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DEPARTMENT OF TRANSPORTATION

DEPARTMENT OF TRANSPORTATION

NOTICE TO CONTRACTORS,

PROPOSAL, SPECIAL PROVISIONS,

CONTRACT AND CONTRACT BOND

FOR

STRUCTURES (276.5' STEEL GIRDER, 313' STEEL GIRDER, 11X10 CIP RCBC), GRADING, PCC SURFACING, STORM SEWER, PAVEMENT MARKING, LIGHTING, SIGNAL, SIDEWALK

FEDERAL PROJECT NO. EM 0292(88)73, IM 2292(104)0
(PCN 06JQ, 07D0)

INTERSTATE HIGHWAY 29 & 229 & 85TH STREET

IN LINCOLN COUNTY

October 15, 2025

NOTICE TO ALL BIDDERS

TO REPORT BID RIGGING ACTIVITIES, CALL: 1-800-424-9071

THE U.S. DEPARTMENT OF TRANSPORTATION (DOT) OPERATES THE ABOVE TOLL-FREE "HOTLINE" MONDAY THROUGH FRIDAY, 8:00 A.M. TO 5:00 P.M., EASTERN TIME. ANYONE WITH KNOWLEDGE OF POSSIBLE BID RIGGING, BIDDER COLLUSION, OR OTHER FRAUDULENT ACTIVITIES SHOULD USE THE "HOTLINE" TO REPORT SUCH ACTIVITIES.

THE "HOTLINE" IS PART OF THE DOT'S CONTINUING EFFORT TO IDENTIFY AND INVESTIGATE HIGHWAY CONSTRUCTION CONTRACT FRAUD AND ABUSE AND IS OPERATED UNDER THE DIRECTION OF THE DOT INSPECTOR GENERAL.

ALL INFORMATION WILL BE TREATED CONFIDENTIALLY, AND CALLER ANONYMITY WILL BE RESPECTED.

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PLANS, PROPOSALS AND ADDENDA

AFTER AWARD OF CONTRACT, THE LOW BIDDER WILL RECEIVE TEN (10) COMPLIMENTARY SETS OF PLANS, PROPOSALS, PROJECT Q & A FORUM, AND ADDENDA FOR FIELD AND OFFICE USE. AN ELECTRONIC COPY WILL ALSO BE PROVIDED. ANY ADDITIONAL COPIES REQUIRED WILL BE THE RESPONSIBILITY OF THE CONTRACTOR.

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Project Number: EM 0292(88)73, IM 2292(104)0

Revised 10/1/25
PCN 06JQ, 07D0

NOTICE TO CONTRACTORS

Bid proposals for this project will be prepared, transmitted, and received electronically by the South Dakota Department of Transportation (SDDOT) via the South Dakota Electronic Bid System until 10 A.M. Central time, on October 15, 2025, at which time the SDDOT will open bids. All bids will be checked for qualifications with results posted on the SDDOT website. The South Dakota Transportation Commission will consider all bids at a scheduled Commission meeting.

The work for which proposals are hereby requested is to be completed within the following requirement(s):

FIELD WORK COMPLETION: **NOVEMBER 19, 2027**

The project category is Category III
The project type is Grading
The geographic zone is Zone 6

THE DBE GOAL FOR THIS PROJECT IS: **NOT SPECIFIED**

WORK TYPE FOR THIS PROJECT IS: **WORK TYPE 1 OR WORK TYPE 3 OR WORK TYPE 7**

Bidding package for the work may be obtained at:
http://apps.sd.gov/hc65bidletting/ebslettings1.aspx#no-back-button

An electronic version of the most recent version of the South Dakota Standard Specifications for Roads and Bridges may be obtained at https://dot.sd.gov/doing-business/contractors/standard-specifications/

The electronic bid proposal must be submitted by a valid bidder as designated by their company's https://apps.sd.gov/HC65C2C/EBS/BidAdminAuthorizationForm.pdf. A bidding administrator will have privileges in the SDEBS to prepare bids, submit bids, and authorize additional company employees to prepare and submit bids. Additionally, a bidding administrator will be responsible for maintaining the list of authorized bidders for the company and will have the ability to add employees, remove employees, and set-up bidder identifications and passwords within the SDEBS. Bidding Administrator authorization will remain in full force and effect until written notice of termination of this authorization is sent by an Officer of the company and received by the Department.

A bidder identification and password, coupled with a company identification previously assigned by the Department, will serve as authentication that an individual is a valid bidder for the company.

Contact information to schedule a preconstruction meeting prior to commencing with the work on this project.

Harry Johnston
5316 W 60th St N
Sioux Falls, SD 57107
Phone: 605/367-5680

PROPOSAL Revised 8/10/11

SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION, STATE OF SOUTH DAKOTA:

Ladies / Gentlemen:

The following proposal is made on behalf of the undersigned and no others. It is in all respects fair and is made without collusion on the part of any other person, firm or corporation not appearing in the signature to this proposal.

The undersigned certifies that she / he has carefully examined the plans listed herein, the Specifications hereinbefore referred to, the Special Provisions and the form of contract, both of which are attached hereto. The undersigned further certifies that she / he has personally inspected the actual location of the work, together with the local sources of supply and that she / he understands the conditions under which the work is to be performed, or, that if she / he has not so inspected the actual location of the work, that she / he waives all right to plea any misunderstanding regarding the location of the work or the conditions peculiar to the same.

On the basis of the plans, Specifications, Special Provisions and form of contract proposed for use, the undersigned proposes to furnish all necessary machinery, tools, apparatus and other means of construction, to do all the work and furnish all the materials in the manner specified, to finish the entire project **within the contract time specified** and to accept as full compensation therefore the amount of the summation of the products of the actual quantities, as finally determined, multiplied by the unit prices bid.

The undersigned understands that the quantities as shown in the Bid Schedule are subject to increase or decrease, and hereby proposes to perform all quantities of work, as increased or decreased, in accordance with the provisions of the specifications, and subject to any applicable special provisions, and at the unit prices bid.

The undersigned understands that the "Total or Gross Amount Bid" as immediately hereinbefore set forth is not the final amount which will be paid if this proposal is accepted and the work done, but that such amount is computed for the purpose of comparison of the bids submitted and the determination of the amount of the performance bond.

The undersigned further proposes to perform all extra work that may be required on the basis provided in the specifications, and to give such work personal attention in order to see that it is economically performed.

The undersigned further proposes to both execute the contract agreement and to furnish a satisfactory performance bond, in accordance with the terms of the specifications, within twenty (20) calendar days after the date of Notice of Award from the South Dakota Department of Transportation that this proposal has been accepted.

CERTIFICATION REGARDING LOBBYING

I certify, to the best of my knowledge and belief, that: 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 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 a Federal contract, grant, loan, or cooperative agreement. If any funds other than Federal appropriated funds have been paid or will be paid to any of the above mentioned parties, the undersigned shall complete and submit Standard Form LLL, “Disclosure Form to Report Lobbying,” in accordance with its instructions.

The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly. 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 section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty or not less than $10,000 and not more than $100,000 for each such failure.

REV 10/1/25

INDEX OF SPECIAL PROVISIONS

PROJECT NUMBER(S): EM 0292(88)73, IM 2292(104)0 PCN: 06JQ, 07D0

TYPE OF WORK: STRUCTURES (276.5' STEEL GIRDER, 313' STEEL GIRDER, 11X10 CIP RCBC), GRADING, PCC SURFACING, STORM SEWER, PAVEMENT MARKING, LIGHTING, SIGNAL, SIDEWALK

COUNTY: LINCOLN

The following clauses have been prepared subsequent to the Standard Specifications for Roads and Bridges and refer only to the above described improvement, for which the following Proposal is made.

The Contractor's attention is directed to the need for securing from the Department of Environment & Natural Resources, Foss Building, Pierre, South Dakota, permission to remove water from public sources (lakes, rivers, streams, etc.). The Contractor should make his request as early as possible after receiving his contract, and insofar as possible at least 30 days prior to the date that the water is to be used.

Sara Garbe is the official in charge of the Sioux Falls Career Center for Lincoln County.

THE FOLLOWING ITEMS ARE INCLUDED IN THIS PROPOSAL FORM:

Special Provision for Contract Time, dated 8/29/25.

Special Provision for Subletting of Contract, dated 9/16/25.

Special Provision Regarding Combination Bids, dated 8/27/25.

Special Provision for Traffic Control Supervisor, dated 9/16/25.

Special Provision for On-The-Job Training Program, dated 3/10/16.

Special Provision Regarding Section 404 of the Clean Water Act, dated 8/27/25.

Individual Permit NOW-2020-00086-PIE.

Special Provision for Adaptive Traffic Signal Control System.

Special Provision for ATC Traffic Signal Controller Cabinet.

Special Provision for Optical Activated Emergency Vehicle Preemption System.

Special Provision for Traffic Signal Heads (LED Modules).

Special Provision for Traffic Signal Poles.

Special Provision for Expanded Polystyrene(EPS).

Special Provision for EPS Geomembrane.

Special Provision for Next Generation Concrete Surface (NGCS) Grinding of PCC Pavement, dated 9/17/25.

Special Provision for Aggregate Column Reinforcement, dated 2/18/25.

Special Provision for Cylindrical Concrete Footings, dated 7/22/25.

Special Provision for Mechanically Stabilized Earth (Large Panel) Walls, dated 8/25/25.

Special Provision for Stainless Reinforcing Steel, dated 8/25/25.

Special Provision for Stud Shear Connector Field Installation (Incidental), dated 4/21/23.

Special Provision for PI PCC Pavement Smoothness with 0.2" Blanking Band, dated 11/30/18.

Special Provision for Contractor Furnished Mix Design for PCC Pavement, dated 8/30/18.

Special Provision for Concrete Penetrating Sealer, dated 7/30/24.

Special Provision for Contractor Staking with Machine Control Grading Option, dated 8/27/25.

List of Utilities.

Special Provision for Steel Beam Guardrail AASHTO M 180 Designation, dated 10/1/25.
Special Provision for Acknowledgment and Certification Regarding Article 3, Section 12 of the South Dakota Constitution, dated 8/24/23.
Special Provision for Buy America, dated 10/1/25.
Fuel Adjustment Affidavit, DOT form 208 dated 7/15.
Standard Title VI Assurance, dated 3/1/16.
Special Provision For Disadvantaged Business Enterprise, dated 2/9/24.
Special Provision For EEO Affirmative Action Requirements on Federal and Federal-Aid Construction Contracts, dated 2/5/24.
Special Provision For Required Contract Provisions Federal-Aid Construction Contracts, Form FHWA 1273 (Rev. October 23, 2023), dated 10/18/23.
Required Contract Provisions Federal-Aid Construction Contracts, Form FHWA 1273 (Rev. 10/23/23).
Special Provision Regarding Minimum Wage on Federal-Aid Projects, dated 10/24/19.
Wage and Hour Division US Department of Labor Washington DC. - US Dept. of Labor Decision Number SD20230032, dated 3/10/23.

Special Provision Regarding Storm Water Discharge, dated 5/8/18.
General Permit for Storm Water Discharges Associated with Construction Activities, dated 4/1/18
https://danr.sd.gov/OfficeOfWater/SurfaceWaterQuality/stormwater/StormWaterConstruction.aspx

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
CONTRACT TIME

PROJECT EM 0292(88)73, PCN 06JQ
LINCOLN COUNTY

AUGUST 29, 2025

Sign Bridges

The Contractor will set sign bridges in accordance with the details of the table below. When a section is closed to traffic for other work, the Contractor will set sign bridges within that closed section.

Table of Sign Bridge Work

Station	Route	Direction	Work	When work is to be Accomplished
61+75	I29	NB	New Sign Bridge	I29 NB Closure when Setting Girders
79+20	I29	NB	Replace Signs	I29 NB Closure when Setting Girders
87+20	I29	NB	New Sign Bridge	I29 NB Closure when Setting Girders
99+75	I29	SB	New Sign Bridge	I 29 SB Closure when Setting Girders
105+60	I29	NB	Replace Signs	I29 NB Closure when Setting Girders
115+10	I29	SB	Replace Signs	I 29 SB Closure when Setting Girders
158+00	I29	SB	New Sign Bridge	I 29 SB Closure when Setting Girders
153+56	I229	NB	Replace Signs	Between hours of 10 pm and 5 am - After Additional 229 Lane Constructed
206+00	I229	SB	Replace Signs	Between hours of 10 pm and 5 am - Traffic Detour to Exit at Louise
26+85	I229	SB Ramp C	New Sign Bridge	I229 SB to I29 SB Closure for Bridge Items
61+42	I229	SB Ramp C	New Sign Bridge	I229 SB to I29 SB Closure for Bridge Items
78+60	I229	SB Ramp C	Replace Signs	Between hours of 10 pm and 5 am
52+69	I29	NB	Salvage Sign Bridge	I29 NB Closure when Setting Girders
158+25	I29	SB	Salvage Sign Bridge	I 29 SB Closure when Setting Girders

*Any none applicable signs to be installed during closures will be either covered or installed at a later time if work can be done under lane closures.

I-29 Girder Setting Requirements

The Contractor may complete bridge girder setting while maintaining I-29 traffic in one lane in each direction (head to head) using the crossover traffic detail in the plans. The

Contractor will complete the bridge girder between the hours of 8:00 PM on Friday to 6:00 AM on Monday only. Work will be allowed on Sundays.

If the Contractor does not open all lanes of I-29 to unimpeded traffic outside the hours specified, the Department will make a disincentive assessment amounting to $500 per hour.

I-29 Canopy and Falsework Requirements

The Contractor may use lane closures to erect falsework and canopy and remove falsework and canopy during non-peak hours. Peak hours are considered 6:30 AM to 9:00 AM and 3:30 PM to 6:00 PM.

If the Contractor does not open all lanes of I-29 to unimpeded traffic outside the hours specified, the Department will make a disincentive assessment amounting to $500 per hour.

I-229SB to I-29SB Girder Setting, Canopy, and Falsework Requirements

The Contractor will complete the girder setting, canopy erection and removal, and falsework erection and removal from the hours of 8:00 PM to 6:00 AM only.

If the Contractor does not open all lanes of I-229 and I-29 to unimpeded traffic outside the hours specified, the Department will make a disincentive assessment amounting to $500 per hour.

Lane Closure Restrictions on I-29 and I-229

Lane closures during peak hours will be allowed provided a minimum of 2 through lanes are maintained in each direction. Peak hours are considered 6:30 AM to 9:00 AM and 3:30 PM to 6:00 PM.

Winter Work Restrictions

The Contractor will be allowed to close lanes during daylight hours only in the winter, if approved by the Engineer. Winter will be considered November 21, 2025 to April 6, 2026 and November 20, 2026 to April 5, 2027. Daylight hours are considered one half hour before sunrise to one half hour after sunset.

Louise Ramp Closure

The Contractor will not close the Louise Ramp until 85th St traffic movements of I-29 NB to 85th EB and I-29 SB to 85th EB can be achieved.

The Contractor will complete all work in the Louise Ramp portion of the project within 30 working days. The Department will begin to count working days when the Contractor

closes the ramp to through traffic. The Department will continue to count working days until the Contractor completes the work required and opens the ramp to through traffic. The Department will count working days in accordance with Section 8.7 C.

If the Contractor does not complete the work within the working day completion requirement, the Department will make a disincentive assessment in the amount of $3,000 per working day. A contract item for incentive/disincentive pay is included in the bid schedule for the Department's use in assessing disincentive. The Department will use a negative quantity of days for assessing disincentives. The Department will count working days in accordance with Section 8.7 C.

Field Work Completion

The Contractor will complete the project by the November 19, 2027 field work completion date.

Failure to Complete on Time

The Contractor will complete all work on the project prior to the field work completion requirement. If the Contractor does not complete all work by the field work completion requirement, the Department will assess liquidated damages in accordance with Section 8.9. The Department will assess liquidated damages for each working day the work (project) is late until the Contractor completes all field work.

In the event the Contractor does not complete all field work on time, the Department will count working days in accordance with Section 8.7 B.

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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
SUBLETTING OF CONTRACT

PROJECT EM 0292(88)73, PCN 06JQ
LINCOLN COUNTY

SEPTEMBER 16, 2025

Delete the 2nd paragraph of Section 8.1 and replace with the following:

The Contractor may subcontract up to 80% of the original contract amount, based on the contract unit prices, but must perform not less than 20% of the total amount of the original contract with the Contractor's own organization.

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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION REGARDING
COMBINATION BIDS

EM 0292(88)73, IM 2292(104)0, PCN 06JQ, 07D0
STRUCTURES (276.5' STEEL GIRDER, 313' STEEL GIRDER, 11X10 CIP RCBC), GRADING, PCC SURFACING, STORM SEWER, PAVEMENT MARKING, LIGHTING, SIGNAL, SIDEWALK
LINCOLN COUNTY

AUGUST 27, 2025

Bidders submitting a bid on this project **MUST ALSO** submit a bid on project:

CIP 11017( ), PCN X06R
85TH STREET
WATERMAIN
LINCOLN COUNTY

Award of both projects will be to the same bidder based on the total of the two projects.

Work on PCN (X06R) CANNOT be used to meet the DBE Goal established for this project.

After award, the contracts will be administered as entirely separate contracts.

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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
TRAFFIC CONTROL SUPERVISOR

PROJECT EM 0292(88)73, PCN 06JQ
LINCOLN COUNTY

SEPTEMBER 16, 2025

I. DESCRIPTION

This work consists of the Contractor providing a certified Traffic Control Supervisor (TCS) to oversee all traffic control operations including, but not limited to; vehicular traffic control, detour route traffic control, and pedestrian access route traffic control for the safety of workers and the traveling public.

II. MATERIALS

No material requirements.

III. CONSTRUCTION REQUIREMENTS

A. Certification: The TCS must be certified through the South Dakota AGC-DOT Traffic Control Supervisor Training and Certification program or the American Traffic Safety Services Association (ATSSA) Traffic Control Supervisor certification program and must have training and experience in the field of construction traffic control.

The Contractor will submit the name of the individual designated as the TCS to the Engineer prior to or during the preconstruction meeting for verification of qualifications by the Department's Operations Traffic Engineer.

B. Duties: Delete Section 634.3 E.5. of the specifications. The TCS will perform the following duties and responsibilities to the satisfaction of the Engineer:

1. The TCS will provide the name, phone number, and location of the TCS to the Department, SD Highway Patrol, county sheriff's office, and the local city police department.

2. The TCS is responsible for coordinating all temporary traffic control operations, including temporary traffic control operations needed for subcontractors and suppliers.

3. The TCS is responsible for implementing the project temporary traffic control plan. The TCS is also responsible for reviewing and, if needed, making recommendations to change the project temporary traffic control plan. Any change to the project temporary traffic control plan must be approved by the Engineer.

4. The TCS must be available as the 24 hour a day and 7 days a week contact responsible to ensure maintenance of temporary traffic control is performed, as needed.

5. The Contractor shall monitor and maintain all traffic control items. The Contractor is responsible for adjustments of traffic control items when traffic conditions change. A representative of the TCS or another employee of the Contractor may perform the routine maintenance of temporary traffic control devices. The TCS is responsible for any maintenance performed by other employees of the Contractor in accordance with Section III.B.2 duties for coordinating all temporary traffic control operations.

6. The TCS is responsible for and shall perform all required day time and night time inspections of all temporary traffic control devices on the project to verify the overall traffic control system is adequate and all devices are legible both during daylight hours and at night. This includes detour route signing. The inspections shall begin when the first traffic control sign or device is put into operation and end when the last traffic control sign or device is removed from operation. The TCS will provide the Engineer a written summary of each required day time and night time inspection. All inspections must ensure the temporary traffic control devices are clean, maintained, and functioning as intended.

   a. For night time inspections at the minimum frequency of once per week.

   b. For day time inspections at the minimum frequency of once per week.

7. In addition to the required day time and night time inspections, the TCS is required to be on-site at the work zone for the following, at a minimum:

   a. When requested by the Engineer and, in the sole discretion of the Engineer, there is a need requiring the attention of the TCS to address an issue with the current temporary traffic control devices or plan. Routine maintenance of the current temporary traffic control devices alone will not be considered as a need requiring the TCS to be on-site.

b. For major traffic shifts or phase changes.

c. After a storm or major event that has the potential to knock over or upend the temporary traffic control devices.

8. In conjunction with Section III.B.7.a and Section III.B.7.c of this special provision, the TCS is required to be on-site within a maximum of 4 hours of notification from the Engineer, or an alternate timeframe if mutually agreed upon by the Contractor and the Project Engineer. If there is an immediate safety concern or an immediate need to make an adjustment to any of the temporary traffic control devices, the Contractor will take measures to address the concern or need, to the satisfaction of the Engineer, prior to the TCS arriving on-site.

C. General: Temporary traffic control on the project will be furnished, maintained, and installed in accordance with Section 634 and the project plan notes and details.

IV. METHOD OF MEASUREMENT

Traffic Control Supervisor: Measurement for Traffic Control Supervisor will not be made.

V. BASIS OF PAYMENT

Traffic Control Supervisor: Traffic Control Supervisor will be paid for at the contract lump sum price. Payment will be full compensation for all costs associated with providing the Traffic Control Supervisor and performing all related duties.

Payment for Traffic Control Supervisor will be made as follows:

A. 20% of contract item lump sum price upon designation of certificated Traffic Control Supervisor.

B. 50% of contract item lump sum price when construction project is 25% completed.

C. 75% of contract item lump sum price when construction project is 50% completed.

D. 90% of contract item lump sum price when construction project is 75% completed.

E. 100% of contract item price when construction project is 100% completed and the Area Office has issued the Acceptance of Field Work in accordance with Section 5.16.

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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION FOR ON-THE-JOB TRAINING PROGRAM

MARCH 10, 2016

This Training Special Provision supersedes Part II, Nondiscrimination, Section 6, Training and Promotion, paragraph "b" on Page 2 of the Required Contract Provisions Federal-Aid Construction Contracts (FHWA 1273 – Rev. 5/1/2012).

PURPOSE

The purpose of the On-the-Job (OJT) Program is to provide training in the highway construction industry for minority, female, and economically disadvantaged individuals, hereafter known as the target group. Pursuant to 23 Code of Federal Regulations Part 230, Subpart A, Appendix B – Training Special Provisions, this program provides for on-the-job training aimed at developing full journeyworkers in the type of trade or job classification involved.

INTRODUCTION

A signature from a bidder on the proposal sheet indicates that the bidder agrees to take part in the OJT Program and to follow the OJT Program Special Provision. Contractors that fail to follow the special provision will be subject to sanctions up to and including revocation of bidding privileges.

In order for the OJT Program to be successful, contractors must follow basic and uniform procedures in training such as, keeping monthly records of trainee progress towards journeyworker status and reporting trainee's successful completion/termination from the OJT Program.

SELECTION OF TRAINING PROGRAM

A. 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 South Dakota Department of Transportation (Department or SDDOT) and the Federal Highway Administration (FHWA).

B. The Department and FHWA have currently approved one OJT program for use in South Dakota and that is the OJT program designed and implemented by the

department. Any trainee who has begun training in the previously approved OJT program will be allowed to transfer to the current approved OJT program.

C. There may be other training programs which some Contractors might wish to utilize. If the Contractor intends to use such a program to meet the OJT requirements on a federal-aid contract with training requirements, approval or acceptance of such program shall be obtained from the Department and FHWA **prior** to beginning training on any classification covered by that program.

It is the intention of these provisions that training is to be provided in the construction crafts rather than administrative support type positions or lower level management positions. Training for any job classification not listed in the current OJT program manual may be permitted provided that significant and meaningful training is provided and prior approval is obtained by the Department Civil Rights Office and the FHWA Division office.

RECRUITMENT AND SELECTION PROCEDURES

A. Prerequisite for Trainees

1. To be qualified for enrollment in the OJT Program, a trainee applicant should be a member of one of the targeted groups (unless an alternate selection is authorized by the Department), must possess basic physical ability for the work to be performed, should have demonstrated qualities of dependability, willingness to learn, ability to understand and follow instructions and an aptitude to maintain a safe work environment.

2. No person shall be employed as a trainee in any classification in which that person has successfully completed a training course leading to journeyworker status or in which the individual has been employed as a journeyworker. 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.

B. Licenses

Truck driver trainees must possess appropriate driver permits or licenses for the operation of Class A, B, and C trucks. When an instructional permit is used in lieu of a license, the trainee must be accompanied by an operator who:

1. Holds a license corresponding to the vehicle being operated;

2. Has had at least one year of driving experience; and

3. Is occupying the seat next to the driver trainee.

C. Recruitment

1. Notices and posters setting forth the Contractor's Equal Employment Opportunity Policy and the availability of training programs will be placed in areas readily accessible to employees, applicants for employment and potential employees.

2. Training and upgrading of minorities, women, and socially and economically disadvantaged persons toward journeyworker status is the primary objective of this Special Provision. Accordingly, the Contractor shall make every effort to enroll minority trainees, women and disadvantaged persons by conducting systematic and direct recruitment through public and private sources likely to yield minority and female applicants to the extent that such persons are available within a reasonable area of recruitment.

3. Full consideration will be given to upgrading current minority and female employees.

D. Selection

1. The selection and employment of an eligible person by a participating Contractor, in accord with the above Parts A, B, and C, shall qualify the person of the OJT Program.

2. Employment of trainees will be in accordance with the work force requirements of the Contractor. Each Contractor will hire and train the trainees for use in his own organization.

3. Contractors must follow the registration procedures as set out for the South Dakota Department of Transportation. An original registration form must be sent to the Department Civil Rights Office for review and approval. In the event that the Department OJT Registration Form(s) are not received by the Civil Rights Office within two weeks of the date the contractor begins significant work on the project, progress payments may be suspended. This suspension will be lifted upon receipt and approval of the form(s).

4. To be acceptable as an economically disadvantaged trainee, the applicant must meet current disadvantaged guidelines (relative to employment and income) as set out by the United States Department of Labor. These guidelines are available from South Dakota Department of Labor offices and contractors must maintain the necessary documentation on file for review by the department.

5. The Department expects that Contractors will employ minority, female, and disadvantaged persons for all trainee positions assigned through this OJT Special Provision unless such persons are not available within a

reasonable area of recruitment. The Civil Rights office may withhold approval of any trainee who is not a member of one of the targeted groups unless the Contractor can demonstrate a good faith effort to recruit and select a minority, female, or economically disadvantaged person and was unsuccessful in recruiting from the target group.

DEPARTMENT RESPONSIBILITES

The Department (Civil Rights office):

A. Will monitor Contractor payrolls and OJT reports for payment of correct wage rates and for evidence of providing a continuing instructional process. The Civil Rights office will maintain records of Contractor participation in the program; names, and training classifications of trainees and other information necessary to assess program participation and results.

B. Will assist contractors with trainee recruitment, will encourage minority/female recruitment sources to refer suitable applicants, and will monitor Contractor instructional efforts and record keeping.

C. Reserves the right to do EEO (Equal Employment Opportunity) or OJT reviews on the contractor, at any time without prior notice, to ensure that trainees are getting the proper instruction from their trainer/supervisor.

CONTRACTOR RESPONSIBILITIES

The Contractor:

A. Will furnish the trainee a copy of the training program to be followed in providing the training and will provide each trainee graduate with a certificate showing the type of training satisfactorily completed.

B. Will identify all trainees on the registration forms, training reports and project payroll by proper classification title, (see SDDOT Training program booklet) e.g. *heavy duty mechanic, form builder,* etc. **Do not use** coding letters/numbers from the wage scale. On payrolls, contractors must include the designation “trainee” following the job classification title.

C. Will provide a monthly training report to the Department Civil Rights office within thirty (30) days of the last full pay period of the month on the form supplied by the Department and will use this same form to promptly notify the Department (within thirty days) whenever a trainee leaves the OJT program (voluntarily or involuntarily) or when a trainee completes the program.

D. Will pay not less than the minimum wage rates as set forth in the specific requirements of the applicable training program and as noted on the copy of the registration form returned to the contractor.

E. Assign the trainee to a skilled craftsman, foreman, supervisor or mentor who will be responsible for the day-to-day training and mentoring of the trainee and who will share the appropriate skills associated with the classification for which the trainee is enrolled. The contractor attests to providing verification, if requested, that the trainee is being trained and is gaining knowledge to achieve full journeyman status by a supervisor/trainer.

F. Shall only count, for credit; hours spent training within the classification for which the trainee is enrolled. If such classification is not necessary for a period of time or a particular project, the contractor should attempt to continue to employ the trainee by assigning him/her other duties. A percentage of hours worked on other pieces of equipment are required to be counted in the total hours worked. Approximately 25% of other duties can be counted towards graduation.

G. Shall count all hours worked in a training program regardless of whether the work was in South Dakota or outside the state. For trainees in required training slots, the contractor will only be reimbursed for eligible hours for work performed in South Dakota.

H. Will provide a program orientation to the training foreman, superintendent, and OJT trainee. This orientation shall include at a minimum, a review of individual responsibilities during the training program and copies of the training syllabus for the job classification.

I. Will instruct the trainee in safe and healthful work practices and shall ensure that the trainee is trained in facilities and other environments that are in compliance with all applicable safety and health laws and regulations of the United States and the State of South Dakota.

J. Provide the trainee a copy of the training program to be used. The contractor must also designate the employee as a “trainee” on weekly certified payrolls. The contractor is responsible for ensuring that proper training is taking place on the job by meeting with the supervisor/foreman of the project that the trainee is working.

K. In the event that a contractor may be unable to fill the required trainee slot during the current construction season, the Civil Rights Compliance Officer must be notified and contacted by December 1 of the current construction season. Proper documentation must be provided as to why the trainee position was not filled, such as project carry-over until next year.

L. Certify the trainee hours and be able to show that the trainee is receiving the proper training for their classification. Failure to do so may result in project sanction.

M. Is expected to begin training trainees on a project as soon as feasible after the start of work utilizing the job classification involved. After training has started the contractor should strive to provide monitoring efforts to retain and successfully train employees.

ADDITIONAL APPLICABLE PROVISIONS

A. The minimum number of hours of training to be provided on this project is as specified in the bid documents. The Contractor shall select whatever training classification specified in the current training program that best meet his employment needs and training hours and minimum wage shall be in accord with that classification.

B. For the purposes of bidding required trainee slots each trainee is assigned a bid quantity of 500 hours. For example if there is 1000 hours in the bidding documents, that is requiring 2 trainees. The contractor has the option to register multiple trainees to fulfill the training requirement. For example if there is a 1000 hour bid quantity, which equals 2 required trainees, the contractor could have three or more trainees registered in the program as long as there enough work for additional trainees to successfully complete the curriculum and not exceed the allowable ratio of trainees to journeyworkers (generally considered to fall between 1:10 or 1:4)

C. Please note that 500 hours for each training slot is for bidding purposes only. If a contractor does not achieve the bid quantity on a project, there is no penalty as long as a good faith effort was made to fulfill the training requirement. Also the contractor is not limited to just the bid quantity for reimbursement. If the total hours achieved on a project is higher than the bid quantity, the contractor will be reimbursed for all hours worked. For example if the bid quantity is 1000 hours and the total hours of the trainees are 1450 hours, the contractor will receive reimbursement for 1450 hours.

D. Registration and reporting requirements shall be as set forth in the program documents; printed instructions and this provision.

E. Contractors using the current training program may meet the training obligations by either 1) enrolling a new trainee in one of the classifications, or 2) using a trainee currently enrolled in one of the current training program classifications, provided that person has sufficient training hours remaining to meet the minimum project requirements as specified in bid documents. In either case, prospective trainees must meet the program requirements as set forth in “Recruitment and Selection Procedures” above.

F. The department is responsible for long term maintenance of records regarding trainee registration in various training classifications and for total trainee hours as provided by one or more contractors.

WAGE RATES

A. Minimum wage rates shall be in accord with program requirements for each classification and trainee placement within the training hours requirement. In no case shall the minimum wage be less than the common laborer classification of the applicable wage rate information contained in the bid documents. Where applicable, trainees shall be paid full fringe benefit amounts.

B. At the completion of the OJT program, the trainee shall receive the wages of a skilled journeyworker for that specific classification.

C. For the purpose of the OJT program, a quarter of the program is twenty-five percent (25%) of the training hours credited to the trainee for a particular classification and does not represent three months of the year. Other wage benchmarks are calculated in a similar manner.

BASIS OF PAYMENT

A. All program reimbursements will be made directly to the Contractor at the project conclusion. The Contractor will be paid, as reimbursement for the extra cost involved in providing the training, the amount per training hour bid for the item "Training" for each hour of training provided and reported.

B. All hours of onsite and approved offsite training provided in accordance with the approved program and this provision and as shown in trainee reports and on project payrolls will be credited as trainee hours for purpose of contract payment.

C. No payment will be made to the Contractor if either the failure to provide the required training, or the failure to hire the trainee as a journeyworker, is caused by the Contractor and evidences a lack of good faith on the part of the Contractor in meeting the requirements of this Special Provision.

D. Liquidated damages will be assessed the contractor for failure to make a good faith effort to enroll the number of trainees necessary to meet the training requirements of this Special Provision. For each trainee slot left unfilled, damages will be assessed at the rate of 100% of the bid amount for the training item times the minimum number of hours specified in the item quantity. For each trainee for whom contractor training is determined to be inadequate and which evidences a lack of good faith to fulfill the training requirements, damages will be assessed at the rate of 100% of the bid amount for the training item times the minimum number of hours specified in the item quantity.

E. Failure to furnish required documents and reports in the manner and time specified may result in forfeiture of all or a portion of the amounts due the Contractor for reimbursement for training.

*****

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION REGARDING
SECTION 404 OF
THE CLEAN WATER ACT

Project # EM 0292(88)73; PCN 06JQ
Project # IM 2292(104)0; PCN 07D0
Lincoln County

AUGUST 27, 2025
INDIVIDUAL SECTION 404 PERMIT

The above referenced project is authorized by the Department of the Army Individual Section 404 Permit.

Please refer to the following Individual Permit for general conditions.

The above authorization permits placement of fill in the drainage crossings or wetlands identified in the Section A plan notes.

PLEASE REFER TO THE TABLE OF WETLANDS IN THE SECTION A ENVIRONMENTAL COMMITMENTS.

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
NORTH DAKOTA REGULATORY OFFICE
3319 UNIVERSITY DRIVE
BISMARCK, NORTH DAKOTA 58504-7565

DEPARTMENT OF THE ARMY PERMIT

Permittee: South Department of Transportation
Attn: Jacob Cadwell
700 East Broadway Avenue
Pierre, South Dakota 57501

Permit Number: NWO-2020-00086-PIE

Issuing Office: U.S. Army Engineer District, Omaha District
Corps of Engineers
North Dakota Regulatory Office
3319 University Drive
Bismarck, North Dakota 58504-7565

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below. A notice of appeal options is enclosed.

Project Description:

SDDOT is authorized to construct a new interchange at the intersection of Interstate 29 and 85th Street in southwest Sioux Falls. A new bridge will be constructed along 85th Street over existing I-29, as well as an I-29 ramp bridge constructed over Interstate 229 (I-229). New 85th Street exit/entrance ramps will be constructed at I-29 along with necessary grading to construct the ramps. Reconstruction of approximately 0.45 miles of 85th Street west of I-29 will also occur between I-29 and South Sundowner Avenue. Proposed work will result in the permanent discharge of dredged or fill material into 9.64 acre of wetlands.

All work is to be completed in accordance with the SDDOT plans for Projects EM 0292(88)73 and IM 2292(104)0 dated March 20, 2025 and the SEH plans and impact tables for I-29/85th Street Interchange dated March 12, 2025.

Project Location:

The project site is located near the interchange of Interstate 29/Interstate 229 and 85th Street (270th Street), Sections 7, 8, 18, and 19, Township 100 North, Range 50 West, Latitude 43.4754° North, Longitude -96.7966° West, Sioux Falls, Lincoln County, South Dakota.

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on July 14, 2030. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

Special Conditions:

1. To offset the loss of 9.64 acres of wetlands, you shall purchase 52.415 functional credit units from the lower Big Sioux Regional Service Area. Evidence of this purchase shall be provided to this office prior to initiation of construction activities in waters of the U.S. authorized by this permit.

Further Information:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

( ) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).

(X) Section 404 of the Clean Water Act (33 U.S.C. 1344).

( ) Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. Limits of this authorization.

a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.

b. This permit does not grant any property rights or exclusive privileges.

c. This permit does not authorize any injury to the property or rights of others.

d. This permit does not authorize interference with any existing or proposed Federal projects.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.

e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data. The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant.

Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (see 4 above).

c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with

such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General Condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

Jacob Cadwell Digitally signed by Jacob Cadwell Date: 2025.07.14 14:58:50 -05'00'

Name Jacob Cadwell Date

Title Environmental Scientist II

Permittee

South Dakota Department of Transportation

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below

REILE.BENJAMIN.DAVID.1384339456 Digitally signed by REILE.BENJAMIN.DAVID.1384339456 Date: 2025.07.15 07:54:56 -05'00'

Date

(For the District Engineer)
for **Benjamin N. Soiseth**
Chief, North Dakota Section

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

Name Date

Title

Transferee

PERMIT COMPLETION AND COMPLIANCE CERTIFICATION

Permit Number: NWO-2020-00086-PIE

Name of Permittee: South Dakota Department of Transportation

Date of Issuance: July 14, 2025

Upon **completion** of the activity(s) authorized by this permit, including any approved mitigation (if required), please sign this certification and return it to the following address:

US Army Corps of Engineers
South Dakota Regulatory Office
28563 Powerhouse Road
Pierre, North Dakota 57501

Please note that your permitted activity is subject to a compliance inspection by a US Army Corps of Engineers representative. If you fail to comply with this permit, you are subject to permit suspension, modification, or revocation.

I hereby certify that the work authorized by the above referenced permit has been completed in accordance with the terms and conditions of the said permit, and the approved mitigation was completed in accordance with the permit.

_____
Signature of Permittee

_____
Date

Special Provision for Adaptive Traffic Signal Control System

1.0 Description:

This work shall consist of furnishing, configuring and placing into operation an adaptive traffic signal control system which detects and collects vehicle data by processing video images and automatically optimizing the changing of traffic signals to instantly adapt to real time traffic demand. The adaptive traffic control system selected will be deployed and currently operating at a minimum of 30 independent, noncontiguous corridors in the United States.

The system shall have remote monitoring and configuring capability using IEEE 802.3 standards. The equipment shall meet the NEMA environmental, power and surge ratings according to the latest NEMA Specifications. The system shall include all equipment listed as shown on the plans and described in this special provision and shall include any incidental items necessary for the satisfactory operation of the system. This special provision shall be in addition to the specifications.

Adaptive Traffic Signal Control System will include removal of existing wireless interconnect systems, as necessary. In addition, existing traffic loop detection shall remain in use and software connectivity with Adaptive Traffic Signal Control System, Special in included in this pay item. Labor and material to place new traffic loop detection wire connections to the traffic controller shall be incidental to the cost of the Adaptive Traffic Signal Control System.

2.1 Materials:

The Adaptive Traffic Signal Control System shall include the following materials: hardware to manage up to four approaches per intersection, fusion processors, standard camera mounting hardware per approach, 7" LCD monitor, integrated USB mouse/keyboard, Ethernet repeaters, project management & operating training, installation training (onsite), and configuration of the system.

2.2 Material Adherence to Quality Standards

Equipment and material shall be of new stock unless the contract provides for relocation of existing units or use of units furnished by others.

New equipment and material shall be the product of reputable manufacturers and conform to all relevant requirements including the requirements of Caltrans 170, ICEA, IMSA, ITE, MUTCD, NEMA, RETMA, NEX and regulations of the National Board of Fire Underwriters, as applicable, and meet the approval of the engineer.

2.3 System Compatibility

The adaptive traffic control system must be compatible with all major makes and models of traffic controllers and cabinets, including but not limited to those associated with NEMA, Caltrans, TS1, TS2, Econolite, McCain, Peek, Naztec and other prominent controllers manufactured currently or in the last 15 years. The system will not require the replacement of a traffic controller or modification thereof.

2.4 System Components

The adaptive traffic control system shall consist of color video cameras enclosed in secure housings, a shelf or rack mounted processing unit, software and license for system control via a web browser such as Microsoft Internet Explorer on any authorized computer, and a switch with the capability of independently networking a minimum of 4 video cameras and the processor.

The adaptive traffic control system shall include a separate Processor Unit (PU) mounted in the traffic cabinet that connects to the controller which is running in free mode. The processor shall intercept traffic calls and place calls passively to the traffic controller.

The adaptive traffic control system must include in its base product standard Internet Protocol (IP) cameras which allow for real time images to be viewed remotely via the Internet using a standard browser, not proprietary software. The video cameras shall be digital cameras and their video feeds shall be available over standard Internet Protocol (IP) connection in Motion JPEG and MPEG 4 formats using the latest IP technology. All camera views shall be obtainable simultaneously without cable swaps. The system shall be capable of displaying post-processed video on a web browser such as Microsoft Internet Explorer. The engineer shall have the option to view one camera at a time, all cameras at an intersection, or some or all of the cameras along an arterial in a single browser window.

2.5 Processing Unit (PU):

2.5.1 General

The PU may be rack or shelf mounted and shall be modular in design. It shall support onsite configuration using a USB keyboard and VGA monitor, or remote configuration over an IP Network. It shall support onsite backup to restore from a USB Memory Stick for rapid replacement. The PU shall contain at least 4 USB ports to allow simultaneous connection of keyboard/mouse and storage devices.

2.5.2 Communications

Communications from the PU to any computer shall be through RJ45 (8P8C) connector over a regular IP network connection at the installation location or over a network. The computer shall have the capability to download detection data as well as the real-time detection information needed to show detector actuations. The user shall also have the capability of connecting directly to the detection cameras over the IP network and display post-processed and pre-processed color video in the MPEG 4 and MJPEG format.

2.5.3 Compatibility with NEMA Standards

The PU shall be available with NEMA TS1/TS2 detector interface. Output levels shall be compatible with the NEMA TS1 and NEMA TS2 Type 2 standards.

2.5.4 Historical Split Information

The PU shall store historical split information and shall compute and deploy optimized signal splits based on historical split information when the system goes into fog mode or emergency mode.

2.5.5 Free Mode Controller Operations

The PU shall input optimized detector calls into a controller that is running in free mode.

2.5.6 Suspension of Inputs When Needed

The PU shall suspend, for the necessary time, its inputs to a controller when calls of a higher priority are put in to the controller by pedestrians, preemption vehicles or the pre-determined parameters set by traffic officials.

2.5.7 Transmission of Information to Adjacent Intersections

The PU shall automatically send all necessary information to system processors at adjacent upstream and downstream intersections in order to facilitate the progression of traffic flow along the arterial.

2.5.8 Optimization of Traffic Flow

The adaptive traffic control system must be able to assess volume and delay in real time to optimize signalization. The PU shall optimize the flow of traffic at both intersections and arterials based on the possible states of traffic rather than required splits, cycles and offsets. The system must be able to perform adaptive calculations without regularly relying on recalculating offsets to perform adaptive operations.

The sequences of phase pairs is not set but rather dynamic allowing for serving one phase twice before first serving another phase once. The system must have the ability to adjust green time without a per cycle maximum permitted adjustment. The system must be able to operate without, and without being dependent upon, any traditional timing plans.

2.5.9 Pedestrian Calls

The PU shall incorporate the optional capability to include pedestrian calls in the optimization algorithms.

2.5.10 Time Clock Synchronization

The PU shall keep accurate time using a mechanism that synchronizes the clocks at least weekly.

2.5.11 Time of Day Operation

The PU shall be capable of functioning in a detector mode or adaptive mode selectable by time of day and day of week.

2.6 Vehicle Detection:

2.6.1 General

The video detection system shall be included and provide flexible detection zone and/or count sensor placement anywhere and at any orientation within the combined field of view of the image processors. Preferred presence detector zone configurations shall be a box or polygon across lanes of traffic placed parallel with lanes of traffic. A single detector zone shall be able to replace multiple conventional detector loops. Detection zones shall be capable of overlapping. Detection zones shall detect multiple vehicles within a single detection zone.

2.6.2 Detection Zones

The detection zones shall be created by using a pointing device and a graphical user interface (GUI) displayed on any computer connected directly to the PU or a GUI available to any authorized remote terminal over IP network connection. It shall be possible to add, edit or remove previously defined detector configurations to fine-tune detection zone placement.

2.6.3 Detection System Outputs

When a vehicle is detected by crossing a detection zone, there shall be a visual change on the video display, such as a change in color or intensity, thereby verifying proper operation of the detection system. The system shall compute and display real-time queue information per lane. The system shall compute and store traffic volumes, stopped time delay, and Level of Service per phase and display such information on demand over an Internet Browser.

2.6.4 Detection System Performance Standards

Overall performance of the video detection system shall be comparable to inductive loops. Using camera, optics and in the absence of occlusion, the system shall be able to detect vehicle presence with 95% accuracy under normal (day and night) conditions and with only a slight deterioration in performance under adverse (fog, snow, rain) conditions. During extremely adverse conditions or camera failures the system shall default to emergency mode or fog mode. The processor shall store historical split information and shall compute and deploy optimized signal splits based on historical split information when the system goes into fog mode or emergency mode.

2.6.5 Camera Operation

The camera shall automatically function in a special mode at night and the processor shall utilize such images and conduct image processing after filtering out a high degree of reflected and ambient lighting. The PU shall change image parameters such as sharpness and contrast based on the lighting conditions.

2.6.6 Camera Notifications

The system shall be able to automatically generate notifications to one or more email addresses and other communication devices when a camera has failed or the view is obstructed (e.g. fog or ice).

2.7 Video Camera and Housing:

2.7.1 General

The PU supplier shall furnish the video camera for traffic detection. The camera shall produce a usable color video image of vehicles under normal roadway lighting conditions regardless of time of day. Usable video in color shall be produced for scenes with a minimum luminance of 0.65 lux at aperture f-value 1.0.

Video cameras will be mounted at the locations shown in the plans or as directed by the Engineer. A 9 foot U-bolt extension arm will be used for steel strain poles and a 10 foot extension arm will be used for wood poles with a bolt through clamp. All associated camera bracket parts associated with installation shall be included in the pay item Bracket, Extension Arm, Special.

Each intersection will require delivery of four (4) traffic detection video cameras. If less than four cameras are shown for installation, the non-installed camera(s) shall be delivered to the Genesee County Sign Shop for reserve use.

2.7.2 Camera System Sensing and Video Streams

The camera system shall use a CCD sensing element and shall deliver MJPEG and MPEG 4 video streams simultaneously.

2.7.3 Camera Lens and Control

The camera shall include an electronic shutter or auto iris control based upon average scene luminance and shall be equipped with an auto iris lens.

2.7.4 Camera Focal Length

The camera shall have a variable focal length. The maximum aperture of the lens shall not be smaller than f1.8 and the minimum aperture shall not be larger than f360.

2.7.5 Camera Environmental Parameters

The camera shall be able to operate under harsh environmental conditions, including temperatures 30F (34C) to 165F (74C), heavy rain, and ice. The enclosure shall allow the camera to be adjusted in the field during installation.

2.7.6 Camera Enclosure

The enclosure shall be equipped with a sun shield that prevents sunlight from directly entering the lens. The sun shield shall include a provision for water diversion to prevent water from flowing in the camera field of view.

2.7.7 Camera System Access

The camera system shall be Ethernet-centric. The system shall be capable of delivering MPEG-4 and MJPEG video to the switch in the cabinet. The user shall be able to access the camera directly over the network and configure the camera parameters using a standard Internet Browser.

2.8 Cable:

2.8.1 Ethernet Cable

Any Ethernet cable run outside of the traffic cabinet shall be environmentally hardened, shielded, and outdoor rated 350 MHz Category 5e cable. The cable shall be riser rated, 24 AWG solid copper, have Polyolefin insulation, UV and oil resistant PVC jacket. Pair 1 shall be Blue, White/Blue, Pair 2 shall be Orange, White/Orange, Pair 3 shall be Green, White/Green and Pair 4 shall be Brown, White/Brown. The operating temperature shall be from -40° C to +70° C. The cable shall conform to the following standards: ISO/IEC 11801 Category 5e, NEMA WC 63, and ANSI/TIA/EIA 568-B.2 Category 5e. The cable shall be without splicing or joints for any single run. The contractor shall obtain instructions from the manufacturer about alternate architecture when length of a single run of CAT 5e cable exceeds 320 feet.

2.8.2 RJ45

The RJ-45 plug connectors shall be used at both the camera and cabinet ends.
The supplier of the video detection systems shall approve the Category 5 cable, RJ-45 connector and crimping tool and the manufacturer's instructions must be followed to insure proper connection.

2.8.3 Power Cable

Power cable shall be 14 AWG three-conductor cable. This cable shall comply with the requirements of IMSA Specification 19-1.

2.9 System Software:

The system shall include software that detects vehicles in multiple lanes using the video image and existing detection in combination. The software shall automatically account for changes in scene including but not limited to lighting conditions or adverse weather. The engineer would have the dual benefit of defining detection zones via a web interface accessible from any regular computer with an IP network connection or using a computer physically connected to the network (which may include a laptop computer). A minimum of 12 detection zones per camera shall be available. The detections zones must be capable of counting multiple vehicles within a single detection zone. The system software shall communicate to an existing signal controller passively, allowing the signal controller to still handle emergency preempts. The software shall determine and display real-time queue lengths along each approach.

The software/hardware shall have the capability to seamlessly intercept existing detection status. The combination detection logic shall work as follows:

1. If existing detection is positive and video detection is negative, the result shall be positive.
2. If existing detection is negative and video detection is positive, the result shall be negative.
3. If existing detection is negative and video detection is negative, the result shall be negative.

The adaptive traffic control system shall not rely on the central server or central software for regular operations.

2.8.1 Access to Detection System Data

The video detection system shall be programmable via a web browser using the same IP network connection that delivers the video camera output and thus allow the engineer to have complete control of the system without being physically present at the intersection. It shall provide still image and real time detection displays in color video to a remote computer using a web browser such as Microsoft Internet Explorer. The system shall collect real-time traffic data such as vehicle counts, stop delay and level of service. Real-time and historical statistical information must be available to the engineer in graphical and/or tabular form as and when required.

3.1 ADAPTIVE TRAFFIC CONTROL OPERATIONS

3.2 General:
The adaptive traffic control module shall be contained within the PU. The PU shall communicate with neighboring PUs over an IP network. The PUs shall communicate information such as the green and red status of signal, queue lengths, and traffic volumes in real time. Based on such information received from adjacent signals and local traffic data, the PU shall optimize the phasing sequence, duration, and initiation of movements in order to optimize traffic flow on arterials as well as arterial networks.

3.3 Optimization of Green Time Allocation:
The adaptive traffic control shall not use common cycle lengths but use principles of robotics and artificial intelligence to optimize traffic flow. The optimization shall be real time using the principles of a finite state changing machine and shall not involve switching between cycle lengths or timing plans. The system shall not be in transition at any time but shall respond to real-time inputs with changing of states. Guaranteed arterial progression shall be created using dynamic green bands. Nonmaterial traffic at each intersection shall be served adequately without interfering with the green bands.

3.4 Configuration of Signal Control:
The supplier's engineers shall configure the adaptive traffic signal control system for optimal operation of the arterial or arterial network. Traffic flow and anomalous traffic conditions shall be programmed into the adaptive traffic signal control system.

3.5 Configuration via IP Network:
The parameters for the adaptive traffic signal control shall be capable of being configured remotely over the IP network. Parameters are adjustable via a web browser capable of running Java, such as Internet Explorer. The software shall also display traffic signal green status and up to 48 camera views. All configuration information shall be stored in easily backed up and humanly readable XML files.

3.6 Monitoring of Arterial:
The system shall allow monitoring via a web browser such as Microsoft Internet Explorer on any authorized computer. It shall be possible to view a single camera, multiple cameras from a single intersection, or multiple cameras from multiple intersections. This system must be capable of displaying these views even under limited network bandwidth. It must be possible to format these views to support different size viewing screens.

3.7 Self-Monitoring of Arterial:
The system shall be able to automatically generate notifications to one or more email addresses when it detects disruption of the communications network, failure of PUs, intersections going into flash, or other such events that would impact the operation of the arterial.

4.0 INSTALLATION

The adaptive traffic control system shall be installed as recommended by the manufacturer and as documented in the installation materials provided by the supplier. A factory certified representative from the supplier shall be present onsite at the beginning of installation to do onsite training.

5.1 NEW EQUIPMENT AND SUPPORT

The adaptive traffic control system software shall be supported by the manufacturer to be free of defects in material workmanship for a minimum of three years, and hardware for a minimum of two years.

Technical support shall be available from the supplier via telephone within 4 hours of the time a call is made by the user. This support shall be available from factory certified personnel or factory certified installers.

Special Provision for
ATC Traffic Signal Controller Cabinet

The control equipment specified herein shall conform, where applicable, to Advanced Transportation Controller (ATC) Cabinet Standard version ATC 5301 v02, latest revision, Traffic Control Systems, and shall also comply with the additional City requirements.

All auxiliary equipment supplied in the signal cabinet not produced by the primary controller manufacturer shall have service information and parts availability information supplied including model number, serial number, and/or part number, and the address of the manufacturer included on the cabinet layout and master parts list. The cabinet terminal facilities shall be manufactured by the same manufacturer as the controller timing unit. All other equipment may be multi-source product.

A. Controller

The traffic signal controller shall be supplied with its most up to date software/firmware available and be compatible with the City of Sioux Falls Tactics 5.4 or a method of making timing changes through the City's Traffic Network using a browser and IP address needs to be present. Contact Heath Hoftiezer (#605-367-8634) of the City of Sioux Falls for further information.

Two sets of wiring diagrams and one maintenance and operation manual shall be supplied for the traffic signal controller. The Contractor shall place all diagrams and manuals in the controller cabinet.

The Contractor shall deliver the traffic signal controller to the City of Sioux Falls for programming. The City will program the controller and contact the Contractor for pick-up. The Contractor shall install the programmed controller in the controller cabinet. Contact Heath Hoftiezer (#605-367-8634) of the City of Sioux Falls for drop-off information.

All costs to furnish and install the traffic signal controller shall be included in the contract unit price per each for "Traffic Signal Controller".

B. Traffic Signal Cabinet

The traffic signal cabinet shall be capable of accepting a power assembly using either 120 VAC or 48 VDC. 120 VAC shall be used in this instance.

The housing shall be rainproof. It shall have two front and two rear doors, each equipped with a lock and handle. The enclosure top shall be crowned to prevent standing water. The cabinet shall be approximately 67" H x 44" W x 26" D designed to fit on a NEMA P cabinet base. The enclosure, doors, lifting eyes, gasket channels, police panel door, spacer supports and all supports welded to the enclosure and doors shall be fabricated of 0.125 inch minimum thickness aluminum sheet. All exterior seams for enclosure, enclosure top and doors shall be continuously welded and shall be smooth.

The latching mechanism shall be a three-point draw roller type. The pushrods shall be turned edgewise at the outward supports and have a cross section of 0.25 in thick by 0.75 in wide, minimum. 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 left side of the rear door. The lock and lock support shall be rigidly mounted on the door. A seal shall be provided to prevent dust or water entry through the lock opening. The locks shall be Corbin 2 type, or approved equal. One key shall be supplied with each lock. The keys shall be removable in the locked position only.

A police panel assembly shall be provided to allow limited control access. The panel door shall be equipped with a lock and master police key. The front and back of the panel shall be enclosed with a rigid metal covering so that no parts having live voltage are exposed. The panel assembly shall have a drain to prevent water from collecting within the assembly. The drain shall be channeled to the outside. The cabinet shall have one switch provided and labeled "SIGNALS ON / OFF" and one switch provided and labeled "FLASH / AUTO". The MANUAL CONTROL ENABLE ON / OFF switch and a receptacle for the INTERVAL ADVANCE cord shall be provided. An INTERVAL ADVANCE cord, six feet in length, shall be provided.

Housing ventilation shall include intake, exhaust, filtration, fans and thermostat.

The cabinet shall be equipped with four LED lights activated by door switches and equipped with fuses.

The cabinet assembly shall be capable of providing control for up to 32 output channels and management for up to 48 detector inputs.

The cabinet shall monitor the voltage and current of all signal outputs.

The cabinet shall be able to change flash operation through the use of color coded flash plugs.

Special Provision for
Optical Activated Emergency Vehicle Preemption System

System Description

The required priority control system will employ data-encoded optical communication to verify the presence of authorized priority vehicles. The data-encoded optical communication will request the traffic signal controller to advance to and/or hold a desired traffic signal display selected from phases normally available.

The priority control system will consist of a matched system of optical detectors, detector cable, signal discriminators, and confirmation lights.

A code secured signal will be detected and recognized by the optical detectors at or near the intersection over a line-of-sight path of up to 2,500 feet (762 m) under clear atmospheric conditions. The signal discriminator will process the electrical signal from the detector to ensure that the communication (1) is a valid base frequency, and (2) is within user-settable range. If these conditions are met, the signal discriminator will generate a priority control request (i.e., the appropriate green lights) for the approaching priority vehicles.

The system will require no action from the vehicle operator other than to turn on a code secured emitter. The system will operate on a first-come, first-served basis. Higher priority (Command) requests will override lower priority (Advantage) requests. The system will interface with most traffic signal controllers and will not compromise normal operation or existing safety provisions.

Matched System Components

The required priority control data-encoded optical communications system will be comprised of optical detector, detector cable, signal discriminator, and conformation light. In addition, a card rack shall be available, if required. To ensure system integrity, operation, and compatibility, all components will be from the same manufacturer. The system will be compatible with NEMA (National Electrical Manufacturers Association) TS1 and TS2 controllers.

The priority control system shall be Model 721 Far Side as manufactured by Global Traffic Technologies or approved equal. The preemption and conductor cables for the detector heads shall be installed without splices from the heads to the controller cabinets.

A. Optical Detector: The detector will change the optical signal to an electrical signal. It will be located at or near the intersection. It will send the electrical signal, via the detector cable, to the discriminator.

B. Detector Cable: The detector cable will carry the electrical signal from the detector to the discriminator.

C. Signal Discriminator: The discriminator will validate the signal from the detector. Itwill be located within the controller cabinet at the intersection. It will request the controller to provide priority to the requesting vehicle.

D. Card Rack: The card rack will provide simplified installation of a signal discriminator into controller cabinets that do not already have a suitable card rack.

System Component Specifications

A. Optical Detector:

1. The required optical detector will be a lightweight, weatherproof device capable of sensing and transforming pulsed infrared energy into electrical signals for use by the discrimination equipment.

2. The optical detector will be designed for mounting at or near an intersection on mast arms, pedestals, pipes, or span wires.

3. Each optical detector will be supplied with mounting hardware to accommodate installation on span wires or mast arms using 3/4-inch NPT electrical pipe materials including a malleable Iron "T" approved for rain-tight locations, threaded nipples, and single lamp holder approved for outdoor use. The use of a PELCO AB-0155-42 Band Mount Mini-Brac or approved equal shall be used where no integrated threaded outlet exists on the mast arm. All equipment shall be securely mounted to be level/plumb and retain its alignment.

4. The optical detector design shall include adjustable tubes to enable their reorientation for span wire mounting without disassembly of the unit.

5. The optical detector will accept optical signals from one or two directions and will provide single or dual electrical output signal(s).

6. The optical detector will be available in three configurations:

   a. Uni-directional with one output channel

   b. Bi-directional with one output channel

   c. Bi-directional with two output channels

7. The optical detector will allow aiming of the two optical sensing inputs for skewed approaches or slight curves.

8. The optical detector will have a built-in terminal block to simplify wiring connections.

9. The optical detector will receive power from the discriminator and will have internal voltage regulation to operate from 18 to 37 volts DC.

10. The optical detector will respond to a clear lens code secured emitter with 0.84 (± 10%) Joules of energy output per flash at a distance of 2,500 feet (762 m) under clear atmospheric conditions. If the emitter is configured with a visible light filter, the detector will respond at a distance of 1,800 feet (549 m) under clear atmospheric conditions. The noted distances shall be comparable day and night.

11. The optical detector will deliver the necessary electrical signal to the discriminator via a detector cable up to 1,000 feet (305 m) in length.

B. Detector Cable:

1. The detector cable shall deliver sufficient power from the discriminator to the detector and will deliver the necessary quality signal from the detector to the discriminator over a nonspliced distance of 1,000 feet (305 m).

2. The detector cable will be of durable construction to satisfy the following installation methods:
   a. Direct burial
   b. Conduit and mast arm pull
   c. Exposed overhead (supported by messenger wire)

3. The outside diameter of the detector cable will not exceed 0.3 inches (7.62 mm).

4. The insulation rating of the detector cable will be 600 volts minimum.

5. The temperature rating of the detector cable will be +158°F (+70°C) minimum.

6. The conductors will be shielded with aluminized polyester and have an AWG #20 (7 x 28) stranded and individually tinned drain wire to provide signal integrity and transient protection.

7. The detector cable will have four conductors of AWG #20 (7 x 28) stranded, individually tinned copper, color-coded insulation as follows:
   a. Orange for delivery of optical detector power (+)
   b. Drain wire for optical detector power return (-)
   c. Yellow for optical detector signal #1
   d. Blue for optical detector signal #2

8. The characteristic impedance of the detector cable shall be:

   0.6 ohms/1,000'

   14.3uF/1,000'

9. The shield wrapping will have a 20% overlap to ensure shield integrity following conduit and mast arm pulls.

C. Signal Discriminator:

1. The signal discriminator, designed to be installed in the traffic controller cabinet, is intended for use directly with NEMA controllers, with the system card rack and suitable system interface equipment.

2. The discriminator will be a plug-in, two-channel, dual-priority device intended to be installed directly into a card rack located within the controller cabinet.

3. The discriminator will be powered from 115-volt (95 volts AC to 135 volts AC), 60 Hz mains and will contain an internal, regulated power supply that supports up to four optical detectors.

4. The discriminator's default range values shall be resettable by the operator using switches located on its front.

5. The discriminator will be capable of two levels of discrimination code secured optical signals, as follows:

    a. Verification of the presence of the base optical signal of either 14.03509Hz ± 0.01773Hz for Command priority, or 9.63855Hz ± 0.00836Hz for Advantage priority.

    b. Determination of when the vehicle is within the prescribed range.

6. The discriminator's card edge connector will include primary optical detector inputs and power outputs.

7. The discriminator will include one opto-isolated NPN output per channel that provides the following electrical signal to the appropriate pin on the card edge connector:

    a. 6.25Hz ± 0.1Hz 50% on/duty square wave in response to an Advantage priority call.

    b. A steady ON in response to a Command priority call.

8. The discriminator will accommodate two methods for setting intensity thresholds (emitter range) for high and low priority signals:

    a. Using an encoded emitter with range-setting capability.

    b. Using any encoded emitter while manipulating the front panel switches.

9. The discriminator will have a solid state POWER ON LED indicator that flashes to indicate unit diagnostic mode and illuminates steadily to indicate proper operation.

10. The discriminator will have internal diagnostics to test for proper operation. If a fault is detected, the discriminator will use the front panel LED indicators to display fault information.

11. The discriminator will have a Command (High) and Advantage (Low) solid state LED indicator for each channel to display active calls.

12. The discriminator will have a test switch for each channel to test proper operation of Command or Advantage priority.

13. The discriminator will properly identify a Command priority call with the presence of 10 Advantage priority code secured emitter signals being received simultaneously on the same channel.

14. The discriminator will have write-on pads to allow identification of the phase and channel.

15. The discriminator shall have the capability of functionally testing connected detector circuits and indicating via front panel LEDs nonfunctional detector circuits.

16. The signal discriminator shall have a solid state circuit board. Module units will not be allowed.

D. Card Rack:

1. The required card rack will provide simplified installation of a discriminator into controller cabinets that do not already have a suitable card rack.

2. The card rack will be factory wired to one connector, located behind the card slot, and a terminal block, located next to the discriminator slot, on the front of the card rack.

3. The card rack connector on the front will provide for all connections to the traffic controller.

4. The card rack will provide labeled terminal blocks for connecting the primary optical detectors to a discriminator.

E. Interface Cards:

1. Interface Card for Electromechanical Controllers

a. The required interface card for electromechanical controllers will provide electrical and logic interface between the discriminator and an electromechanical-type controller.

b. The inputs to the interface card for electromechanical controllers will be connected to the outputs of the discriminator.

c. The outputs of the interface card for electromechanical controllers will be connected to the Hand Control Switch or Police Panel where the dial motor and its self-generated solenoid advance pulses are disconnected from the cam/solenoid assembly and replaced by pulses generated by the action of the Hand Control Switch in the electromechanical-type controller.

d. The interface card for electromechanical controllers will decode the outputs of the discriminator(s) and advance the controller to the phase that is set for that channel by sensing the traffic controller signal indications.

e. The interface card for electromechanical controllers will have one input to disable the interface card.

f. The interface card for electromechanical controllers will include the following switches:

i. Channel 1 Green Time: 16-position rotary switch; Controls timing between advance pulses, in seconds, when in Phase 1 green

ii. Channel 2 Green Time: 16-position rotary switch; Controls timing between advance pulses, in seconds, when in Phase 2 green

iii. Channel 3 Green Time: 16-position rotary switch; Controls timing between advance pulses, in seconds, when in Phase 3 green

iv. Channel 4 Green Time: 16-position rotary switch; Controls timing between advance pulses, in seconds, when in Phase 4 green

v. NON Green Time: 16-position rotary switch; Controls timing between advance pulses, in seconds, when no indications are green

vi. Power Switch

2. Confirmation Light Card:

   a. The required confirmation light card will provide electrical and logic interface between discriminators and confirmation light switching devices at the intersection.

   b. The confirmation light card will have four inputs to allow connection to the outputs of one or two discriminators.

   c. The confirmation light card will connect to unused load switch inputs in the controller cabinet.

   d. The confirmation light card will provide 10 confirmation light patterns programmable by the user using a rotary switch.

   e. The confirmation light card will monitor green traffic signal indications for dynamic control of confirmation lights; e.g., to modify the response when proper phasing is reached.

   f. The patterns shall be as described below:

	Non-Called Direction		**Called Direction**	
Pattern Number	**Desired Green**	**Non-Desired Green**	**Desired Green**	**Non-Desired Green**
0	Off	Off	Steady On	Off
1	Off	Off	Flashing	Off
2	Flashing	Flashing	Steady On	Steady On
3	Steady On	Steady On	Flashing	Flashing
4	Flashing	Flashing	Steady On	Off
5	Steady On	Steady On	Flashing	Off
6	Flashing	Flashing	Steady On	Flashing
7	Steady On	Steady On	Flashing	Steady On
8	Off	Off	Steady On	Flashing
9	Off	Off	Flashing	Steady On
1/0	Off	Off	Flashing	Off
1/1	Off	Off	Steady On	Off
1/2	Steady On	Steady On	Flashing	Flashing
1/3	Flashing	Flashing	Steady On	Steady On
1/4	Steady On	Steady On	Flashing	Off
1/5	Flashing	Flashing	Steady On	Off
1/6	Steady On	Steady On	Flashing	Steady On
1/7	Flashing	Flashing	Steady On	Flashing
1/8	Off	Off	Flashing	Steady On
1/9	Off	Off	Steady On	Off

Reliability

A. All equipment supplied as part of the optical priority control system intended for use in the controller cabinet will meet the following electrical and environmental specifications spelled out in the NEMA Standards Publication TS2 1992, Part 2:

1. Line voltage variations per NEMA TS2 1992, paragraph 2.1.2.

2. Power source frequency per NEMA TS2 1992, paragraph 2.1.3.

3. Power source noise transients per NEMA TS2 1992, paragraph 2.1.6.1.

4. Temperature range per NEMA TS2 1992, paragraph 2.1.5.1.

5. Humidity per NEMA TS2 1992, paragraph 2.1.5.2.

6. Shock test per NEMA TS2 1992, paragraph 3.13.9.

7. Vibration per NEMA TS2 1992, paragraph 3.13.8.

B. Each piece of equipment supplied as part of the priority control system intended for use in or on priority vehicles will operate properly across the entire spectrum of combinations of environmental conditions (temperature range, relative humidity, vehicle battery voltage) per the individual component specifications.

Responsibilities

The manufacturer of the required optical priority control system and/or the manufacturer's representative will provide responsive service before, during, and after installation of the priority control system. The manufacturer and/or the manufacturer's representative will provide certified, trained technicians having traffic systems industry experience and operational knowledge of priority control systems.

Guaranteed Warranty

A. The manufacturer of the required optical priority control system will warrant that, provided the priority control system has been properly installed, operated and maintained, component parts of a matched component system (see Section II) that prove to be defective in workmanship and/or material during the first five years from the date of shipment from the manufacturer will be covered in a documented system-protection plan, plus an added five-year warranty for repair or replacement at a fixed deductible charge for a total of ten years of product coverage.

B. The protection plan will warrant that component parts of a matched component system that prove to be defective in workmanship and/or material during the first five years from the date of shipment from manufacturer will be repaired at no charge, and that extended coverage with a fixed repair deductible will be available for an additional five years.

C. In total, the warranty coverage must assure ten-year operational reliability and interface compatibility with future components designed for the system.

Certification

The manufacturer of the required priority control system will certify that all component products are designed, manufactured, and tested as a system of matched components and will meet or exceed the requirements of this specification.

* * * *

Special Provision for Traffic Signal Heads (LED Modules)

1. Overview

1.1 Purpose

1.1.1 The purpose of this specification is to provide the minimum performance requirements for 200 mm (8 in) and 300 mm (12 in) Light Emitting Diode (LED) vehicle traffic signal. This specification refers to procedures and definitions as described in the **Vehicle Traffic Control Signal Heads—Light Emitting Diode (LED) Circular Supplement (VTCSH), Adopted June 27, 2005**, published by the Institute of Transportation Engineers (ITE) and contains additional requirements to ensure optimum long-term reliability and performance.

1.2 Manufacturer's Requirements and Approvals

1.2.1 The manufacturer supplying product to this specification shall have a minimum of seven years' experience in the manufacture of LED Traffic Signals with High-Flux LEDs.

1.2.2 Manufacturers supplying products to this specification must be a registered participant and have the base part numbers being provided listed on the ***Intertek ETL LED Traffic Signal Modules Certification Program*** approved products website with unique long life module part numbers for products that carry a 15 year warranty.

1.2.3 If requested, documentation shall be provided by manufacturer demonstrating the changes made to their standard product that allows for ITE specification compliance over a 15 year warranty period.

1.2.4 All LED Traffic Signal Modules shall fully meet the "Buy American Provision of the ARRA of 2009". Certificate of Compliance shall be provided by the manufacturer prior to bid opening.

2. Physical and Mechanical Requirements

2.1 General

2.1.1 Modules shall fit into existing traffic signal housings built to the VTCSH Standard without modification to the housing, or shall be stand-alone units that incorporate a housing meeting the performance and design requirements of the VTCSH Standard.

2.1.2 Installation of a module into an existing signal housing shall not require the use of special tools. The module shall connect directly to existing electrical wiring system.

2.2 LED Signal Module

2.2.1 The LED module shall be capable of replacing the existing optical components in the signal housing.

2.2.2 The module lens shall be hard-coated or otherwise made to comply with the material exposure and weathering effects requirements of the Society of Automotive Engineers (SAE) J576.

2.2.3 Tinted or Clear Lens. Unless designated otherwise in the below table, the standard lens color shall be tinted with a color similar to the colors required in Section 3.2, Chromaticity, for all Red and Yellow modules and clear for all Green modules.

	200 mm (8") Balls		300 mm (12") Balls	
	Tinted Lens Required	Clear Lens Required	Tinted Lens Required	Clear Lens Required
Red				
Yellow				
Green				

2.2.4 The LED module shall utilize high-flux LEDs rated at 1 watt or higher and havean incandescent, nonpixilated appearance when illuminated.

2.2.5 The external lens shall have a smooth outer surface to prevent the buildup of dirt/dust and shall be designed to minimize the potential for sun phantom signals.

2.2.6 All LEDs utilized to illuminate Circular signal modules shall be LEDs that have been manufactured utilizing materials that have industry acceptance as being suitable for uses in outdoor applications. At no time is the use of LEDs that utilize AlGaAs technology acceptable.

2.3 Environmental Requirements

2.3.1 All exposed components of a module shall be suitable for prolonged exposure to the environment without appreciable degradation that would interfere with function or appearance. As a minimum, selected materials shall be rated for service for a period of a minimum of 60 months in a south-facing Arizona Desert installation.

2.3.2 A module shall be rated for use throughout an ambient operating temperature range, measured at the exposed rear of the module, of -40°C (-40°F) to +74°C (+165°F).

2.3.3 A module shall be protected against dust and moisture intrusion, including rain and blowing rain, per Mil-Std-810F Method 506.4, Procedure 1.

2.4 Construction

2.4.1 A module shall be a self-contained device, not requiring on-site assembly for installation into an existing traffic signal housing. The power supply for the signal module shall be integral to themodule.

2.4.2 Assembly and manufacturing processes for a module shall be designed to assure all internal LED and electronic components are adequately supported to withstand mechanical shock and vibration due to high winds and other sources.

2.5 Materials

2.5.1 Materials used for the lens and module construction shall conform to ASTM.

2.5.2 Enclosures containing either the power supply or electronic components of the signal module shall be made of UL94 flame retardant materials. The module lens is excluded from this requirement.

2.6 Module Identification

2.6.1 Each module shall be identified on the backside with the manufacturer's name, model, operating characteristics, and serial number. The operating characteristics identified shall include the nominal operating voltage and stabilized power consumption in watts and volt-amperes.

2.6.2 Modules and removable lenses shall have a prominent and permanent vertical indexing indicator; i.e., UP Arrow, or the word UP or TOP, for correct indexing and orientation in the signal housing.

2.6.3 Modules conforming to all nonoptional requirements of this specification shall have the following statement on an attached label: "Manufactured in Conformance with the ITE LED Circular Signal Supplement."

2.6.4 All modules must be labeled with the ETL-Verified label shown in Figure 1. This label designates the compliance and listing with the Intertek ETL Traffic Signal Certification Program.

3. Photometric Requirements

3.1 Luminous Intensity, Uniformity, and Distribution

3.1.1 Minimum maintained luminous intensity: When operated under the conditions defined in Sections 2.3.2 and 4.2.1, the luminous intensity values for modules shall not be less than the specified values for a minimum period of 60 months.

3.1.1.1 Calculate the vertical intensity factor ($f(I_{Vert})$) for the range from 12.5 degrees up (+12.5) to 27.5 degrees down (-27.5), using the appropriate equation:

For $Ø_{Vert} > -2.5$ degrees:

$$f(I_{Vert}) = 0.05 + 0.9434 * e^{-\left(\frac{\theta_{Vert}+2.5}{5.3}\right)}$$

For $Ø_{Vert} \leq -2.5$ degrees:

$$f(I_{Vert}) = 0.26 + \left(\frac{\theta_{Vert}}{143}\right) + 0.76 * \left[e^{-0.02(\theta_{Vert}+2.5)^2} - e^{(-0.07*\theta_{Vert})}\right]$$

where: $Ø_{Vert}$ is the angle measured above or below a horizontal plane perpendicular to the face of the module lens. (Note: Angles above the horizontal plane are positive, while angles below the horizontal plane are negative.)

3.1.1.2 Calculate the horizontal intensity factor ($f(I_{Horiz})$) for the range from 27.5 degrees left to 27.5 degrees right:

$$f(I_{Horiz}) = 0.05 + \left(0.95 * e^{\left(-\frac{1}{2}*\left(\frac{\theta_{Horiz}}{11}\right)^2\right)}\right)$$

where: $Ø_{Horiz}$ is the angle measured from a vertical plane to the left or right, perpendicular to the face of the module lens.

3.1.1.3 Select the appropriate peak minimum maintained luminous intensity value for the specified module size and color peak minimum maintained luminous intensity values, at $Ø_{Vert}$ = –2.5 deg and $Ø_{Horiz}$ = 0 deg [$\mathbf{I_{(-2.5, 0)}}$], by size and color of the module are:

	$\mathbf{I_{(-2.5, 0)}}$	
Color	200 mm	300 mm
Red	165 cd	365 cd
Yellow	410 cd	910 cd
Green	215 cd	475 cd

3.1.1.3 Multiply the vertical intensity factor times the horizontal intensity factor (for the selected pair of angles). Round the result to two significant figures, and multiply the combined angular intensity factor times the peak minimum maintained luminous intensity value for the appropriate signal size and color:

$$\mathbf{I}_{(Øvert, Øhoriz, size, color)} = [f(I_{Vert})^* f(I_{Horiz})]^* I_{(-2.5, 0)}$$

The resultant value of the luminous intensity shall be rounded to the nearest whole number.

Example: What is the minimum maintained luminous intensity value for a green, 300 mm LED signal light at 5 degrees down and 10 degrees left?

$$\mathbf{I}_{(-5, 10, 300, Green)} = [f(I_{vert = -5})^* f(I_{horiz = 10})]^*475 \text{ cd}$$
$$\mathbf{I}_{(-5, 10, 300, Green)} = [0.953^*0.678]^*475 \text{ cd}$$
$$\mathbf{I}_{(-5, 10, 300, Green)} = 0.65^*475 = 309 \text{ cd}$$

3.1.1.4 Table 1 provides the minimum maintained luminous intensity values, over the required angular range, at 5-degree increments. Note that the horizontal limitations vary for various vertical angles (e.g.: at $Ø_{Vert}$ = +12.5 degrees, requirements are only specified from 7.5 degrees right to 7.5 degrees left, while at $Ø_{Vert}$ = -12.5 degrees, the horizontal limitations are from 27.5degrees right to 27.5 degrees left. Table 1 is provided to illustrate the minimum required values at certain specific angles within the required angular range of performance. One must use the procedure outlined above for determining the minimum maintained luminous intensity values at any specific pairs of vertical and horizontal angles within the required angular range.

3.1.2 Maximum permissible luminous intensity: When operated within the temperature range specified in Section 2.3.2, the actual luminous intensity for a module shall not exceed three times the required peak value of the minimum maintained luminous intensity for the selected signal size and color specified in Section 3.

3.1.3 Luminance uniformity: The uniformity of the signal output across the entire module lens shall not exceed a ratio of 10 to 1 between the maximum and minimum luminance values (cd/m^2).

3.2 Chromaticity

3.2.1 The measured chromaticity coordinates of modules shall conform to the following color regions, based on the 1931 CIE chromaticity diagram (see Figure 2):

Red: $y = 0.308$;
$y = 0.953 – 0.947x$;
$y = 0.290$:

Point	Red	
	x	*y*
1	0.692	0.308
2	0.681	0.308
3	0.700	0.290
4	0.710	0.290

Yellow: $y = 0.151 + 0.556x$;
$y = 0.972 – 0.976x$;
$y = 0.235 + 0.300x$:

Point	Yellow	
	x	*y*
1	0.545	0.454
2	0.536	0.449
3	0.578	0.408
4	0.588	0.411

Green: $y = 0.655 - 0.831x$
$x = 0.150$;
$y = 0.422 - 0.278x$:

Point	Green	
	x	*y*
1	0.005	0.651
2	0.150	0.531
3	0.150	0.380
4	0.022	0.416

3.2.2 The dominant wavelength for any individual color measurement of a portion of the emitting surface of a module shall be within ±3 nm of the dominant wavelength for the average color measurement of the emitting surface as a whole.

4. Electrical

4.1 General

4.1.1 All wiring and terminal blocks shall meet the requirements of the VTCSH standard. Two secured, color-coded, 600V, jacketed wires, a minimum of 20 AWG and at least 1 meter (39 in) in length, conforming to the NFPA 70, National Electrical Code, and rated for service at +105°C, shall be provided.

4.1.2 The following color scheme shall be used for all modules AC power leads: White for Common, Red for the Red ball signal, Yellow for the Yellow ball signal, and Brown for the Green ball signal.

4.1.3 The AC power leads shall exit the module via a rubber grommetted strain relief, and shall be terminated with insulated female quick-connect terminals with spade/tab adapters. The leads shall be separate at the point at which they leave the module.

4.1.3.1 All external wiring utilized in the LED traffic signal module shall be anti-capillary-type wire to prevent the wicking of moisture to the interior of the module.

4.1.4 All power supplies shall be conformal coated for additional protection.

4.2 Voltage Range

4.2.1 LED signal modules shall operate from a 60±3 Hz AC line power over avoltage range from 80 to 135 VACRMS.

4.2.2 Fluctuations in line voltage over the range of 80 to 135 VAC shall not affect luminous intensity by more than ±10 percent.

4.2.3 The module circuitry shall prevent flicker of the LED output at frequencies less than 100 Hz over the voltage range specified in Section4.2.1.

4.2.4 Low Voltage Turn-OFF: There shall be no visible illumination from the LED signal module when the applied voltage is less than 35 VAC.

4.2.5 Turn-ON and Turn-OFF Time: A module shall reach 90% of full illumination (turn-ON) within 75 msec of the application of the nominal operating voltage. The signal shall cease emitting visible illumination (turn-OFF) within 75 msec of the removal of the nominal operating voltage.

4.3 Transient Voltage Protection

4.3.1 The on-board circuitry of a module shall include voltage surge protection, to withstand high-repetition noise transients and low-repetition high-energy transients as stated in Section 2.1.8, NEMA Standard TS 2-2003.

4.3.1.1 In addition to the transient test requirements defined in the Design Qualification Testing section of this specification, all power supplies used in the circular signals supplied to this specification shall be capable of passing an additional ring-wave surge testing in accordance with the IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1,000 V and less) AC Power Circuits, ANSI/IEEE C62.41.2-2002, 6KV, 100 kHz ring-wave with an output impedance of 30 ohms. The short circuit current shall be 200 amps.

4.4 Electronic Noise

The LED signal and associated on-board circuitry shall meet the requirements of the Federal Communication Commission (FCC) Title 47, Subpart B, Section 15 regulations concerning the emission of electronic noise by Class A digital devices.

4.5 Power Factor, AC Harmonics, and Power

4.5.1 Modules shall provide a power factor of 0.90 or greater when operated at nominal operating voltage and 25ºC (77ºF).

4.5.2 Total harmonic distortion induced into an AC power line by a module at nominal operating voltage, and at 25ºC (77ºF), shall not exceed 20%.

4.5.3 Typical wattages at 25º Cfor the LED traffic Signal Modules for the 200 mm (8") ball shall be; Red 6 watts, Yellow 7 watts, and Green 8 watts. For the 300 mm (12") balls, the typical wattage at 25º C shall be; Red 7 watts, Yellow 9 watts, and Green 7 watts.

4.6 Controller Assembly Compatibility

4.6.1 The current draw shall be sufficient to ensure compatibility and proper triggering and operation of load current switches and conflict monitors in signal controller units.

4.6.2 Off-State Voltage Decay: When the module is switched from the On-state to the Off-state, the terminal voltage shall decay to a value less than 10 VAC RMS in less than 100 milliseconds when driven by a maximum allowed load switch leakage current of 10 milliamps peak (7.1 milliamps AC).

4.7 Failed-State Impedance

The module shall be designed to detect catastrophic loss of the LED load. Upon sensing the loss of the LED load, the module shall present a resistance of at least 250 kΩ across the input power leads within 300 msec. The LED light source will be said to have failed catastrophically if it fails to show any visible illumination when energized according to Section 4.2 after 75 msec.

5. Quality Assurance

5.1 General

5.1.1 Quality Assurance Program: Modules shall be manufactured in accordance with a vendor quality assurance (QA) program. The QA program shall include two types of quality assurance: (1) design quality assurance; and (2) production quality assurance. The production quality assurance shall include statistically controlled routine tests to ensure minimum performance levels of modules built to meet this specification.

5.1.2 Record Keeping: QA process and test results documentation shall be kept on file for a minimum period of seven years.

5.1.3 Conformance: Module designs not satisfying design qualification testing and the production quality assurance testing performance requirements in Sections 5.3 and 5.4 shall not be labeled, advertised, or sold as conforming to this specification.

5.1.4 Potential suppliers must complete and submit the LED Module Supplier checklist shown in Table 2 and provide a copy of the checklist with the submission of any proposals.

5.2 Manufacturer's Serial Numbers

Each module shall be identified with the information specified in Section 2.6.1.

5.3 Production Tests and Inspections

5.3.1 Production Test Requirements: All modules tendered for sale shall undergo the following Production Testing and Inspection prior to shipment. Failure of a module to meet

the requirements of Production Testing and Inspection shall be cause for rejection. Test results shall be maintained per the requirement of Section 5.1.2.

5.3.1.1 All Production Tests shall be performed at an ambient temperature of 25ºC (77ºF) and at the nominal operating voltage of 120VAC.

5.3.2 Luminous Intensity: All modules shall be tested for luminous intensity. A single-point measurement, with a correlation to the intensity requirements of Section 3 may be used.

5.3.3 Power Factor: All modules shall be tested for power factor per the requirements of Section 4.5.1. A commercially available power factor meter may be used to perform this measurement.

5.3.4 Current Consumption Measurement: All modules shall be measured for current flow in Amperes. The measured current values shall be compared against the design current values from design qualification measurements in Section 5.4.6.1. A measured current consumption in excess of 120% of the design qualification current value for an ambient temperature of 25ºC (77ºF) shall be cause for rejection module.

5.3.5 Visual Inspection: All modules shall be visually inspected for any exterior physical damage or assembly anomalies.

5.4 Design Qualification Testing

5.4.1 Design Qualification Test Requirements. Design qualification testing shall be performed on new module designs when a major design change has been implemented on an existing design or after every five years that a design is in service. Modules used in design qualification testing shall be representative of the manufacturer's proposed normal production. The certification of UV Stabilization, Section 5.4.5.1, shall be provided for all materials used in or on the emitting lenses. If modules are provided with both clear and tinted lenses, the tests per the stated section of the VTCSH below shall be conducted for all lens types. Refer to the Design Qualification Testing Flow Chart in the VTCSH:

Test	Section
Temperature Cycling	5.4.3.2
Moisture Resistance	5.4.3.3
Luminous Intensity	5.4.4.1
Luminance Uniformity	5.4.4.5
Chromaticity	5.4.4.6
Color Uniformity	5.4.4.7
Lens Abrasion	5.4.5.2

5.4.1.1 Test data shall be retained by the manufacturer in accordance with Section 5.1.2, or for 60 months following final production of a specific design, whichever is longer.

5.4.1.2 Six modules of each color shall be used in Design Qualification Testing. All six modules shall be subjected to the Design Qualification testing requirements as specified in Section 6.4 and Figure 2 of the VTCSH.

5.4.1.3 In order for a module design to be considered acceptable for marking with the label described in 2.6.3, all tested modules must comply with the acceptance/rejection criteria of Section 6.4 of the VTCSH and Section 5.4.3 below.

5.4.2 Conditioning: Modules shall be energized for a minimum of 24 hours, at 100% duty cycle, in an ambient temperature of +60°C (+140°F).

5.4.3 Environmental Tests:

5.4.3.1 Mechanical Vibration: Mechanical vibration testing shall be performed per MIL-STD-883, Test Method 2007, using three 4-minute cycles along each x, y, and z axis, at a force of 2.5 Gs, with a frequency sweep from 2 Hz to 120 Hz.

5.4.3.2 Temperature Cycling: Temperature cycling shall be performed per MIL-STD-883, Test method 1010. The temperature range shall include the full ambient operating temperature range specified in Section 2.3.2. A minimum of 20 cycles shall be performed with a 30-minute transfer time between temperature extremes and a 30-minute dwell time at each extreme temperature. Signals under test shall be nonoperating.

5.4.3.3 Moisture Resistance: Moisture-resistance testing shall be performed per MIL-STD-810F, Test Method 506.4, Procedure I, Rain, and Blowing Rain. The test shall be conducted on stand-alone modules without a protective housing. The rainfall rate shall be 1.7 mm/min (4 in/hr) and droplet size shall predominantly be between 0.5 mm and 4.5 mm (0.02 to 0.18 in). The modules shall be vertically oriented, such that the lens is directed toward the wind source when at a zero rotation angle. The module shall be rotated at a rate of 4 degrees per minute along the vertical axis from an orientation of –60 to +60 degrees during the test. The duration of the test shall be 30 minutes. The modules shall be energized throughout the test. The water shall be at 25° ± 5°C (77° ± 9°F). The wind velocity shall be 80 km/hr (50 mph). If the module is equipped with a remote power supply unit, then the test shall be conducted with the remote power supply unit attached to the clamping device holding the module to the test apparatus.

5.4.3.4 Environmental Tests Evaluation: At the conclusion of the Environmental Tests, all the modules will be visual inspected for damage and energized to ensure proper operation.

5.4.3.5 Acceptance/Rejection Criteria: The loosening of the lens, or any internal components, or evidence of other physical damage, such as cracking of the module lens or housing, or presence of internal moisture, or failure to operate correctly after testing, shall be considered a failure of the design.

5.4.4 Photometric and Colorimetric Tests: Three of the modules that were subjected to the Environmental Tests shall undergo Photometric and Colorimetric Tests. Unless otherwise specified, these tests shall be performed with the modules energized at nominal operating voltage.

5.4.4.1 Luminous intensity at standard temperature: The modules shall be tested for compliance with the requirements for minimum maintained luminous intensity at a temperature of 25°C (77°F). Measurements shall be made for all angular combinations specified in Table 1.

5.4.4.1.1 Luminous intensity measurements for red and green signal modules shall be made after the signal module has been operated under the test conditions for a minimum of 60 minutes at a 100% duty cycle.

5.4.4.1.2 Luminous intensity measurements for yellow signal modules shall be made after the module has been operated under the test conditions for a minimum of 60 minutes at a 12.5% dutycycle (5 seconds ON and 35 seconds OFF). Readings shall be taken at the end of the 5-second ON interval, or as close to the end of the ON interval as possible.

5.4.4.2 Luminous intensity at low voltage: The modules shall be tested for compliance with the requirements for minimum maintained luminous intensity when operated at 80 VAC at a temperature of 25°C (77°F). A single-point correlation measurement of the luminous intensity in the region from 0 to 7.5 degrees down and from 7.5 degrees left to 7.5 degrees right shall be recorded. The single-point measurement shall be correlated to the measurement made in the same direction under Section 5.4.4.1 to generate a full range of luminous intensity values at reduced voltage. The luminous intensity measurement at reduced voltage shall be made immediately following measurements for Luminous Intensity at Standard Temperature, Section 5.4.4.1, and following the same procedures as in Sections 5.4.4.1.1 and 5.4.4.1.2.

5.4.4.3 Luminous intensity at elevated voltage: The modules shall be tested for compliance with the requirements for minimum maintained luminous intensity when operated at 135 VAC at a temperature of 25°C (77°F). A single-point correlation measurement of the luminous intensity, in the region from 0 to 7.5 degrees down, and from 7.5 degrees left to 7.5 degrees right shall be recorded. The single-point measurement shall be correlated to the measurement made in the same direction under Section 5.4.4.1 to generate a full range of luminous intensity values at elevated voltage. The luminous intensity measurement at elevated voltage shall be made immediately following measurements for luminous intensity at reduced voltage, Section 5.4.4.2, and following the same procedures as in Sections 5.4.4.1.1 and 5.4.4.1.2.

5.4.4.4 Luminous intensity at high temperature: The modules shall be tested for compliance with the requirements for minimum maintained luminous intensity at a temperature of 74ºC (165ºF). The modules shall be mounted in a temperature chamber so that the lens is outside the chamber and all portions behind the lens are within the chamber at a temperature of 74ºC (165ºF). The air temperature in front of the lens shall be maintained at a minimum of 49°C (120°F) during all tests. A single-point correlation measurement of the luminous intensity, in the region from 0 to 7.5 degrees down, and from 7.5 degrees left to 7.5 degrees right shall be recorded. The single-point measurement shall be correlated to the 25°C (77°F) measurement made in the same direction under Section 5.4.4.1 to generate a full range of luminous intensity values at high temperature.

5.4.4.4.1 Luminous intensity measurements for red and green signal modules shall be made after the module has been operated under the test conditions for a minimum of 60 minutes at a 100% dutycycle.

5.4.4.4.2 Luminous intensity measurements for yellow signal modules shall be made after the module has been operated under the test conditions for a minimum of 60 minutes at a 12.5% duty cycle (5 seconds ON and 35 seconds OFF). Readings shall be taken at the end of the 5-second ON interval, or as close to the end of the ON interval as possible.

5.4.4.5 Luminance uniformity: The modules shall be tested for compliance with the requirements for luminance uniformity at a temperature of 25°C (77°F). Measurements shall be made using a luminance meter located on the physical axis of the module lens at a distance such that the selected aperture samples a spot size of 25 mm (1 inch) at the lens surface. The position of the luminance meter shall be translated from side to side and up and down, so as to sample the entire emitting surface of the module. The highest and lowest values of luminance shall be recorded. These measurements may be made immediately following measurements for luminous intensity at standard temperature and elevated voltage, Section 5.4.4.3, after returning the voltage to the nominal operating voltage (120 VAC).

5.4.4.5.1 Luminance uniformity measurements for the green and red signals must be made with the signal module operating at a 100% duty cycle. Therefore, it is necessary for the signal module under test to reach thermal equilibrium, and for the output to be stable prior to taking measurements.

5.4.4.5.2 Measurements for yellow signal modules shall be made after the module has been operated under the test conditions for a minimum of 60 minutes at a 12.5% duty cycle (5 seconds ON and 35 seconds off). Readings shall be taken at the end of the 5-second ON interval, or as close to the end of the ON interval as possible.

5.4.4.6 Chromaticity: The chromaticity of the emitted light from modules shall be measured at a temperature of 25°C (77°F). A spectro-radiometer with a maximum bandwidth of 4nm, or a colorimeter that has a measurement uncertainty of less than 2.5% over the emission spectra of the module, shall be used for this measurement. The spectro-radiometer or colorimeter shall be located on the physical axis of the module lens at a distance such that the selected aperture samples a spot size of 25 mm (1 inch) at the lens surface. The meter shall be translated from side to side and up and down, so as to sample a minimum of nine equally distributed positions about the emitting surface of the module. The colorimetric values of the emitted light at each of the nine positions shall be recorded, and an average value calculated, based on the CIE Standard 2° Observer. These measurements may be made immediately following measurements for Luminance Uniformity, Section 5.4.4.5.

5.4.4.6.1 Chromaticity measurements for the green and red signals must be made with the signal module operating at a 100% duty cycle. Therefore, it is necessary for the signal module under test to reach thermal equilibrium and for the output to be stable prior to taking measurements.

5.4.4.6.2 Measurements for yellow signal modules shall be made after the module has been operated under the test conditions for a minimum of 60 minutes at a 12.5% duty cycle (5 seconds ON and 35 seconds OFF). Readings shall be taken at the end of the 5-second ON interval, or as close to the end of the ON interval as possible. If

necessary, the ON interval may be extended to 10 seconds to permit completion of a measurement. The duty cycle between individual measurements, however, shall remain 12.5%, with a 5-second on interval.

5.4.4.7 Color uniformity: The average and nine individual sets of chromaticity values of each module under evaluation shall be plotted on the CIE 1931 Chromaticity Diagram (see Figure 2).

5.4.4.8 Photometric and Colorimetric Tests Evaluation: At the conclusion of the Photometric and Colorimetric Tests, the measurement data shall be compared to the applicable requirements of Sections 4.1 and 4.2.

5.4.4.9 Acceptance/Rejection Criteria: The failure of any module to meet the requirements for Minimum Maintained Luminous Intensity, Section 3.1.1, or Maximum Permissible Luminous Intensity Section 3.1.2, under standard and high temperatures. The requirement for Luminance Uniformity, Section 3.1.3, and/or the appropriate requirement for Chromaticity, Section 3.2, shall be considered a failure of the proposed design.

5.4.5 Lens Tests: Following the Photometric and Colorimetric Tests, the three modules shall be subjected to the following tests of the acceptability of the lens construction.

5.4.5.1 UV Stabilization: Documentation shall be provided that certifies that the loss of direct transmission through the lens shall not cause the performance of the module to fall below the photometric requirements, or deviate from the colorimetric requirements of this specification after 60 months, or greater as specified by the manufacturer, of service in accordance with Sections 2.3.1 and 2.3.4. Documentation shall be provided for hard-coat film (if used) and lens material.

5.4.5.2 Lens Abrasion Test: Abrasion resistance testing of the module lens shall be performed as follows:

a) A lens shall be mounted in the abrasion test fixture with the lens facing upwards.

b) An abrading pad meeting the requirements in paragraphs c) through f) below shall be cycled back and forth (1 cycle) for 12 cycles at 10 cm ± 2 cm per second over the whole surface of the lens.

c) The abrading pad shall be not less than 2.5 cm ± 0.1 cm square, constructed of 0000 steel wool and rubber, cemented to a rigid base shaped to the same contour as the lens. The “grain” of the pad shall be perpendicular to the direction of motion.

d) The abrading pad support shall be equal in size to the pad and the center of the support surface shall be within ± 2 mm of parallel to the lens surface.

e) The density of the abrading pad shall be such that when the pad is mounted to its support and is resting unweighted on the lens, the base of the pad shall be no closer than 3.2 mm to the lens at its closest point.

f) When mounted on its support and resting on the lens, the abrading pad shall be weighted such that a pad pressure of 14 kPa ± 1kPa exists at the center and perpendicular to the face of the lens.

g) A pivot shall be used if required to follow the contour of the lens.

h) Unused steel wool shall be used for each test.

5.4.5.3 Acceptance/Rejection Criteria: The photometric performance of a module following the lens abrasion test shall be 90% or more of the photometric performance of the same module measured prior to the lens abrasion test. A single point correlation as described in Section 5.4.4.4 may be used to determine the change in photometric performance. Failure of any module to meet the requirement for photometric performance following the lens abrasion test shall be considered a failure of the proposed design.

5.4.6 Electrical Tests: Three of the modules that were subjected to the Environmental Tests shall undergo Electrical Tests. These tests shall be performed with the modules energized at nominal operating voltage and at a standard temperature of 25°C (77°F), unless specified otherwise.

5.4.6.1 Current Consumption: The current flow, in Amperes, shall be measured at various ambient temperatures across the span of the operating temperature range specified in Section 2.3.2. The manufacturer shall provide information (charts, tables, and/or graphs) on the variation in current through 60 months of service, or greater as specified by the manufacturer, within the operating temperature range of Section 2.3.2. In addition, the current consumption at start-up shall be measured at 25°C (77°F) to establish the reference value used for Production Quality Assurance, Section 5.

5.4.6.2 Low-Voltage Turn-OFF: The modules shall be connected to a variable power supply and energized at nominal operating voltage. The applied voltage shall be reduced to a point where there is no visible illumination from the module when the background is at an average luminance of 0.1 cd/m^2 (0.01 ft-cd).

5.4.6.3 Turn-ON/Turn-OFF Times: Using a two-channel oscilloscope, the time delay between application of nominal operating voltage and the module reaching 90% of full light output, and the time delay between de-energizing the module and the light output dropping to 0% of full output, shall be measured.

5.4.6.4 Transient Voltage Immunity: The modules shall be tested for transient immunity using the procedure described in Section 2.1.8, NEMA Standard TS 2-2003.

5.4.6.5 Electronic Noise: The modules shall be tested for conformance with the requirements of a Class A digital device, as specified in FCC Title 47, Subpart B, Section 15.109(b).

5.4.6.6 Power Factor: The power factor for the modules shall be measured and recorded. A commercially available power factor meter may be used to perform this measurement.

5.4.6.7 Total Harmonic Distortion (THD): The THD induced into an AC power line by the modules shall be measured and recorded. A commercially available total harmonic distortion meter may be used to perform this measurement.

5.4.6.8 Electrical Tests Evaluation: At the conclusion of the Electrical Tests, the measurement data shall be compared to the requirements of Sections 4.2 through 4.5.

5.4.6.9 Acceptance/Rejection Criteria: The failure of any module to meet the requirements for low-voltage turn-OFF, Section 4.2.4; turn-ON/turn-OFF times, Section 4.2.5; transient voltage immunity, Section 4.3; emission of electronic noise, Section 4.4; minimum power factor, Section 4.5.1; and/or maximum total harmonic distortion, Section 4.5.2, shall be considered a failure of the proposed design.

5.4.7 Controller Assembly Compatibility Tests: Following the Electrical Tests, three modules shall be tested for compatibility with load current switches and conflict monitors presently in service. The manufacturer shall test the design for the specific type signal control unit with which the design is intended to be compatible.

5.4.7.1 Load Switch Compatibility: The modules shall be tested for compatibility and proper operation with load current switches. Each module shall be connected to a variable AC voltage supply. The AC line current into the module shall be monitored for sufficient current draw to ensure proper load switch operation while the voltage is varied from 80 to 135 VAC.

5.4.7.2 Off-State Voltage Decay Test: Each module shall be operated from a 135 VAC voltage supply. A 19.5 kΩ resistor shall be wired in series in the hot line between the module and the AC power supply. A single-pole-single-throw switch shall be wired in parallel with the 19.5 kΩ resistor. A 220 kΩ shunt resistor shall be wired between the hot line connection and the neutral line connection on the module. Conflict monitor Off-state impedance compatibility shall be tested by measuring the voltage decay across the 220 kΩ shunt resistor as follows: The single-pole-single-throw switch shall be closed, bypassing the 19.5 kΩ resistor and allowing the AC power supply to energize the module. Next, the switch shall be opened and the voltage across the 220 kΩ shunt resistor shall be measured for decay to a value equal to or less than 10 VAC RMS. The test shall be repeated 10 times with the longest decay time recorded as the final test value.

5.4.7.3 Controller Assembly Compatibility Tests Evaluation: At the conclusion of the Controller Assembly Compatibility Tests, the measurement data shall be compared to the requirements of Section 4.6.

5.4.7.4 Acceptance/Rejection Criteria: Failure of the module to draw sufficient current to ensure compatibility with the load current switches in the appropriate controller assembly, Section 4.6.1, and/or failure of the circuit voltage to decay to a value equal to or less than 10 VAC RMS within a time period equal to or less than 100 milliseconds, Section 4.6.2, shall be considered a failure of the proposed design.

5.4.8 Failed-State Impedance Test: The modules shall be tested for compliance with the requirement for provision of a Failed-State Impedance, Section 4.7. The test is conducted in two parts: First the module is energized with the LED load disconnected from the power supply to establish the failed-state impedance. Next, the requirement for the failed-state impedance is tested. The module shall be operated from a 120 VAC voltage supply.

a) Wire a 50 kΩ resistor in series with the hot line between the module and the AC power supply. A 100 kΩ shunt resistor shall be wired between the hot line connection

and the neutral line connection on the module. A single-pole-single-throw switch shall be wired in parallel with the 50 kΩ resistor. With the switch in the closed position and the LED load disconnected from the module power supply, energize the module for 300 ms to establish the failed-state impedance, Section 4.7.

b) The second part of the failed-state impedance test is conducted to ensure that the appropriate failed-state impedance is established. The switch is opened and the circuit is energized by the 120 VAC voltage supply. The voltage across the 100 kΩ shunt resistor shall be continuously monitored. The voltage shall decay to a value equal to or greater than 70 VAC RMS. For the continuous interval of 500 ms through 1,500 ms, after energizing the circuit with an open switch, the measured voltage shall be 70 VAC RMS or greater. The second part of the test shall be repeated ten times, with the minimum voltage recorded during the continuous interval of 500 ms through 1,500 ms, after energizing the circuit with an open switch, recorded as the final test value.

5.4.8.1 Failed-State Impedance Test Evaluation: At the conclusion of the Failed-State Impedance Test, the measurement data shall be compared to the requirement of Section 4.7.

5.4.8.2 Acceptance/Rejection Criteria: Failure of the voltage across the 100 kΩ shunt resistor to remain at a value equal to or greater than 70 VAC RMS for the continuous time interval of 500 ms through 1,500 ms, after energizing the circuit with an open switch, shall be considered a failure of the proposed design.

6. Warranty Requirements

6.1 Warranty

6.1.1 Manufacturers shall provide a written warranty issued by the factory located in the NAFTA country of module origin with the following minimum provisions:

6.1.2 Modules shall at the manufacturer's option be repaired or replaced if the module fails to function as intended due to workmanship or material defects within the first 15 years from the date of delivery.

6.1.3 Modules shall at the manufacturer's option be repaired or replaced if the module exhibits luminous intensities less than the minimum specified values within the first 15 years of the date of delivery.

6.1.4 Upon request, the LED lamp module manufacturer shall provide written documentation of its ability to satisfy a worst-case, catastrophic warranty claim.

6.1.4.1 A current corporate annual report duly-certified by an independent auditing firm, containing financial statements illustrating sufficient cash on hand and net worth to satisfy a worst-case, catastrophic warranty claim is an example of suitable documentation.

6.1.4.2 The documentation shall clearly disclose:

a. The country in which the factory of module origin is located.

b. The name of the company or organization that owns the factory of module origin including any and all of its parent companies and/or organizations, and their respective country of corporate citizenship.

6.1.4.3 For firms with business and/or corporate citizenship in the United States of less than seven years, the process by which the end-users/owners of the modules will be able to obtain worst-case, catastrophic warranty service in the event of bankruptcy or cessation-of-operations by the firm supplying the modules within North America, or in the event of bankruptcy or cessation-of-operations by the owner of the factory of origin, shall be clearly disclosed.

Figure 1.
Intertek ETL Verified Label

Table 1

Table 1 provides the minimum maintained luminous intensity values for the VTCSH LED Circular Signal, for the range from 12.5 degrees above to 22.5 degrees below the horizontal plane, and from 27.5 degrees left to 27.5 degrees right of the vertical plane, at 5-degree increments.

Minimum Maintained Luminous Intensity Values

Per the VTCSH LED Circular Signal Supplement, June 27, 2005

Vertical Angle	Horizontal Angle	Luminous Intensity (candela)					
		200 mm (8-inch)			300 mm (12-inch)		
		Red	Yellow	Green	Red	Yellow	Green
+12.5	2.5	17	41	22	37	91	48
	7.5	13	33	17	29	73	38
+7.5	2.5	31	78	41	69	173	90
	7.5	25	62	32	55	137	71
	12.5	18	45	24	40	100	52
+2.5	2.5	68	168	88	150	373	195
	7.5	56	139	73	124	309	162
	12.5	38	94	49	84	209	109
	17.5	21	53	28	47	118	62
	22.5	12	29	15	26	64	33
-2.5	2.5	162	402	211	358	892	466
	7.5	132	328	172	292	728	380
	12.5	91	226	118	201	501	261
	17.5	53	131	69	117	291	152
	22.5	28	70	37	62	155	81
	27.5	15	37	19	33	82	43
-7.5	2.5	127	316	166	281	701	366
	7.5	106	262	138	234	582	304
	12.5	71	176	92	157	391	204
	17.5	41	103	54	91	228	119
	22.5	21	53	28	47	118	62
	27.5	12	29	15	26	64	33
-12.5	2.5	50	123	65	110	273	143
	7.5	40	98	52	88	218	114
	12.5	28	70	37	62	155	81
	17.5	17	41	22	37	91	48
	22.5	8	21	11	18	46	24
	27.5	5	12	6	11	27	14
-17.5	2.5	23	57	30	51	127	67
	7.5	18	45	24	40	100	52
	12.5	13	33	17	29	73	38
	17.5	7	16	9	15	36	19
	22.5	3	8	4	7	18	10
-22.5	2.5	17	41	22	37	91	48
	7.5	13	33	17	29	73	38
	12.5	10	25	13	22	55	29
	17.5	5	12	6	11	27	14
-27.5	2.5	12	29	15	26	64	33
	7.5	8	21	11	18	46	24

Note 1: Luminous intensity values for equivalent left and right horizontal angles are the same.
Note 2: Tabulated values of luminous intensity are rounded to the nearest whole value.

Figure 2

Color Regions for LED Traffic Control Signal Lights:

Figure 2 illustrates the acceptable color regions for traffic control signal lights using LED emitters as the light source.

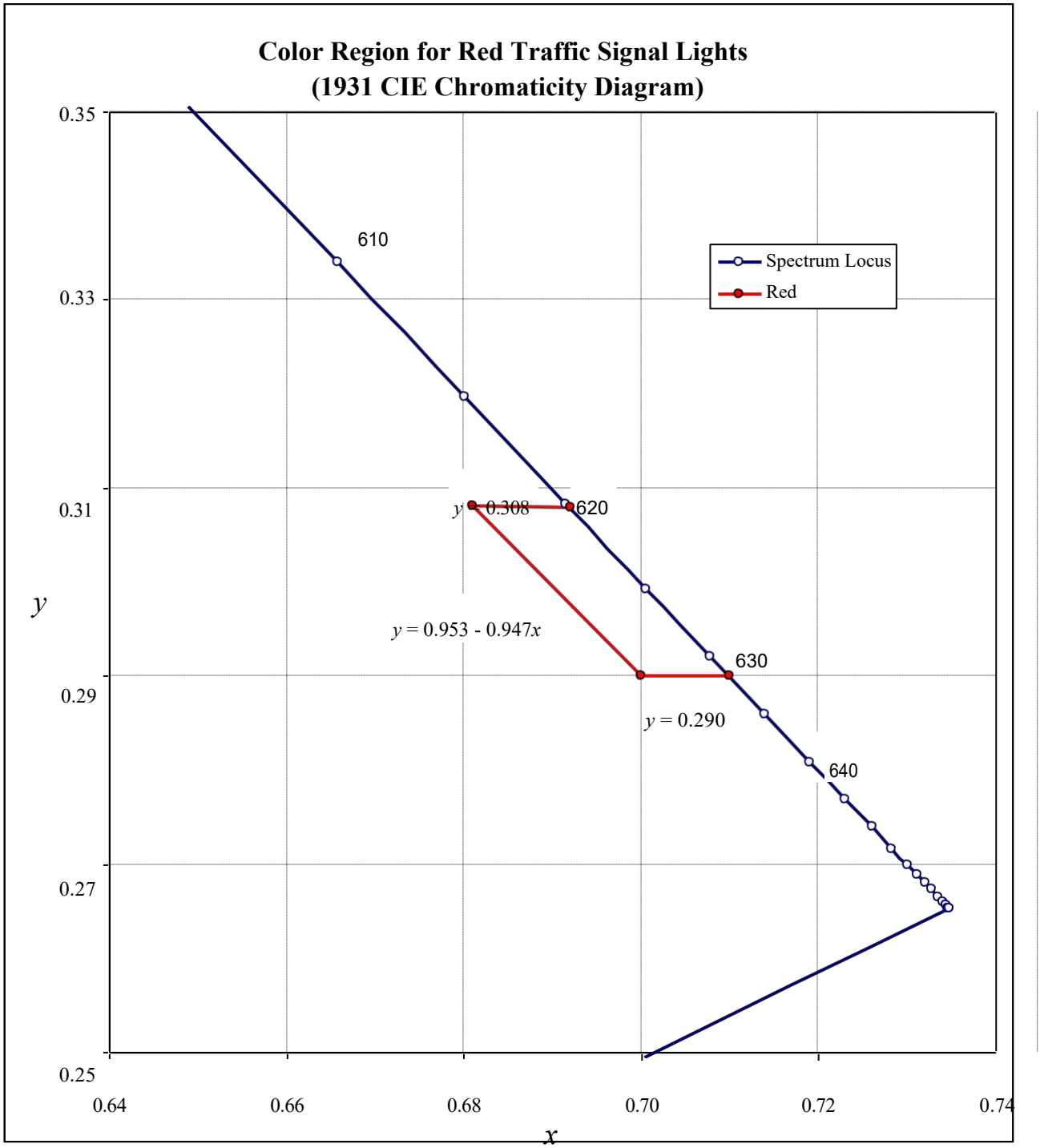


Figure 2a: Color Region for Red Traffic Control Signal Lights

Figure 2 (cont'd)

Color Regions for LED Traffic Control Signal Lights:

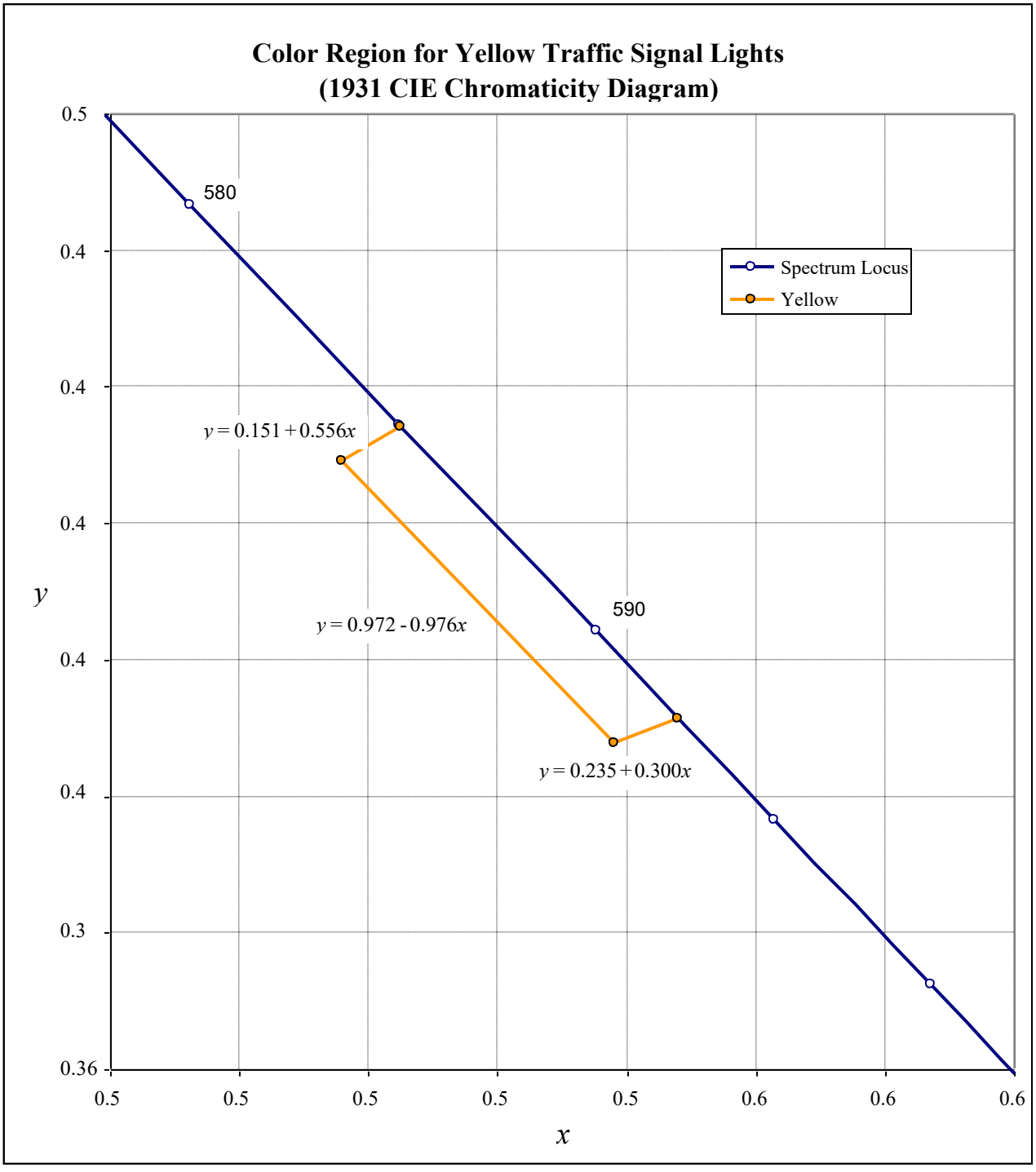


Figure -2b: Color Region for Yellow Traffic Control Signal Lights

Figure 2 (cont'd)

Color Regions for LED Traffic Control Signal Lights:

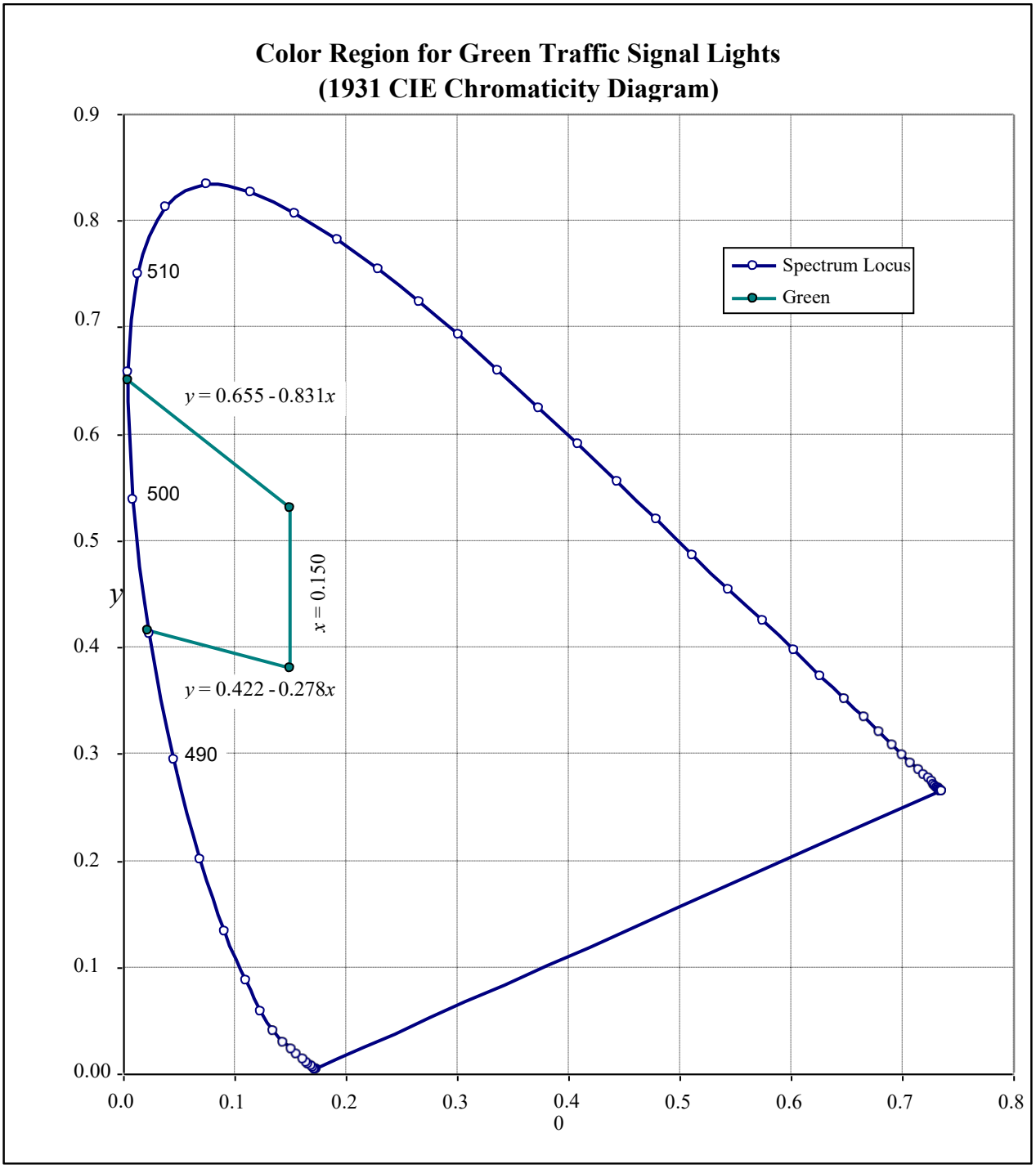


Figure 2c: Color Region for Green Traffic Control Signal Lights

LED Pedestrian Hand/Person/Countdown Modules Specification

1. Overview

1.1 Purpose

The purpose of this specification is to provide the minimum performance requirements for LED pedestrian signal modules (hereafter called module or modules) with “walking person,” “upraised hand,” and “countdown digit” icons. This specification includes the following sizes (nominal message bearing surface): 406 mm x 457 mm (16 in x 18 in), 305 mm x 305 mm (12 in x 12 in), and 229 mm x 229 mm (9 in x 9 in). This specification refers to definitions and practices described in **Pedestrian Traffic Control Signal Indications (PTCSI) Part 2: Light Emitting Diode (LED) Pedestrian Traffic Signal Modules (PTCSI) Adopted March 19, 2004,** and published in the *Equipment and Materials Standards of the Instituteof Transportation Engineers (ITE)* and contains additional requirements to ensure optimum long-term reliability and performance.

1.2 Manufacturer’s Requirements and Approvals

1.2.1 Manufacturer’s supplying products to this specification must be a registered participant and have the base part numbers being provided listed on the Intertek-ETL LED Traffic Signal Modules Certification Program approved-products website. “Countdown Only” Modules do not require having the part number listed on the program website.

1.2.2 All LED Pedestrian Signal Modules shall be produced in a NAFTA-participating country.

1.2.3 All 12 x 12 and 16 x 18 products shall be CSA-approved.

2. Physical and Mechanical Requirements

2.1 General

2.1.1 Usage: Modules shall fit into pedestrian signal housings manufactured in accordance with the ITE PTCSI Standard without modification to the housing.

2.1.2 Installation requirements: Installation of a module into an existing pedestrian signal housing shall only require the removal of the existing optical unit components; i.e., lens, lamp module, gaskets, and reflector, shall be weather-tight and fit securely in the housing; and shall connect directly to existing electrical wiring. Installation shall not require special tools.

2.1.3 The sizes of the message bearing surfaces shall be in accordance with the dimensions given in Table 1.

Table 1—Dimensions of Hand/Person Signal Sizes

Message Bearing Surface Height x Width	Minimum Message Size Height x Width
229 mm x 229 mm (9" x 9")	152 mm x 89 mm (6" x 3.5")
305 mm x 305 mm (12" x 12")	297 mm x 178 mm (11" x 7")
406 mm x 457 mm (16" x 18")	297 mm x 178 mm (11" x 7")

2.1.4 All countdown display digits shall be 9 inches in height (225 mm) to allow for use in all size crosswalks to comply with MUTCD recommendations.

2.2 The LED Signal Module

2.2.1 The module shall be capable of replacing the optical component of the pedestrian indication.

2.2.2 The lens shall have a textured outer surface to reduce glare.

2.2.3 The module lens may be a replaceable part without the need to replace the complete module.

2.2.4 Icons that are printed on the lens shall be on the interior surfaces in order to prevent scratching and abrasion to the icons.

2.2.5 All icons and numbers shall have a uniform incandescent, nonpixilated appearance.

2.2.6 All LED utilized to illuminate the Hand and Person icons shall be LED that have been manufactured utilizing material that have industry acceptance as being suitable for uses in outdoor applications. At no time is the use of LED that utilizes AlGaAstechnology acceptable.

2.2.7 The configurations of the walking person icon, upraised hand icon, and countdown digits are illustrated in Figure 1, Figure 2, and Figure 3 respectively. All icons shall be the meet the minimum size requirements of Table 1.

2.2.8 The LED countdown display shall consist of two “7-segment” digits forming the time display. The countdown shall be capable of displaying the digits 0 through 99.

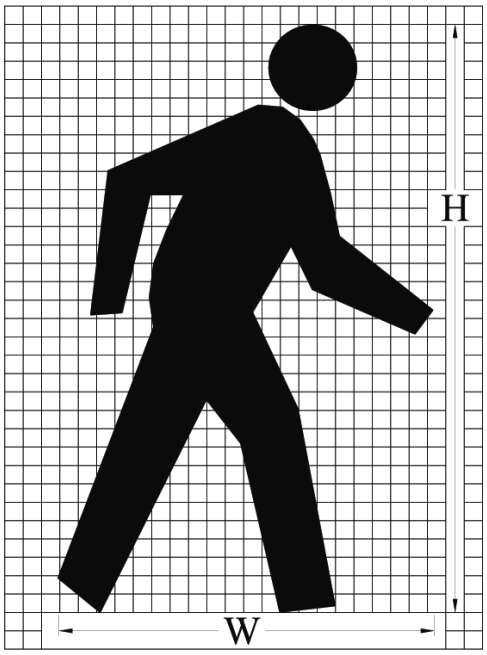


Figure 1—Walking Person icon

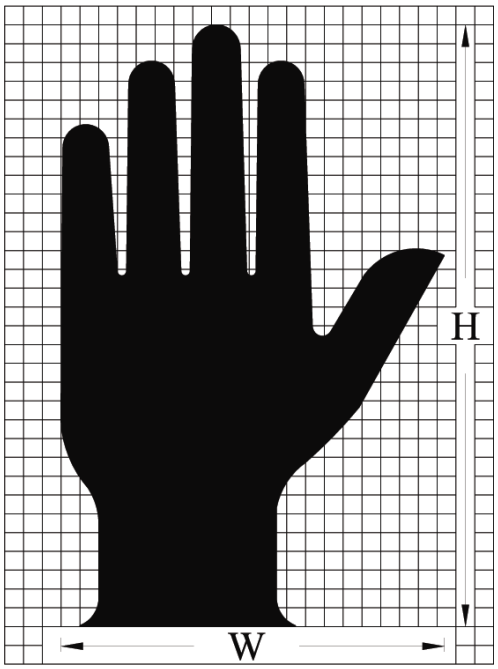


Figure 2—Upraised Hand icon

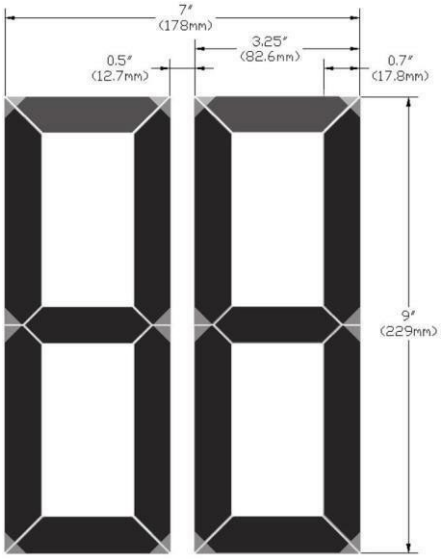


Figure 3—Countdown Display

2.3 Environmental Requirements

2.3.1 All exposed components of a module shall be suitable for prolonged exposure to the environment without appreciable degradation that would interfere with function or appearance. As a minimum, selected materials shall be rated for service for a period of a minimum of 60 months in a south-facing Arizona Desert installation.

2.3.2 A module shall be rated for use throughout an ambient operating temperature range, measured at the exposed rear of the module, of -40°C (-40°F) to +74°C (+165°F).

2.3.3 A module shall be protected against dust and moisture intrusion, including rain and blowing rain, per Mil-STD-810F Method 506.4 Procedure 1.

2.4 Construction

2.4.1 The module shall be a single, self-contained device, not requiring on-site assembly for installation into an existing traffic signal housing.

2.4.2 The assembly and manufacturing process for the module shall be designed to assure all internal LED and electronic components are adequately supported to withstand mechanical shock and vibration from high winds and other sources.

2.5 Materials

2.5.1 Materials used for the lens and module construction shall conform to ASTM specifications for the materials, where applicable.

2.5.2 Enclosures containing either the power supply or electronic components of the signal module shall be made of UL94 flame-retardant materials. The module lens is excluded from this requirement.

2.6 Module Identification

2.6.1 Each module shall be identified on the backside with the manufacturer's name, model, operating characteristics, and serial number. The operating characteristics identified shall include the nominal operating voltage and stabilized power consumption in watts and Volt-Amperes. The main module label, which includes the module's serial number (or date code) and the model number, shall be attached using polyester or vinyl self-adhesive labels. The use of paper labels is not acceptable.

2.6.2 Modules shall have a prominent and permanent vertical indexing indicator; i.e., UP Arrow, or the word UP or TOP, for correct indexing and orientation in the signalhousing.

2.6.3 Modules conforming to all requirements of this specification shall have a statement on an attached label which states conformance to the latest version of the ITE PTCSI – Part 2 LED Pedestrian Signal Specification.

2.6.4 All modules must be labeled with the ETL-Verified label shown in Figure 4. This label designates the compliance and listing with the Intertek ETL Traffic Signal Certification Program.

3. Photometric Requirements

3.1 Luminance, Uniformity, and Distribution

3.1.1 For a minimum period of 60 months, the minimum maintained luminance values for the modules under the operating conditions defined in Sections 2.3.2 and 4.2.1, when measured normal to the plane of the icon surface, shall not be less than:

- Walking Person: 2,200 cd/m^2
- Upraised Hand: 1,400 cd/m^2
- Countdown Digits: 1,400 cd/m^2

3.1.1.1 The luminance of the emitting surface, measured at angles from the normal of the surface, may decrease linearly to a value of 50% of the values listed above at an angle of 15 degrees.

3.1.1.2 The light output requirements in this specification apply to pedestrian signal heads without any visors, hooded or louvered (egg-crate). Addition of such visors may affect the light output of the signal head.

3.1.2 The uniformity of the walking person, upraised hand, and countdown digit icons' luminance shall meet a ratio of not more than 1 to 5 between the minimum and maximum luminance values, as measured in 12 mm (0.5 in) diameter spots.

3.1.3 When operating within the temperature range specified in Section 2.4.2, the average luminance of the module shall not exceed three times the maintained minimum luminance of the modules, as defined in Section 3.1.1.

3.2 Chromaticity

3.2.1 The standard colors for the LED Pedestrian Signal Module shall be White for the walking person and Portland Orange for the upraised hand and countdown digit icons. The colors for these icons shall conform to the following color regions, based on the 1931 CIE chromaticity diagram:

Walking Person—White:

Blue boundary:	$x = 0.280.$
1st Green boundary:	$0.280 \le x < 0.400$
	$y = 0.7917 \cdot x + 0.0983.$
2nd Green boundary:	$0.400 \le x < 0.450$
	$y = 0.4600 \cdot x + 0.2310.$
Yellow boundary:	$x = 0.450$
1st Purple boundary:	$0.450 \le x < 0.400$
	$y = 0.4600 \cdot x + 0.1810.$
2nd Purple boundary:	$0.400 \le x < 0.280$
	$y = 0.7917 \cdot x + 0.0483.$

Point	White	
	x	*y*
1	0.280	0.320
2	0.400	0.415
3	0.450	0.438
4	0.450	0.388
5	0.400	0.365
6	0.280	0.270

Upraised Hand and Countdown Digits—Portland Orange:

Yellow boundary:	$y = 0.390$
White boundary:	$0.600 \le x \le 0.680$
	$y = 0.990 - x$
Red boundary:	$y = 0.331.$

Point	Portland Orange	
	x	*y*
1	0.6095	0.390
2	0.600	0.390
3	0.659	0.331
4	0.669	0.331

The color regions are illustrated in Attachment 1.

3.3 Color Uniformity

3.3.1 The uniformity of the emitted colors shall be such that any color measurement within a 12 mm (0.5 in) spot on the emitting surface shall fall within the following regions around the average measured color of the entire emitting surface:

Walking Person—White: $\sqrt{(\Delta x^2)+(\Delta y^2)} \leq 0.04$;

where Δx and Δy are the differences in the chromaticity coordinates of the measured colors to the coordinates of the average color, using the CIE 1931 Chromaticity Diagram and a 2-degree Standard Observer.

Upraised Hand and Countdown Digits—Portland Orange:

The dominant wavelength for all individual color measurements shall be within ±3 nm of the dominant wavelength for the average of all the individual color measurements.

4. Electrical

4.1 General

4.1.1 All wiring shall meet the requirements of Section 13.02 of the VTCSH standard. Secured, color-coded, 600V, 18 AWG jacketed wires, 1 meter (39 in) in length, conforming to the NFPA 70, National Electrical Code, and rated for service at +105°C, shall be provided.

4.1.2 The following color scheme shall be used for the module's AC power leads: Orange for the upraised hand, Blue for the walking person, and White for common. A "countdown only" module shall contain an orange wire for connection to the hand, a blue wire for connection to the person, and a white wire for common connection.

4.1.3 For modules containing a Hand and Person Overlay display as well as a Countdown Timer display: Three wires (orange, blue, white) shall be provided for electrical connection. The countdown portion of the LED module shall be internally wired to the incoming Hand/Person power.

4.1.4 The AC power leads shall exit the module via a rubber grommetted strain relief and shall be terminated with insulated female quick-connect terminals with spade/tab adapters. The leads shall be separate at the point at which they leave the module.

4.1.4.1 All external wiring utilized in the modules shall be anti-capillary-type wire to prevent the wicking of moisture to the interior of the module.

4.1.5 The Hand and Person Icons shall utilize separate power supplies. On countdown products, the countdown module must have its own power supply but may take the incoming AC power from the hand/person AC signal lines. All power supplies shall be located inside the signal module.

4.1.5.1 All power supplies shall be conformal coated for additional protection.

4.2 Voltage Range

4.2.1 LED signal modules shall operate from a 60±3 Hz AC line power over a voltage range from 80 to 135 VAC RMS. Nominal operating voltage for all measurements shall be 120 ± 3 VAC RMS, unless otherwise specified.

4.2.2 Fluctuations in line voltage over the range of 80 to 135 VAC shall not affect luminous intensity by more than ±10 percent.

4.2.3 The module circuitry shall prevent flicker of the LED output at frequencies less than 100 Hz over the voltage range specified in Section4.2.1.

4.2.4 Low-Voltage Turn-OFF: There shall be no visible illumination from the LED signal module when the applied voltage is less than 35 VAC.

4.2.5 Turn-ON and Turn-OFF Time: A module shall reach 90% of full illumination (turn-ON) within 75 msec of the application of the nominal operating voltage. The signal shall cease emitting visible illumination (turn-OFF) within 75 msec of the removal of the nominal operating voltage.

4.2.6 Default Condition: Applies to modules that have both the walking person and the hand as one module: For abnormal conditions when nominal voltage is applied to the unit across the two-phase wires or simultaneously to both upraised hand and walking person icons, the pedestrian signal unit shall default to the upraised hand symbol. For units that contain a countdown module, the countdown shall display 0 then blank.

4.3 Transient Voltage Protection

4.3.1 The on-board circuitry of the module shall include voltage surge protection to withstand high-repetition noise transients and low-repetition high-energy transients as stated in Section 2.1.8, NEMA Standard TS 2-2003.

4.4 Electronic Noise

4.4.1 The LED signal and associated on-board circuitry shall meet the requirements of the Federal Communication Commission (FCC) Title 47, Subpart B, Section 15 regulations concerning the emission of electronic noise by Class A digital devices.

4.5 Power Factor (PF), AC Harmonics, and Power

4.5.1 Modules shall provide a power factor of 0.90 or greater when operated at nominal operating voltage and 25ºC (77ºF).

4.5.2 Total harmonic distortion induced into an AC power line by a module at nominal operating voltage and 25ºC (77ºF) shall not exceed 20%.

4.5.3 Typical Power at 25ºC (77ºF) for the Pedestrian Signal Modules shall be the values shown in Table 2.

Table 2—Nominal Power of Pedestrian Signals

Size	Description	Wattage @ 25ºC		
		Hand	Person	Countdown[1]
9 x 9	Person Only	N/A	6	N/A
9 x 9	Hand Only	6	N/A	N/A
12 x 12	Overlay H & P	8	6	N/A
12 x 12	Person Only	N/A	7	N/A
12 x 12	Hand Only	8	N/A	N/A

[1] Wattage shown is for the countdown module when the digit “18” is displayed.

12 x 12	Countdown Timer	N/A	N/A	5
16 x 18	Overlay H & P	8	6	N/A
16 x 18	Side by Side H & P	8	7	N/A
16 x 18	H & P Overlay w/Countdown	9	7	5

4.6 Controller Assembly Compatibility

4.6.1 The current draw for hand and person icons shall be sufficient to ensure compatibility and proper triggering and operation of load current switches and conflict monitors in signal controller units.

4.6.2 OFF-State Voltage Decay: When the hand or person icon is switched from the ON-state to the OFF-state the terminal voltage shall decay to a value less than 10 VAC RMS in less than 100 milliseconds when driven by a maximum allowed load switch leakage current of 10 milliamps peak (7.1 milliamps AC).

4.7 Countdown Drive Circuitry

4.7.1 The countdown portion of the signal shall have a high off-state input impedance so as not to provide a load indication to conflict monitors and interfere with the monitoring of the pedestrian signal. The input impedance of the countdown circuitry shall maintain a voltage reading above 25 VAC to the conflict monitor for up to four units connected on the same channel.

4.7.2 The countdown timer drive circuitry shall not be damaged when subjected to defective load switches providing a half wave signal input.

4.7.3 The countdown module shall be compatible with all traffic signal controllers that are fully compliant to NEMA TS-1, NEMA TS-2, Type 170, and Type 2070 traffic signal controller specifications.

4.7.4 The countdown module shall have an internal conflict monitor circuit preventing any possible conflicts between the Hand/Person signal indications and the Countdown Timer display. It shall be impossible for the display to countdown during a solid Hand indication.

4.8 Countdown Functionality

4.8.1 Per MUTCD Manual 2003 edition, with revisions 1 and 2 incorporated dated December 2007, Section 4E.07: “Countdown displays should ONLY be used during the “Clearance Cycle.” They should NOT be used during the walk interval nor during the yellow change interval of a concurrent vehicular phase.”

4.8.2 The countdown timer module shall have a micro-processor capable of recording the pedestrian crossing timing when connected to a traffic controller. It shall be capable of displaying the digits 0 through 99.

4.8.3 When connected, the module shall blank out the display during the initial cycle while it records the countdown time using the Walk (Person) and D/Walk (Flashing Hand) signal indications. The hand and person icons shall be displayed as normal during this cycle.

4.8.4 The countdown timer module shall continuously monitor the traffic controller for any changes to the pedestrian phase time and reprogram itself automatically, if needed.

4.8.5 The countdown module shall register the time for the walk and clearance intervals individually and shall begin counting down at the beginning of the pedestrian clearance interval. The countdown module shall display the numerals in a continuous display and shall not flash during the countdown.

4.8.6 When the flashing Hand becomes solid, the module shall display 0 for one second and then blank-out. The display shall remain dark until the beginning of the next countdown.

4.8.7 In the event of a preemption sequence, the countdown module shall skip the preempted clearance time and reach 0 at the same time as the flashing Hand becomes solid and then remain dark until the nextcycle.

4.8.8 In the cycle following a preemption call, the signal shall display the correct time and not be affected by the reduced previous cycle. The countdown shall remain synchronized with the signal indications and always reach 0 at the same time as the flashing Hand becomes solid.

4.8.9 The countdown timer shall be capable of displaying two consecutive complete Pedestrian Phases outputted by the traffic controller (no steady Hand signal between cycles). **NOTE:** When a controller is programmed with the option to serve a second consecutive pedestrian phase (walk followed by flashing don't walk) if a pedestrian activates a pedestrian button during the clearance interval, and the controller is set to allow a second consecutive phase, the countdown will blank out during the walk, and restart counting down the correct time during the flashing don't walk, just as in a regular PED phase.

4.8.10 The countdown module shall not display an erroneous or conflicting time when subjected to defective load switches. Should there be a short power interruption during the PED clearance interval, or if voltage is applied to both the hand and person simultaneously, the display will go to 0 then blank.

4.8.11 The countdown module shall have accessible dip-switches for the user selectable options. The unit shall have a removable plug on the rear allowing easy access to control the user selectable functions. The unit shall be shipped from the factory with the specified default setting.

4.8.11.1 Switch 1: Blank Cycle Following a Timing Change—Factory default is "OFF." When this switch is "OFF," the unit will allow the time to be displayed normally during the cycle following a truncated timing such as a preemption call. The countdown shall be capable of displaying the correct time and not affected by the previous reduced cycle. The unit will require two consecutive reduced cycles of identical value to validate and record a new time setting. If the timing is extended, the unit will record it immediately. In the "ON" position when a change in timing is detected, the unit will blank out during the following cycle while the new cycle time is measured and recorded, if confirmed.

4.8.11.2 Switch 2: Disables Auto-sync Mode—Factory default setting is "OFF." When this switch is in the "OFF" position, the auto-sync is enabled. When the clearance interval begins and the initial flash of the hand is not in sync with the walk signal, the unit will measure the offset and reduce the duration of the first secondby

the value of the offset. This will ensure the countdown reached 0 at the same time as the flashing hand becomes solid. In the “ON” position there is no time correction when the flashing hand is in offset with the walk signal. The duration of the first second will not be reduced and the hand will appear solid shortly before the countdown reaches 0.

4.8.11.3 Switch 3: Countdown Starts with Flashing Hand Signal—Factory default setting is “ON.” When this switch is “ON,” the countdown begins when the hand signal is turned on. With this switch “ON” and the auto-sync mode enabled, a short power interruption will have no effect on the countdown display. With switch 3 in the “OFF” position, the countdown begins when the walk signal is turned off. This eliminates the effect of an offset hand signal. When switch 3 is in the “OFF” position, the auto-sync switch 2 has no effect on the countdown. In this mode if the power to the walk signal is interrupted, the unit will interpret this as the start of the clearance interval and will display the countdown time for 2 seconds before the operation is cancelled. The countdown will resume with the normal ending of the walk signal.

4.8.11.4 Switch 4: Stores Time Value in Memory (Immediate. Restart)—Factory default setting is “OFF.” When this switch is in the “OFF” position and power is removed from the unit, the time value stored in the unit is erased. The unit will need to run a dark cycle before it can display the countdown again. In the “ON” position, the countdown timing is stored in memory. Following a power interruption, the unit will restart with the stored value and not remain dark during the learning cycle. If the value is different after restart, it will be recorded and displayed correctly at the following cycle.

4.8.11.5 Switch 5: All LEDs “ON” (Test Mode)—Factory default setting is “OFF.” With this switch in the “ON” position, all LEDs are turned on simultaneously. With both switches 4 and 5 in the “ON” position, the LED test mode will also scan the seven individual segments of both digits.

4.8.11.6 The countdown shall be disabled when all switches are placed in the “ON” position.

5. Quality Assurance

5.1 General

5.1.1 Quality Assurance Program: Modules shall be manufactured in accordance with a vendor quality assurance (QA) program. The QA program shall include two types of quality assurance: (1) design quality assurance; and (2) production quality assurance. The production quality assurance shall include statistically controlled routine tests to ensure minimum performance levels of modules built to meet this specification.

5.1.2 Record Keeping: QA process and test results documentation shall be kept on file for a minimum period of seven years.

5.1.3 Conformance: Module designs not satisfying design qualification testing and the production quality assurance testing performance requirements in Sections 5.3 and 5.4 should not be labeled, advertised, or sold as conforming to this specification.

5.1.4 Potential suppliers must complete and submit the LED Module Supplier checklist shown in Table 3 and provide a copy of the checklist with the submission of any proposals.

5.2 Manufacturer's Serial Numbers

Each module shall be identified with the information specified in Section 2.6.

5.3 Production Tests and Inspections

5.3.1 Production Test Requirements: All modules shall undergo the following Production Testing and Inspection prior to shipment. Failure of a module to meet the requirements of Production Testing and Inspection shall be cause for rejection. Test results shall be maintained per the requirement of Section 5.1.2.

5.3.1.1 All Production Tests shall be performed at an ambient temperature of 25ºC (77ºF) and at the nominal operating voltage of 120VAC.

5.3.2 Production Luminance Test: Hand/Person/Digit icons shall be tested for maintained minimum luminance. Any measurement with a correlation to the luminance requirements of Section 3.1.1 may be used. Modules that do not meet the maintained minimum luminance requirements as per Section 3.1.1 shall be rejected.

5.3.3 Power Factor: Hand/Person icons shall be tested for power factor per the requirements of Section 4.5.1. A commercially available power factor meter may be used to perform this measurement. Failure of a module to meet the requirements for power factor, Section 4.5.1, shall be cause for rejection of the module.

5.3.4 Current Consumption Measurement: Hand/Person icons shall be measured for current flow in Amperes. The measured current values shall be compared against the design current values from design qualification measurements in Section 5.4.5.1. A measured current consumption in excess of 120% of the design qualification current value for an ambient temperature of 25ºC (77ºF) shall be cause for rejection of the module.

5.3.5 Visual Inspection: All modules shall be visually inspected for any exterior physical damage or assembly anomalies. Careful attention shall be paid to the surface of the lensto ensure there are no scratches (abrasions), cracks, chips, discoloration, or other defects. The presence of any such defects shall be cause for rejection of the module.

5.4 Design Qualification Testing

5.4.1 Design Qualification testing shall be performed on the hand/person icons of new module designs, and when a major design change has been implemented on existing hand/person pedestrian signal designs. Modules used in design qualification testing shall be representative of the manufacturer's proposed normal production.

5.4.1.1 Testing shall be performed once every five years or when the module design or LED technology has been changed. Test data shall be retained by the module manufacturer in accordance with Section 5.1.2 or for 60 months following final production of a specific design, whichever is longer.

5.4.1.2 Six modules shall be used in Design Qualification Testing. All six modules shall be subjected to Conditioning, Section 5.4.2, followed by the Environmental Testing, Section 5.4.3. Following the Environmental Testing, three modules shall undergo Photometric and Colorimetric Tests, Section 5.4.4. The remaining three modules shall undergo the Electrical Tests, Section 5.4.5, and

Controller Compatibility Tests, Section 5.4.5.11. Tests shall be conducted in the order described herein, unless otherwise specified.

5.4.1.3 In order for a module design to be considered acceptable for marking with the label described in 2.7.1, all tested modules must comply with the acceptance/rejection criteria for the Environmental Tests, Section 5.4.3; Photometric and Colorimetric Tests, Section 5.4.4; Electrical Tests, Section 5.4.5; and Controller Assembly Compatibility Tests, Section 5.4.5.11.

5.4.2 Conditioning: Modules shall be energized for a minimum of 24 hours, at 100% duty cycle, in an ambient temperature of +60°C (+140°F).

5.4.3 Environmental Testing:

5.4.3.1 Mechanical Vibration Testing: Three modules shall be tested per MIL-STD-883, Test Method 2007, using three 4-minute cycles along each x, y, and z axis, at a force of 2.5 Gs, with a frequency sweep from 2 Hz to 120 Hz.

5.4.3.2 Temperature Cycling: Temperature cycling shall be performed per MIL-STD-883, Test method 1010. The temperature range shall be per Section 2.3.2. A minimum of 20 cycles shall be performed with a 30-minute transfer time between temperature extremes and a 30-minute dwell time at each temperature. Modules under test shall be nonoperating.

5.4.3.3 Moisture Resistance: Moisture resistance testing shall be performed on a sample of three modules per MIL-STD-810F, Procedure I, Rain, and Blowing Rain. The test shall be conduced on a stand-alone unit, without a protective housing. The rainfall rate shall be 1.7 mm/min (4 in/hr) and droplet size shall predominantly be between 0.5 mm and 4.5 mm. The module shall be rotated through 120 degrees and the duration of the test shall be 30 minutes. The module shall be energized throughout the test. The water shall be at 25°C. The wind velocity shall be 80 km/hr (50 mph). Any evidence of internal moisture into the module shall be cause for rejection.

5.4.3.4 UV Stabilization: Documentation may be provided that clearly demonstrates that the external lens complies with the requirements of Section 2.5.1.

5.4.3.5 Environmental Tests Evaluation: At the conclusion of the Environmental Tests, all the modules will be visually inspected for damage.

5.4.3.6 Acceptance/Rejection Criteria: The loosening of the lens, or any internal components, or evidence of other physical damage, such as cracking of the module lens or housing, presence of internal moisture after testing, a change in haze of >15%, if the module extinguished itself shall be considered a failure for the proposed design.

5.4.4 Photometric and Colorimetric Tests: Three of the modules that were subjected to the Environmental Tests shall undergo Photometric and Colorimetric Tests. Unless otherwise specified, these tests shall be performed with the modules energized at nominal operating voltage (120 VAC).

5.4.4.1 Maintained Minimum Luminance: The sample set shall be tested for maintained minimum luminance at both 25°C and 74°C. Prior to making

measurements, each module shall be operated at a 100% duty cycle for a minimum of 60 minutes at the test temperature.

5.4.4.2 For elevated temperature testing at 74°C, the modules to be tested shall be mounted in a temperature-testing chamber so that the external surface of the emitting lens is outside the chamber and all portions behind the lens are within the chamber at a temperature of 74ºC (165ºF). The air temperature in front of the lens of the module shall be maintained at a minimum of 49°C (120°F) during the elevated temperature testing.

5.4.4.2.1 Measurements shall be made using a luminance meter located on the physical axis of the module lens at a distance such that the selected aperture samples a spot size of 12 mm (0.5 inch) at the lens surface. The position of the luminance meter shall be translated from side to side and up and down, so as to sample nine points across the emitting surface of the module.

5.4.4.2.2 The luminance values for the nine points shall be recorded and the average value calculated.

5.4.4.2.3 Modules for which the calculated average value of luminance does not meet the requirements of Section 3.1.1 shallbe rejected.

5.4.4.3 Luminance Uniformity: The sample set shall be tested in accordance with the requirements of Section 3.1.2, using the recorded values of luminance, at a testing temperature of 25°C. The highest and lowest values of luminance shall be recorded and compared. Modules not meeting requirements of Section 3.1.2 shall be rejected.

5.4.4.3.1 Maximum Luminance: The sample set shall be tested in accordance with the requirements of Section 3.1.3, using therecorded values of luminance, at testing temperatures of 25°C and 74°C. Modules for which the calculated average value of the luminance exceeds the limit established in Section 3.1.3, at either or both temperature levels, shall be rejected.

5.4.4.4 Chromaticity: From the sample set, two modules shall be measured for chromaticity per the requirements of Section 3.2. Prior to making measurements, each module shall be operated at a 100% duty cycle for a minimum of 60 minutes at +25°C (+77°F). Color measurements shall be made using a spectro-radiometer with a maximum bandwidth of 4 nm, or a colorimeter that has a measurement uncertainty of less than 2.5% over the emission bandwidth of the icon under measurement.

5.4.4.4.1 Measurements shall be made by locating the instrument on the axis normal to the emitting surface of the icon, at a distance such that the meter samples a spot size of 12 mm (0.5 inch) at the lens surface. The position of the instrument shall be translated from side to side and up and down, so as to sample nine points across the emitting surface of the module.

5.4.4.4.2 The chromaticity coordinates of the emitted light at the nine points shall be recorded and the average value calculated. In addition, the dominant wavelengths for the nine sampled points of the hand icon shall be calculated and recorded.

5.4.4.4.3 Modules for which the calculated average chromaticity coordinates do not meet the requirements of Section 3.2 shall be rejected.

5.4.4.4.4 Color Uniformity: The sample set shall be tested in accordance with the requirements of Section 3.3, using the recorded values of the chromaticity coordinates (walking person—white icon) or the dominant wavelengths (hand—portland orange icon), from Section 5.4.4.4. Modules not meeting requirements of Section 3.3 shall be rejected.

5.4.4.5 Photometric and Colorimetric Tests Evaluation: At the conclusion of the Photometric and Colorimetric Tests, the measurement data shall be compared to the requirements of Sections 3.1, 3.2, and 3.3.

5.4.4.6 Acceptance/Rejection Criteria: The failure of any module to meet all of the requirements for maintained minimum luminance, Section 3.1.1; and maximum permissible luminance, Section 3.1.3; at 25°C and/or 74°C, and the requirements for luminance uniformity, Section 3.1.2; Chromaticity, Section 3.2; and Color Uniformity, Section 3.3; at 25°C, shall be considered a failure of the proposed design.

5.4.5 Electrical

5.4.5.1 Current Consumption: The sample set shall be measured for current flow in Amperes. The measured current values shall be used for quality comparison of Production Quality Assurance current measurements on production modules.

5.4.5.2 Temperature vs. Power Consumption: The sample set shall be tested to measure the change in power consumption in Watts versus the change in temperature over the specified operating temperature range. This data shall be recorded and may be made available to all end users.

5.4.5.3 Power Consumption vs. Long-Term Life: If the rated power consumption of the module at 25°C (77ºF) and 74ºC (165ºF) will change more than 10% over time, the manufacturer may provide documentation showing the projected power consumption in Watts of the module over a period of 60 months from the date of installation. This documentation may include data for the following temperature points: 0°C (32ºF), 25°C (77ºF), 50ºC (122ºF), and 74ºC (165ºF).

5.4.5.4 Power Factor (PF): The sample set shall be measured for power factor per the requirements of Section 4.5.1. A commercially available power factor meter may be used to perform this measurement. The PF shall be calculated separately for each of the icons for the module.

5.4.5.5 Total Harmonic Distortion (THD): The sample set shall be measured for total harmonic distortion per the requirements of Section 4.5.2. A commercially available total harmonic distortion meter may be used to perform this measurement. The THD shall be measured for each of the icons for the module.

5.4.5.6 Low Voltage Turn-OFF: The sample set shall be measured to ensure compliance with the low voltage turn-off requirement of Section 4.2.4. To test for this condition, each icon must first be fully illuminated at the nominal operating voltage. The applied voltage shall then be reduced to the point where there is no visible illumination. This point must be greater than 35 VAC RMS AC.

5.4.5.7 Turn-ON and Turn-OFF Times: The sample set shall be measured to ensure compliance with the turn-on and turn-off requirements of Section 4.2.5. The measurement shall be conducted using a two-channel oscilloscope to measure the time delay between when the module is energized at 120 VAC RMS and when the light output reaches 90% of full output. A photo-multiplier tube shall be used to measure the light output of the module. The same apparatus shall be used to measure the time delay between when the module is de-energized and when the light output reaches 0% of full output. The time in msec shall be plotted in the X axis and light output shall be plotted in the Y axis.

5.4.5.7.1 A module not reaching 90% nominal light output within 75 msec at startup, or still showing light output 75 msec after being de-energized, shall be deemed to have failed this test.

5.4.5.8 Electronic Noise: From the sample set, a sample of 2 modules shall be tested. The modules shall be tested for conformance with the requirements of a Class A digital device, as specified in FCC Title 47, Subpart B, Section 15.109(b).

5.4.5.9 Nondestructive Transient Immunity: The sample set shall be tested for transient immunity using the procedure described in Section 2.1.8, NEMA Standard TS 2-2003. Failure to meet these requirements shall be cause for rejection.

5.4.5.10 Electrical Tests Evaluation: At the conclusion of the Electrical Tests, the measurement data shall be compared to the requirements of Sections 4.2 through 4.5.

5.4.5.10.1 Acceptance/Rejection Criteria: The failure of any module to meet the applicable requirements of Sections 4.2 through 4.5 shall be considered a failure of the proposed design.

5.4.5.11 Controller Assembly Compatibility: Due to the low load current draw and high off-state impedance of modules, testing shall be performed to ensure the module design is compatible and operates properly with load current switches and conflict monitors in NEMA and Type 170 traffic signal control units.

Before performing the following tests, the manufacturer should ascertain which type of signal controller unit(s) the procuring traffic authority customer has in use and tailor these tests to meet the requirements of that type and model of controller unit(s).

5.4.5.11.1 Load Switch Compatibility: The sample set shall be tested for compatibility and proper operation with load current switches. Each module shall be connected to a variable AC voltage supply. The AC line current into the module shall be monitored for sufficient current draw to ensure proper load switch operation while the voltage is varied from 80 VAC RMS to 135 VAC RMS. Failure of the current draw to ensure proper load current switch operation shall be cause for rejection.

5.4.5.11.2 Signal Conflict Monitor (MMU) Compatibility: The sample set shall be tested for compatibility and proper operation with signal conflict monitors. Each module shall be operated from a 135 VAC RMS supply. A 19.5 kΩ resistor shall be wired in series in the hot line between the module and the AC power supply. A single-pole-single-throw switch shall be wired in parallel across the 19.5 kΩ resistor. A 220 kΩ shunt resistor shall be wired between the hot line connection and the neutral line connection on the module. Conflict monitor compatibility shall be tested by measuring the voltage decay across the 220 kΩ shunt resistor as follows: The single-pole-single-throw switch shall be closed, shorting out the 19.5 kΩ resistor, allowing the AC power supply to illuminate the module. Next, the switch shall be opened, and the voltage across the 220 kΩ shunt resistor shall be measured for a decay to a value equal to or less than 10 VAC RMS within a time period equal to or less than 100 milliseconds. This test shall be repeated a sufficient number of times to ensure that testing occurs at the peak of the AC line voltage cycle.

A voltage decay across the 220 kΩ shunt resistor to a value greater than 10 VAC RMS or a decay time to 10 VAC RMS greater then 100 milliseconds shall be cause for rejection.

5.4.5.11.3 Controller Assembly Compatibility Evaluation: At the conclusion of the Controller Assembly Compatibility Tests, the measurement data shall be compared to the requirements of the specific make and model Controller Assembly with which the module design is intended to operate.

5.4.5.11.4 Acceptance/Rejection Criteria: Failure of the module to draw sufficient current to ensure compatibility with the load current switches in the appropriate Controller Assembly, Section 4.6.1, and/or failure of the circuit voltage to decay to a value equal to or lessthan 10 VAC RMS within a time period equal to or less than 100 milliseconds, Section 4.6.2, shall be considered a failure of the proposed design.

6.1 Warranty Requirements

6.2 Warranty

6.2.1 Manufacturers shall provide a written warranty issued by the factory located in the NAFTA country of module origin with the following minimum provisions:

6.2.2 Modules shall at the manufacturer's option be repaired or replaced if the module fails to function as intended due to workmanship or material defects within the first 60 months from the date of delivery.

6.2.3 Modules shall at the manufacturer's option be repaired or replaced if the module exhibits luminous intensities less than the minimum specified values within the first 60 months of the date of delivery.

6.2.4 Upon request, the LED lamp module manufacturer shall provide written documentation of its ability to satisfy a worst-case, catastrophic warranty claim.

6.2.4.1 A current corporate annual report duly-certified by an independent auditing firm, containing financial statements illustrating sufficient cash on hand and net worth to satisfy a worst-case, catastrophic warranty claim is an example of suitable documentation.

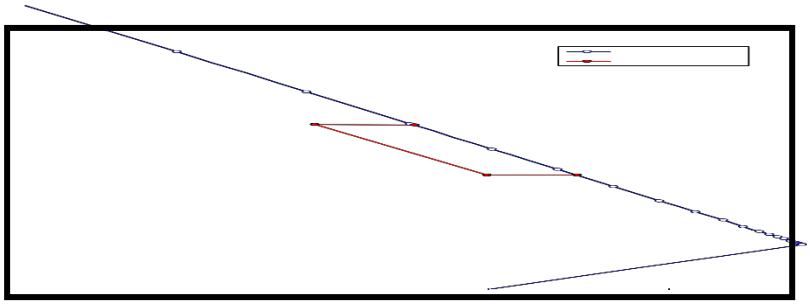
6.2.4.2 The documentation shall clearly disclose:

a) The country in which the factory of module origin is located.

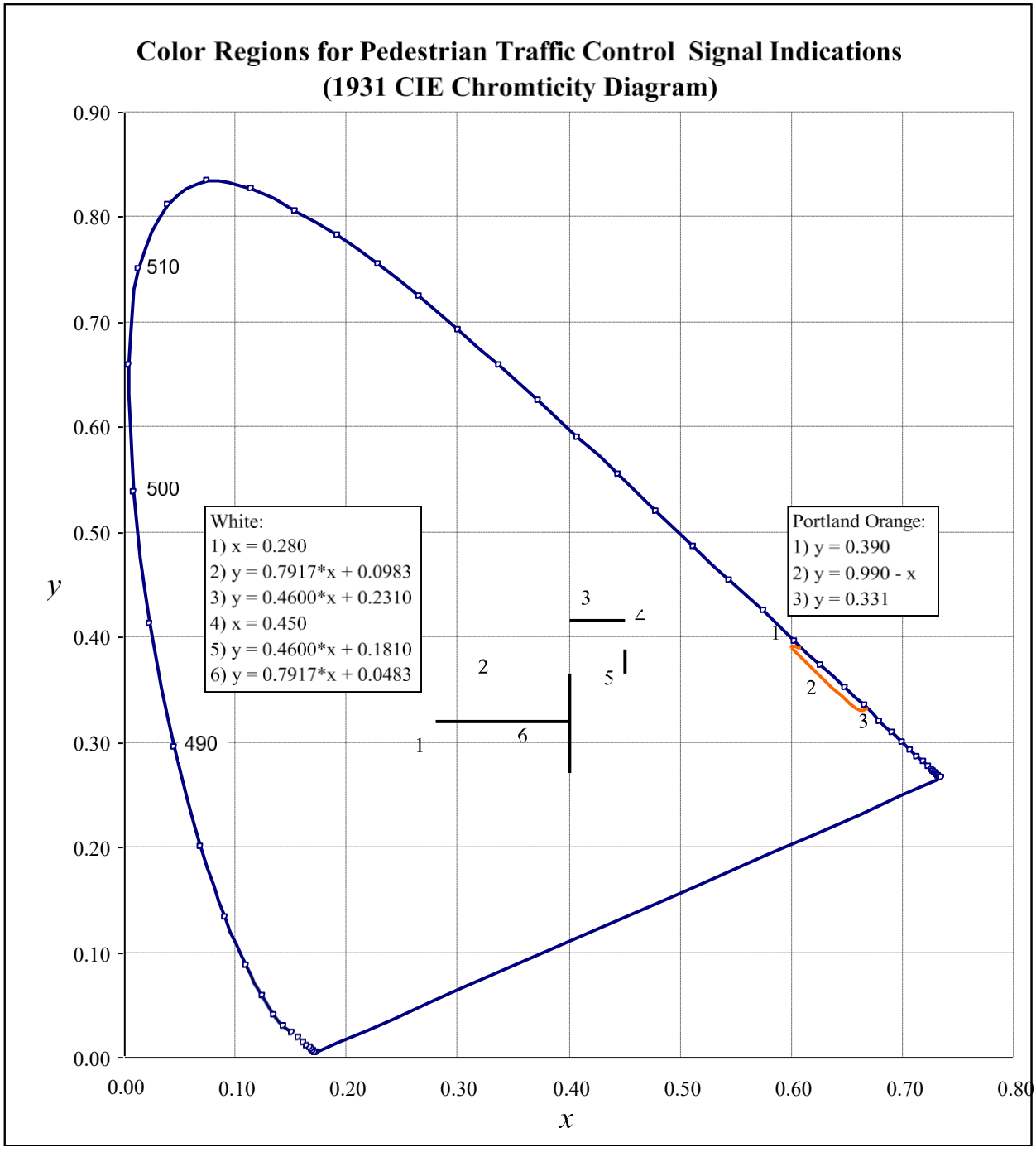
b) The name of the company or organization that owns the factory of module origin, including any and all of its parent companies and/or organizations, and their respective country of corporate citizenship.

6.2.4.3 For firms with business and/or corporate citizenship in the United States of less than seven years, the process by which the end-users/owners of the modules will be able to obtain worst-case, catastrophic warranty service in the event of bankruptcy or cessation-of-operations by the firm supplying the modules within North America, or in the event of bankruptcy or cessation-of-operations by the owner of the factory of origin, shall be clearly disclosed.

Figure 4.
Intertek ETL Verified Label



ATTACHMENT 1



LED Vehicle Arrow Signal Module Specification

1. Overview

1.1 Purpose

1.1.1 The purpose of this specification is to provide the minimum performance requirements for ***Omni-Directional*** 300 mm (12 in) Light Emitting Diode (LED) vehicle arrow traffic signals. This specification refers to procedures and definitions as described in the **Vehicle Traffic Control Signal Heads—Light Emitting Diode (LED) Vehicle Arrow Traffic Signal Supplement (VTCSH), Adopted July 1, 2007,** published by the Institute of Transportation Engineers (ITE) and contains additional requirements to ensure optimum long-term reliability and performance.

1.2 Manufacturer's Requirements and Approvals

1.2.1 The manufacturer supplying product to this specification shall have a minimum of seven years' experience in the manufacture of LED Traffic Signals with High-Flux LED's.

1.2.2 Manufacturers supplying products to this specification must be a registered participant and have the base part numbers being provided listed on the ***Intertek ETL LED Traffic Signal Modules Certification Program*** approved products website With unique long life module part numbers for products that carry a 15 year warranty.

1.2.3 If requested, documentation shall be provided by manufacturer demonstrating the changes made to their standard product that allows for ITE specification compliance over a 15 year warranty period.

1.2.2 All LED Traffic Signal Modules shall fully meet the "Buy American Provision of the ARRA of 2009". Certificate of Compliance shall be provided by the manufacturer prior to bid opening.

2. Physical and Mechanical Requirements

2.1 General

2.1.1 Modules shall fit into existing traffic signal housings built to the VTCSH Standard without modification to the housing, or shall be stand-alone units that incorporate a housing meeting the performance and design requirements of the VTCSH Standard.

2.1.2 Installation of a module into an existing signal housing shall not require the use of special tools. The module shall connect directly to the existing electrical wiring system.

2.2 LED Signal Module

2.2.1 A module shall be designed as replacement for the existing optical components or signal module in a signal housing, or shall provide a complete replacement of the signal head.

2.2.2 The module lens shall be hard-coated or otherwise made to comply with the material exposure and weathering effects requirements of the Society of Automotive Engineers (SAE) J576.

2.2.3 Tinted or Clear Lens: Unless designated otherwise in the below table the standard lens color shall be tinted with a color similar to the colors required in Section 3.2, Chromaticity, for all Red and Yellow modules and clear for all Green modules.

	300 mm (12") Arrows	
	Tinted	Clear
Red		
Yellow		
Green		

2.2.4 The module lens shall have a convex smooth exterior surface to minimize the buildup of dust and dirt.

2.2.5 The general configuration of the arrow icon is illustrated in Figure 2. The arrow should be oriented in the direction of its intended use. LED vehicle arrow traffic signal modules shall be manufactured for use as omni-directional arrows.

2.2.6 All LEDs utilized to illuminate arrow traffic signal modules shall be LEDs that have been manufactured utilizing materials that have industry acceptance as being suitable for uses in outdoor applications. At no time is the use of LEDs that utilize AlGaAs technology acceptable.

2.3 Environmental Requirements

2.3.1 All exposed components of a module shall be suitable for prolonged exposure to the environment, without appreciable degradation that would interfere with function or appearance. As a minimum, selected materials shall be rated for service for a period of a minimum of 60 months in a south-facing Arizona Desert installation.

2.3.2 A module shall be rated for use throughout an ambient operating temperature range, measured at the exposed rear of the module, of -40°C (-40°F) to +74°C (+165°F).

2.3.3 A module shall be protected against dust and moisture intrusion, including rain and blowing rain per Mil-Std-810F Method 506.4, Procedure 1.

2.4 Construction

2.4.1 A module shall be a self-contained device, not requiring onsite assembly for installation into an existing traffic signal housing. The power supply for the module shall be integral to the signal module.

2.4.2 Assembly and manufacturing processes for the module shall be designed to assure all internal LED and electronic components are adequately supported to withstand mechanical shock and vibration due to high winds and other sources.

2.5 Materials

2.5.1 Materials used for the lens and module construction shall conform to ASTM specifications for the materials where applicable. All lenses shall be hard-coated to protect the lens from abrasion.

2.5.2 Enclosures containing either the power supply or electronic components of the module shall be made of UL94 flame-retardant materials. The lens is excluded from this requirement.

2.6 Module Identification

2.6.1 Each module shall be identified on the backside with the manufacturer's name, model, operating characteristics, and serial number. The operating characteristics identified shall include the nominal operating voltage and stabilized power consumption, in watts and volt-amperes.

2.6.2 Omni-directional modules shall be clearly marked with the phrase "Suitable for mounting in any orientation."

2.6.3 Modules conforming to all nonoptional requirements of this specification shall have the following statement on an attached label: "Manufactured in Conformance with the ITE LED Vehicle Arrow Traffic Signal Supplement."

2.6.4 All modules must be labeled with the ETL Verified label shown in Figure 1. This label designates the compliance and listing with the Intertek ETL Traffic Signal Certification Program.

3. Photometric Requirements

3.1 Luminous Intensity, Uniformity, and Distribution

3.1.1 Minimum maintained luminous intensity: When operated under the conditions defined in Sections 2.3.2 and 4.2.1, the luminous intensity values for modules shall not be less than the values calculated using the method described below for a minimum period of 60 months.

3.1.1.1 For omni-directional LED vehicle arrow traffic signal modules, calculate the intensity factor ($f(I_{OD})$) for the range from 27.5 degrees up to 27.5 degrees down, and for 27.5 degrees left to 27.5 degrees right using the following equation:

$$f(I_{OD}) = 1.02 * e^{\left(-0.0038 * \theta^2_{OD}\right)}$$

where: $\emptyset_{OD} = \cos^{-1}(\cos(\emptyset_{Vert}) * \cos(\emptyset_{Horiz}))$, $\emptyset_{Vert}$ is the angle measured above or below a horizontal plane perpendicular to the face of the module lens, and $\emptyset_{Horiz}$ is the angle measured to the left or right from a vertical plane perpendicular to the face of the module lens. All angles are measured in degrees. Round the result to two significant figures.

3.1.1.1.1 Multiply the intensity factor ($f(I_{OD})$) by the appropriate peak minimum maintained luminous intensity value for the specified module color: Red—58.4 cd, Yellow—145.6 cd, and Green—76.0 cd. Round the resultant value of the luminous intensity to the first decimal place.

3.1.1.1.2 For the region where $\emptyset_{Vert}$ is between 2.5 degrees up and 2.5 degrees down, and $\emptyset_{Horiz}$ is between 2.5 degrees left and 2.5 degrees right, the values shall be the same as those calculated for $\emptyset_{Vert}$ = 2.5 degrees and $\emptyset_{Horiz}$ = 2.5 degrees.

3.1.1.1.3 There are no requirements for the region where $\emptyset_{OD}$ > 30 degrees.

3.1.1.2 Table 1 provides the minimum maintained luminous intensity values for omni-directional modules, over the required angular range.

3.1.2 Maximum permissible luminous intensity: When operated within the temperature range specified in Section 2.3.2, the actual luminous intensity for a module shall not exceed three times the required peak value of the minimum maintained luminous intensity for the selected signal color.

3.1.3 Luminance uniformity: The uniformity of the signal output across the emitting section of the module lens (i.e., the arrow icon) shall not exceed a ratio of 10 to 1 between the maximum and minimum luminance values (cd/m^2).

3.2 Chromaticity

3.2.1 Color regions: The measured chromaticity coordinates of modules shall conform to the color regions specified in the VTCSH LED Circular Signal Supplement.

3.2.2 Color uniformity: The uniformity of the emitted color of a module shall conform to the requirements specified in the VTCSH LED Circular Signal Supplement.

4. Electrical

4.1 General

4.1.1 All wiring and terminal blocks shall - coded, 600V, jacketed wires, a minimum of 20 AWG and at least 1 meter (39 in) in length, conforming to the NFPA 70, National Electrical Code, and rated for service at +105°C, shall be provided.

4.1.2 The following color scheme shall be used for all modules AC power leads: White for Common, Red for the Red arrow signal, Yellow for the Yellow arrow signal, and Brown for the Green arrow signal.

4.1.3 The AC power leads shall exit the module via a rubber grommetted strain relief, and shall be terminated with insulated female quick-connect terminals with spade/tab adapters. The leads shall be separate at the point at which they leave the module.

4.1.3.1 All external wiring utilized in the LED traffic signal module shall be anti-capillary-type wire to prevent the wicking of moisture to the interior of the module.

4.1.4 All power supplies shall be conformal-coated for additional protection.

4.2 Voltage Range

4.2.1 The modules shall operate from a 60±3 Hertz AC power line over a voltage range from 80 to 135 VAC RMS.

4.2.2 Fluctuations in line voltage over the range of 80 to 135 VAC RMS shall not affect luminous intensity by more than ±10 percent.

4.2.3 To prevent the appearance of flicker, the module circuitry shall drive the LEDs at frequencies greater than 100 Hz, when modulated or at DC over the voltage range specified in Section 4.2.1.

4.2.4 Low Voltage Turn-OFF: There shall be no visible illumination from the module when the applied voltage is less than 35 VACRMS.

4.2.5 Turn-ON and Turn-OFF Time: A module shall reach 90% of full illumination (turn-ON) within 75 msec of the application of the nominal operating voltage. The signal shall cease emitting visible illumination (turn-OFF) within 75 msec of the removal of the nominal operating voltage.

4.3 Transient Voltage Protection

4.3.1 The on-board circuitry of a module shall include voltage surge protection to withstand high-repetition noise transients and low-repetition high-energy transients as stated in Section 2.1.8, NEMA Standard TS 2-2003.

4.3.1.1 In addition to the transient test requirements defined in the Design Qualification Testing section of this specification, all power supplies used in the circular signals supplied to this specification shall be capable of passing an additional ring-wave surge testing in accordance with the IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1,000 V and less) AC Power Circuits, ANSI/IEEE C62.41.2-2002, 6KV, 100 kHz ring-wave with an output impedance of 30 ohms. The short circuit current shall be 200 Amps.

4.4 Electronic Noise

The LED signal and associated on-board circuitry shall meet the requirements of the Federal Communications Commission (FCC) Title 47, Subpart B, Section 15 regulations concerning the emission of electronic noise by Class A digital devices.

4.5 Power Factor (PF), AC Harmonics, and Power

4.5.1 Modules shall provide a power factor of 0.90 or greater when operated at nominal operating voltage and at 25ºC (77ºF).

4.5.2 Total harmonic distortion induced into an AC power line by a module at nominal operating voltage, and at 25ºC (77ºF), shall not exceed 20%.

4.5.3 Typical power at 25ºC for the arrows modules shall be 6 watts for all colors.

4.6 Controller Assembly Compatibility

4.6.1 The current draw shall be sufficient to ensure compatibility and proper triggering and operation of load current switches and conflict monitors in signal controller units.

4.6.2 Off-State Voltage Decay: When the module is switched from the On-state to the Off-state the terminal voltage shall decay to a value less than 10 VAC RMS in less than 100 milliseconds when driven by a maximum allowed load switch leakage current of 10 milliamps peak (7.1 milliamps AC).

4.7 Failed State Impedance

The module shall be designed to detect catastrophic loss of the LED load. Upon sensing the loss of the LED load, the module shall present a resistance of at least 250 kΩ across the input power leads within 300 msec. The LED light source will be said to have failed catastrophically if it fails to show any visible illumination when energized according to Section 4.2.1 after 75 msec.

5. Quality Assurance

5.1 General

5.1.1 Quality Assurance Program: Modules shall be manufactured in accordance with a vendor quality assurance (QA) program. The QA program shall include two types of quality assurance: (1) design quality assurance and (2) production quality assurance. The production quality assurance shall include statistically controlled routine tests to ensure minimum performance levels of modules built to meet this specification.

5.1.2 Record Keeping: QA process and test results documentation shall be kept on file, and available for viewing, for a minimum period of seven years.

5.1.3 Conformance: Module designs not satisfying design qualification testing and the production quality assurance testing performance requirements in Sections 5.3 and 5.4 shall not be labeled, advertised, or sold as conforming to this specification.

5.1.4 Potential suppliers must complete and submit the LED Module Supplier checklist shown in Table 2 and provide a copy of the checklist with the submission of any proposals.

5.2 Manufacturer's Serial Numbers

Each module shall be identified with the information specified in Section 2.6.1.

5.3 Production Tests and Inspections

5.3.1 Production Test Requirements: All modules tendered for sale shall undergo the following Production Testing and Inspection prior to shipment. Failure of a module to meet the requirements of Production Testing and Inspection shall be cause for rejection. Test results shall be maintained per the requirement of Section 5.1.2.

5.3.1.1 All Production Tests shall be performed at an ambient temperature of 25ºC (77ºF) and at the nominal operating voltage of 120VAC.

5.3.2 Luminous Intensity: All modules shall be tested for luminous intensity. A single point measurement with a correlation to the intensity requirements of Sections 3.1.1 and 3.1.2 may be used. The purchaser may specify additional measurements. Failure of a module to meet the requirements for Minimum Maintained Luminous Intensity, Section 3.1.1; or Maximum Permissible Luminous Intensity, Section 3.1.2; shall be cause for rejection of the module.

5.3.3 Power Factor: All modules shall be tested for power factor per the requirements of Section 4.5.1. A commercially available power factor meter may be used to perform this measurement. Failure of a module to meet the requirements for power factor, Section 4.5.1, shall be cause for rejection of the module.

5.3.4 Current Consumption Measurement: All modules shall be measured for current flow in Amperes. The measured current values shall be compared against the design current values from design qualification measurements in Section 5.4.6.1. A measured current consumption in excess of 120% of the design qualification current value for an ambient temperature of 25ºC (77ºF) shall be cause for rejection of the module.

5.3.5 Visual Inspection: All modules shall be visually inspected for any exterior physical damage or assembly anomalies. Careful attention shall be paid to the surface of the lensto ensure there are no scratches (abrasions), cracks, chips, discoloration, or other defects. The presence of any such defects shall be cause for rejection of the module.

5.4 Design Qualification Testing

5.4.1 Design Qualification Test Requirements. Design qualification testing shall be performed on new module designs, when a major design change has been implemented on an existing design, or after every five years that a design is in service. Modules used in design qualification testing shall be representative of the manufacturer's proposed normal production. The certification of UV Stabilization, Section 5.4.5.1, shall be provided for all materials used in or on the emitting lenses. If modules are provided with both clear and tinted lenses, the tests per the stated section of the VTCSH below shall be conducted for all lens types. Refer to the Design Qualification Testing Flow Chart in the VTCSH:

Test	**Paragraph**
Temperature Cycling	5.4.3.2
Moisture Resistance	5.4.3.3
Luminous Intensity	5.4.4.1
Luminance Uniformity	5.4.4.5
Chromaticity 5.4.4.6	
Color Uniformity	5.4.4.7
Lens Abrasion	5.4.5.2

5.4.1.1 Test data shall be retained by the manufacturer in accordance with Section 5.1.2 or for 60 months following final production of a specific design, whichever is longer.

5.4.1.2 Six modules shall be used in Design Qualification Testing. All six modules shall be subjected to Conditioning, Section 5.4.2, followed by the Environmental Tests, Section 5.4.3. Following the Environmental Tests, three modules shall undergo Photometric and Colorimetric Tests, Section 5.4.4, followed by the Lens Abrasion Test, Section 5.4.5. The remaining three modules shall undergo the Electrical Tests, Section 5.4.6, the Controller Assembly Compatibility Tests, Section 5.4.7, and the Failed-State Impedance Test, Section 5.4.8. Tests shall be conducted in the order described herein, unless otherwise specified. Figure 2 provides a flow chart for the Design Qualification Testing.

5.4.1.3 In order for a module design to be considered acceptable for marking with the label described in 2.6.4, all tested modules must comply with the acceptance/rejection criteria for the Environmental Tests, Section 5.4.3; Photometric and Colorimetric Tests, Section 5.4.4; Lens Tests, Section 5.4.5; Electrical Tests, Section 5.4.6; Controller Assembly Compatibility Tests, Section 5.4.7; and the Failed-State Impedance Test, Section 5.4.8.

5.4.2 Conditioning: Modules shall be energized for a minimum of 24 hours at 100% duty cycle in an ambient temperature of +60°C (+140°F).

5.4.3 Environmental Tests:

5.4.3.1 Mechanical Vibration: Mechanical vibration testing shall be performed per MIL-STD-883, Test Method 2007, using three 4-minute cycles along each x, y, and z axis, at a force of 2.5 Gs, with a frequency sweep from 2 Hz to 120 Hz.

5.4.3.2 Temperature Cycling: Temperature cycling shall be performed per MIL-STD-883, Test method 1010. The temperature range shall include the full ambient operating temperature range specified in Section 2.3.2. A minimum of 20 cycles shall be performed with a 30-minute transfer time between temperature extremes and a 30-minute dwell time at each extreme temperature. Signals under test shall be nonoperating.

5.4.3.3 Moisture Resistance: Moisture resistance testing shall be performed per MIL-STD-810F, Test Method 506.4, Procedure I, Rain, and Blowing Rain. The test shall be conducted on stand-alone modules, without a protective housing. The rainfall rate shall be 1.7 mm/min (4 in/hr) and droplet size shall predominantly be between 0.5 mm and 4.5 mm (0.02 to 0.18 in). The modules shall be vertically oriented, such that the lens is directed towards the wind source when at a zero rotation angle. The module shall be rotated at a rate of 4 degrees per minute along the vertical axis, from an orientation of -60 to +60 degrees during the test. The duration of the test shall be 30 minutes. The modules shall be energized throughout the test. The water shall be at 25° ± 5°C (77° ± 9°F). The wind velocity shall be 80 km/hr (50 mph). If the module is equipped with a remote power supply unit, then the test shall be conducted with the remote power supply unit attached to the clamping device holding the module to the test apparatus.

5.4.3.4 Environmental Tests Evaluation: At the conclusion of the Environmental Tests, all the modules will be visual inspected for damage and energized to insure proper operation.

5.4.3.5 Acceptance/Rejection Criteria: The loosening of the lens, or any internal components, or evidence of other physical damage, such as cracking of the module lens or housing, or presence of internal moisture, or failure to operate correctly after testing shall be considered a failure for the proposed design.

5.4.4 Photometric and Colorimetric Tests: Three of the modules that were subjected to the Environmental Tests shall undergo Photometric and Colorimetric Tests. Unless otherwise specified, these tests shall be performed with the modules energized at nominal operating voltage.

5.4.4.1 Luminous intensity at standard temperature: The modules shall be tested for compliance with the requirements for minimum maintained luminous intensity at a temperature of 25°C (77°F). Measurements shall be made for all angular combinations specified in Table 1 or 3, as appropriate, or at other angles, as specified by the purchaser.

5.4.4.1.1 Luminous intensity measurements for red and green signal modules shall be made after the module has been operated under the test conditions for a minimum of 60 minutes at a 100% dutycycle.

5.4.4.1.2 Luminous intensity measurements for yellow signal modules shall be made after the module has been operated under the test conditions for a minimum of 60 minutes at a 12.5% dutycycle

(5 seconds ON and 35 seconds OFF). Readings shall be taken at the end of the 5-second ON interval, or as close to the end of the ON interval as possible.

5.4.4.2 Luminous intensity at low voltage: The modules shall be tested for compliance with the requirements for minimum maintained luminous intensity when operated at 80 VAC at a temperature of 25°C (77°F). A single-point measurement of the luminous intensity shall be recorded, and correlated to the measurement made in the same direction under Section 6.4.4.1 to generate a full range of luminous intensity values at reduced voltage. For omni-directional modules, the single point measurement shall be taken in the region from 7.5 degrees up to 7.5 degrees down and from 7.5 degrees left to 7.5 degrees right. The luminous intensity measurement at reduced voltage shall be made immediately following measurements for luminous intensity at standard temperature, Section 5.4.4.1.

5.4.4.3 Luminous intensity at elevated voltage: The modules shall be tested for compliance with the requirements for minimum maintained luminous intensity when operated at 135 VAC at a temperature of 25°C (77°F). A single point measurement of the luminous intensity shall be recorded and correlated to the measurement made in the same direction under Section 5.4.4.1 to generate a full range of luminous intensity values at elevated voltage. The single point measurement shall be taken in the region described in Section 5.4.4.2. The luminous intensity measurement at elevated voltage shall be made immediately following measurements for luminous intensity at reduced voltage, Section 5.4.4.2.

5.4.4.4 Luminous intensity at high temperature: The modules shall be tested for compliance with the requirements for minimum maintained luminous intensity at a temperature of 74ºC (165ºF). The modules shall be mounted in a temperature chamber so that the signal module lens is outside the chamber and all portions behind the lens are within the chamber at a temperature of 74ºC (165ºF). The air temperature in front of the lens of the signal shall be maintained at a minimum of 49°C (120°F) during all tests. A single-point measurement of the luminous intensity shall be recorded and correlated to the 25°C (77°F) measurement made in the same direction under Section 5.4.4.1 to generate a full range of luminous intensity values at high temperature. The single point measurement shall be taken in the region described in Section 5.4.4.2.

5.4.4.4.1 Luminous intensity measurements for red and green modules shall be made after the module has been operated under the test conditions for a minimum of 60 minutes at a 100% duty cycle.

5.4.4.4.2 Luminous intensity measurements for yellow modules shall be made after the module has been operated under the test conditions for a minimum of 60 minutes at a 12.5% duty cycle (5 seconds ON and 35 seconds OFF). Readings shall be taken at the end of the 5-second ON interval, or as close to the end of the ON interval as possible.

5.4.4.5 Luminance uniformity: The modules shall be tested for compliance with the requirements for luminance uniformity at a temperature of 25°C (77°F). Measurements shall be made using a luminance meter located on the physical axis of the module lens at a distance such that the selected aperture samples a circular spot with a diameter of 12 mm (0.5 inch) at the lens surface. The position of the luminance meter shall be translated from side to side and up and down, so as to

sample the entire emitting surface of the module. The highest and lowest values of luminance shall be recorded. Luminance measurements may be made immediately following measurements for luminous intensity at standard temperature and elevated voltage, Section 5.4.4.3, after returning the voltage to the nominal operating voltage (120 VAC).

5.4.4.5.1 Luminance uniformity measurements for the green and red signals must be made with the signal module operating at a 100% duty cycle. Therefore, it is necessary for the signal module under test to reach thermal equilibrium, and for the output to be stable prior to taking measurements.

5.4.4.5.2 Measurements for yellow signal modules shall be made after the module has been operated under the test conditions for a minimum of 60 minutes at a 12.5% duty cycle (5 seconds ON and 35 seconds OFF). Readings shall be taken at the end of the 5-second ON interval, or as close to the end of the ON interval as possible.

5.4.4.6 Chromaticity: The chromaticity of the emitted light from modules shall be measured at a temperature of 25°C (77°F). A spectro-radiometer with a maximum bandwidth of 4 nm, or a colorimeter that has a measurement uncertainty of less than 2.5% over the emission spectra of the module, shall be used for this measurement. The spectro-radiometer or colorimeter shall be located on the physical axis of the module lens at a distance such that the selected aperture samples a circular spot with a diameter of 12 mm (0.5 inch) at the lens surface. The meter shall be translated from side to side and up and down, so as to sample a minimum of nine equally distributed positions about the emitting surface of the module. The colorimetric values of the emitted light at each of the nine positions shall be recorded, and an average value calculated, based on the CIE Standard 2° Observer. These measurements may be made immediately following measurements for Luminance Uniformity, Section 5.4.4.5.

5.4.4.6.1 Chromaticity measurements for the green and red signals must be made with the signal module operating at a 100% duty cycle. Therefore, it is necessary for the signal module under test to reach thermal equilibrium, and for the output to be stable prior to taking measurements.

5.4.4.6.2 Measurements for yellow signal modules shall be made after the module has been operated under the test conditions for a minimum of 60 minutes at a 12.5% duty cycle (5 seconds ON and 35 seconds OFF). Readings shall be taken at the end of the 5-second ON interval, or as close to the end of the ON interval as possible. If necessary, the ON interval may be extended to 10 seconds to permit completion of a measurement. The ON interval between measurements, however, shall remain 5 seconds.

5.4.4.7 Color uniformity: The average and nine individual sets of chromaticity values of each module under evaluation shall be plotted on the CIE 1931 Chromaticity Diagram (see Figure 1, VTCSH LED Circular Signal Supplement).

5.4.4.8 Photometric and Colorimetric Tests Evaluation: At the conclusion of the Photometric and Colorimetric Tests, the measurement data shall be compared to the applicable requirements of Sections 3.1 and 3.2.

5.4.4.9 Acceptance/Rejection Criteria: The failure of a module to meet any of the following: the requirements for Minimum Maintained Luminous Intensity, Section 3.1.1; or Maximum Permissible Luminous Intensity, Section 3.1.2; under standard and high temperatures. The requirement for Luminance Uniformity, Section 3.1.3; or the appropriate requirement for Chromaticity, Section 3.2; shall be considered a failure of the proposed design.

5.4.5 Lens Tests: Following the Photometric and Colorimetric Tests, the three modules shall be subjected to the following tests of the acceptability of the lens construction.

5.4.5.1 UV Stabilization: Documentation shall be provided that certifies that the loss of direct transmission through the lens shall not cause the performance of the module to fall below the photometric requirements, or deviate from the colorimetric requirements of this specification after 60 months, or greater as specified by the manufacturer, of service in accordance with 2.3.1 and 2.3.4. Documentation shall be provided for hard-coat film (if used) and lens material.

5.4.5.2 Lens Abrasion Test: Abrasion resistance testing of the module lens shall be performed as follows:

a) A lens shall be mounted in the abrasion test fixture with the lens facing upwards.

b) An abrading pad meeting the requirements in paragraphs c) through f) below shall be cycled back and forth (1 cycle) for 12 cycles at 10 cm ± 2 cm per second over the whole surface of the lens.

c) The abrading pad shall be not less than 2.5 cm ± 0.1 cm square, constructed of 0000 steel wool and rubber, cemented to a rigid base shaped to the same contour as the lens. The “grain” of the pad shall be perpendicular to the direction of motion.

d) The abrading pad support shall be equal in size to the pad and the center of the support surface shall be within ± 2 mm of parallel to the lens surface.

e) The density of the abrading pad shall be such that when the pad is mounted to its support and is resting unweighted on the lens, the base of the pad shall be no closer than 3.2 mm to the lens at its closest point.

f) When mounted on its support and resting on the lens, the abrading pad shall be weighted such that a pad pressure of 14 kPa ± 1 kPa exists at the center and perpendicular to the face of the lens.

g) A pivot shall be used if required to follow the contour of the lens.

h) Unused steel wool shall be used for each test.

5.4.5.3 Acceptance/Rejection Criteria: The photometric performance of a module following the lens abrasion test shall be 90% or more of the photometric performance of the same module measured prior to the lens abrasion test. A single point correlation as described in 5.4.4.2 may be used to determine the change in photometric performance. The single point measurement shall be made at an ambient temperature of 25°C (77°F) and nominal voltage of 120 VAC. Failure of any module to meet the requirement for photometric performance following the lens abrasion test shall be considered a failure of the proposed design.

5.4.6 Electrical Tests: Three of the modules that were subjected to the Environmental Tests shall undergo Electrical Tests. These tests shall be performed with the modules energized at nominal operating voltage and at a standard temperature of 25°C (77°F), unless specified otherwise.

5.4.6.1 Current Consumption: The current flow in amperes shall be measured at various ambient temperatures across the span of the operating temperature range specified in Section 2.3.1. The manufacturer shall provide information (charts, tables, and/or graphs) on the variation in current through 60 months of service, or greater as specified by the manufacturer, within the operating temperature range of 2.3.2. In addition, the current consumption at startup shall be measured at 25°C (77°F) to establish the reference value used for Production Quality Assurance, Section 5.

5.4.6.2 Low-Voltage Turn-OFF: The modules shall be connected to a variable power supply and energized at nominal operating voltage. The applied voltage shall be reduced to a point where there is no visible illumination from the module when the background is at an average luminance of 0.1 cd/m^2 (0.01 ft-cd).

5.4.6.3 Turn-ON/Turn-OFF Times: Using a two-channel oscilloscope, the time delay between application of nominal operating voltage and the module reaching 90% of full light output, and the time delay between de-energizing the module and the light output dropping to 0% of full output, shall be measured.

5.4.6.4 Transient Voltage Immunity: The modules shall be tested for transient immunity using the procedure described in Section 2.1.8, NEMA Standard TS 2-2003.

5.4.6.5 Electronic Noise: The modules shall be tested for conformance with the requirements of a Class A digital device, as specified in FCC Title 47, Subpart B, Section 15.109(b).

5.4.6.6 Power Factor: The power factor for the modules shall be measured and recorded. A commercially available power factor meter may be used to perform this measurement.

5.4.6.7 Total Harmonic Distortion (THD): The total harmonic distortion induced into an AC power line by the modules shall be measured and recorded. A commercially available total harmonic distortion meter may be used to perform this measurement.

5.4.6.8 Electrical Tests Evaluation: At the conclusion of the Electrical Tests, the measurement data shall be compared to the requirements of Sections 4.2 through 4.5.

5.4.6.9 Acceptance/Rejection Criteria: The failure of any module to meet the requirements for low-voltage turn-OFF, Section 4.2.4; turn-ON/turn-OFF times, Section 4.2.5; transient voltage immunity, Section 4.3; emission of electronic noise, Section 4.4; minimum power factor, Section 4.5.1; and/or maximum total harmonic distortion, Section 4.5.2; shall be considered a failure of the proposed design.

5.4.7 Controller Assembly Compatibility Tests: Following the Electrical Tests, three modules shall be tested for compatibility with load current switches and conflict monitors

presently in service. The manufacturer shall test the design for the specific type signal control unit with which the design is intended to be compatible.

5.4.7.1 Load Switch Compatibility: The modules shall be tested for compatibility and proper operation with load current switches. Each module shall be connected to a variable AC voltage supply. The AC line current into the module shall be measured for sufficient current draw to ensure proper load switch operation while the voltage is varied from 80 to 135 VAC.

5.4.7.2 Off-State Voltage Decay Test: Each module shall be operated from a 135 VAC voltage supply. A 19.5 kΩ resistor shall be wired in series in the hot line between the module and the AC power supply. A single-pole-single-throw switch shall be wired in parallel with the 19.5 kΩ resistor. A 220 kΩ shunt resistor shall be wired between the hot line connection and the neutral line connection on the module. Conflict monitor Off-state impedance compatibility shall be tested by measuring the voltage decay across the 220 kΩ shunt resistor as follows: The single-pole-single-throw switch shall be closed, bypassing the 19.5 kΩ resistor and allowing the AC power supply to energize the module. Next, the switch shall be opened and the voltage across the 220 kΩ shunt resistor shall be measured for decay to a value equal to or less than 10 VAC RMS. The test shall be repeated 10 times with the longest decay time recorded as the final test value.

5.4.7.3 Controller Assembly Compatibility Tests Evaluation: At the conclusion of the Controller Assembly Compatibility Tests, the measurement data shall be compared to the requirements of Section 4.6.

5.4.7.4 Acceptance/Rejection Criteria: Failure of the module to draw sufficient current to ensure compatibility with the load current switches in the appropriate Controller Assembly, Section 4.6.1, and/or failure of the circuit voltage to decay to a value equal to or less than 10 VAC RMS within a time period equal to or less than 100 milliseconds, Section 4.6.2, shall be considered a failure of the proposed design.

5.4.8 Failed-State Impedance Test: The modules shall be tested for compliance with the requirement for provision of a failed-state impedance, Section 4.7. The test is conducted in two parts: first the module is energized with the LED load disconnected from the power supply to establish the failed-state impedance. Next, the requirement for the failed-state impedance is tested. The module shall be operated from a 120 VAC voltage supply.

a) Wire a 50 kΩ resistor in series with the hot line between the module and the AC power supply. A 100 kΩ shunt resistor shall be wired between the hot line connection and the neutral line connection on the module. A single-pole-single-throw switch shall be wired in parallel with the 50 kΩ resistor. With the switch in the closed position and the LED load disconnected from the module power supply, energize the module for 300 ms to establish the failed-state impedance, Section 4.7.

b) The second part of the failed-state impedance test is conducted to ensure that the appropriate failed-state impedance is established. The switch is opened and the circuit is energized by the 120 VAC voltage supply. The voltage across the 100 kΩ shunt resistor shall be continuously monitored. The voltage shall decay to a value equal to or greater than 70 VAC RMS. For the continuous interval of

500 ms through 1,500 ms, after energizing the circuit with an open switch, the measured voltage shall be 70 VAC RMS or greater. The second part of the test shall be repeated 10 times with the minimum voltage recorded during the continuous interval of 500 ms through 1,500 ms, after energizing the circuit with an open switch, recorded as the final test value.

5.4.8.1 Failed-State Impedance Test Evaluation: At the conclusion of the Failed-State Impedance Test, the measurement data shall be compared to the requirement of Section 4.7.

5.4.8.2 Acceptance/Rejection Criteria: Failure of the voltage across the 100 kΩ shunt resistor to remain at a value equal to or greater than 70 VAC RMS for the continuous time interval of 500 ms through 1,500 ms, after energizing the circuit with an open switch, shall be considered a failure of the proposed design.

6. Warranty Requirements

6.1 Warranty

6.1.1 Manufacturers shall provide a written warranty issued by the factory located in the NAFTA country of module origin with the following minimum provisions:

6.1.2 Modules shall at the manufacturer's option be repaired or replaced if the module fails to function as intended due to workmanship or material defects within the first 15 years from the date of delivery.

6.1.3 Modules shall at the manufacturer's option be repaired or replaced if the module exhibit luminous intensities less than the minimum specified values within the first 15 years of the date of delivery.

6.1.4 Upon request, the LED lamp module manufacturer shall provide written documentation of its ability to satisfy a worst-case, catastrophic warranty claim.

6.1.4.1 A current corporate annual report duly-certified by an independent auditing firm, containing financial statements illustrating sufficient cash on hand and net worth to satisfy a worst-case, catastrophic warranty claim is an example of suitable documentation.

6.1.4.2 The documentation shall clearly disclose:

a) The country in which the factory of module origin is located.

b) The name of the company or organization that owns the factory of module origin including any and all of its parent companies and/or organizations, and their respective country of corporate citizenship.

6.1.4.3 For firms with business and/or corporate citizenship in the United States of less than seven years, the process by which the end users/owners of the modules will be able to obtain worst-case, catastrophic warranty service in the event of bankruptcy or cessation of operations by the firm supplying the modules within North America, or in the event of bankruptcy or cessation of operations by the owner of the factory of origin, shall be clearly disclosed.

Figure 1.
Intertek ETL Verified Label

Table 1

Table 1 provides the minimum maintained luminous intensity values for the VTCSH Omni-directional LED Vehicle Arrow Traffic Signal, for the range from 27.5 degrees above to 27.5 degrees below the horizontal plane, and from 27.5 degrees left to 27.5 degrees right of the vertical plane, at 5-degree increments.

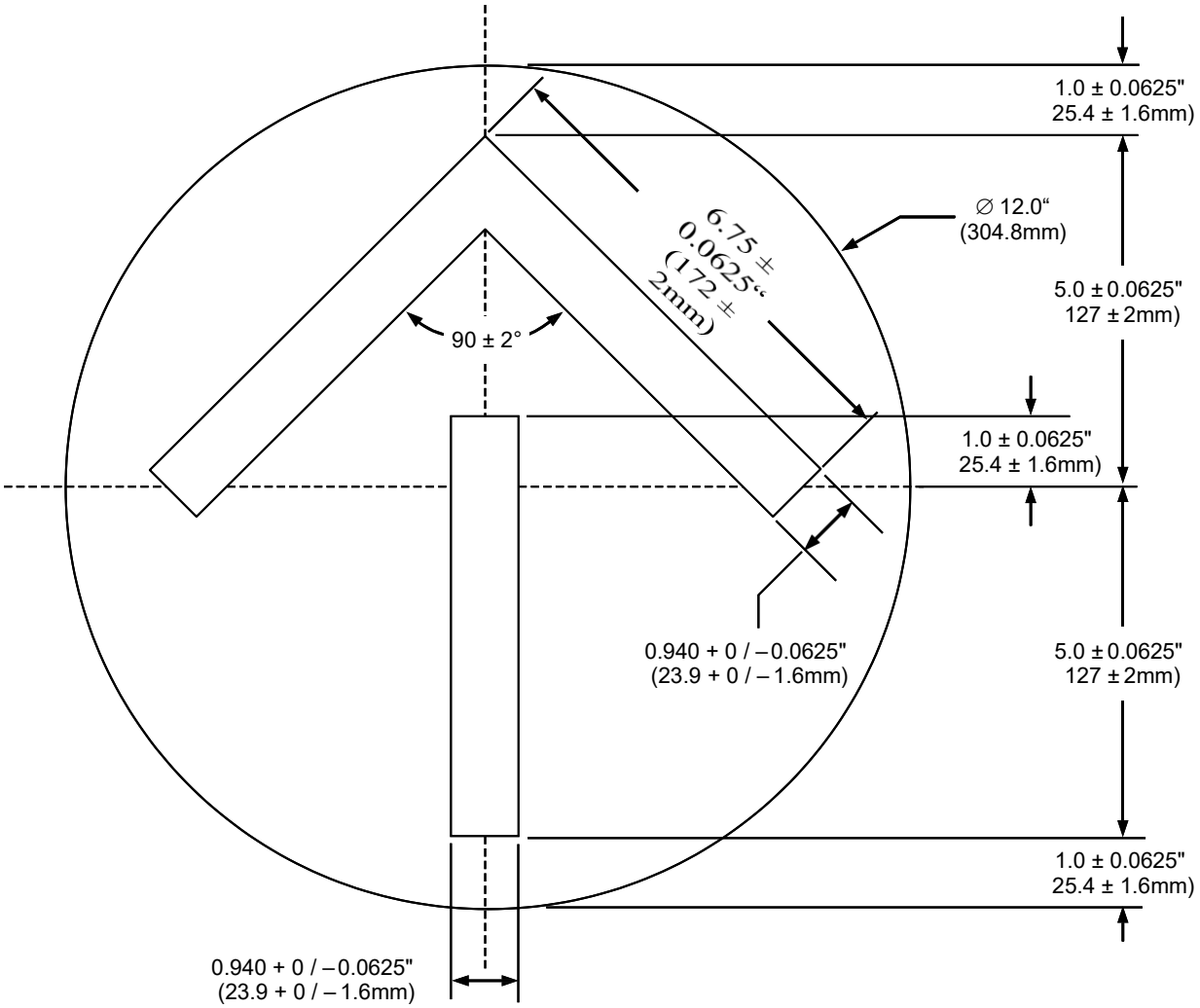
Minimum Maintained Luminous Intensity Value
Per VTCSH LED Vehicle Arrow Traffic Signal, July 1, 2007
(Omni-directional—suitable for mounting in any orientation)

Vertical Angle (deg)	Horizontal Angle (deg)	Omni-directional Angle (deg)	Luminous Intensity (candela)		
			300 mm (12 in) Arrow Signal		
			Red	Yellow	Green
27.5	7.5	28.4	2.8	6.9	3.6
	2.5	27.6	3.3	8.2	4.3
22.5	17.5	28.2	2.9	7.2	3.8
	12.5	25.6	5.0	12.4	6.4
	7.5	23.7	7.1	17.7	9.2
	2.5	22.6	8.5	21.2	11.1
17.5	22.5	28.2	2.9	7.2	3.8
	17.5	24.6	6.0	15.0	7.8
	12.5	21.4	10.5	26.1	13.6
	7.5	19.0	15.1	37.7	19.7
	2.5	17.7	18.2	45.3	23.7
12.5	22.5	25.6	5.0	12.4	6.4
	17.5	21.4	10.5	26.1	13.6
	12.5	17.6	18.3	45.7	23.9
	7.5	14.5	26.7	66.5	34.7
	2.5	12.7	32.1	80.1	41.8
7.5	27.5	28.4	2.8	6.9	3.6
	22.5	23.7	7.1	17.7	9.2
	17.5	19.0	15.1	37.7	19.7
	12.5	14.5	26.7	66.5	34.7
	7.5	10.6	38.9	97.0	50.6
	2.5	7.9	47.0	117.1	61.1
2.5	27.5	27.6	3.3	8.2	4.3
	22.5	22.6	8.5	21.2	11.1
	17.5	17.7	18.2	45.3	23.7
	12.5	12.7	32.1	80.1	41.8
	7.5	7.9	47.0	117.1	61.1
	2.5	3.5	56.8	141.6	73.9

Note 1: Luminous intensity values for equivalent up and down vertical angles are the same.
Note 2: Luminous intensity values for equivalent left and right horizontal angles are the same.
Note 3: Tabulated values of luminous intensity are rounded to the first decimal place.

Figure 2

Configuration of LED Vehicle Arrow Traffic Signal Icon:



7.1 LED Pedestrian Hand/Man Retrofit Module

The LED Pedestrian Retrofit Module shall consist of a dual signal display overlay utilizing the international symbols of the “Hand” and walking “Person.” The “Hand” symbol shall be Portland Orange and walking “Person” shall be white. The “Hand” symbol shall be “filled” and the walking “Person” shall be “filled.” The entire assembly shall fit into existing 12-inch pedestrian signal housings replacing the existing signal lens. Any additional hardware required shall be provided with the retrofit module.

7.2 Construction Requirements

Each traffic signal face shall consist of a number of signal sections assembled and rigidly fastened together.

The design of the signal shall be such that with the aid of simple tools and the addition of certain standard parts, it shall be possible to make an assembly consisting of one, two, three, four, or more signal sections. It shall further be possible with the addition of certain standard bracket assemblies and accessories to assemble signal faces into two-way, three-way, four-way, or more traffic signal head configurations.

All signal heads shall have tunnel visors and backplates as specified in the plans and detail.

All signal heads doors and visors and backplates shall have a black powder coat finish. The housing shall be black in color, of best quality and meeting Government Specification T-TE-489B.

7.3 Signal Head Backplates

All backplates will be aluminum, all one-piece construction, with a black powder coat finish. All backplates shall be louvered or flexible to reduce wind load (Pelco AeroFlex or approved equal when using the flexible style). All backplates will be factory drilled for mounting on the traffic signal heads and will include all mounting hardware.

All vehicle signal heads shall have backplates with fluorescent yellow retro-reflective borders. The borders shall include a 3” wide, fluorescent yellow, super/very high intensity (Type XI conforming to ASTM D4956), sheeting strip on the perimeter face.

7.4 Method of Measurement

Measurement of these items shall be by actual count of signal heads satisfactorily furnished complete.

7.5 Basis of Payment

Payment for signal heads of the various types will be at their respective contract unit price per each. This payment will be full compensation for furnishing signal heads, backplates, and visors.

7.6 Traffic Signal Mounting Bracket

This specification provides the requirements for furnishing traffic signal mounting

brackets. The type and quantity required shall be in accordance with these provisions, the standard plate details shown in the plans, and the proposal.

7.7 General

Any available rigid mast arm signal mounting bracket may be utilized provided that it is:

1. Capable of supporting the weight of the signal head.
2. Capable of withstanding the appropriate gust and wind loadings.
3. Capable of retaining signal location and aiming adjustments.
4. Adjustable about two axes as shown in Section B-B and C-C of Plate Number 635.01.
5. Approved by the engineer.

The traffic signal mounting brackets to be furnished shall be the manufacturer's "standard" mounting brackets to mount and support the various combinations of signals as indicated on Detail Plate Number 635.01. An acceptable system and component for mast arm mounting is the Stellar Series "Astro-Brac" as furnished by PELCO. The "Astro-Brac" mounting hardware shall have a threaded solid pipe instead of the ribbed pipe, and the bracket shall have a 42" stainless steel strap. Catalog cuts and/or shop drawings of all mounting brackets shall be provided to the City Traffic Engineer for approval with each bid.

Each mounting fitting in contact with a signal section shall have serrations to match those of the signal sections and shall have 1 1/2" I.P.S. threads for attachment to the signal section.

On side of post mounting bracket assemblies, Plate No. 635.01, the top horizontal spacer pipe must have a minimum of 3" of threaded end to provide for proper vertical alignment of heads.

7.8 Materials

Brackets shall be 1 1/2" standard pipe or rigid conduit, or cast, molded, or extruded metal. All brackets shall be finished of the best quality synthetic resin enamel, black in color.

Locknuts shall be 2 1/2" OD and made of steel ferrous material.

Post Top Base Requirements

Shall be of sufficient load-bearing capacity to provide support for any combination of signals meeting MUTCD Standards with minimum physical properties as follows:

Square cast aluminum with natural finish and minimum weight of 20 lbs.

Upper end shall be threaded to receive a 4" NPT pipe shaft.

Shall be of such design that it may be fastened to a foundation by means of 3/4" anchor bolts located 90 degrees apart on the bottom of the base. There shall be slots in the bottom of the base 1 1/2" wide and 2 1/2" long measured along the circumference of the bolt circle, allowing a proper fit even if the bolts are placed slightly off center.

Shall accommodate bolt circles of minimum of 12" and a maximum of 14 1/2".

Shall be equipped with a removable aluminum door. Door opening shall be free of burrs and sharp edges and be no less than 8 1/2" square. The door shall be attached to the base using one socket button head screw to prevent unauthorized entry.

Shall be fabricated free of voids, pits, molding sand, and excessive foundry grinding marks. All design radii shall be smooth and intact.

Shall be fabricated from new aluminum billet. No scrap materials shall be used. Minimum requirements as follows:

Aluminum Alloy	319
Tensile Strength, KSI	34
Yield Strength, KSI	19
Elongation (% in 2")	2.5
Brinell Hardness	65
Shearing Strength, KSI	23

7.10 Method of Measurement and Payment

Measurement and payment of these items shall be by actual count of signal bases and poles satisfactorily furnished and installed complete.

Special Provision for Traffic Signal Poles

Scope

This work shall consist of furnishing signal poles in accordance with the plans and these specifications. These specifications shall cover signal poles with mast arms.

General

All poles, mast arms, and transformer bases shall be of the material specified on the plans or in the proposal. Design and fabrication shall be as follows:

1. Poles shall be designed in accordance with plan requirements and “Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals,” AASHTO publication, current edition. The design wind velocity shall be 80 miles per hour. Approval of poles shall be by certification from a registered professional engineer that poles meet or exceed plans and specification requirements. The supplier shall provide the City Traffic Engineer with a copy of the certification.

2. The pole shall have a removable top and an opening near the top for the cable entrance from the shaft into the mast arm.

3. The pole manufacturer may provide punched or drilled holes, free of sharp edges or projections, for wire outlets in the signal poles and mast arms.

4. All poles shall have means of attaching a cable strain relief grip at the entrance to all mast arms. A “J” hook at points of ingress to mast arms and electrical fixtures shall be fabricated in the pole as a means of attaching these items. These “J” hooks shall be mounted horizontally perpendicular to the handhole.

5. All poles shall be designed to support the number of signal heads and luminaires shown on the standard Detail Sheets 635.01 and 635.12 for poles using the areas and weights shown. When a pole is bolted properly to the leveled transformer base, the mast arm must not drop past center.

6. The number and length of mast arms shall be as specified on the proposal.

7. Signal mast arms shall be designed such that when signals are installed, there is a minimum and maximum clearance to the bottom of the signal back plate as shown in the plans. Mast arm shall be attached to pole so that it can be rotated about the shaft without damage to the cable or slipping vertically on the shaft. All poles shall have a welded collar on the pole for support of the rotatable mast arm, and must have a locking device for the mast arm. An acceptable locking device shall be a bolt inserted through the mast arm flange and pole. The locking bolt holes shall be predrilled in the mast arm flange and field drilled in the pole. All signal mast arms shall be constructed in one continuous piece. Flush-welded joints are acceptable. Telescoping or bolted joints (sections) are not acceptable.

8. All poles shall be supplied with a transformer base with a 22-inch bolt circle. The holes shall be 1 1/2” diameter. The transformer base must fit within a 30- to 36-inch diameter

footing. Bases must be constructed so that, if used, leveling nut can be adjusted with transformer base in place on the concrete footing.

9. The transformer base shall be adequate to satisfactorily transfer all loads from the pole to the concrete base.

10. Handholes and other openings shall be smooth and neat with no sharp edges or projections.

11. For grounding purposes, a 1/2-inch nut shall be welded inside the handhole in the transformer base. The weld shall not show through the exterior of the base. A bolt and washer to fit the above-mentioned nut must be supplied.

12. New poles, pole bases, and mast arms shall be bid in accordance with the following: Shall be galvanized steel. Galvanizing shall be in accordance with AASHTO specification M111. All galvanized threads on the bases, poles, and mast arms must be free of excess galvanizing and must be in workable order upon delivery.

13. Welding shall be in accordance with current A.W.S. specifications.

14. Poles shall be fabricated from steel and have a yield strength of not less than 36,000 psi and not more than 55,000 psi.

15. The transformer base must sit in place parallel to curb.

16. The location, number, area, and weight of the signals as shown on Detail Sheet Numbers 635.01 and 635.12 shall be used for determination of adequate pole and footing structural design.

17. All signal poles designated for luminaries shall have the capability of mounting the luminaire in any of four directions. Signal poles shall have a means of fastening a poli cap if the luminaire extension is not used.

18. If the pole, transformer base, arm, luminaire extension, etc., are not universal, then all parts shall be clearly and permanently marked so all parts can be easily identified and matched for assembly. Manufacturer's part numbers shall also be clearly and permanently marked for re-order purposes.

19. A 3/4-inch half coupling shall be welded on the top of the mast arm 6 feet from the end.

20. Pole caps shall be provided with each pole supplied, even if a luminaire is ordered with the pole.

Anchor Bolts

1. Design

    1.1 Loading: AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (hereafter referred to as the Specification).

    1.2 Allowable Stresses: As per Section 3 of the Specification.

2. Material

2.1 Bolts: ASTM A307, A449, A687, or a material on an approved list maintained by the department.

2.1.1 Approved List for Anchor Bolt Material:

The department maintains a list of approved anchor bolt material. To be considered for addition to the list, furnish typical Charpy V-Notch Energy, ultimate tensile, and yield strength reports in accordance with ASTM A370. Minimum average Charpy Impact values shall be 15 ft.-lb. at -20°F. State what allowable stresses are to be used for designs based on the proposed material.

2.2 Nuts: ASTM A194, 2H or ASTM A563, DH. All nuts are to be heavy hex.

2.3 Washers: ASTM F436 or F959.

3. Threads

3.1 Type: Rolled threads are required.

3.2 Thread Series: Use UNC for all bolts.

3.3 Length: Provide a threaded length at least 3 inches below the top of the concrete. That is, minimum thread length shall be the bolt projection plus 3 inches.

3.4 Two non-galvanized nuts with one non-galvanized washer provided on the bottom of the anchor bolt. Two galvanized nuts with two galvanized washers provided on the top of the bolt.

4. Anchorage Method

4.1 Anchor bolts shall either be threaded full length or swaged. Submit proposed alternate mechanical anchorage details for prior approval.

4.2 Swaged Anchorage: A minimum of 20 percent of the embedded bolt surface shall be covered with deformations whose radial dimensions are 15 percent to 20 percent of the bolt diameter.

5. Bolt Finish

5.1 Galvanize anchor bolts, nuts, and washers in accordance with ASTM A153 or B695, Class 50. The minimum length of galvanizing on anchor bolts shall be the bolt projection plus 3 inches.

6. Documentation

6.1 For acceptance of A307, A325, A449, and A687 and other anchor bolt material, provide certified test reports as described in the bolt testing notes.

7. Payment

7.1 Payment for furnishing and installing anchor bolts shall be included in the bid item for the concrete into which they are installed. Such payment shall also include costs for mechanical testing and reporting.

Bolt Testing

When bolts conforming to ASTM A325, A449, A307, or A687 are designated for use in the plans and/or shop drawings, a Certified Mill Test Report for each type designated shall be submitted for approval to the certification engineer a minimum of 14 days prior to incorporating these bolts into the work. (Including certified mill test reports for all nuts, washers, and other required hardware.)

The Certified Mill Test Reports for the bolts shall include test results (tested in accordance with the applicable ASTM Specifications) for the following:

~ Certified Mill Test Report Requirements

	A325	A449	A307	A687	Other
Chemical Analysis	X	X	X	X	X
Hardness Test	X	X	X		X
* Tensile Strength by Wedge Test Method	X	X	X	X	X
# Proof Load Test	X	X	X	X	X
@ Rotational Capacity Test	X				
Charpy V-Notch				X	X

* Certified Mill Test Report shall state that Wedge Test Method was used. (Wedge Test Method may not be required for some ASTM A307 Bolts. See ASTM A307 Specifications.)

Proof Load Test and/or Yield Test as allowed or specified by the applicable ASTM Specification.

@ Rotational Capacity Test required for Zinc Coated (Galvanized) bolts only. This test shall be conducted using the actual nuts that are used on the project.

~ The requirements set forth in this table are to alert the Contractor to the requirements for testing and certification as specified in the applicable ASTM Specifications and are not intended to alter the requirements of the specification.

Streetlight Extension Arm

The extension arm used by the City of Sioux Falls is eight (8) feet in length. The light standard weighs approximately 50 pounds. The extension arm must be galvanized and must accommodate a two (2)-inch slip-fitter for a cobra head. A flange adapter shall be provided between the signal pole and the streetlight extension arm. Mounting heights are shown on the proposal sheet(s).

Method of Measurement

Signal Poles with Mast Arms—Signal poles with mast arms regardless of number of arms or arm lengths shall be measured by actual count, complete.

Basis of Payment

Signal Poles with Mast Arms—Signal poles with mast arms shall be paid for at their contract unit price per each. This payment will be full compensation for furnishing signal poles with mast arms and transformer bases.

Special Provisions
For
Expanded Polystyrene (EPS)

EXPANDED POLYSTYRENE (EPS)

1.0 DESCRIPTION

This work shall consist of furnishing and placing Geofoam blocks at locations shown on the Plans and according to these special provisions or as directed by the Engineer. Expanded Polystyrene (EPS) shall be placed along the Ramp B, Ramp C, and at the Pedestrian Bridge Connection Trail. Geofoam is the generic name for Expanded Polystyrene (EPS), a lightweight rigid foam plastic.

2.0 MATERIALS

The Geofoam blocks shall meet the requirements of ASTM D6817-04, Rigid Cellular Polystyrene Geofoam. The Geofoam blocks shall have the following properties:

EPS 22 (ASTM D6817-02)

Density (Min) ASTM 1622 ..... 1.35 pcf

Compressive Resistance, min (1 % Deformation) ..... 7.3 psi

Compressive Resistance, min (5% Deformation) ..... 16.7 psi

Compressive Resistance, min (10% Deformation)..... 19.6 psi

Flexural Strength, min .....50.0 psi

Oxygen Index, min 24.0%

In addition, the Geofoam shall contain no chloro-fluorocarbon, hydro-chloro-fluorocarbon, or hydro-fluorocarbon compounds.

Provide other materials required for a complete and satisfactory installation, as selected by the Contractor subject to approval by the Engineer.

A geomembrane shall be placed over the top of the Geofoam to prevent chemical spills from infiltrating into the geofoam mass. See Special Provisions for geomembrane requirements.

Geofoam blocks shall be manufactured to standard nominal dimensions of 4 ft. wide by up to 3 ft. deep by 8, 16, 24, 32, 40, 42 in. thick OR to dimensions of similar magnitude specific to project geometry and plan dimensions.

3.0 SHOP DRAWING SUBMITTAL AND ACCEPTANCE

The Contractor shall provide the final Geofoam block layout in the form of detailed shop drawings showing the horizontal and vertical location of each Geofoam block. The block layout will match the planned Geofoam locations as closely as possible. The drawings will also include cross sectional views with a vertical and horizontal reference (elevation and station offset) and plan views with horizontal reference to demonstrate the placement of the Geofoam blocks with respect to the proposed cross sections and plans.

These shop drawing shall be provided for review to the Engineer at least ten (10) days prior to beginning placement of the Geofoam. Placement of the Geofoam blocks shall not begin until the submitted shop drawings meet the approval of the Engineer.

4.0 MATERIAL ACCEPTANCE

With each material shipment, the manufacturer shall provide a certification containing quality control test results obtained from the lot(s) of material shipped. The certification shall include third party laboratory accreditation or certification testing, such as Underwriters Laboratories (UL), Inc. Each block shall be

stamped to provide identification sufficient for field identification and correlation to test results.

5.0 SAMPLING AND TESTING

The Engineer will perform on-site density tests by weighing one block randomly from each truck load or 250± cubic yards of Geofoam blocks delivered to the project site. If any block does not conform to the density requirement, the sampled truck load or 250± cubic yard batch will be rejected in writing by the Engineer. Sample size shall be 1 ft^3.

6.0 CONSTRUCTION DETAILS

To assure proper installation methods, a manufacturer's representative shall be present at the start of construction.

Keep excavations and site construction area free from water. Remove all water, including rain water, snow and ice encountered during operations by pumps, drains and other methods approved by the Engineer. This work is considered incidental to construction.

Exercise care to prevent damage to the Geofoam blocks during delivery, storage and construction. Damaged blocks will not be used. Protect the Geofoam blocks from (1) Organic solvents such as acetone, benzene, and paint thinner; (2) Petroleum based solvents such as gasoline and diesel fuel; (3) Open flames; (4) Prolonged exposure to sunlight (no more than 30 days) during shipping and on-site storage. Geofoam shall be considered combustible and shall not be exposed to open flame or any source of ignition. The manufacturer shall present proposed treatment methods to the Engineer for review and approval.

Do not drive or operate heavy vehicles or machinery directly on the Geofoam blocks. Maintain at least a 6 inch cushion of soil between Geofoam blocks and any equipment operating on the Geofoam. Geofoam blocks damaged due to the Contractor's operations after anchoring, shall be removed and replaced at the Contractor's expense.

Prepare subgrade for Geofoam placement by maintaining minimum 14-inch thickness of drainage rock below the Geofoam blocks. Drainage rock material shall meet the gradation requirements of type "Size 1A" as specified in Section 820 – Coarse Aggregate for use in Portland Cement Concrete of the SDDOT Standard Specifications for Roads and Bridges, Current Edition.

Place the Geofoam blocks on the prepared surface indicated on the plans, within a tolerance of 1 ½ inch in 10 feet. Trim the blocks as required to maintain this tolerance throughout the fill height. Trim and place blocks to maintain a minimum of 2 layers of Geofoam blocks throughout.

Trim or cut the blocks using a handsaw or an alternative cutting method approved by the Engineer. To avoid continuous joints, lay blocks in a bond pattern and orient each successive layer with the long axis of blocks at 90 degrees to previous layer as shown on the plans. All blocks shall accurately fit relative to adjacent blocks. No gaps greater than 1 in. will be allowed on vertical joints. All blocks shall be laid with a maximum lift thickness of 42 in.

Because of the light unit weight of the Geofoam blocks, the Contractor shall provide temporary weighing and/or guying as necessary to prevent positive buoyancy of the geofoam mass until all the blocks are built into a homogeneous mass, and the pavement section as well as any soil cover are in place.

Embankment over the side slopes of the Geofoam block fill shall be placed starting at the bottom of the slope in such a manner as to prevent damage to the Geofoam blocks. Finished Geofoam block fill on side slopes shall have a minimum of 3 ft. of cover or more as shown on the plans.

7.0 METHOD OF MEASUREMENT

The completed work for Geofoam blocks lightweight fill will be paid under plan quantity. No credit will be made for wasted material.

8.0 BASIS OF PAYMENT

Payment for Geofoam Blocks Lightweight Fill will be made under SDDOT Bid Item 900E1050 - Expanded Polystyrene (EPS) Foam at the unit contract price per cubic yard as the plan quantity, which shall include compensation for all equipment, labor and materials necessary to furnish and install the Geofoam blocks and connectors according to the plans and this specification.

9.0 SUGGESTED MANUFACTURERS

The following is a list of suggested local and regional manufacturers that can produce the required Geofoam block material for this job:

Benchmark Foam Inc.
400 Pheasant Ridge
Dr.
Watertown, South Dakota
57201 800-658-3444

Plymouth Foam, Inc. (An Altor Co.)
P.O. Box 407
1800 Sunset Dr.
Plymouth, WI 53073
800-669-1176

Iowa EPS Products,
Inc. 4100 Dixon St.
Des Moines, IA 50313
515-262-0882

Diversifoam Products
9091 County Road 50
Rockford, MN 55373
763-477-5854

Styrotech Inc.
8800 Wyoming Avenue North
Brooklyn Park, Minnesota 55445
800-451-6963

Special Provisions
For
EPS Geomembrane

GEOMEMBRANE

1.0 DESCRIPTION

This work shall consist of furnishing and placing a geomembrane over Expanded Polystyrene (EPS) block fill for the purpose of preventing petroleum based material from infiltrating and damaging the EPS blocks.

2.0 MATERIALS

The EPS Geomembrane shall consist of a separate, puncture free geomembrane. The geomembrane shall be flexible and, by its own weight, shall cover and conform closely to 90 degree edges and corners of EPS blocks at ambient temperatures above 45 degrees Fahrenheit, without additional heating of the geomembrane. The geomembrane shall be a high density polyethylene (HDPE) product. It shall meet the following physical and chemical requirements, specified as minimum 01' maximum, not average roll properties:

Thickness ASTMD-5199 ..... min. 40 mil.

Density ASTMD-1505 ..... min. 0.93 g/cm^{-3}

Carbon Black Content ASTMD-1603 ..... min. 2.00%

Tensile Properties ASTM D-6693
Stress at Yield ..... min. 66 lb/in-width
Stress at Break ..... min 114 lb/in-width
Strain at Break ..... min. 700 %
Strain at Yield ..... min. 12 %

Tear Resistance ASTMD-I004 ..... min. 25 lbs.

Puncture Resistance ASTMD-4833 ..... min. 70 lbs.

Permittivity ASTMD-4491 ..... max. $1.0x10^{-4}$ sec^{-1}

Bonded Seam Strength ASTMD-4437 ..... 66 lb/in-width

3.0 ACCEPTANCE

A Certificate of Compliance shall be furnished stating that the selected geomembrane has been tested, and meets the above mentioned requirements and is:

A) Free from pinholes, tears, and other defects which would cause leekage of liquids through the geomembrane.

B) Acceptable for spill containment of hydrocarbons, including automobile gasolines, aviation gas, diesel fuel, kerosene, hydraulic fluid, methanol, mineral spirits, and naphtha.

4.0 SAMPLING AND TESTING

Sampling and Testing shall meet M.S.T.R. 11.15 MSE/Geotextile Fabric.

5.0 CONSTRUCTION DETAILS

No construction equipment shall drive directly on the geomembrane. Damage to the geomembrane resulting from the Contractor's vehicles, equipment, or operations shall be replaced or repaired with new materials to the satisfaction of the Engineer with no additional compensation made.

All seams shall be bonded or field welded to meet Vapor Transmission Rates.

6.0 METHOD OF MEASUREMENT

The completed work for EPS Geomembrane will be measured in place by area covered in square yards. No credit will be made for wasted material.

7.0 BASIS OF PAYMENT

Payment for EPS Geomembrane will be made under SDDOT Bid Item 900E1049 EPS Geomembrane, which includes all equipment, labor and materials necessary to furnish and install the geomembrane according to the plans and this specification.

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
NEXT GENERATION CONCRETE SURFACE (NGCS)
GRINDING OF PCC PAVEMENT

PROJECT EM 0292(88)73, PCN 06JQ
LINCOLN COUNTY

SEPTEMBER 17, 2025

I. DESCRIPTION

This work consists of creating a Next Generation Concrete Surface (NGCS) on new or existing concrete pavement through grinding and grooving techniques to provide a quiet surface meeting the specified smoothness requirements.

II. MATERIALS (None Required)

III. CONSTRUCTION REQUIREMENTS

A. NGCS Grinding:

1. **Equipment:** NGCS grinding of PCC pavement shall be accomplished using diamond blades mounted on a self-propelled machine designed specifically for diamond grinding and texturing pavement. The equipment shall weigh a minimum of 35,000 pounds including the grinding head and be of a size that will grind a strip at least 4 feet wide in a single pass. The effective wheel base of the machine shall be no less than 12 feet. The effective wheel base is defined as the distance from the front wheel assembly transverse pivot point to the transverse pivot point of the profile/depth control/ground drive wheels.

   The equipment shall be such that it will not strain or damage the underlying pavement surface. Grinding equipment that causes raveling, aggregate fractures, spalls, or disturbance to the transverse or longitudinal joints shall not be permitted. The equipment shall have a positive means of vacuuming the grinding residue from the pavement surface leaving the surface in a clean, near-dry condition.

The Contractor shall maintain the equipment to ensure the equipment is in proper working order, with attention paid to the “roundness” of the match and depth control wheels. The Contractor shall immediately replace any wheels found to be out of round.

2. **Construction:** The Contractor shall schedule and proceed with construction operations in a manner that produces a neat, uniform finished surface. Shoulder grinding shall transition from the edge of the mainline and other lanes requiring NGCS grinding as required to provide drainage, leaving no more than a 3/16 inch ridge and an acceptable riding surface. Adequate cross slope drainage shall be maintained. The Contractor shall use NGCS grinding or conventional diamond grinding in accordance with Section 380.3 O when conditions require a feather pass into adjacent surfacing outside of the area requiring NGCS grinding. For concrete repair projects, full and partial depth concrete repairs, slab stabilization, and dowel bar retrofit shall be completed prior to any grinding. For projects with new concrete pavement, the Contractor shall not begin the NGCS grinding until the concrete has attained a compressive strength of 4,000 psi. Joint sealing shall be completed subsequent to the diamond grinding operations. Structures shall not be ground.

   NGCS construction may be accomplished as a single-pass or two-pass operation as determined by the Contractor. If the Contractor elects to use a single pass operation, PCC pavement smoothness requirements stated later in this special provision must be attained and checked periodically by the Contractor throughout the construction phase to ensure corrective grinding is not necessary as this could impact the quality of the NGCS texture.

   Grinding shall be accomplished in a manner that eliminates joint or crack faults so there is no more than a 1/16 inch differential between the adjacent sides of the joints and cracks.

   Lateral drainage shall be achieved by maintaining a constant cross slope between grinding extremities in each lane. The finished cross slope shall mirror the pre-grind cross slope and shall have no depressions or misalignment of slope greater than 1/8 inch in 10 feet when measured with a 10 foot straightedge placed perpendicular to the centerline. Straightedge requirements will not apply across longitudinal joints or outside the ground area.

   The grinding shall be performed in a longitudinal direction. Grinding shall begin and end at lines normal to the pavement centerline at the project limits. Passes of the grinding head shall not overlap more than 1 inch. No

unground surface area between passes will be permitted. The area ground shall not be left smooth or polished.

a. **Single-Pass NGCS Operation:** The construction operation will provide a flush ground surface that contains longitudinal grooves and shall be constructed in one, single-pass operation. The diamond blade stack will consist of two types of diamond grinding blades arranged to provide a flush ground surface as well as those required to produce the longitudinal grooves. The diamond blade stack shall be mounted on a 4 foot grinding head, stacked with 0.125 inch wide blades separated by 0.035 +/- 0.005 inch wide spacers. The blades used to produce the flush ground surface shall be flat across their contact surface and in the same plane with other flush grind blades (excluding grooving blades) when mounted. The complete head, when stacked with all blades, shall be straight across its length without bowing when mounted on the diamond grinding machine. No unground surface area between passes will be permitted. The longitudinal grooving blades will be spaced among the flush grind blade stack on 1/2 inch to 5/8 inch centers and shall produce grooves 1/8 inch to 3/16 inch in depth. The grooves shall be constructed parallel to the centerline. The contractor shall use a guide to ensure proper alignment of the grooves to centerline.

b. **Two-Pass NGCS Operation:** This construction operation will allow for two separate operations to construct the NGCS section. The first operation will create the flush ground surface. The flush grind blades shall be mounted on a 4 foot grinding head, stacked with 0.125 inch wide blades separated by 0.035 +/-0.005 inch wide spacers. The blades used to produce the flush ground surface shall be flat across their contact surface and in the same plane with other flush grind blades when mounted. The complete head, when stacked with all blades, shall be straight across its length without bowing when mounted on the diamond grinding machine. No unground surface area between passes will be permitted. The PCC pavement smoothness requirements stated within this special provision must be attained and measured to the satisfaction of the Engineer prior to constructing the second operation. The second operation will provide the longitudinal grooves. The longitudinal grooves shall be 1/8 inch wide and will be 1/8 inch to 3/16 inch in depth. The longitudinal grooves will be spaced on 1/2 inch to 5/8 inch centers. The grooves shall be constructed parallel to the centerline. The contractor shall use a guide to ensure proper alignment of the grooves to centerline.

3. **Final Surface Finish:** The NGCS grinding process shall produce a pavement surface that is true to grade and uniform in appearance with a longitudinal grooved texture. The flush ground surface shall appear

smooth and shall contain no ridges that exceed 1/32 inch. The longitudinal grooves shall be constructed parallel to the centerline. At a minimum, 98% of the pavement surface shall be textured utilizing the NGCS. Depressed pavement areas due to subsidence, edge slump or other localized causes will be excluded from this requirement when approved by the Engineer.

4. **Removal of Residue:** The Contractor shall establish a positive means for the removal of the grinding and grooving residue from the pavement surface leaving the surface in a clean, near-dry condition. Solid residue shall be removed from the pavement surfaces before being blown by traffic action or wind. Residue shall not be permitted to flow across lanes used by public traffic. Residue and wastewater shall not be expelled on the roadway or shoulder surface. Residue shall be disposed of in a manner that will prevent residue, whether in solid or slurry form, from reaching any waterway in a concentrated state. Residue may continuously flow on adjacent dry vegetated roadway slopes or ditches within the right-of-way. A flexible drag hose shall be attached to the discharge end of the slurry pipe to minimize splashing of slurry placed on roadway slopes or ditches. If the Engineer determines that the slurry is going to enter a waterway, drainage facility, or curb & gutter section, the slurry shall be placed in storage tanks and deposited in settling basins, spread over flat vegetated areas, or filtered by other means approved by the Engineer at no additional cost.

   The Contractor shall satisfactorily remove grinding material or wastes prior to returning traffic to the roadway. If a significant amount of residue remains after grinding, the Engineer may require flushing be done in a manner and in sufficient quantity to assure that slurry produced by the pavement grinding is not deposited on vehicles. The Contractor's proposed method of flushing the roadway should produce acceptable results, which will be based on a driving surface that will not create a nuisance for the public. All costs for flushing roadway shall be incidental to the contract unit price per square yard for NGCS Grinding PCC Pavement.

5. **NGCS Smoothness:** The Contractor may perform quality control profile testing as needed to control the work. The Contractor assumes all responsibility for the finished product meeting the pavement smoothness requirements. The NGCS surface will conform to the smoothness requirements of Section 380.3 O.2 except as modified by the following:

   The Contractor will collect the profile data after the Contractor completes all NGCS grinding and joint sealing. If the NGCS grinding and joint sealing is completed in phases, the Contractor may profile test a completed phase before the completion of subsequent phases.

The Contractor will accomplish corrective grinding with specially prepared circular diamond blades mounted on a horizontal shaft meeting the requirements for the NGCS grinding or conventional diamond grinding in accordance with Section 380.3 O. The Contractor will day light corrective grinding to the outside edge of the pavement. The Contractor will repair and replace joint sealant damaged by corrective grinding as directed by the Engineer and at no additional cost to the Department. The Contractor will not leave ground areas smooth or polished. The Contractor will perform NGCS grinding following the corrective grinding or as part of the corrective grinding. The Contractor will ensure ground areas have a uniform texture equal in roughness to the surrounding pavement with NGCS grinding completed.

IV. METHOD OF MEASUREMENT

A. NGCS Grinding PCC Pavement: The Engineer will measure NGCS grinding PCC pavement for the construction of the NGCS by the square yard. The measurement will be the final textured surface area regardless of the number of passes required to achieve acceptable results. Minor areas of unground pavement within the designated areas to be ground will be included in the measurement.

B. Grinding PCC Pavement: The Engineer will measure grinding PCC pavement for the feather pass, if required, by the square yard based on a width of 2 feet multiplied by the length in feet of the required feather pass.

V. BASIS OF PAYMENT

A. NGCS Grinding PCC Pavement: NGCS grinding PCC pavement will be paid for at the contract unit price per square yard. Payment shall be full compensation for equipment, labor, incidentals necessary for grinding the pavement, removing residue and excess water, hauling and disposal of grinding slurry, and the Contractor profile testing.

B. Grinding PCC Pavement: Grinding PCC pavement will be paid for at the contract unit price per square yard. Payment shall be full compensation for equipment, labor, incidentals necessary for grinding the pavement, removing residue and excess water, and hauling and disposal of grinding slurry.

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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
AGGREGATE COLUMN REINFORCEMENT

PROJECT EM 0292(88)73, PCN 06JQ
LINCOLN COUNTY

FEBRUARY 18, 2025

I. DESCRIPTION

This work will consist of design, testing, furnishing the material for, and installation of aggregate columns in accordance with this special provision and the contract plans. The term “Aggregate Column” as used in this special provision refers to columns of compacted aggregate used to reinforce the ground to increase bearing capacity and reduce settlement of embankments and structures. The columns may be constructed with a down-hole vibrator or down-hole tamper.

The purpose of the aggregate columns is to improve soils within reasonably close conformity to the limits shown on the plans.

The final location and extent of the aggregate columns will be determined by the Contractor but will conform to the minimums listed in Section III of this special provision.

II. MATERIALS

A. Backfill Materials: Aggregate column backfill material will be clean crushed stone meeting requirements of select granular backfill in Section 850 and meeting the requirements of Section 820.2.A for deleterious substances.

B. Water: Potable water or other suitable source will be used to increase the aggregate moisture content when required.

III. CONSTRUCTION REQUIREMENTS

A. Design Requirements:

1. **Foundation Improvement Area:** Aggregate column foundation improvement limits for the west approach begin at station 316+00 37Rt and

316+41 96 Lt, and end at approximately station 318+80 46Lt to 104Rt along centerline of east bound 85th street. Aggregate column foundation improvement limits for the east approach begin at approximately 321+75 56Lt to 104Rt, and end at 324+70 113Lt to 47Rt. There will be additional aggregate columns for the box culvert starting at 323+76 146Lt to 324+20 150Lt and from 324+44 68Rt to 324+68 64Rt center line of east bound 85th Street. The foundation improvement limits are shown on the Site Plan and Subsurface Profile sheet.

2. **Working Platform Elevation:** On the east side of I29 prior to beginning installation of aggregate columns, create a working platform by excavating the foundation improvement plan area to an elevation of 1515' or until over saturated unstable material is removed and place granular backfill to an elevation of 1517'. The granular material that will conform to the requirements of Aggregate Base Course in Section 882 of the Standard Specifications, placed in 6 inch lifts and compacted according to section 260.3.B of the Standard Specifications.

   On the west side of I29 prior to beginning installation of aggregate columns, create a working platform by excavating the foundation improvement plan area 2 foot below current ground line and backfill with 1 foot with granular material that will conform to the requirements of Aggregate Base Course in Section 882 of the Standard Specifications and compacted according to section 260.3.B of the Standard Specifications.

3. **Column Depth:** The aggregate columns will extend to a minimum depth of 16 feet, or as specified by the Designer.

4. **Replacement Ratio:** The minimum replacement ratio will be 8%, or greater as needed to meet design bearing capacity and settlement criteria.

5. **Bearing Capacity:** The aggregate column system will provide a minimum Factored Bearing Resistance of 5,000 psf.

6. **Settlement:** The maximum allowable post embankment construction settlement will be 2 inches, and a maximum allowable differential settlement will be 1 inch in 100 feet.

B. Construction:

1. **Aggregate Column Contractor's Experience Requirements and Submittals:**

   The aggregate column design and installation will be performed by a specialist aggregate column Contractor experienced in the design and installation of aggregate columns. The Contractor will have successfully

completed at least three projects of similar size within the last five years using the same proposed installation technique.

The aggregate column Contractor will have previous experience installing aggregate columns in soil and groundwater conditions similar to the project conditions. The Contractor will submit construction details, structural details, and verification test results for at least three previous successful aggregate column projects of similar scope to this project.

The aggregate column Contractor will assign a senior design engineer to this project with method-specific experience from previous projects and a field engineer with some previous experience on similar projects. The field engineer will serve as a full-time quality control representative, reporting to senior design staff, to supervise the work and verify all installation procedures.

The on-site foreman will have a minimum of three years' experience in supervising construction of aggregate columns of similar size, using the same methods in similar soil and groundwater conditions.

At least 45 calendar days prior to the installation of the aggregate columns, the Contractor will submit five copies of the completed project reference list and a personnel list to the Engineer. The project list will include a brief project description with the owner's name and phone number and results of the tests performed as part of the verification program. The personnel list will identify the supervising engineer and on-site foreman to be assigned to the project. The personnel list will contain a summary of each individual's experience and be complete enough for the Engineer to determine whether each individual satisfies the required qualifications. The Engineer will accept or reject the Contractor's qualification within 15 calendar days after receipt of a complete submission. Additional time required due to incomplete or unacceptable submittals will not be cause for time extensions or impact or delay claims. All costs associated with incomplete or unacceptable submittals will be borne by the Contractor.

Work will not begin until the Engineer's written acceptance of the Contractor's experience qualification is given. The Engineer may suspend the work if the Contractor uses personnel not included in the Engineer's review. If the work is suspended, the Contractor will be fully liable for all resulting costs and no adjustments in contract time will result from the suspension.

2. **Submittals:** The Contractor will prepare and submit an Aggregate Column Installation Plan to the Department for the Department's review. The Department will review the installation plan for general conformance with the contract plans and specifications only. Any deviation from the plans or

specifications not clearly noted by the Contractor will not be reviewed. The Aggregate Column Installation Plan must include the following:

a. Construction drawings for review showing identification numbers, spacing, locations, and depths of the aggregate columns, as well as details for the working platform. Construction drawings will be signed and sealed by a Professional Engineer registered in the State of South Dakota.

b. Detailed step-by-step description of the proposed equipment and construction procedures to be used, including a plan to dispose of any water or spoils. Descriptions of the proposed equipment and construction procedures should reference applicable minimums listed in section III.B.9 of this special provision.

c. A proposed Verification Program.

d. The gradation of the proposed aggregate column backfill material the Contractor proposes to use. Upon completion of the review, the Contractor will maintain this gradation throughout the aggregate column installation.

e. A proposed plan for quality control throughout the installation procedure. This will address issues such as control and measurement of column or pier diameter, lift thickness, full time quality control personnel, and any other pertinent information.

f. Design calculations including results of bearing capacity, anticipated settlements, and other calculations relating to the performance of the aggregate columns.

g. A proposed program to monitor settlement during and after construction of the embankment. At a minimum 2 settlement plates at each berm will be installed at the base of the embankment. Periodic elevations will be obtained as construction progresses to monitor settlement of the embankments.

The Contractor will provide required submittals 21 calendar days prior to initiating aggregate column construction. The Contractor will send an email with the submittals attached as a PDF to the Project Engineer. Upon request, the Project Engineer will provide the Contractor with the appropriate email addresses. Within 14 calendar days of receiving the submittals, the Department will respond to the Contractor and submitter in one of the following ways: 1) No Exceptions Noted; 2) Returned for Revision; or 3) Not Required for Review. If the Department's response states "Returned for Revision", the Contractor will make the revisions and

resubmit the submittals for review as specified above. Upon completion of the Department's review process and a Department response of "No Exceptions Noted" or "Not Required for Review", the Contractor will send the Project Engineer an email with the final installation plan as a PDF for distribution. The Contractor will not begin construction of the work contained in the submittals until the Department has confirmed, in writing, a completed review with a response of "No Exceptions Noted" or "Not Required for Review".

3. **Verification Program:** A verification program designed, accomplished, and reported by the Contractor is required to measure the quality of the installed aggregate columns. The proposed verification program is subject to review by the Engineer and completed prior to placement of production columns. As a minimum, the verification program must include the following:

   a. Minimum of one verification tests in each of the 2 proposed areas, to be completed prior to installation of production columns in that area.

   b. Verification tests will, at a minimum, consist of a modulus test measuring deflection at the top of the pier with a load per column of at least 150 percent of the design load.

   c. Proposed means and methods for verification ensuring design and performance criteria have been satisfied. This will include modulus tests as described above and may also include additional load tests on individual elements, groups of elements, soil borings, and other methods as required by the aggregate column designer or required by the Engineer. Acceptable performance will consist of demonstrating that the installed columns at a minimum meet their design stiffness. Construction equipment may be used as deadload for verification testing.

   d. A quality control program to verify that the aggregate columns are installed in accordance with the designer's specifications and the requirements outlined in this special provision.

4. **Daily Reports:** During construction, the Contractor will submit daily progress reports to the Engineer detailing the following:

   a. Column identified by location number.
   b. Date constructed.
   c. Elevation of top and depth of each column.
   d. Average lift thickness.
   e. Volume estimate and location of any ground heave or subsidence.
   f. Vibrator power consumption during penetration and compaction of each increment of column constructed (if applicable).
   g. Description of soil and groundwater conditions.

h. Details of any obstructions, delays, and unusual ground conditions.
i. Quantity of aggregate placed in each column.
j. Amount of water used per column (if applicable).
k. Results of quality control testing.

5. **Construction Site Survey:** Before bidding the work, the Contractor will review the available subsurface information and visit the site to assess the site geometry, equipment access conditions, and locations of existing structures and above ground facilities.

6. **Aggregate Column Preconstruction Meeting:** An aggregate column preconstruction meeting will be scheduled by the Engineer and held prior to the start of aggregate column construction. The Engineer, prime Contractor, aggregate column specialty Contractor, and representatives from the SDDOT's Geotechnical Engineering Activity will attend the meeting. Attendance is mandatory. The aggregate column preconstruction meeting will be conducted to clarify the construction requirements for the work, to coordinate delineation of responsibilities amongst the prime Contractor and aggregate column Contractor, anticipated subsurface conditions, aggregate column survey control, and aggregate column installation and testing.

7. **Site Drainage Control:** The Contractor will control all materials displaced as a result of aggregate column installation, including water and cuttings, and properly dispose of these in accordance with the Specifications and all applicable local codes and regulations.

8. **Aggregate Column Allowable Construction Tolerances:** If any aggregate column or groups of columns falls outside these tolerances, the Engineer may require additional column(s) installed at the Contractor's expense.

    a. Horizontal Control: The center of the completed column will be within 4 inches of the plan location.

    b. Vertical Control: The completed column will not deviate from the vertical by more than 2 inches in 10 feet.

    c. Diameter: The completed column effective diameter will not be more than 10% below the plan diameter and the average effective diameter of any group of 50 consecutively installed columns will not be less than the plans diameter.

9. **Procedures and Equipment:** The actual construction procedures and equipment will be determined by the Contractor. The following are minimum requirements:

a. Down-Hole Vibrator Method:

1) The vibrator will be capable of providing at least 70 HP of rated energy and a centrifugal force of 15 tons. Capable of providing a daily report of vibrator power consumption for each increment of individual column construction

2) The probe and follower tubes will be of sufficient length to reach the elevations shown on the Contractor's design plans and shop drawings. The probe used in conjunction with the tip jet will be capable of penetrating to the required tip elevation. Pre-boring of cemented lenses, layers, or strata if encountered is permitted at no additional cost to the Department.

3) The probe and follower tubes will have visible markings at regular increments to enable measurement of penetration and re-penetration depths.

4) When the pre-drilled hole remains open during construction, pre-drilling to the design depth will be performed with an auger of diameter equal to the plans diameter.

5) If required by installation method or if caving soil conditions are encountered, provide methods for supplying to the tip of the probe a sufficient quantity of air or water to widen the probe hole to allow adequate space for aggregate backfill placement around the probe. Maintain the flow of air or water from the bottom of the jet at all times during backfilling to prevent caving or collapse of the hole and to form a clean aggregate column.

6) The probe will penetrate to the minimum depths required in the Contractor's design plans or listed in section III.A.3 of this special provision, whichever is deeper.

7) Lift thickness will not exceed 4 feet. After penetration to the treatment depth, slowly retrieve the vibrator in 1-foot to 1 1/2-foot increments to allow backfill placement.

8) Compact the backfill in each lift by re-penetrating it at least twice with the horizontally vibrating probe to densify and force the aggregate radially into the surrounding soil. Re-penetrate the aggregate in each increment a sufficient number of times to develop an ammeter reading on the motor significantly higher than the freestanding (unloaded) ampere draw on the motor.

9) Aggregate columns will be installed so that each completed column is continuous throughout its length.

10) Removal of subsurface obstructions, if directed by the Engineer, will be incidental to the aggregate columns. Additional columns or replacement columns required due to obstructions will also be incidental to the aggregate columns. Obstructions include but are not limited to boulders, timbers, concrete, and utility lines which prevent placing a column to the required depth or cause a column to drift from the required location.

11) Any ground heave that is observed will be reworked and compacted by the Contractor prior to the embankment construction. The depth of soil to be reworked and degree of the compaction required will be determined by the Engineer. Rework and compaction of heaved ground will be incidental to the aggregate column installation.

12) If during jetting operations caving, collapse of the hole, or any other ground disturbances occur, the Engineer may require alternative installation procedures, including but not limited to predrilling and use of temporary casing, at no additional cost to the Department.

b. Down-Hole Tamper Method:

1) The tamper will have a diameter that is at least 85% of the pre-drilled hole diameter, have beveled sides, and be long enough to reach the full depth of the pre-drilled hole. The tamper will have a minimum Construction Industry Manufacturer's Association (CIMA) rating of 1,200 ft-lb and will apply direct downward impact energy to each lift of aggregate.

2) The drilled cavity excavation will be in reasonably close conformity to the limits and construction stages shown on the plans. Temporary casing may be required to limit sloughing of subsurface soils, the casing should be inserted to at least 2 feet beyond the sloughing strata. Casing of sufficient length will be onsite prior to beginning drilling operations. Upon extraction, the bottom of the casing should be maintained at not more than 1 foot to 2 feet above the level of backfill.

3) Removal of subsurface obstructions, if directed by the Engineer, will be incidental to the aggregate columns. Additional columns or replacement columns required due to obstructions will also be incidental to the aggregate columns. Obstructions include but are not limited to boulders, timbers, concrete, and utility lines which prevent placing a column to the required depth or cause a column to drift from the required location.

4) Backfill placement will closely follow the excavation of each cavity. The backfill will be placed in 12-inch-thick loose lift thickness. Each lift should be rammed with a high-energy impact tamper to the satisfaction of the Engineer and as recommended in the Contractor's design plans.

IV. METHOD OF MEASUREMENT

Measurement will be by quantity of cubic yards of aggregate column material installed. The plan quantity is calculated to the nearest $1/10^{th}$ of a cubic yard using the dimensions of the treatment areas, a projected column diameter of 30 inches, initial column spacing of 8 feet center to center, and initial projected depths of 16 feet. The initial quantity of 3858.7 cubic yards of material is only an estimate based on these values. The aggregate column Designer will determine actual quantities,

spacing, depth, and all other design aspects of the aggregate column foundation improvements within the requirements of this Special Provision. Aggregate column verification testing and temporary casing will not be measured.

V. BASIS OF PAYMENT

The Contractor will be paid the quantity of cubic yards of aggregate column installed. This payment will be full compensation for design, field staking for the location of the elements, mobilization, drilling, furnishing, transporting, placing and compacting aggregate column backfill, associated work, and full-time quality control. Verification testing and temporary casing will not be paid for directly and will be considered incidental to the aggregate column foundation improvements.

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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
CYLINDRICAL CONCRETE FOOTINGS

PROJECT EM 0292(88)73, PCN 06JQ
LINCOLN COUNTY

JULY 22, 2025

I. DESCRIPTION

This work consists of all labor, materials, equipment, and services required in the construction of cylindrical concrete footings.

II. MATERIALS

A. Concrete: Concrete will be A45 Drilled Shaft and conform to the requirements of Section 460, except as modified by this section.

B. Concrete Reinforcing: Section 1010.

C. Temporary Casing: Casing will be of sufficient thickness to withstand handling and installation stresses. Casing material may consist of Sono tube, corrugated metal pipe, PVC, smooth metal pipe, or other material as approved by the Engineer.

D. Permanent Casing: Casing will be smooth steel of sufficient thickness to withstand handling stresses, concrete pressure, and surrounding earth and fluid pressures. The casing will be of the diameter specified and will have teeth at the bottom to facilitate proper seating of the casing to plans specified depth.

III. CONSTRUCTION REQUIREMENTS

A. Concrete Quality and Proportioning: The Contractor will design and be responsible for the performance of the concrete mix. The concrete mix will have the following characteristics:

1. Minimum cementitious content of 750 pounds per cubic yard. The maximum cementitious content (total cement, fly ash, and other cementitious admixture) content will be 800 pounds per cubic yard. The Contractor will

substitute a portion of the cement with Class F modified fly ash in accordance with Section 605. The amount of cement to be replaced will be 20% to 25% by weight. The ratio of substitution of fly ash to cement will be 1:1 by weight.

2. Coarse aggregate will conform to Section 820 and be either size #1, #1A, or #15.

3. Minimum 28-day compressive strength of 4500 psi.

4. Slump at time of placement will be between 6 and 8 inches for concrete that is placed with free-fall or tremie method. Slump at time of placement will be between 7 and 9 inches for concrete that is placed with a pump line.

5. Entrained air content of 6.5% with an allowable tolerance of +1% to -1.5%.

6. The mix design will establish a maximum water cementitious material ratio for the concrete mix (never to exceed 0.44).

The use of a water reducer will be required to achieve the above properties. Water reducers conforming to AASHTO M 194 Type C (Accelerating) and Type E (Water-Reducing and Accelerating) will not be permitted.

B. General Requirements: The Contractor will perform the excavation for the footings through the various types of materials that are encountered. The excavation will be to the depth, dimensions, and locations as shown in the plans.

Contractor methods and equipment will be suitable for the intended purpose and materials encountered. The following equipment is required to be always available for use on the project site during footings construction:

1. Tremie and concrete pump line (if used) of sufficient length to reach the bottom of the footings.

2. T-bar for installing casing.

3. Cleanout bucket of the proper size.

4. Graduated measuring device to determine excavation and water depth.

5. A pump of sufficient discharge rate for filling the excavation with water when required due to caving or water bearing soils and to remove the displaced water during underwater placement of concrete.

6. Water tank(s), water truck(s), or on-site water source of at least 2 times the volume of the footing.

Unless otherwise specified on the plans, the Contractor will begin footing excavation using the dry construction method. If caving or water bearing soils is encountered the Contractor will be required to continue using the wet construction method.

Upon completion of the excavation of the footings, a cleanout bucket will be used to remove all loose material from the bottom of the shaft.

C. **Dry Construction Method:** The dry construction method consists of drilling the footings, removing loose material from the excavation, and placing the concrete in a relatively dry excavation. If, during dry excavation, the Contractor encounters caving or water bearing soils, the Contractor will stop drilling and fill the hole with water to a point above the ground water elevation and continue with the wet construction method. For dry construction to continue the Engineer must be able to inspect the sides and bottom of the excavation before placing the reinforcing steel cage and concrete.

D. **Wet Construction Method:** If caving or water bearing soils are encountered, it may be necessary to use water, or other drilling fluid, or a temporary casing to maintain an open excavation. If practical, a positive 10-foot head of water will be maintained above the ground water elevation. When necessary, a drilling fluid other than water or temporary casing may be required to achieve this head pressure. Once a method to stop the caving and water intrusion is applied, the excavation will be advanced to the depth required in the plans. A sufficient head pressure will be maintained during the drilling operation, reinforcement placement, and concrete placement.

1. The concrete will be placed in the footings according to the underwater concrete placement section. Any contaminated water or drilling fluid will be disposed of as approved by the Engineer.

2. If a temporary casing is used, as concrete is placed simultaneously extract the casing and tremie, or pump line, at a slow uniform rate. Maintain 5-feet of embedment for the tremie or pump line with a sufficient head of concrete above the bottom of the casing to overcome the hydrostatic pressure outside the casing.

E. **Permanent Casing Construction Method:** The permanent casing construction method will be used only when specified on the plans or approved by the Engineer. This method consists of placing a casing to a prescribed depth before excavation begins. A T-bar will be used to twist the permanent casing to the specified depth.

F. Reinforcing Steel Cage Construction and Placement: The reinforcing steel cage (consisting of longitudinal bars, spirals, or tie bars) will be completely assembled and placed as a unit into the excavated footings. Placement of the reinforcing steel cage will take place immediately before concrete placement.

The reinforcing steel cage will be tied and supported in the footings so the cage will remain within the specified tolerances.

G. Concrete Placement: Concrete placement will be continuous until the footing is full and uncontaminated concrete flows out of the top of the footing, as determined by the Engineer.

H. Underwater Placement of Concrete:

1. **Tremie:** The tremie pipe will be a minimum of 0.25-inch-thick wall steel pipe, with a minimum inside diameter of 6 inches. The tremie pipe will be watertight, smooth inside and out, and thoroughly cleaned of any hardened concrete, rust, and all other contaminants.

   Starting/Restarting of the concrete placement by tremie will begin by sealing the bottom of the tremie with a watertight seal. The watertight seal will prevent water from entering the tremie yet will be dislodged when concrete flow is initiated. The sealed tremie pipe will be lowered to the bottom of the footings and filled with concrete. The tremie will be slowly lifted 6 inches off the bottom to start concrete flow. The concrete supply will be continuous as the tremie is lifted slowly maintaining 5-foot of embedment. At no time will the concrete be allowed to fall through water.

   All vertical movements of the tremie will be made slowly and will be carefully controlled to prevent loss of seal. If loss of seal occurs, placement through that tremie will be halted immediately. The tremie will be removed, resealed, and restarted as directed above.

   Concrete placement will be continuous until the footing is full and uncontaminated concrete flows out of the top of the footing, as determined by the Engineer.

2. **Concrete Pump:** Concrete pumps can be used for underwater concrete placement.

   No reducers will be allowed from the pump truck to the tremie. The portion of the pump line that penetrates the deposited concrete will be a rigid steel line (pipe) at least the same diameter as the pump line. The rigid steel line (pipe) will have a minimum thickness of 3/16 inch.

An approved plug will be inserted into the pump line, near the pump, in such a way that there is fresh concrete against the plug, with no air or water between the plug and concrete.

Placement will be continuous and begin with the pump line within 6 inches of the bottom of the footings. After pumping begins the pump line may be raised with the rising column of concrete as long as the end of the pump line remains embedded 5-feet in the concrete. At no time will the concrete be allowed to fall through water.

If the pump line is allowed to come out of or is removed from the concrete once placement has begun, restarting will require a tremie.

Concrete placement will be continuous until the footing is full and uncontaminated concrete flows out of the top of the footing, as determined by the Engineer.

I. Construction Tolerances: The following tolerances apply to the footings:

The footings will be drilled to the plan shown length.

The top of the footings will be finished level.

Excavation equipment and methods will be designed so the completed footing excavation will have a relatively flat bottom.

IV. METHOD OF MEASUREMENT

Cylindrical Concrete Footing: For each type and size footing specified in the plans, the plan quantity length will be the quantity paid for unless a change is ordered in writing. If a change is ordered, measurement will be according to length specified in the change with additional length computed to the nearest 0.1 foot.

V. BASIS OF PAYMENT

Cylindrical Concrete Footing: Payment will be paid for at the contract unit price per foot for the type and size footing specified in the plans.

Payment will be full compensation for furnishing labor and Materials including but not limited to, A45 drilled shaft concrete, reinforcing steel, water or other drilling fluid, temporary casing, permanent casing, excavation, disposal of all excavated material, surplus material, backfill, labor, equipment, and all incidentals necessary to complete this item of work.

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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
MECHANICALLY STABILIZED EARTH
(LARGE PANEL) WALLS

PROJECT EM 0292(88)73, PCN 06JQ
LINCOLN COUNTY

AUGUST 25, 2025

I. DESCRIPTION

This work will consist of mechanically stabilized earth walls constructed in accordance with these specifications and in reasonably close conformity with the lines, grades, and dimensions shown on the plans or established by the Engineer. Design details for these earth retaining structures such as specified strip or mesh length, concrete panel thickness, loading conditions, size of concrete leveling pad, and details for appurtenances will be as shown on the shop plans. This specification is intended to cover all steel strip or mesh stabilized earth wall systems utilizing discrete concrete face panels, some of which may be proprietary.

II. MATERIALS

The contractor will make arrangements to purchase or manufacture the facing elements, reinforcing mesh or strips, attachment devices, joint filler, and all other necessary components. Materials not conforming to this section of the specifications or from sources not listed in the contract documents will not be used without written confirmation from the Engineer.

A. Reinforced Concrete Facing Panels and Concrete Coping: The facing panels will be as specified in the plan notes. The panels and coping will be fabricated in accordance with Section 8 of AASHTO LRFD Bridge Construction Specifications with the following exceptions and additions.

1. **Notification:** The Contractor will notify the Engineer 24 hours in advance of all concrete pours for inspection and observation of Contractor testing.

2. **Concrete Mix Requirements:** Portland cement concrete will conform to Section 560 of the Specifications. The minimum compressive strength at 28 days is 4,000 psi.

3. **Forms:** Forms will conform to Section 560 of the Specifications.

4. **Fabrication:** Fabrication will conform to Section 560 except:

   a. The concrete panels will be fully supported until the concrete reaches a minimum compressive strength of 1,000 psi. The panels may be shipped after reaching a minimum compressive strength of 3,600 psi.

   b. The following minimum sampling and testing requirements for the concrete will be performed by the fabricator.

   Acceptance of concrete panels and coping with respect to compressive strength, slump, and air testing will be determined on the basis of production lots. A production lot is defined as a group of panels or coping that will consist of either 40 panels, 40 coping sections, or a single day's production, whichever is less.

   During the production of the concrete panels, the manufacturer will randomly sample the concrete every production lot according to SD 402.

   1) **Compressive Strength:** A single compressive strength sample consists of a minimum of four cylinders. Compression tests will be made on standard 6-inch by 12-inch test specimens prepared according to SD 405. Compressive strength testing will be conducted according to AASHTO T 22.

      For every compressive strength sample a minimum of two cylinders will be tested at 28 days if prior cylinders have not indicated lot compressive strength acceptance.

      To determine timing of form removal, shipping the panels/coping sections, or compressive strength acceptance prior to 28 days, a minimum of two cylinders will be tested at ages determined by the fabricator. The compressive strength of a single cylinder can determine the form removal timing or when the panels/coping sections can be shipped.

      Compressive strength acceptance of a production lot will be made if the average of two cylinders compressive strength test results is greater than or equal to 4,000 psi. If the 28-day compressive strength test result is less than 4,000 psi, then the acceptance of the production lot for compressive strength will be based on its meeting the following acceptance criteria in their entirety:

i. Ninety percent of the compressive strength test results for the overall production will exceed 4,150 psi.

ii. The average of the prior six consecutive compressive strength test results will exceed 4,250 psi.

iii. No individual lot compressive strength test result will fall below 3,600 psi.

2) **Slump:** The slump test will be performed according to SD 404. The slump will be determined at the beginning of each day's production and at the same time the compressive strength samples are taken to ensure compliance.

3) **Air:** Air content will be performed according to SD 403. Air content will be determined at the beginning of each day's production and at the same time the compressive strength samples are taken to ensure compliance.

5. **Concrete Cure:** Concrete cure will conform to Section 560 of the specifications.

6. **Surface Finish:** Unless otherwise specified in the plans, the concrete surface of the front face will have a Class I finish as defined by Section 8.12 of AASHTO LRFD Bridge Construction Specifications and the rear face will have a uniform surface finish. The rear face of the panel will be screeded to eliminate open pockets of aggregate and surface distortions in excess of 1/4 inch. The panels will be cast on a flat area. The strips or other metal attachment devices will not contact or be attached to the face panel reinforcement steel.

   The unformed surfaces of the coping will be screeded and fully worked with a suitable floating tool. Before the finish has set, the surface cement film will be removed with a fine brush such that a fine-grained, smooth but sanded texture is achieved.

7. **Marking:** The date of manufacture, the production lot number, and the piece mark will be clearly inscribed on an unexposed face of each panel.

8. **Handling, Storage, and Shipping:** All concrete panels and coping will be handled, stored, and shipped in such a manner as to prevent chipping, discoloration, cracks, fractures, and excessive bending stresses. Panels and coping in storage will be supported on firm blocking to protect the panel connection devices and the exposed exterior finish.

9. **Tolerances:** All concrete panels will be manufactured within the following tolerances.

    a. **Panel Dimensions:** Position panel connection devices within one inch of the plans specified location, all other panel dimensions will be within 3/16 inch of plans specified dimensions.

    b. **Panel Squareness:** Squareness as determined by the difference between the two diagonals will not exceed 1/2 inch.

    c. **Panel Surface Finish:** Surface irregularities on the front surface of the panel measured over a length of five feet will not exceed 1/8 inch. Surface irregularities on the front surface of the panel of a textured finished surface measured over a length of five feet will not exceed 5/16 inch.

10. **Rejection:** Production lots will be rejected because of failure to meet any of the requirements specified above. In addition, any of the following defects will be sufficient cause for rejection of individual panels or coping sections:

    - Defects that indicate imperfect molding.
    - Defects indicating honeycombed or open textured concrete.
    - Cracked or severely chipped panels.
    - Color variation on front face of a panel or on an exposed surface of a coping unit due to excess form oil or other reasons.

11. **Reporting:** A report will be provided to the Engineer detailing all the compressive strength, slump, and air content testing results for each production lot before final acceptance will be given. The testing results performed on that lot to date are to be provided to the Engineer before a lot can be shipped from the point of manufacture.

B. **Soil Reinforcement and Attachment Devices:** Reinforcing and attachment devices that do not meet the manufacture's requirements and are not free of defects will be rejected (i.e. bent strips, damaged coating, etc.). All parts and soil reinforcement will be in their final configuration prior to galvanizing.

    1. **Steel Ribbed Reinforcing Strips:** Reinforcing strips will be hot-rolled from bars to the required shape and dimensions. The strips' physical and mechanical properties will conform to the requirements of ASTM A572, Grade 65 or equivalent. Galvanizing will conform to the requirements of ASTM A123 with a minimum thickness of 2.0 oz/ft^2. Epoxy coatings will meet the requirements of ASTM A775 for reinforcing strips. The minimum thickness will be 18 mills.

2. Ladder Reinforcement: Will be cold drawn steel wire milled to the required shape and dimensions. The physical and mechanical properties will conform to ASTM A1064 plain wire Grade 65. Longitudinal and transverse wires will be of equal size. Minimum shear strength of welds will be 35 ksi. Connector plate material will conform to the requirements of ASTM A1011, Grade 50 or equivalent. Galvanization will conform to ASTM A123 with a minimum thickness of 2.0 oz/ft2. Epoxy coatings will meet the requirements of ASTM A884 for ladder reinforcement. Minimum thickness will be 18 mills.

3. **Tie Strips:** The tie strips will be shop fabricated of hot-rolled steel and will conform to the requirements of ASTM A1011, Grade 50 or equivalent. Galvanization will conform to ASTM A123 with a minimum thickness of 2.0 oz/ft2. Epoxy coatings will meet the requirements of ASTM A884 for ladder reinforcement or ASTM A775 for reinforcing strips. Minimum thickness will be 18 mills.

4. **Fasteners:** Bolts will consist of hexagonal cap screws and nuts conforming to ASTM A449 or equivalent. Galvanizing will conform to ASTM F2329. Tie strips will be cast in the precast concrete panels such that all connectors are in alignment and able to transfer full and even load to the soil reinforcement. Once the reinforcement is connected to the panel, the amount of slack will not exceed 1/8 inch between the connector and the reinforcement during field installation.

C. **Joint Materials:** Installed to the dimensions and thickness according to the plans and shop drawings.

1. All horizontal and diagonal joints between panels will include bearing pads. Bearing pads will meet or exceed the following requirements:

   a. Rubber blocks tested in accordance with ASTM D2240 with a minimum Durometer Hardness of 60 for Type A.

   b. Preformed HDPE (High Density Polyethylene) pads with a minimum density of 59 pcf tested in accordance with ASTM D1505.

2. Provide a geotextile fabric to cover all vertical and horizontal joints between panels on the back side of the wall. The minimum fabric width will be 18 inches with a 6 inch lap.

D. **Granular Backfill for MSE Large Panel Wall:** All backfill material used in the structure volume will be reasonably free from organic and deleterious material. The backfill material will be obtained from crushed natural sources conforming to the following gradation limits as determined by SD 202 using the surface course materials procedure:

Sieve Size	Percent Passing
1-1/2 inches	100
3/8 inch	0-15
#200 mesh sieve	0-10

The backfill will conform to the following additional requirements:

1. **Plasticity Index:** The plasticity index (P.I.) as determined by SD 207 will not exceed 2.

2. **Internal Angle of Friction:** The material will exhibit an angle of internal friction of not less than 34 degrees, as determined by the standard Direct Shear Test, AASHTO T 236 on the portion finer than the #10 sieve.

3. **Soundness:** The materials will be free of soft, poor durability particles. The material will have a sodium sulfate soundness loss of less than 15 percent after five cycles determined in accordance with AASHTO T 104 or SD 220.

4. **Electrochemical Requirements:** The backfill materials will meet the following criteria:

Requirements	**Test Methods**
Resistivity > 3,000 ohm centimeters	AASHTO T 288
ph 5-10	AASHTO T 289
Sulfates < 200 parts per million	AASHTO T 290
Chlorides < 100 parts per million	AASHTO T 291

   If the resistivity is greater or equal to 5,000 ohm-cm, the chloride and sulfates requirements may be waived.

5. **Strength and Chemical Requirements:** The following aggregates meet the above strength and chemical parameters: Minnekahta Limestone, Sioux Quartzite, and Ortonville Granite.

6. **Design Parameters:** Direct shear tests performed on the above aggregates indicate an internal friction angle = 47 degrees, and cohesion = 0. No reduction or safety factors have been applied to these values. A value greater than the standard 34 degrees for the internal friction angle can be used at the wall designer's discretion. A dry unit weight = 105 pcf will be used for the Granular Backfill for MSE Large Panel Wall.

E. Concrete Leveling Pad: The concrete in the concrete leveling pad will conform to Class M6.

F. Acceptance of Material: The Contractor will furnish the Engineer a Certificate of Compliance certifying the above materials, including Granular Backfill for MSE Large Panel Wall if other than Minnekahta Limestone, Sioux Quartzite, or Ortonville Granite, comply with the applicable contract specifications. A copy of all test results performed by the contractor necessary to ensure contract compliance will also be furnished to the Engineer.

Acceptance of the materials other than Granular Backfill for MSE Large Panel Wall will be based on the Certificate of Compliance, accompanying test reports, and visual inspection by the Engineer. Acceptance of the Granular Backfill for MSE Large Panel Wall will be in accordance with the Department's Materials Manual.

III. CONSTRUCTION REQUIREMENTS

A. Construction Plans, Shop Plans, and Design Calculations: The Contractor will consult with an approved MSE wall company and obtain design calculations and construction plans. These plans will be signed/sealed by a Professional Engineer registered in the state of South Dakota.

At least 30 calendar days prior to fabrication or construction, the Contractor will submit construction plans, shop plans, and design calculations to the Department for the Department's review. The Department will review the construction plans, shop plans, and design calculations for general conformance with the contract plans and specifications only. Any deviation from plans or specifications not clearly noted by the Contractor will not be reviewed. Construction plans must include plan view, elevation view, typical cross sections, material and construction specifications, and a detailed quantity list consisting of actual quantities for: Structure Excavation, Retaining Wall (Cu. Yd.), Foundation Preparation, Retaining Wall (Cu. Yd.), MSE Large Panel Wall – Furnish and Install (Sq. Ft.), and Granular Backfill for MSE Large Panel Wall (Cu. Yd.). The Contractor will send an email with the construction plans, shop plans, and design calculations attached as a PDF to the Project Engineer and Office of Bridge Design. Upon request, the Project Engineer will provide the Contractor the appropriate email addresses. Within 30 calendar days of receiving the construction plans, shop plans, and design calculations; the Office of Bridge Design will respond to the Contractor and submitter in one of the following ways: 1) No Exceptions Noted; 2) Returned for Revision; or 3) Not Required for Review. If the Department's response states "Returned for Revision", the Contractor will make the revisions and resubmit the shop plans for review as specified above. Upon completion of the Department's review process and a Department response of "No Exceptions Noted" or "Not Required for Review", the Contractor will send the Project Engineer and the Office of Bridge Design an email with the final construction plans, shop plans, and design calculations as a PDF for distribution. The Contractor will not begin fabrication or construction of the work contained in the construction plans, shop

plans, and design calculations until the Department has confirmed, in writing, a completed review with a response of “No Exceptions Noted” or “Not Required for Review”.

B. Structure Excavation, Retaining Wall: This work will consist of the necessary excavation for erection of the retaining wall system. Structure excavation will be in reasonably close conformity to the limits shown on the typical section located within the plans.

C. Foundation Preparation, Retaining Wall: The foundation area for the retaining wall will be excavated to the limits depicted within the plans or as directed by the Engineer. Backfill material will be as specified in the plans.

D. Wall Erection: At each change in elevation of the foundation level of the wall, a nonreinforced concrete leveling pad of the type shown on the construction plans will be provided. Concrete leveling pads will be cured a minimum of twelve hours before placement of wall panels.

A field representative from the proprietary wall system will be at the job site at the start of wall construction and as needed to resolve wall construction problems. Multiple trips may be required. Before wall construction begins, a pre-construction conference will be held to cover proper wall construction techniques. Personnel at this meeting will include, but not be limited to, Department project personnel, Contractor personnel, the Department’s Bridge Construction Engineer (or representative), and a field representative from the proprietary wall company. The field representative will also be present during the placement and backfilling of the first two complete rows of panels and reinforcement along the length of the wall, or until the backfill, compaction, and wall batter operations have been optimized. The decision of when the operations have been optimized will be at the sole discretion of the Engineer. The services of the field representative will be incidental to the wall cost. Projects that span multiple construction seasons will require an additional pre-construction conference prior to continuation of wall construction the second season. Previously required personnel will attend. The wall company field representative will be present when construction activities resume for the wall to verify correct construction procedures.

Construction of the wall will begin at the lowest course and proceed upwards. The entire lowest course must be placed and backfilled prior to the construction of any subsequent courses. Backfill placement must be in successive horizontal lifts as wall panel placement proceeds. Deviation from these requirements will require a submittal of the proposed erection plan, including how to retain backfill material laterally without undermining wall reinforcement, to the Bridge Construction Engineer for review a minimum of 30 days prior to beginning construction on the wall.

Design calculations and construction details for lateral retaining systems (if required for phased wall construction) will be included in the construction submittals. The cost of the lateral retaining system will be incidental to other retaining wall contract items.

The underdrain system, if applicable, will be placed prior to wall backfill placement. The underdrain system will provide positive drainage from the wall backfill. If the permanent outlet works for the underdrain system are not installed or unable to be installed, a temporary outlet works for the underdrain system will be constructed until the permanent outlet works can be constructed to prevent water from backing up in the wall backfill material.

Precast concrete panels will be placed so that their final position is vertical or battered as shown on the plans. For erection, panels are handled by means of lifting devices connected to the upper edge of the panel. Panels should be placed in successive horizontal lifts in the sequence shown on the plans as backfill placement proceeds. As backfill material is placed behind the panels, the panels will be maintained in position by means of temporary wedges or bracing according to the wall supplier's recommendations. Concrete facing vertical tolerances and horizontal alignment tolerances will not exceed 3/4 inch when measured with a ten-foot straight edge. During construction, the maximum allowable offset in any panel joint will be 3/4 inch. The overall vertical tolerance of the wall (top to bottom) will not exceed 1/2 inch per ten feet of wall height.

Reinforcement elements will be placed normal to the face of the wall, unless otherwise shown on the plans. Prior to placement of the reinforcing elements, backfill will be compacted according to these specifications.

The finished grade backfill in front of the wall will be placed and compacted to a minimum of 97% of maximum dry density as determined by SD 104. For walls in excess of 20 feet in height, the finished grade in front of the wall will be placed and compacted before wall construction exceeds a height of 20 feet.

E. Backfill Placement: Backfill placement will closely follow erection of each course of panels. Backfill will be placed to avoid any damage or disturbance of the wall materials or misalignment of the facing panels or reinforcing element. All wall materials that are damaged during fabrication or construction will be removed and replaced at the contractor's expense. Any misalignment or distortion of the wall facing panels due to placement of backfill outside the limits of this specification will be corrected by and at the expense of the contractor. At each reinforcement level, the backfill will be placed to the level of the connection. Backfill placement methods near the facing will ensure that no voids exist, especially beneath the reinforcing elements.

The moisture content prior to and during compaction will be uniformly distributed throughout each layer. Water will be applied at minimum rate of 0.25 gal/ft^2 of surface area per lift. The Contractor will increase this rate, when ordered by the Engineer, to ensure each lift is fully saturated.

The maximum lift thickness prior to compaction will not exceed eight inches.

Compaction will be achieved by at least four passes with a smooth drum vibratory roller. If adequate compaction is not achieved increase the number of passes, increase the size of the roller, or decrease the thickness of the lift, as directed by the Engineer.

The maximum lift thickness prior to compaction within three feet of the back face of the wall facing and within the area from the back face of the wall facing to two feet beyond the abutment piling steel casing will not exceed four inches. At least two lifts will be completed within this area per each lift outside this stated area.

Compaction within the area requiring four inch lifts will be achieved by at least three passes of a lightweight mechanical tamper, roller, or vibratory system.

At the end of each day's operation, the Contractor will slope the last course of the backfill away from the wall facing to rapidly direct runoff away from the wall face. The Contractor will not allow surface runoff from adjacent areas to enter the wall construction site.

The embankment immediately behind the wall reinforcement will be brought up evenly with the Granular Backfill for MSE Large Panel Wall or benched in accordance with Section 120.3 B.2 of the Specifications.

Backfill will not be constructed on frozen ground and frozen material will not be used in the construction of the MSE Large Panel Wall. The use of ground heaters, blankets, warmers, or other apparatuses may be used at the discretion of the Engineer.

IV. METHOD OF MEASUREMENT

Plan shown quantities are for bidding purposes only. Construction plans quantities will be the measurement for payment. Field measurements will not be made, unless the Department determines that conditions warrant such measurement.

A. Structure Excavation, Retaining Wall will be measured to the nearest cubic yard.

B. Foundation Preparation, Retaining Wall will be measured to the nearest cubic yard.

C. **Granular Backfill for MSE Large Panel Wall** will be measured to the nearest cubic yard.

D. **MSE Large Panel Wall, Furnish and MSE Large Panel Wall, Install** will be measured to nearest square foot. The area of retaining wall to be used for payment will be the area bounded by the top of coping, bottom of wall elevations and the beginning and end wall limits as shown on the construction plans.

V. BASIS OF PAYMENT

A. **Structure Excavation, Retaining Wall** will be paid for at the contract unit price per cubic yard. Payment will be full compensation for equipment, labor, tools and incidentals required to complete the work.

B. **Foundation Preparation, Retaining Wall** will be paid for at the contract unit price per cubic yard. Payment will be full compensation for equipment, labor, tools, and incidentals required for excavating and disposal of the excavated material; equipment, labor, materials, and all other items incidental to scarifying, reshaping, and recompacting the area to be backfilled; and incidentals for furnishing, placing, watering, and compacting backfill material.

C. **Granular Backfill for MSE Large Panel Wall** will be paid for at the contract unit price per cubic yard. Payment will be full compensation for equipment, labor, materials and all other items incidental to placing, watering, and compacting the granular material to the limits shown on the construction plans.

D. **MSE Large Panel Wall, Furnish**, will be paid for at the contract unit price per square foot. Payment will be full compensation for the cost of all wall panels, coping, reinforcing strips, hardware and all incidentals.

E. **MSE Large Panel Wall, Install,** will be paid for at the contract unit price per square foot. Payment will be full compensation for equipment, labor, materials and incidentals required to furnish and install the leveling pad, install the wall, furnish and install the underdrain system and drainage fabric as detailed on the construction plans.

The acceptable large panel wall suppliers are listed on the Department's Approved Products List on the Department's website.

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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
STAINLESS REINFORCING STEEL

PROJECT EM 0292(88)73, PCN 06JQ
LINCOLN COUNTY

AUGUST 25, 2025

I. DESCRIPTION

This structure requires the use of stainless steel deformed reinforcing bars for some parts of the structure, as shown on the plans. Stainless steel reinforcing bars will conform to Section 480 with the following exceptions and additions.

II. MATERIALS

Provide Duplex 2205 (UNS S31803) or 2304 (UNS S32304), deformed stainless steel reinforcing bars conforming to the requirements of ASTM A 955 “Standard Specifications for Deformed and Plain Stainless Steel Bars for Concrete Reinforcement” meeting the grade specified in the plans. Stainless steel reinforcing bars will be free of mill scale. Certified Mill Test Reports and a Certificate of Compliance are required.

III. CONSTRUCTION REQUIREMENTS

A. Bar Supports: Bar supports will be plastic or stainless steel.

B. Tie Wires: Tie wires will be stainless steel, 18 gauge or heavier.

C. Handling: Stainless steel rebar will be shipped, handled, and placed such that carbon steel does not come in contact with the stainless steel rebar. Padding will be used to separate carbon steel bundling bands, or lifting devices, from the rebar. Wire rope will not be used in lifting or handling the reinforcing. Use wooden spacers to separate bundles of stainless steel rebar from other types of rebar.

D. Storage: Cover stainless steel rebar with tarps during outdoor storage. Use wooden supports to store stainless steel rebar off the ground or shop floor.

E. Placing: Stainless steel rebar will be placed such that carbon steel does not come in contact with the stainless steel rebar. Contact surfaces will be protected with a polymer or neoprene.

IV. METHOD OF MEASUREMENT

Stainless reinforcing steel will be measured according to Section 480.

V. BASIS OF PAYMENT

Stainless reinforcing steel will be paid at the contract unit price per pound according to Section 480.

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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
STUD SHEAR CONNECTOR FIELD INSTALLATION
(INCIDENTAL)

APRIL 21, 2023

I. DESCRIPTION

A. This work consists of field installation of stud shear connectors (steel studs) to the top flange of steel girders by automatically timed stud-welding equipment. In addition, this special provision stipulates specific requirements for the following:

1. Workmanship, preproduction testing, operator qualification, and application qualification testing, all to be performed by the Contractor.

2. Quality control and quality assurance inspection of stud welding during production.

B. The ANSI/AASHTO/AWS D1.5 Bridge Welding Code will hereafter be referred to as the Code.

II. MATERIALS

A. Welded stud shear connectors will conform to the requirements of Section 970.2 B of the specifications, and be of the type, size, and spacing shown on the shop plans.

B. Studs will be of suitable design for arc welding to steel members with the use of automatically timed stud-welding equipment. The use of automatically timed stud welding equipment is required.

C. An arc shield (ferrule) of heat-resistant ceramic or other suitable material will be furnished with each stud.

D. A suitable deoxidizing and arc stabilizing flux for welding will be furnished with each stud.

E. Only studs with qualified stud bases will be used. A stud base, to be qualified, will have passed the test prescribed in Annex D of the Code. The arc shield used in production will be the same as used in qualification tests or as recommended by the manufacturer. Qualification of stud bases in conformance with Annex D of the Code will be at the manufacturer's expense.

III. CONSTRUCTION REQUIREMENTS

A. Workmanship

1. At the time of welding, the studs will be free from rust, rust pits, scale, oil, moisture, and other deleterious matter that would adversely affect the welding operation.

2. The stud base will not be painted, galvanized, nor cadmium plated prior to welding.

3. The areas to which the studs are to be welded will be free of scale, rust, moisture, and other injurious material to the extent necessary to obtain satisfactory welds. These areas may be cleaned by wire brushing, scaling, prick-punching, or grinding.

4. The arc shields or ferrules will be kept dry. Any arc shields which show signs of surface moisture from dew or rain will be oven dried at 250°F for two hours before use.

5. Longitudinal and lateral spacing of stud shear connectors (type B) with respect to each other and to edges of beam or girder flanges may vary a maximum of 1 inch from the location shown in the drawings. The clear distance between studs will not be less than 1 inch unless approved by the Engineer. The minimum distance from the edge of a stud base to the edge of a flange will be the diameter of the stud plus 0.125 inch but preferably not less than 1-1/2 inch.

6. After welding, arc shields will be broken free from all studs.

7. The studs, after welding, will be free of any discontinuities or substances that would interfere with their intended function. However, non-fusion on the legs of the flash and small shrink fissures is acceptable.

Note: The fillet weld profiles shown in Figure 5.4 of the Code do not apply to the flash of automatically timed stud welds. The expelled metal around the base of the stud is designated as flash in the Code. It is not a fillet weld such as those formed by conventional arc welding.

B. Technique

1. Studs will be welded with automatically timed stud welding equipment connected to a suitable source of direct current electrode negative (DCEN) power. Welding voltage, current, time, and gun settings for lift and plunge should be set at optimum settings, based on past practice, recommendations of stud and equipment manufacturer, or both. The AWS Welding Handbook should also be used for technique guidance.

2. If two or more stud welding guns are to be operated from the same power source, they will be interlocked so that only one gun can operate at a time, and so that the power source has fully recovered from making one weld before another weld is started.

3. While in operation, the welding gun will be held in position without movement until the weld metal has solidified.

4. Welding will not be done when the base metal temperature is below 0°F or when the surface is wet or exposed to falling rain or snow.

    a. When the temperature of the base metal is below 32°F, one additional stud in each 100 studs welded will be tested by methods specified in Section 9.7.1.3 and 9.7.1.4 of the Code, except that the angle of testing will be approximately 15 degrees. This is in addition to the first two studs tested for each start of a new production period or change in set-up.

    b. Set-up includes stud gun, power source, stud diameter, gun lift and plunge, total welding lead length, or changes greater than ±5% in current (amperage) and time.

5. At the option of the contractor, automatic end welds may be repaired by fillet welding using the shielded metal arc process, provided the following requirements are met:

    a. The minimum fillet size to be used will be the larger of those required in Table 4.1 or Table 9.2 of the Code.

    b. Welding will be done with low-hydrogen electrodes 5/32 or 3/16 inch in diameter except that a smaller diameter electrode may be used on studs 3/8 inch or less in diameter or for out-of-position welds.

    c. The stud base will be prepared so that the base of the stud fits against the base metal.

    d. All rust and mill scale at the location of the stud will be removed from the base metal by grinding. The end of the stud will also be clean.

e. The base metal to which studs are welded will be preheated in accordance with the requirements of Table 6.3 of the Code.

f. Fillet welded stud bases will be visually inspected per Section 8.5 of the Code.

C. Stud Application Qualification Requirements

Studs which are shop or field applied in the flat (down-hand) position to a planar and horizontal surface are deemed prequalified by virtue of the manufacturer's stud-base qualification tests (Annex D of the Code), and no further application testing is required. The limit of flat position is defined as 0-15° slope on the surface to which the stud is applied.

D. Production Control

1. Preproduction Testing

a. Before production welding with a particular set-up (see Section 9.5.4.2 of the Code) and with a given size and type of stud, and at the beginning of each day's or shift's production, testing will be performed on the first two studs that are welded. The stud technique may be developed on a piece of material similar to the production member in thickness and properties. If actual production thickness is not available, the thickness may vary plus or minus 25%. All test studs will be welded in the same general position as required on the production member (flat, vertical, or overhead).

b. Instead of being welded to separate material, the test studs may be welded on the production member, except when separate plates are required by Section 9.7.1.5 of the Code.

c. The test studs will be visually examined. They will exhibit full 360 degree flash.

d. In addition to visual examination, the test will consist of bending the studs after they are allowed to cool, to an angle of approximately 30 degrees from their original axes by either striking the studs on the head with a hammer or placing a pipe or other suitable hollow device over the stud and manually or mechanically bending the stud. At temperatures below 50°F, bending will preferably be done by continuous slow application of load.

e. If on visual examination the test studs do not exhibit 360 degree flash, or if on testing, failure occurs in the weld zone of either stud, the

procedure will be corrected and two more studs will be welded to separate material or on the production member and tested in accordance with the provisions of Section 9.7.1.3 and 9.7.1.4 of the Code. If either of the second two studs fails, additional welding will be continued on separate plates until two consecutive studs are tested and found to be satisfactory before any more production studs are welded to the member.

2. Production Welding

a. Once production welding has begun, any changes made to the welding set-up (see Section 9.5.4.2 of the Code) as determined in Section 9.7.1 of the Code will require that the testing in Section 9.7.1.3 and 9.7.1.4 of the Code be performed prior to resuming production welding.

b. In production, studs on which a full 360 degree flash is not obtained may, at the option of the contractor, be repaired by adding the minimum fillet weld as required by Section 9.5.5 of the Code in place of the missing flash. The repair weld will extend at least 3/8 inch beyond each end of the discontinuity being repaired.

3. Operator Qualification

a. The preproduction test required by Section 9.7.1 of the Code, if successful, will also serve to qualify the stud welding operator. In addition, the stud welding operator will be a certified welder in accordance with Section 410.3 D. of the specifications.

b. Before any production studs are welded by an operator not involved in the preproduction set-up of Section 9.7.1 of the Code, the first two studs welded by the operator will be tested in accordance with the provisions of Section 9.7.1.3 and 9.7.1.4 of the Code. When two consecutively welded studs have been tested and found satisfactory, the operator may then weld production studs.

4. If an unacceptable stud has been removed from a component subjected to tensile stresses, the area from which the stud was removed will be made smooth and flush.

a. Where in such areas the base metal has been pulled out in the course of stud removal, shielded metal arc welding (SMAW) with low-hydrogen electrodes in accordance with the requirements of the Code will be used to fill the pockets, and the weld surface will be ground flush.

b. In compression areas of members, if stud failures are confined to shanks or fusion zones of studs, a new stud may be welded adjacent to each

unacceptable area in lieu of repair and replacement on the existing weld area (see Section 9.4.3 of the Code). If base metal is pulled out during stud removal, the repair provisions will be the same as for tension areas.

c. Where a replacement stud is to be provided, the base metal repair will be made prior to welding the replacement stud.

d. Replacement studs (other than threaded type which should be torque tested) will be tested by bending to an angle of approximately 15 degrees from their original axis.

e. The areas of components will be made smooth and flush where a stud has been removed.

E. Inspection Requirements

1. If visual inspection reveals any stud that does not show a full 360° flash or any stud that has been repaired by welding, such stud will be bent to an angle of approximately 15° from its original axis.

2. The method of bending will be in accordance with Section 9.7.1.4 of the Code. The direction of bending for studs with less than a 360-degree flash will be opposite to the missing portion of the flash.

3. The inspector, where conditions warrant, may select a reasonable number of additional studs to be subjected to the tests specified in Section 9.8.1 of the Code.

4. The bent stud shear connectors (Type B) and other studs to be embedded in concrete (Type A) that show no sign of failure will be acceptable for use and left in the bent position. All bending and straightening, when required, will be done without heating before completion of the production stud welding operation.

5. If, in the judgment of the Engineer, studs welded during the progress of the work are not in accordance with the specifications, as indicated by inspection and testing, corrective action will be required by the contractor at the contractor's expense. The contractor will make the set-up changes necessary to ensure that studs subsequently welded will meet specification requirements.

6. At the option and the expense of the owner, the contractor may be required, at any time, to submit studs of the types used under the contract for a qualification check in accordance with the procedures of Annex D of the Code.

IV. METHOD OF MEASUREMENT

Stud shear connectors will not be measured.

V. BASIS OF PAYMENT

No separate payment for stud shear connectors will be made. All costs involved in furnishing, installing, and quality control testing of stud shear connectors, including any incidental items such as repair welding and non-destructive testing will be included in the unit price bid for structural steel.

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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
PI PCC PAVEMENT SMOOTHNESS
WITH 0.2" BLANKING BAND

NOVEMBER 30, 2018

At locations designated in the plans, the Contractor will determine the PCC pavement smoothness by profile testing the finished surfaces of the PCC pavement in accordance with the following requirements.

A. Exclusions: Excluded from profile testing are:

1. Shoulders;

2. Lanes less than 10 feet in width;

3. The first or last 50 feet of a pavement where the Contractor is not responsible for the adjoining in place pavement; and,

4. Pavements on horizontal curves with centerline radius of curvature of less than 600 feet and pavements within the super-elevated transitions of such curves.

At locations designated in the plans to be profiled but excluded from profile testing, the Engineer will determine the pavement smoothness according to the 10-foot straightedge test requirements in Section 380.3 O.1 of the specifications.

B. Equipment and Calibration: Equipment and calibration will conform to Section 380.3 B.8 of the specifications except for the following exception:

The Contractor will supply and use a California type profilograph. The computer will smooth the profile using only a third-order Butterworth filter with a cutoff wavelength of 2.0 feet. The computer will generate a profile index using a 0.2 inch blanking band and will use a 0.3 inch bump threshold to identify "must grind" locations.

C. Operation: The Contractor will operate the profilograph at a speed no greater than a normal walk. Make two passes in each driving lane, one in each approximate wheel path. Label each trace to show the project, stationing, lane, wheel path, date paved, date ground (if applicable), date tested, date or re-profiling testing (if applicable), and the name of the operator.

The Contractor will not run the profile test prior to the next working day following concrete placement. Segments less than 1000 linear feet may be grouped with the subsequent day's production. The Contractor will furnish results to the Engineer within 2 business days after concrete placement and furnish re-profiling test results within 2 business days after corrective grinding is completed.

The Contractor will repair or replace curing membrane damaged or protective cover removed during profile testing operations as directed by the Engineer at no cost to the Department.

D. Evaluation: The Contract will furnish the Department with the profilogram and the profilogram will become the property of the Department. The Department will evaluate the profilogram. Evaluation will consist of determining the profile index (PI) to the nearest 0.05 inch per mile by measuring and summing scallops appearing outside a 0.2 inch blanking band. The PI will be determined from the average of the two wheel paths in each driving lane. Individual bumps will be evaluated using a 0.3 inch bump template. PIs will be rounded to the nearest 0.1 inch.

The Department will spot check or retest areas the Department desires with the Department owned and operated profilograph. If a discrepancy between the two traces occurs, the Department and Contractor will determine the cause of the discrepancy and the area will be retested if necessary, as determined by the Engineer.

E. Requirements: Pavements will not exceed a PI of 10.0 inches per mile.

1. Pavements with a PI from 10.1 to 20.0 inches per mile in any 0.1 mile section will be subject to one of the following at the discretion of the Contractor.

a. Satisfactorily correct the deficient area by corrective grinding to a PI of 10.0 or less. The Contractor will accomplish corrective grinding with specially prepared circular diamond blades mounted on a horizontal shaft. The Contractor will day light corrective grinding to the outside edge of the pavement. The Contractor will repair and replace joint sealant damaged by corrective grinding as directed by the Engineer and at no additional cost to the Department. The Contractor will not leave ground areas smooth or polished. The Contractor will ensure ground areas have a uniform texture equal in roughness to the surrounding unground concrete. When limestone is used as the course aggregate in the pavement and the current ADT shown on the plans is greater than 1500, the Contractor will reestablish the tining with a mechanical tining machine in all areas where the corrective grinding exceeds 50 feet measured longitudinally along the centerline of the road. The Contractor will remove and replace all joint sealant within the area where tining is replaced.

The Contractor shall establish a positive means for the removal of grinding residue. Solid residue shall be removed from the pavement surfaces before being blown by traffic action or wind. The Contractor shall conduct this work to

control and minimize airborne dust and similar debris that may become a hazard to motor vehicle operation or a nuisance to property owners. Residue from wet grinding shall not be permitted to flow across traffic lanes being used by public traffic or into gutter or drainage facilities. Residue, whether in solid or slurry form, shall be disposed of in a manner that will prevent it from reaching any waterway in a concentrated state.

The Contractor will replace all permanent pavement markings damaged, destroyed, or removed during corrective grinding at no additional cost to the Department. Following the completion of corrective grinding, the Contractor will re-profile test the deficient area.

b. Accept the deficient area with a price reduction as per the table located in section F of this special provision.

If the Contractor elects to correct the deficient area by corrective grinding, the Department will use the resulting PI after corrective grinding for payment calculations in accordance with the incentive and disincentive payment table in this special provision except the sections corrective ground to a PI less than 10.0 inches per mile (159 mm/km) will not earn more than 100.0% payment.

2. Pavements with a PI exceeding 20.0 inches per mile in any 0.1 mile section will be subject to one of the following at the discretion of the Engineer.

a. Satisfactorily correct the deficient area by corrective grinding as specified in section E.1.a of this special provision.

b. Remove and replace deficient areas.

If the Engineer requires the Contractor to correct the deficient area by corrective grinding, the Contractor will correct the deficient area by corrective grinding to a PI of 20.0 or less. Once the PI is 20.0 or less, any subsequent corrective grinding will be done at the discretion of the Contractor in accordance with section E.1 of this special provision. The Department will use the resulting PI after corrective grinding for payment calculations in accordance with the incentive and disincentive payment table in this special provision except the sections corrective ground to a PI less than 10.0 inches per mile will not earn more than 100.0% payment.

3. Individual bumps in excess of 0.3 inches in 25 feet will be subject to one of the following at the discretion of the Engineer.

a. Satisfactorily correct the deficient area by corrective grinding as specified in section E.1.a of this special provision.

b. Individual bumps less than 0.25 inches in 10 feet may be accepted without correction.

c. Remove and replace deficient areas.

Pavements with a PI exceeding 10.1 inches per mile in any 0.1 mile section with individual bumps in excess of 0.3 inches in 25 feet may be corrected to an improved PI by corrective grinding in accordance with section E.1 and E.2 of this special provision.

Coring for pavement thickness measurement will be performed after all corrective action has been completed

F. Incentive and Disincentive Payments: The Department will make incentive and disincentive payments based on the following chart:

Profile Index (in/mile)	Price Adjustment (% of contract unit price)[*1]
0 to 2.9	103.5
3 to 3.9	102.4
4 to 4.9	101.2
5 to 10.0	100.0
10.1 to 12.9	98.8
13 to 15.9	97.7
16 to 20	96.5

[*1] Incentive payments cannot be improved due to grinding regardless of the average PI.

The adjustment in the contract unit price will apply to the total area of the 0.1 mile long section. The Department will calculate the area using the total lane width (12 feet or less) and the total length of the section (0.1 mile or less if the section is the segment at the end of the project).

When the use of a profilograph is specified, the final surface may also be checked with a 10 foot straightedge, according to Section 380.3 O.1 in locations determined by the Engineer.

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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
CONTRACTOR FURNISHED MIX DESIGN
FOR PCC PAVEMENT

AUGUST 30, 2018

This work consists of the Contractor establishing a mix design and providing a concrete paving mix for the Portland Cement Concrete (PCC) pavement of sufficient quality to serve the purpose for which the PCC pavement is intended.

Make the following changes to the specifications:

Section 380.3 A. - Delete this section and replace with the following:

A. Concrete Quality, Proportioning, and Field Performance:

1. **Contractor Responsibility:** The Contractor shall be responsible for the selection of materials meeting the specifications and shall be responsible for the design and composition of all concrete mixes used in the PCC pavement. The Contractor shall be responsible to produce and deliver a concrete paving mix that is uniform, consistent, workable, finishable, and that meets all requirements of the contract. The Contractor shall install a PCC pavement that is homogeneous, consolidated, durable, and free of defects.

   The Contractor is responsible for the actual field performance of the concrete mix and any adverse impacts resulting from the materials used on the project and the Contractor's batching, mixing, hauling, placing, consolidating, finishing, and curing of the concrete mix. Department review of the Contractor's proposed mix design under Section 380.3 A.3. does not relieve the Contractor of any obligations set out in this specification or in the contract as a whole.

2. **Mix Design Parameters:**

   On small areas using stationary side formed paving methods, the Engineer may permit the substitution of Class A45 concrete for the concrete paving mix. Class A45 shall meet the requirements of Section 460, except the concrete shall have a minimum 28 day compressive strength of 4000 psi, slump range of between 1 inch and 3 inches, and

shall contain fly ash. Fly ash shall constitute 20% to 25% of the cementitious material at a 1:1 ratio by weight.

For all other areas and any areas where the Contractor utilizes slip form paving equipment, the following requirements shall apply:

a. **Mix Design Proportioning:** The Contractor shall select mix proportions conforming to the following.

    1) **Combined Aggregate:** Mix designs shall be based on aggregate specific gravities at saturated surface dry (SSD) condition. The mix design process shall produce a mix design that will plot within the optimum limits listed in Chart A. The mix design shall also meet the following requirements when plotted on the 0.45 power chart. The best fit line plotted on the 0.45 power chart shall use a top size of 1 inch aggregate for jointed concrete pavement and 1.5 inch aggregate for Continuously Reinforced Concrete Pavements (CRCP). The combined gradation when plotted on the 0.45 power chart should fit within the limits as defined in Chart B for jointed concrete pavement or Chart C for CRCP. CRCP mix designs shall retain a minimum of 11.5% of the total aggregate above the 1 inch sieve.

    2) **Cementitious Material Content:** The mix design shall establish a cementitious material content (total of cement, fly ash, and other cementitious additions). The minimum cementitious material content shall be 575 pounds per cubic yard. The maximum cementitious material content shall be 800 pounds per cubic yard.

    3) **Fly ash:** Fly ash shall be included in the concrete mixture. Fly ash shall constitute 20% to 25% of the cementitious material at a 1:1 ratio by weight.

    4) **Water/Cementitious Material Ratio:** The mix design shall establish a maximum water/cementitious material ratio, which shall not exceed 0.42 pounds/pounds.

    5) **Coarse Aggregate Percentage:** The mix design shall establish the percentage of coarse aggregates to be used. The minimum coarse aggregate content shall be 55% by weight of total aggregates.

    6) **Air Content:** The volumetrics of the mix design shall be based on 6.5% entrained air content.

b. **Contractor Laboratory Trial Batch Testing:** The Contractor will obtain laboratory tests on trial batches of the proposed mix design.

1) **Procedures:** The trial batch testing must be performed by a competent testing facility. The Department may perform an on-site inspection of the testing facility's mix design procedures and equipment. If the Department, in its sole discretion, deems a testing facility to be incapable of performing accurate, reliable, or valid testing, the Department may require the Contractor to obtain trial batch testing from a different testing facility. Trial batch testing shall be conducted in accordance with the American Concrete Institute Publication 211.1, ASTM C192.

   A minimum of four trial batches shall be required; two batches shall have identical proportions of aggregates and two batches shall have identical water/cementitious ratios or cementitious contents. Of the four trial batches, no two trial batches shall contain the same proportions. A different proportion of aggregate must be at least a 1% (of total aggregate) sand change or a 2% (of total coarse aggregate) rock change. A different water/cementitious ratio shall be at least a 0.02 change. A different cementitious content change shall be an addition or subtraction of at least 20 pounds of cementitious materials.

2) **Testing Results:** Through the trial batch laboratory testing, the Contractor must demonstrate that the proposed mix design reliably achieves the following laboratory test results:

   a) **Slump:** The slump at 20 minutes after completion of mixing for each trial mix shall be between 1.25 inches and 2.75 inches for slip-formed pavements and between 2.25 inches and 3.75 inches for formed pavements. The initial slump immediately after completion of mixing shall be tested and reported as well. The concrete for the 20 minute slump shall be exposed to ambient air temps between 68°F to 86°F.

   b) **Air content:** The air content for all concrete trial mixes shall have an entrained air content of 6.5% to 8.0%.

   c) **Compressive Strength:** The mix design shall be based upon obtaining an average minimum compressive strength of 5200 psi at 28 days.

      A minimum of 3 cylinders at each age and for each trial shall be tested for compressive strength at 7, 14, and 28 days. All 9 cylinders must be made from the same batch of concrete. The cylinders must be consolidated by the rodding method.

d) **Temperature:** The fresh concrete temperature shall be between 68°F and 86°F immediately after completion of mixing.

Consideration for expected field temperatures may be made when evaluating laboratory trials. Changes that cause a deviation from the requirements of this provision for expected field temperatures must be submitted and evaluated by the Concrete Engineer prior to performing trial batches.

3) **Waiver of Laboratory Trial Batch Requirements:** The Contractor may ask the Department to waive the Contractor's trial batch testing requirements if: (1) the mix design was successfully used on a previous Department project; and (2) the mix design is unchanged or the Contractor has made only minor modifications in the mix design, such as changes in admixtures and cementitious materials with the same ASTM designated type of material or small variations to aggregate proportions. The decision to waive the Contractor's trial batch testing requirements is solely within the discretion of the Department.

The Department's waiver of the laboratory trial batch testing requirements does not in any way relieve the Contractor of any obligations set out in this specification or in the contract as a whole. If required by the Engineer, the Contractor shall perform a plant gradation check or a plant mixed trial batch or both prior to use of the proposed mix design in field production. The Contractor shall submit these results to the Department's Concrete Engineer for Department review.

If the Contractor intends to use another party's successfully used mix design, the Contractor must provide written proof to the Department that the use of the mix design has been authorized by the other party.

c. **Proposed Mix Design Submissions:** A minimum of 40 calendar days prior to the anticipated use in field production, the Contractor shall submit the proposed mix design and supporting documentation to the Department's Concrete Engineer.

If laboratory trial batch testing requirements have not been waived, the Contractor shall submit the results of the trial batch testing with a completed Contractor Concrete Mix Design form (DOT-24). The trial batch testing results shall include all batched weights, admixtures and dosages, aggregate moisture contents, fresh concrete results (initial and 20 minute slump, initial air content, initial unit weight, and initial temperature), actual water/cementitious material ratio, compressive

strengths, aggregate gradations (including production tests), aggregate quality results, and required material certifications. The Contractor shall also supply any additional data, supporting documentation, and samples requested by the Department.

If laboratory trial batch testing has been waived, the Contractor shall submit aggregate gradations (including production tests), and required material certifications with a DOT-24. The Contractor shall also supply any additional data, supporting documentation, and samples requested by the Department.

3. **Department Review:** The Department will review the Contractor's proposed mix design to determine if it conforms to the Department's materials and proportioning specifications. The Department may also review the Contractor's laboratory trial batch testing to determine compliance with required laboratory trial batch testing procedures and test results. The Department may, in its sole discretion, perform laboratory trial batch testing to replicate, to the Department's satisfaction, the Contractor's laboratory trial batch testing results.

   When the Department performs laboratory trial batch testing, the Department will not begin laboratory trial batch testing until the Contractor's trial batch samples have obtained an average compressive strength of at least 4000 psi at 7 days or at least 5200 psi at 28 days. The Department will attempt to replicate one of the submitted mix design trials. Satisfactory replication occurs when the Department's laboratory trial batch samples obtain an average compressive strength of at least 4000 psi at 7 days, at least 5200 psi at 28 days, or the average compressive strength is no more than 10% less than the Contractor's submitted 28 day strength. In the sole discretion of the Department's Concrete Engineer's, the Department may complete the replication process based on adequate strength results prior to 28 days.

   If the Department is unable to replicate the Contractor's laboratory trial batch testing to the Department's satisfaction, the Department will perform a second laboratory trial batch testing at the Contractor's request. If the Department is unable to replicate, to the Department's satisfaction, the Contractor's laboratory batch testing results for the proposed mix design after two attempts, the costs involved with any further laboratory trial batch testing will be at the Contractor's expense.

   The Contractor will not begin production and placement of the concrete mix until the Department's Concrete Engineer has confirmed, in writing, a successful review consisting of: (1) the Contractor's proposed mix design conforms to the Department's materials and proportioning specifications; and (2) if applicable, the Contractor's laboratory trial batch testing results

comply with required laboratory trial batch testing procedures and test results; and (3) if applicable, the Department has replicated the Contractor's laboratory trial batch testing results to the Department's satisfaction.

4. **Field Performance and Testing:** In addition to the responsibilities set out in 380.3 A.1, the Contractor shall provide a concrete paving mix conforming to the most recent mix design proposed to and successfully reviewed by the Department. The concrete paving mix provided by the Contractor must also satisfy the following field tests:

   a. **Slump:** For the slip-form method, the slump of the concrete shall not be more than 2 inches at the time of placement. For the stationary side form method, the slump of the concrete shall be between 1 inch and 3 inches at the time of placement.

   b. **Entrained Air Content:** All concrete shall contain 6.5% entrained air with an allowable tolerance of +1% to -1.5%. Air shall be entrained by an air-entraining admixture.

   c. **Water/Cementitious Ratio:** The concrete shall not exceed the maximum Water/Cementitious ratio "W/C Ratio" as listed on the mix design. The W/C Ratio will be calculated as per 380.3 B.2 to compare the as-batched concrete against the mix design maximum.

   d. **Admixture Dosages:** The Contractor may adjust the admixture dosages listed on the final mix design submitted for use by the Contractor on the DOT-24 within the manufacturer's guidelines.

   e. **Compressive Strength:** Concrete shall exhibit a minimum compressive strength of 4000 psi at 28 days. The 28 day compressive strength shall be determined in accordance with Section 460.3 B.

5. **Mix Design Modification:** If, after successful Department review, the Contractor wishes to modify its mix design, the Contractor shall complete and submit a new DOT-24 to the Department's Concrete Engineer. A modification includes, but is not limited to, changes in aggregate source, changes in gradation targets, new admixtures, changes in brand name of admixtures, changes in brand name of cementitious materials, and changes to aggregate percentage splits.

   If the Contractor proposes to make modifications to the mix design that the Department's Concrete Engineer deems to be significant, the Contractor will obtain laboratory trial batch testing of the modified mix design in accordance with section 380.3 A.2.b. The Contractor shall submit the laboratory trial batch testing results to the Department's Concrete

Engineer for Department review. Significant modifications include, but are not limited to aggregate source, combined coarse aggregate gradation target, and combined total aggregate gradation target.

If the Contractor proposes to make modifications to the mix design that the Department's Concrete Engineer deems to be minor, the Department will not require the Contractor to perform laboratory trial batch testing but may require the Contractor to perform a plant gradation check or a plant mixed trial batch or both. The Contractor shall submit the results of any plant gradation check and plant mixed trial batch to the Department's Concrete Engineer for Department review. Changes to the aggregate percentage splits will require the Contractor to submit supporting documentation including, but not limited to the basis for the change and gradation test results. Minor modifications include, but are not limited to new admixtures, changes in brand name of admixtures, changes in brand name of cementitious materials, and changes to aggregate percentage splits.

The Department may, upon request from the Contractor, waive or modify the Contractor's laboratory trial batch testing, plant gradation check, or plant mixed trial batch requirement of the modified mix design.

The Contractor will not begin production and placement of the modified concrete mix until the Department's Concrete Engineer has confirmed, in writing, a successful review consisting of: (1) the Contractor's proposed mix design conforms to the Department's materials and proportioning specifications; and (2) if applicable, the Contractor's laboratory trial batch testing results comply with required laboratory trial batch testing procedures and test results; and (3) if applicable, the Department has replicated the Contractor's laboratory trial batch testing results to the Department's satisfaction.

Section 820.1 A. - Delete this section and replace with the following:

A. Coarse Aggregate for Concrete Pavement: The coarse aggregate shall consist of ledge rock. Coarse aggregate for Continuously Reinforced Concrete Pavement shall conform to Size #20. Coarse aggregate for all other PCC Pavements shall conform to Size #15.

Mix Design Charts:

Chart A

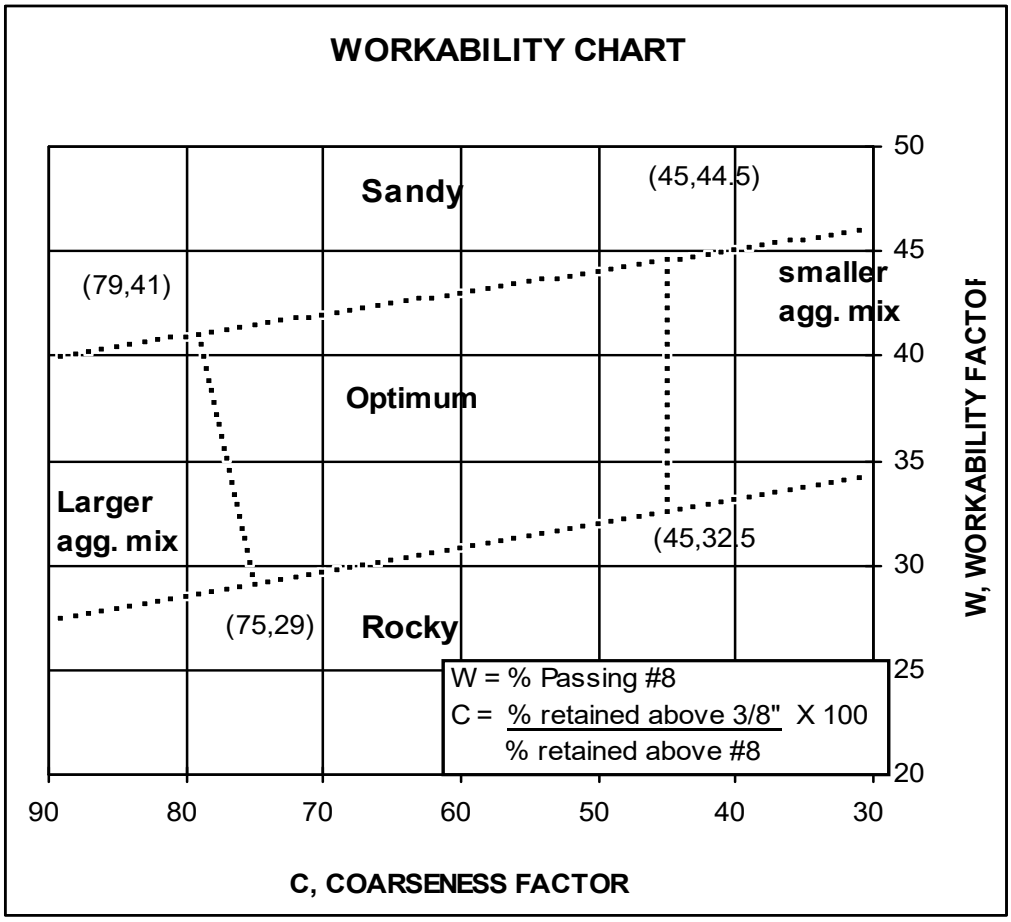
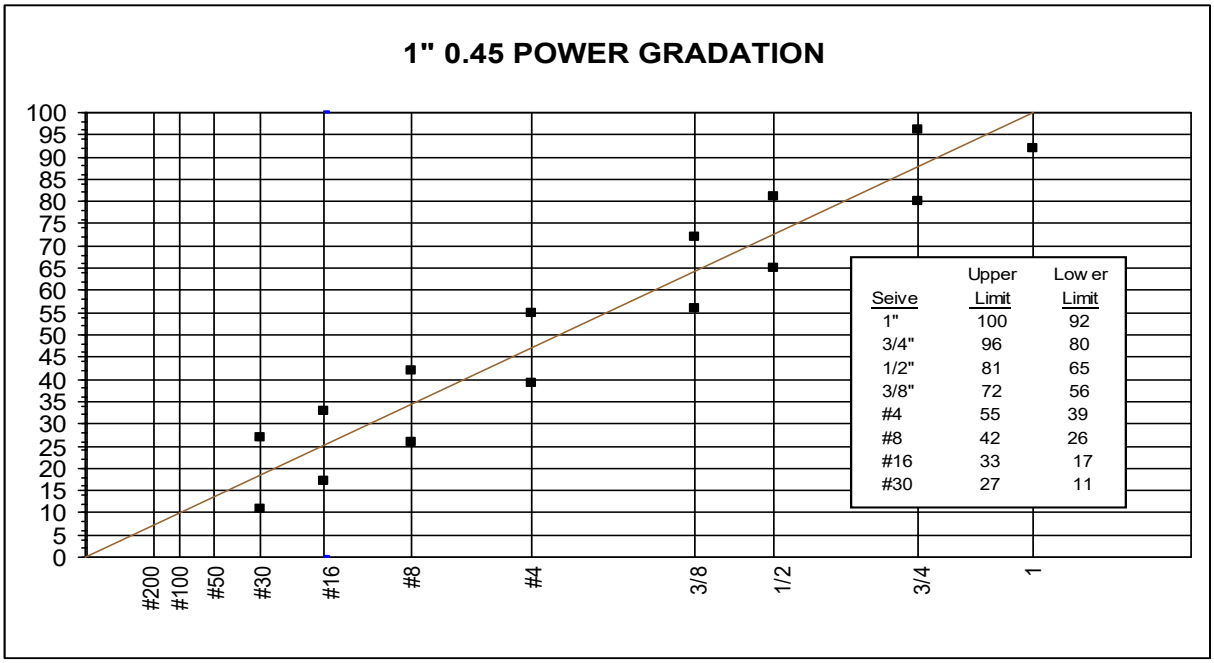
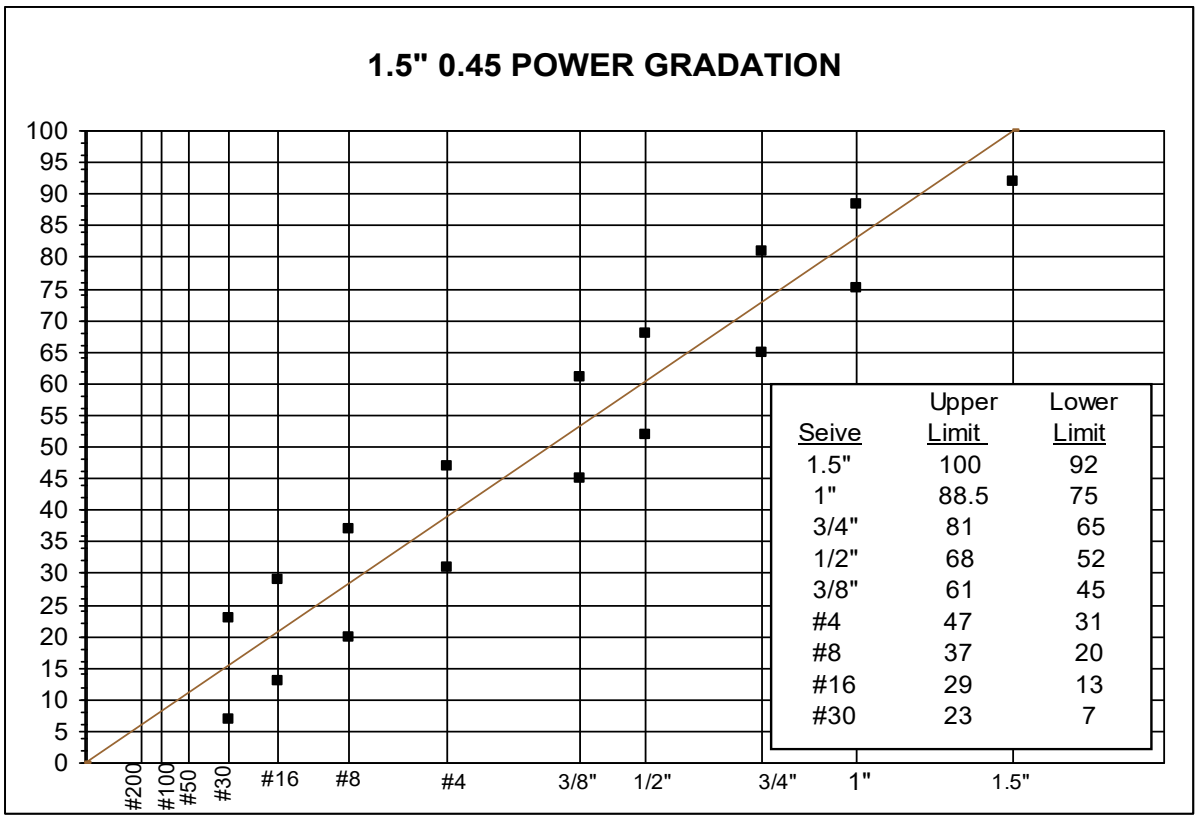


Chart B



Seive	Upper Limit	Lower Limit
1"	100	92
3/4"	96	80
1/2"	81	65
3/8"	72	56
#4	55	39
#8	42	26
#16	33	17
#30	27	11

Chart C



Seive	Upper Limit	Lower Limit
1.5"	100	92
1"	88.5	75
3/4"	81	65
1/2"	68	52
3/8"	61	45
#4	47	31
#8	37	20
#16	29	13
#30	23	7

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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
CONCRETE PENETRATING SEALER

JULY 30, 2024

I. DESCRIPTION

This work consists of furnishing and applying a concrete penetrating sealer to a properly prepared bridge deck surface in compliance with these specifications and the manufacturer's recommendations.

II. MATERIALS

The acceptable sealers are listed on the approved products list for Concrete Penetrating Sealer on the SDDOT Website.

The Contractor will furnish the Engineer the manufacturer's technical data sheets, materials safety data sheet (MSDS), and sufficient evidence that the material to be used has not exceeded the manufacturer's specified shelf life. This documentation will be furnished to the Engineer a minimum of 5 days prior to application of the sealer.

III. CONSTRUCTION REQUIREMENTS

A. Surface Protection and Preparation: The concrete deck surface will be protected from contamination from dirt and debris by covering the deck with a material approved by the Engineer until such time that the surface preparation for the penetrating sealer is begun. Any materials or equipment placed on the deck during this protection period will be placed such that there is no danger of spillage, leakage, or other contamination to the concrete surface.

Concrete surfaces will be cleaned by power washing such that all traces of laitance, dirt, dust, salt, oil, asphalt, paint, and other foreign materials and deleterious substances are removed prior to application of the penetrating sealer. If oil, grease, or other contaminants are inadvertently spilled on the concrete surface, detergent cleaning along with an abrasive blast cleaning will be required on the affected areas.

Other methods and equipment for surface preparation may be used if prior approval is obtained from the Engineer.

If necessary, solvents and hand tools will be used in conjunction with the blasting media to remove bonded materials detrimental to the treatment of the concrete surface.

The cleaning process will not cause undue damage to the concrete surface, remove, or substantially alter the existing surface finish, or expose the coarse aggregate of the concrete. The method of cleaning will be performed in such a manner as to provide a reasonably uniform appearing surface color and texture.

The sealer may be harmful to materials such as rubber, asphalt, and joint compounds; therefore, the Contractor will be required to mask off all joints, strip seals, etc. prior to applying the sealer.

The Engineer will approve the prepared surface prior to application of the penetrating sealer.

B. Sealer Application: The Contractor will have a sufficient quantity of sealer on the project prior to the start of application such that the manufacturer's maximum rate of coverage (minimum ft^2/gal) can be attained. Sealer application will conform to the manufacturer's recommendations and the following:

1. **Weather Limitations:** The penetrating sealer will only be applied when the ambient air and concrete surface temperatures are between 40^o F and 100^o F unless otherwise recommended by the manufacturer. The treatment solution will not be sprayed when blowing winds or other conditions prevent proper application.

   The sealer will not be applied during inclement weather or rain, or if inclement weather or rain is anticipated within 24 hours.

2. **Application Equipment:** Spray equipment for the application of the treatment solution will be a low-pressure airless type sprayer with a maximum application pressure of 15 psi.

3. **Application:** Concrete will be cured for 28 days prior to the application of the sealer. The sealer may be applied prior to the 28 day cure period, but no sooner than 14 days, provided that there is no evidence of moisture in the concrete when tested in accordance with ASTM D4263 and the concrete has attained 80% of the specified design strength.

All surfaces will be substantially dry prior to application of the sealer. The concrete surfaces will be allowed to dry a minimum of 3 days after power washing or precipitation. The Engineer will determine when the surface is sufficiently dry.

All loose dust and debris will be blown off of the concrete surface with compressed air immediately prior to application of the sealer.

The sealer will be used as supplied by the manufacturer and will not be diluted or altered in any way.

The solution will be sprayed on to the concrete surfaces at the manufacturer's recommended maximum rate of coverage (minimum ft^2/gal) or to refusal, whichever is achieved first. Refusal is defined such that additional spray applications remain on the concrete surface and do not soak in, as determined by the Engineer.

If the plans specify a grooved bridge deck surface, the grooving will be accomplished prior to the application of the sealer.

4. **Traffic Limitations:** Traffic will not be permitted on treated surfaces nor will pavement markings be applied until the solution has completely penetrated and the treated surface is dry. The Engineer will determine when the surface is sufficiently dry.

IV. METHOD OF MEASUREMENT

Concrete penetrating sealer will be measured to the nearest 0.1 square yard.

V. BASIS OF PAYMENT

Concrete penetrating sealer will be paid for at the contract unit price per square yard. Payment will be full compensation for equipment, labor, materials, and all other incidental items required to prepare the concrete surfaces, and to furnish and apply the penetrating concrete sealer.

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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
CONTRACTOR STAKING
WITH MACHINE CONTROL GRADING OPTION

PROJECT EM 0292(88)73, PCN 06JQ
LINCOLN COUNTY

AUGUST 27, 2025

Delete Section 5.8 of the specifications and insert the following:

SECTION 5.8
CONSTRUCTION STAKES, LINES AND GRADES
CONTRACTOR GRADE STAKING

A. DESCRIPTION

The Contractor will perform all construction staking. The Contractor may elect to use grading equipment with an automated machine control system for Machine Control Grading (MCG) provided the equipment and methods used provide the same results in the finished work as conventional construction staking. The Engineer may require the Contractor to revert to conventional staking methods for all or part of the work at any point during construction if, in the Engineer's own opinion, the MCG produces unacceptable results.

The Department will not allow the Contractor to use MCG as a substitute for conventional construction staking for slope staking and slope stake referencing, paving hub staking, structure staking, miscellaneous staking, or final cross section surveying.

The staking work includes, but is not limited to, establishing or re-establishing the project centerline; establishing control points and benchmarks as needed; setting additional benchmarks as needed; perform measurement and volume calculations of all Contractor secured borrow sources, State designated borrow sources, and topsoil stockpiles; and staking right-of-way, easements, and fence. The Contractor will perform measurement and volume computations by the average end area method at the slope stake stations and plus stations, surface-to-surface method, or alternate measurement and computation method approved by the Engineer.

The Contractor will perform all construction layout and reference staking necessary for the accurate control and completion of all structures, grading, paving, drainage, median crossovers, signing, pavement marking, permanent benchmarks, detours, fence, and all other appurtenances required for the complete construction and acceptance of the work. The layout will include, but is not limited to, staking clearing line, slope staking and slope stake referencing, grade staking (blue tops), paving hub staking, structure staking, and performing the miscellaneous staking as described in the plans and in this specification.

The Department has established horizontal and vertical control as shown on the plans. Each horizontal and vertical control point will be preserved or reset out of the work limits and available during and after construction is complete. Prior to the Department's final acceptance of the project, the Contractor will replace or reset any control that is disturbed during the construction of the project. The Contractor will provide the Department a list of the in-place control points, including coordinates and elevations relevant to the project control, at the end of the project.

The Department will provide a MCG packet to all prospective bidders consisting of a XML file containing the original surface Digital Terrain Model (DTM) and 4 design files for each new alignment on the project. The electronic design files will include, a XML file containing mainline alignment data, a XML file containing mainline design surface DTM, a DGN file containing triangles for mainline surface, and a DWG file containing triangles for mainline surface. The MCG packet will be available on the Department's electronic bid letting website when the project is advertised for bid letting.

The Contractor will convert the electronic information provided by the Department into the format required by the Contractor's MCG system. The Department makes no guarantee the information provided is directly compatible with the Contractor's MCG system.

The information shown in the plans will govern over the provided electronic information. The Contractor assumes the risk of error if the information is used for any purpose for which the information was not intended. The Contractor assumes all risk of any assumptions made regarding the electronic information.

The Contractor bears all costs, including but not limited to the cost of actual reconstruction of work, that may be incurred due to errors in application of MCG techniques. Grade elevation errors, rework resulting from errors or failures of the MCG system, and associated quantity adjustments resulting from the Contractor's activities are at no cost to the Department. Delays due to late submittals or satellite reception of signals to operate the MCG system will not result in adjustment to any contract unit prices or be justification for granting contract extensions.

The electronic information is not to be considered a representation of actual conditions to be encountered during construction. Providing the Contractor this

information does not relieve the Contractor from the responsibility of making an investigation of conditions to be encountered, including but not limited to, site visits and basing the bid on information obtained from these investigations and the Contractor's professional interpretations and judgment. The Contractor assumes the risk of error if the information is used for any purposes for which the information was not intended. Any assumptions the Contractor makes from this electronic information or manipulation of the electronic information is at the Contractor's own risk.

The Contractor will perform the staking work in accordance with the Department's Survey Manual, except as modified by this specification.

If the Contractor elects to use MCG, the Contractor will submit a comprehensive written MCG work plan to the Engineer for review prior to scheduling the preconstruction meeting. The Department will review the plan to determine if the plan conforms to the requirements of the contract.

The Contractor will include in the MCG work plan how MCG will be incorporated into other technologies used on the project. The Contractor's MCG work plan will include, but is not limited to, the following:

1. A designation of which portions of the subgrade will be completed using MCG and which portions, if any, will be completed using conventional subgrade staking methods.
2. A description of the manufacturer, model, and software version of all MCG equipment.
3. Information on the qualifications of the Contractor's staff including, but not limited to, formal training and field experience.
4. A designation of a single person as the primary contact for MCG technology issues.
5. A description of site calibration procedures.
6. A description of site calibration and checking frequency and procedures for documenting site calibration and checking.
7. A description of the Contractor's quality control procedures including procedures for checking, mechanical calibration, and maintenance of equipment.
8. A description of the frequency and types of checks the Contractor will perform to ensure the constructed subgrade conforms to the contract requirements.

B. MATERIALS

The Contractor will furnish all staking materials of adequate quality for the purpose intended including all stakes, stake chasers, paint, field note books, and all other materials and equipment necessary to perform the required work.

C. CONSTRUCTION REQUIREMENTS

1. **General:** The Department will set control points. The Contractor is responsible for the preservation of ties and references to all control points necessary for the accurate re-establishment of all base lines and centerlines shown in the plans, whether established by the Contractor or found on or adjacent to the project. The Department will also establish benchmark elevations. It is the responsibility of the Contractor to verify the accuracy of the benchmark elevations prior to use on the project.

   The Engineer may check the accuracy and control of the Contractor's survey, staking work, and MCG at any time. The checks performed by the Engineer will not relieve the Contractor of the responsibility for the accuracy of the survey layout or the construction work. If the random checks show the grade is out of tolerance, the Engineer may require the Contractor to set additional stakes, and paving hub stakes at the discretion of the Engineer, at no additional cost to the Department. If the Engineer orders additional stakes, the Contractor will perform the additional staking until the Contractor can show the staking operations achieve the specified grade tolerances.

   Prior to any project staking, the Contractor will run a level circuit to check the plan benchmarks the full length of the project. At structure sites, the circuit will include two benchmarks, one on each end of the structure.

   The Contractor will perform all staking and MCG work under the supervision of a qualified surveyor or engineer who is experienced and competent in road and bridge construction surveying, staking, and MCG procedures. The surveyor or engineer will be available to review work, resolve problems, and make decisions in a timely manner. A crew chief, competent to perform all required surveying duties, will supervise the staking in the absence of the surveyor or engineer from the project. The Contractor will submit the qualifications and work experience history of the surveyor or engineer who will supervise the construction survey and MCG work to the Engineer for review at least 14 calendar days prior to beginning the staking or MCG work.

   a. **Conventional Construction Staking:** The Contractor will also submit the proposed starting date of the staking and the anticipated surveying work schedule.

      The Contractor will furnish, set, and properly reference all stakes, references, lines, grades, and batter boards required. Minimum reference notations will be for type, location, and alignment (when there are multiple alignments in the same area). The Contractor will perform the survey and staking work in a manner consistent with standard engineering practices and approved by the Engineer.

The Contractor is solely responsible for the accuracy of the survey and staking work. The Contractor will notify the Engineer of any errors and discrepancies found in previous surveys, plans, specifications, or special provisions prior to proceeding with the survey work.

The Contractor will be responsible for the supervision of the construction staking personnel. The Contractor will correct any deficient survey or staking work that results in construction errors at no additional cost to the Department.

The Contractor will keep field notes in conventional handwritten notebooks or in a computerized form acceptable to the Engineer in a clear, orderly, and neat manner. The notebooks will become the property of the Department upon completion of the project. The notebooks will provide enough information such that quantity measurements are verifiable by the Department. Field notes are subject to inspection by the Engineer at any time.

The Contractor is required to submit any remaining required quantity calculations and notes to the Engineer no later than 60 calendar days after completion of the survey and staking work.

The Contractor will furnish stakes and wooden hubs or steel pins of sufficient length to provide a solid set in the ground. The Contractor will place half-length lath stakes or stake chasers or an alternate, acceptable to the Engineer, adjacent to or on the blue top hubs for guards. The Contractor will place guard stakes or an alternate, acceptable to the Engineer, adjacent to the paving hub with stationing and a grade to the top of slab written on the stake. Stakes set not meeting these requirements will be reset at the Contractors expense. The Contractor will replace stakes and paving hubs damaged, destroyed, or made unusable at no additional expense to the Department.

b. Machine Control Grading: If the Contractor elects to use MCG, the Contractor will confirm the design surface DTM agrees with the contract plans, make adjustments to the design surface DTM as approved by the Engineer, and will maintain the design surface DTM for all areas of the project where MCG is used. The Contractor will also provide constructed surface DTM information to the Department in LandXML or other Engineer approved format.

The Contractor will notify the Department of any errors or discrepancies in Department provided information. The Department will determine what revisions may be required. The Department will revise the contract plans, if necessary, to address errors or discrepancies the Contractor identifies. The

Department will provide the best available information related to those contract plan revisions.

The Contractor will revise the design surface DTM as required to support construction operations and to reflect any contract plan revisions the Department makes. The Contractor will perform checks to confirm the revised design surface DTM agrees with the contract plan revisions. The Contractor will provide a copy of the resultant revised design surface DTM to the Engineer in LandXML. The Department will pay for costs incurred to incorporate contract plan revisions as extra work.

The Contractor will designate a set of control points, including a total of at least 6 horizontal and vertical points or 2 per mile, whichever is greater, for site calibration for the portion of the project employing MCG. The Contractor will incorporate the Department provided control framework used for the original survey and design.

The Contractor will calibrate the site by determining the parameters governing the transformation of satellite information into the project coordinate system. The Contractor will use the control points provided by the Department for the initial site calibration. The Contractor will provide the resulting site calibration file to the Engineer before beginning subgrade construction.

In addition to the site calibration, the Contractor will perform site calibration checks at individual control points not used in the initial site calibration. At a minimum, the Contractor will check the calibration at the start of each day as described in the contractor's MCG work plan. The Contractor will report out-of-tolerance checks to the Engineer. The measured position must match the established position at each individual control point within the horizontal tolerance of ±0.1 foot and the vertical tolerance of ±0.05 foot.

The Contractor will construct the subgrade as the Contractor’s MCG work plan indicates and in accordance with the contract requirements. The Contractor will update the plan as necessary during construction of the subgrade. The Contractor will perform periodic sensor calibrations, checks for blade wear, and other routine adjustments as required to ensure the final subgrade conforms to the contract requirements.

The Department may use Department supplied GPS rover and data collector (GPS inspection equipment) to aid in the inspection of the work. The Department supplied GPS inspection equipment will require a connection to the Contractor’s Machine Control Grading (MCG) system, through the Contractor’s base station, used for MCG equipment.

The Contractor will configure the radio settings of the base station to allow the Department's rover to receive corrections directly from the Contractor's base station. The radio settings must be configured properly to ensure continuous communication across multiple brands of GPS equipment. The radio settings will be as follows:

- Frequency: 461.050 to 464.750 MHz
- Narrow Bandwidth: 12.5 kHz
- Protocol: PDL or PDL Tx
- Modulation: 4fSK
- Forward Error Correction (FEC): On
- Scrambler: Off
- Free Channel Scan (FCS): On

The connection of the Department's GPS inspection equipment will allow the Engineer the ability to positively and efficiently determine plan station, offset, and elevations in all MCG sections.

The Department will not make payment for the ability to connect or the connection to the Contractor's MCG system.

2. **Slope Staking:** The Contractor will set slope stakes at the catch points. The slope stake reference hubs will be offset behind the slope stake. The Contractor will place slope stake reference hubs behind the slope stakes at a set distance, at the right-of-way line, or at the easement line, as approved by the Engineer.

   The slope stakes will be set at 100-foot intervals on tangents and at 50-foot intervals in horizontal curves. The horizontal tolerance is ±0.2 foot and the vertical tolerance is ±0.1 foot. The Contractor will reference the subgrade shoulders with slope stake reference hubs set with a horizontal tolerance of ±0.2 foot and a vertical tolerance of ±0.05 foot.

   The Contractor will retain the slope stakes and hub references until the final survey computations are completed and accepted by the Department.

   Contractor will set slope stakes based on the information included in the MCG files provided by the Department.

3. **Grade Staking:** In accordance with the requirements of this provision, the Contractor may elect to use MCG equipment or may use conventional construction staking methods for all or part of the grade staking work, excluding paving hub staking.

   a. **Conventional Blue Tops:** The Contractor will set grade finishing stakes (blue tops) for grade elevations and horizontal alignment on the roadway centerline and at each shoulder at the top of the subgrade. Where additional

lanes or turnouts are to be constructed, The Contractor will set blue tops at centerline, the normal shoulder distance, and the extended shoulder distance or outside the additional lane edge.

The transverse distance between blue tops will not exceed 20 feet. The Contractor will be required to set intermediate blue tops when the transverse distance is greater than 20 feet. When intermediate blue tops are required, The Contractor will set the intermediate blue tops at locations approved by the Engineer.

The blue top grade stakes will be set at 100-foot intervals on tangents and 50-foot intervals on horizontal curves. The horizontal tolerance for blue tops is ±0.2 foot and the vertical tolerance is ±0.02 foot.

Contractor will set grade stakes based on the information included in the MCG files provided by the Department.

The Contractor will retain the shoulder blue tops and guards through placement of the granular material.

The Contractor will not be required to set grade stakes at the top of the base course. If the Contractor deems it necessary to place grade stakes to achieve typical section as per section 260.3 A of the specifications, the staking will be incidental to the contract unit price for base course.

b. Machine Control Grading: The Contractor will set conventional construction staking grade finishing stakes (blue tops) for grade elevations and horizontal alignment on the roadway centerline and at each shoulder at the top of the subgrade (and gravel cushion for PCC paving projects) at a minimum of 500 foot intervals on mainline and slide repairs or at least one location for sections less than 500 foot long; at least two locations on side roads, side streets, and ramps; and at least one location within 100 feet of each bridge end. In addition, the Contractor will set blue tops for grade elevations and horizontal alignment on the roadway centerline and at each shoulder at the top of the subgrade (and gravel cushion for PCC paving projects) at critical transition points including, but not limited to, PC's, PT's, super elevations transition points, and other critical points required for the construction of drainage and roadway structures. The Contractor will also provide conventional construction staking grade finishing stakes (blue tops) at additional locations designated by the Engineer.

The Contractor will establish these grade staking (blue top) grades using the information included in the MCG files provided by the Department, plan typical sections, and cross sections. The Contractor will use these stakes to check the accuracy of the MCG during construction. The Contractor will

notify the Engineer at least 3 calendar days before making subgrade checks to allow the Engineer to observe the process.

The Contractor will ensure at least four of any five consecutive conventional construction staking grade finishing stakes (blue tops) locations are within the horizontal and vertical tolerances specified in Section 120.3. The Contractor will notify the Engineer if more than one of any five consecutive conventional construction staking grade finishing stakes (blue tops) locations is not within the horizontal or vertical tolerance.

The Department may conduct periodic independent subgrade checks. The Department will notify the Contractor if any individual check is not within the horizontal or vertical tolerance.

c. **Paving Hub Staking:** When paving hub staking is required, the Contractor will set paving hubs at a maximum longitudinal distance of double the transverse joint spacing. The paving contractor may require a closer spacing. The horizontal and vertical tolerance for the paving hubs or grade nails is ± 0.02'.

The Department will not provide paving hub notes. The Contractor is responsible for generating the paving hub grades from the blue top notes.

4. **Structure Staking:** The Contractor will stake and reference bridges and box culverts to ensure adequate horizontal and vertical control of the substructure and superstructure components. The Contractor will stake and reference the bridge chord or the bridge tangent and centerline of each pier, bent, and abutments for bridges. The Contractor will stake the box culvert centerline(s) in both longitudinal and transverse directions.

When the work requires bridge rehabilitation work, the structure staking will include all surveying and staking required for completion of the project. The staking work may include, but not be limited to, setting the rail for the deck overlay. The plans will indicate the grade line for the deck overlay; and if necessary, the Engineer may modify the grade line.

When staking retaining walls (except Type C), the Contractor will survey and record the original ground profile along the front face of the proposed wall at the elevation break points. The Contractor will supply the wall designer the original ground profile data prior to the wall designer performing the design. Set adequate stakes and references for horizontal and vertical control during construction.

For structures and retaining walls, the horizontal tolerance is ±0.04 foot and vertical tolerance is ±0.02 foot.

The Contractor is responsible for all notes required to stake structures including bridges, box culverts, and walls.

5. **Miscellaneous Staking:** Miscellaneous staking includes the following work:

   a. Approach road staking and all tie-in checks. The Contractor will submit profiles and elevations of all approach roads and other tie-ins throughout the project to the Engineer at least 3 business days prior to staking;
   b. Perform measurement and computation of topsoil quantities. The Contractor will perform volume computations by the average end area method, surface-to-surface method, or alternate computation method approved by the Engineer;
   c. Special ditch staking;
   d. Staking of signs, delineators, pavement markings, guardrail, curb & gutter, light poles, conduit, junction boxes, and related items (Staking is for all aspects, i.e. detours, temporary and permanent);
   e. Right-of-way staking including easement lines and fence post panels;
   f. Pipe and storm sewer staking including drop inlets, manholes, cattle passes, and related items. If additional pipe, storm sewer, drop inlets, manholes, or cattle passes are required which are not shown on the plans, the staking will be paid in accordance with the bid item Engineer Directed Surveying/Staking;
   g. Mark limits of removal items (trees, foundations, curb & gutter, sidewalk, etc.);
   h. Detours, roadway diversions, and crossovers. (This work includes all design and staking notes required to design and stake the detour, roadway diversion, or crossover in accordance with the plan requirements. The Contractor will submit the completed design including profile and alignment and staking notes to the Engineer at least 3 business days prior to staking.);
   i. Perform measurement and computation of quantities of Contractor and State furnished borrow pits. The Contractor will perform volume computations by the average end area method, surface-to-surface method, or alternate computation method approved by the Engineer;
   j. Resetting horizontal and vertical control, if disturbed;
   k. Approach slab and sleeper slab staking;
   l. Staking of sidewalks and curb ramps; and,
   m. Staking of steps and wheel chair ramps.

   The Contractor will perform the pipe staking so the pipe will fit the field conditions. The plans show only approximate pipe locations and grades. The Contractor will not install pipe prior to gaining the Engineer's approval of minor location and grade adjustments necessary for proper staking of the pipe.

   The Contractor will stake the slope catch points to determine the inlet and outlet locations, set reference stakes for the inlet and outlet locations, and stake ditches and special inlet and outlet grades to ensure proper drainage. The

staking of manholes and drop inlets will be included in pipe and storm sewer staking. The Contractor will stake precast cattle passes similar to drainage pipes.

The horizontal tolerance for the pipe and storm sewer staking is ±0.05 foot and the vertical tolerance is ±0.03 foot.

The Contractor will keep pipe staking notes on a DOT Form 214.

6. **Engineer Directed Surveying/Staking:** The use of the engineer directed surveying/staking contract item is intended for surveying/staking not included in the plan notes and this special provision. The Contractor may use a survey crew to perform additional survey/staking work caused or required by the Department. The Engineer will use a written order to authorize the hourly engineer directed surveying/staking item and describe the surveying/staking work required of the Contractor.

7. **Final Cross Section Survey:** When the contract allows an option for the measurement of final earthwork quantities by survey or by plan quantities, the Contractor and Engineer must agree to the method of measurement for final earthwork quantities prior to using this item. If this item is not used for the final measurement, the Department will remove this item by a contract change order. If the Contractor and Engineer agree to use this item for measurement of final earthwork quantities, the resulting quantities will be used for payment of the excavation quantities.

   Final Cross Section Survey includes final earthwork (or terrain data) measurement and calculation of as-built quantities. The Contractor will include the blue top subgrade elevations, both shoulders, and centerline in the final earthwork (or terrain data). The Contractor will perform earthwork computations by the average end area method at the same intervals, stations, and plus stations as the slope stakes, surface-to-surface method, or alternate computation method approved by the Engineer.

D. METHOD OF MEASUREMENT

Refer to the Table of Contractor Staking in the plans for more detail on how quantities were calculated.

1. **Slope Staking:** The Department will not measure slope staking. The Department will pay the plan quantity as the final quantity unless the Engineer orders additional slope staking in writing.

   The Department will consider all combinations of roadway widths as one set of slope stakes. On projects with ramps, the Department will consider ramps as roadway and include the ramps in the slope staking quantity. All additional

slope staking for intersections will be incidental to the contract unit price for slope staking.

2. **Grade Staking:** The Department will not measure grade staking. The Department will pay the plan quantity as the final quantity unless the Engineer orders additional grade staking in writing. The Department will make no adjustment to the plan quantity of grade staking regardless if the Contractor elects to use MCG on all or part of the project.

   The Department will consider a two-lane roadway as one set of grade stakes. The Department will proportionately increase the plan quantity for multi-lane roadways in excess to two-lanes as shown in the table of construction staking (lane factor). For example, a three-lane roadway is equivalent to 1.5 times the quantity for a two-lane roadway. On projects requiring grade staking on ramps, the Department will consider ramps as a two-lane roadway for measurement as shown in the table of construction staking. The Department will not consider Acceleration/deceleration lanes and turning lanes for intersecting roads, and median crossovers as an additional roadway. All cost for additional grade staking for acceleration/deceleration lanes, turning lanes, intersecting roads, grade adjustments, and median crossovers will be incidental to the contract unit price for grade staking. All additional grade staking for intersections and medians will be incidental to the roadway grade staking. Any additional staking the Contractor feels necessary to complete the grade staking work is the responsibility of the contractor and will be incidental to the contract unit price for grade staking.

   When two sets of blue top stakes are required, the Department will base and calculate the plan quantity to include each set of grade staking as a separate set of stakes.

3. **Structure Staking:** The Department will measure structure staking by the each for bridges, box culverts, and retaining walls.

4. **Miscellaneous Staking:** The Department will not measure miscellaneous staking. The Department will pay the plan quantity as the final quantity.

5. **Engineer Directed Surveying/Staking:** The Department will measure engineer directed surveying/staking to the nearest 0.1 hour with the following restrictions:

   The use of engineer directed surveying/staking will be for the work ordered by the Engineer. The measured quantity will be the actual time the survey crew is working on the project, physically performing the field survey/staking work. The Department will not include travel time for the survey crew in the measurement.

The Engineer will issue a DOT 75 ticket for the hours authorized for engineer directed surveying/staking.

6. **Final Cross Section Survey:** The Department will measure final cross section survey to the nearest 0.001 mile for the plan earthwork balances requiring a final survey to determine as-built unclassified excavation quantities. The Engineer will determine which balances (if any) require a final survey during construction. The plan quantity will be the length of the project mainline. This item will be decreased if the Contractor and Engineer agree to accept the plan excavation quantity prior to performing the work for any or all earthwork balances.

E. BASIS OF PAYMENT

Payment for all survey items will be considered full compensation for furnishing all necessary personnel, vehicles, surveying equipment, software, supplies, materials, recording fees, transportation, and incidentals to accurately and satisfactory complete the work.

The Department reserves the right to omit any of these bid items without providing compensation to the contractor if the Department deems the bid prices are unreasonable.

1. **Slope Staking:** The Department will pay slope staking at the contract unit price per mile.

2. **Grade Staking:** The Department will pay grade staking at the contract unit price per mile.

3. **Structure Staking:** The Department will pay structure staking at the contract unit price per each.

4. **Miscellaneous Staking:** The Department will pay miscellaneous staking at the contract unit price per mile.

   The Department will make partial payment as follows:

   a. Upon submission of the name, experience, and qualifications of the surveyor or engineer who will supervise the staking, the proposed starting date, and the staking schedule, the Department will pay the Contractor 25 percent of the plan quantity for the miscellaneous staking.

   b. The Department will make intermediate payments based on the amount of the staking work completed.

c. The Department will make full payment at the plan quantity for miscellaneous staking upon completion of all surveying and staking and when the Contractor has furnished all field notebooks and records to the Engineer.

The Department will not adjust the contract unit price or plan quantity for miscellaneous staking due to overruns or under runs in the other contract items.

5. **Engineer Directed Surveying/Staking:** The Department will pay engineer directed surveying/staking on an hourly basis as per the Price Schedule for Miscellaneous Items. The value listed in the Price Schedule for Miscellaneous Items includes salaries, travel time, equipment, staking supplies, payroll additive, and all incidental expenses related to providing the survey crew.

6. **Final Cross Section Survey:** The Department will pay final cross section survey at the contract unit price per mile.

* * * * *

THE FOLLOWING UTILITY COMPANIES ARE INVOLVED ON

PROJECT: EM 0292(88)73, Lincoln County, PCN 06JQ
IM 2292(104)0, Lincoln County, PCN 07D0

The contractor shall contact the following utilities in a sufficient amount of time prior to starting work. The companies will identify their facilities, and it is the responsibility of the contractor and the company to coordinate their work to avoid damage to existing facilities and to allow for relocation of facilities as may be required for grading work:

The following utilities were determined to be involved and were formally notified on March 9, 2023, that if their facility is located within the existing public right-of-way, any adjustment of their facility would have to be accomplished at no cost to the State, **within 90 days from receipt of the notice, unless other arrangements are made with the Area Engineer.**

(1) Bluepeak (Vast Broadband, aka Vast)
5100 S. Broadband Ln
Sioux Falls, SD 57108
CONTACT: Jordan Huber, Tel. #605.498.4922, Jordan.Huber@mybluepeak.com
The Company has an existing underground fiber line located within the existing public right-of-way (ROW) running parallel to I29 on the west side. This fiber also crosses I229 on the east side of Solberg Ave. The Company will relocate their fiber line along I29 on the west side to the proposed right-of-way. They will cross under 85th Street and plan to maintain a vertical alignment deep enough to avoid proposed and existing utilities. They are located within the proposed SDDOT right-of-way and will relocate at their own expense.

(2) Lincoln County Rural Water
27066 Henry Pl
Sioux Falls, SD 57108
CONTACT: Robin Dykstra, Tel. #605.767.2966, rdykstra@lincolncoruralwater.com
The Company has an underground watermain located along the north side of 85th St between Sundowner Ave and Tallgrass Ave. along the existing 66' statutory ROW. The City of Sioux Falls has an agreement with the Company to remove and/or abandon their watermain after the city installs their new 16" water line. The remaining customers services will be switched over to the new city watermain. The contractor will coordinate the crossover with both Lincoln County Rural Water and the City of Sioux Falls.

(3) Lewis & Clark Regional Water (L&C)
31474 SD Hwy 19
Vermillion, SD 57069
CONTACT(S):
Justin Walsh, Tel. #605-310-8780, jwalsh@lcrws.org
Todd Giffin, Tel. #605.310-3085, tgiffin@lcrws.org
IN CASE OF EMERGENCY CALL 866-572-8688
The Company has an existing underground 36" welded steel carrier watermain located in an easement along the south side of 85th St along the entirety of the project corridor that provides water to multiple communities in southeast SD, northwest IA, and southwest MN. This watermain also includes various water vaults, blow-off valves, hydrants, etc. within the project corridor. Design efforts were made to accommodate the water line with no anticipated relocations planned during construction. Multiple provisions will be included in the plans that identify the L&C requirements the contractor will follow while working in and around this pipeline. The Company requests a two-week notice prior to entry into their easement or working over their existing pipeline.

(4) Southeastern Electric
47077 276th St
Lennox, SD 57039
CONTACT: Adam Stark, Tel. #605.368.4000, adam@southeastern.coop
The Company has below ground electrical lines in various locations within the project area. There is an existing underground electric power line in an easement on the south side of 85th St between Sundowner Ave and Enterprise Ave. where it crosses 85th St on the east side of the Enterprise Ave ¾ intersection and continues north into the private property. There is also an existing underground power line that parallels I29 in an easement along the east public ROW line from the southern project limits to approximately (¼) mile north of 85th St. There is also an existing underground electric power line that crosses I29 approximately one-quarter (¼) mile north of 85th St and continues north in an easement along the public ROW line where it turns east at the 69th St ROW. Because they are in a private easement a utility relocation funding agreement between SEC and the City of Sioux Falls was prepared to pay for the relocation costs. The relocation will take place in coordination with the project.

(5) MidAmerican Energy
1200 S Blauvelt Ave
Sioux Falls, SD 57105
CONTACT: Ryan Hendriks, Tel. #605.373.6061, rhendriks@midamerican.com
The Company has a 4" steel gas line on the south side of 85th St that extends east from Sundowner Ave to the west end of the project limits where it stops. MidAmerican has said they are planning to hold off on extending this gas line further east until a future date.

(6) Xcel Energy
500 W Russell St
Sioux Falls, SD 57104
CONTACT: Mike Ronfeldt, Tel. #605.339.8358, michael.a.ronfeldt@xcelenergy.com
The Company has an overhead power line on the south side of 85th St east of I29 within the existing statutory ROW. They are planning to relocate their line once the new ROW has been established. The power line is in the existing public ROW, therefore any relocation/adjustment necessary to accommodate the construction will be accomplished at no cost to the State and performed in coordination with construction of the project.

(7) Northwestern Energy
313 Cedar St
Yankton, SD 57078
CONTACT: Noah Kimuyukilonzo, Tel. #605.415.1977, noah.kimuyukilonzo@northwestern.com
The Company has a 4" plastic gas line on the south side of 85th St that extends east from Sundowner Ave to Enterprise Ave. They are planning to extend their gas line east on the south side of 85th St after the project has been completed.

(8) SDN Communications
2900 W 10th St
Sioux Falls, SD 57104
CONTACT: Matt Burton, Tel. #712-333-5542, Matt.Burton@sdncommunications.com
The Company has an existing underground fiber line located within the existing public ROW running parallel to I29 on the east side. They have a pull box on both the north and south sides of 85th St. They are planning to relocate their line once the new ROW has been established. The fiber line is in existing public ROW, therefore any relocation/adjustment necessary to accommodate the construction will be accomplished at no cost to the State and performed in coordination with construction of the project.

(9) SDDOT (SF Area Office)

5316 W 60th St
Sioux Falls, SD 57107
CONTACT: Stacy Bartlett, Tel. #605.773.6488, stacy.bartlett@state.sd.us
The state has a lighting electrical conduit in the I29 median that will be relocated at various locations as part of the project.

(10) City of Sioux Falls (water)
231 N Dakota Ave
Sioux Falls, SD 57104
CONTACT(S):
Shannon Ausen, Tel. # 605.367.8607, shannon.ausen@siouxfalls.gov
Nick Borns, Tel. #605.367.8655, nicholis.borns@siouxfalls.gov
The city has no current facilities within the project limits. The city is proposing to construct a new 16" watermain in conjunction with the interchange project. This separate city utility project (PCN X06R, CIP 11017) will be bid by the SDDOT together with the interchange project.

(11) Midcontinent Communications
1305 N Terry Avenue
Sioux Falls, SD 57105
CONTACT: Trent Bialas, Tel. #605.231.1972, Trent.Bialas@Midco.com
Midco has a fiber line located on the north side of 85th St at the west end of the project limits. They have future plans to extend east along 85th St after the project is completed. They have no conflicts with the current interchange project.

(12) City of Tea
510 S Main Ave
Tea, SD 57064
CONTACT(S):
Ben Scholtz (HDR representing Tea), Tel. #605.977.7759, ben.scholtz@hdrinc.com
Thad Konrad, Tel. #605.498.2906
The City of Tea has a 12" PVC watermain that extends from the Lewis & Clark watermain to the new Tea water tower located in the southwest quadrant of the proposed interchange. There are no conflicts with the current interchange project.

(13) Lumen
125 S Dakota Ave
Sioux Falls, SD 57104
CONTACT: Andrew Wixon, Tel. #605.681.2049, andrew.wixon@lumen.com
The Company has an existing fiber line in an easement just outside the west I29 ROW. At the SB I229 / I29 gore area the line parallels I229 in an easement. This line will be impacted by the project and will have to be relocated to a new private easement. Because they are in a private easement a utility relocation funding agreement between Lumen and the City of Sioux Falls was prepared to pay for the relocation costs. The relocation will take place in coordination with the project.

(14) East River Electric Power
211 S Harth Ave
Madison, SD 57042
CONTACT: Jordan Brown, Tel. #605.256.8231, jbrown@eastriver.coop
As of 12/10/2020 East River Electric indicated they were clear.

(15) Windstream
3540 SW 61sdt St
Des Moines, IA 50321
CONTACT: Lori Ketter, Tel. #920.410.6902, Lori.Ketter@Windstream.com
As of 12/10/2020 Windstream indicated they were clear.

(16) Northern Natural Gas
47496 272nd St
Harrisburg, SD 57032
CONTACT: Travis Beck, Tel. #605.215.7757, travis.beck@nngco.com
The Company has an existing high-pressure gas main in a casing crossing I229 Ramp B just south of the merge with I229 NB south of the Solberg Avenue crossing. The high-pressure gas main is deep enough and will not be impacted by the proposed widening and ditch grading on the project.

(17) Midwest Fiber Networks
6070 North Flint Road
Glendale, WI 53209
CONTACT(S):
Patrick Graham, Tel. #414.672.5612, pgraham@midwestfibernetworks.com
Corey Schmukim, Tel. 414.349.2764, cschmunkim@midwestfibernetworks.com
As of 12/10/2020 Midwest Fiber Networks indicated they were clear.

The requirements relating to Cooperation Between Contractors, as set forth in Section 5.7 of the Standard Specifications for Roads and Bridges, 2015 edition, shall prevail throughout the limits of this project.

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
STEEL BEAM GUARDRAIL
AASHTO M 180 DESIGNATION

OCTOBER 1, 2025

Section 630.2 B. – Delete and replace with the following:

B. Beam Guardrail:

For all projects let prior to January 1, 2027 the following shall apply:

Beam guardrail will conform to AASHTO M 180-18, Type I, or AASHTO M 180-23, Type I, unless the plans specify another type.

For all projects let January 1, 2027 and after the following shall apply:

Beam guardrail will conform to the most recent, at the time of the letting, version of AASHTO M 180, Type I, unless the plans specify another type.

Section 630.2 C. – Delete and replace with the following:

C. Bolts, Nuts, and Washers:

For all projects let prior to January 1, 2027 the following shall apply:

Bolts, nuts, and washers will be as specified in AASHTO M 180-18 or AASHTO M180-23.

For all projects let January 1, 2027 and after the following shall apply:

Bolts, nuts, and washers will be as specified in the most recent, at the time of the letting, version of AASHTO M 180.

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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
ACKNOWLEDGEMENT AND CERTIFICATION REGARDING
ARTICLE 3, SECTION 12
OF THE SOUTH DAKOTA CONSTITUTION

AUGUST 24, 2023

In accordance with the State of South Dakota Office of the Governor Executive Order 2023-13, the following will apply to all contracts:

The Contractor acknowledges and certifies that the following information is correct:

CERTIFICATION OF NO STATE LEGISLATOR INTEREST:

Contractor (i) understands neither a state legislator nor a business in which a state legislator has an ownership interest may be directly or indirectly interested in any contract with the State that was authorized by any law passed during the term for which that legislator was elected, or within one year thereafter, and (ii) has read South Dakota Constitution Article 3, Section 12 and has had the opportunity to seek independent legal advice on the applicability of that provision to this contract. By signing this contract, Contractor hereby certifies that this contract is not made in violation of the South Dakota Constitution Article 3, Section 12.

It is understood and agreed that, if this certification is false, such false certification will constitute grounds for the Department to terminate the contract.

The Contractor further agrees to provide immediate written notice to the Department if during the term of the contract it no longer complies with this certification and agrees such noncompliance may be grounds for contract termination.

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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
BUY AMERICA
FOR MANUFACTURED (COMPOSITE) PRODUCTS

OCTOBER 1, 2025

Section 6.9 C – Page 64 – Delete and replace with the following:

C. Manufactured (Composite) Products: Iron and Steel components of manufactured (composite) products will comply with the Buy America requirements for iron & steel. Due to an existing nationwide waiver, manufactured (composite) products without iron and steel components currently have no specific requirements.

Section 6.9 F 2.b – Page 65 – Delete and replace with the following:

b. Minor quantities of non-compliant iron & steel and construction materials may be incorporated in the Department's sole discretion based on the Department's review of the Contractor's documented invoiced material costs, provided the total value of the non-compliant items does not exceed 5.0% of the total applicable costs for the project or $1,000,000, whichever is less.

The total value of the non-compliant items will include non-compliant iron & steel and non-compliant construction materials. The total value of the non-compliant items will not include excluded materials, manufactured (composite) products, or other items within the scope of an existing Buy America waiver.

The total value of an item includes the cost of the material plus the cost of transportation to the project site, as evidenced by delivery receipt, but does not include the labor costs to assemble and install at the project site.

The total applicable project costs will be defined as the total value of materials used in the project that are subject to a domestic preference requirement, including the total value of any iron & steel, construction materials, manufactured (composite) products, and other items within the scope of an existing Buy America waiver. The total applicable project costs will not include excluded materials.

* * * * *

DOT-208
(07/15)

FUEL ADJUSTMENT AFFIDAVIT

Project Number _____
PCN _____
County _____

For project let using the SDEBS) and in accordance with Section 9.12, the bidder is not required to notify the Department at the time of submitting bids whether the Contractor will or will not participate in the fuel cost adjustment program. Prior to execution of the contract, the successful bidder must submit this completed form to the Department for approval. The Fuel Adjustment Affidavit shall include the anticipated fuel cost of subcontractors.

Does your company elect to participate in a fuel adjustment for this contract for the fuels that do not have a fixed price? No adjustments in fuel prices will be made if "No" is checked.

☐ Yes ☐ No

If yes, provide the total dollars for each of the applicable fuels. No adjustments in fuel price will be made for the fuel types that are left blank or completed with a $0.00 value.

Diesel (x) $_____

Unleaded (y) $_____

Burner Fuel (z) $_____ Type of Burner Fuel Used: _____

Sum (x + y + z) = $_____

Note: The sum of the x, y, and z may not exceed 15% of the original contract amount.

The following must be completed regardless of whether the Contractor elects to participate in the fuel adjustment affidavit

Under the penalty of law for perjury or falsification, the undersigned, _____,
(Printed Name)

_____ of _____,
(Title) *(Contractor)*

hereby certifies that the documentation is submitted in good faith, that the information provided is accurate and complete to the best of their knowledge and belief, and that the monetary amount identified accurately reflects the cost for fuel, and that they are duly authorized to certify the above documentation on behalf of the company.

I hereby agree that the Department or its authorized representative shall have the right to examine and copy all Contractor records, documents, work sheets, bid sheets, and other data pertinent to the justification of the fuel costs shown above.

Dated _____ Signature _____

Notarization is required only when the Contractor elects to participate in the fuel adjustment affidavit

Subscribed and sworn before me this _____ day of _____ , 20___.

_____ _____
Notary Public *My Commission Expires*

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

STANDARD TITLE VI / NONDISCRIMINATION ASSURANCES APPENDIX A & E

MARCH 1, 2016

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. **Compliance with Regulations**: The contractor (hereinafter includes consultants) will comply with the Acts and the Regulations relative to Non-discrimination in Federally-assisted programs of the U.S. Department of Transportation, Federal Highway Administration, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.

2. **Non-discrimination**: The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part 21.

3. **Solicitations for Subcontracts, Including Procurements of Materials and Equipment**: In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and the Acts and the Regulations relative to Non-discrimination on the grounds of race, color, or national origin.

4. **Information and Reports**: The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Recipient or the Federal Highway Administration to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the contractor will so certify to the Recipient or the Federal Highway Administration, as appropriate, and will set forth what efforts it has made to obtain the information.

5. **Sanctions for Noncompliance**: In the event of a contractor's noncompliance with the Non-discrimination provisions of this contract, the Recipient will impose such contract sanctions as it or the Federal Highway Administration may determine to be appropriate, including, but not limited to:

    a. withholding payments to the contractor under the contract until the contractor complies; and/or
    b. cancelling, terminating, or suspending a contract, in whole or in part.

6. **Incorporation of Provisions**: The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as the Recipient or the Federal Highway Administration may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or

is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request the Recipient to enter into any litigation to protect the interests of the Recipient. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

Pertinent Non-Discrimination Authorities:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d et seq., 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin); and 49 CFR Part 21.
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Federal-Aid Highway Act of 1973, (23 U.S.C. § 324 et seq.), (prohibits discrimination on the basis of sex);
- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 et seq.), as amended, (prohibits discrimination on the basis of disability); and 49 CFR Part 27;
- The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 et seq.), (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131-12189) as implemented by Department of Transportation regulations at 49 C.F.R. parts 37 and 38;
- The Federal Aviation Administration's Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures Non-discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of Limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1681 et seq).

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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
DISADVANTAGED BUSINESS ENTERPRISE

FEBRUARY 9, 2024

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 Department-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 Department deems appropriate.

I. Definitions

A. Specified Goal: A DBE participation goal for a contract as indicated by a specific numerical percentage of the total dollar amount of the contract in the bidding documents.

B. Not Specified: No specific DBE participation goal is specified for a contract.

C. Disadvantaged Business Enterprise (DBE): A for-profit small business that is certified by the Department and is listed in the DBE Directory available on the Department's web site.

D. Good Faith Effort (GFE): Efforts to achieve a DBE goal which; by their scope, intensity, and appropriateness to the objective; can reasonably be expected to meet the objective of the Department's DBE program pursuant to 49 CFR 26.1.

E. Positive Contact: Communication between the bidder and the DBE in which the bidder receives an oral or written response from the DBE stating the DBE's intention to quote or not quote a project.

F. Commitment: The dollar amount of work to be subcontracted to DBEs, according to the bidder's bid. The commitment may be compared to the dollar amount of all contract items in the bidder's bid and expressed as a percentage of the total bid amount.

G. Reasonable Effort: For projects when goals are not specified, bidders are encouraged to solicit all certified DBEs listed in the appropriate work classifications in the DBE directory that have indicated in the directory they are

willing to work in the project's geographic area and also those that are listed on the plan holders list.

II. Bidding Requirements

A bidder must not discriminate on the basis of race, color, national origin, or sex in the solicitation or award to subcontractors and material suppliers. Bidders who demonstrate a pattern of possible discrimination through consistent and repeated under-utilization of DBEs may be subject to investigation and sanctions allowed by regulation, administrative rule, or law.

The Bidder's failure to carry out the requirements of this special provision will be treated as a non-responsive bid.

On contracts that specify a specific DBE contract participation goal, all bidders must include their DBE commitment for the contract in the bidding files provided by the Department.

If the contract indicates "Not Specified," all bidders are encouraged to include their anticipated DBE utilization for the contract in the bidding files provided by the Department.

Each bidder must submit a list of all subcontractors and suppliers (DBEs and non-DBEs) the bidder received quotes from for that contract with the bid files.

A Contractor must make reasonable efforts to provide opportunities for DBEs to participate on Federal-aid contracts throughout the life of the contract.

On contracts let with a specified DBE contract participation goal, where the low bidder has not met or exceeded that goal, upon request from the Department all bidders who did not meet or exceed the goal must provide GFE documentation as indicated in Section III of this special provision.

When the DBE participation is "Not Specified" on a contract, each bidder is encouraged to use DBE Contractors; however no bidder will be required to furnish GFE documentation.

Bidders must submit GFE documentation, when requested by the Department, within 2 business days from the date bidders are contacted by the Department. Section III of this special provision provides information on the types of action bidders should make as part of their GFE to obtain DBE participation. Bidders may submit documentation with the bidding files provided all pertinent information is included. Bidders must submit any missing documentation within 2 business days from the date the Department contacts the bidder. If the bidder fails to comply with this requirement, the Department will consider the bid proposal irregular and may reject the bid proposal.

If the apparent low bidder does not provide documentation showing GFE as required by this special provision, the Department will consider that bid nonresponsive and may either award the contract to the next lowest responsible bidder with a responsive bid, or reject all bids. Subsequent to the DBE committee's decision that the apparent low bidder's efforts do not establish GFE, the apparent low bidder will be notified that the bid is not responsive. The apparent low bidder will have 2 business days from the date of notification to contact the Bid Letting Engineer to arrange a meeting with the Department Secretary, or the Secretary's designee, to present documentation and argument about why the bid should not be rejected. The Department Secretary or the Secretary's designee will issue a written decision on responsiveness of the bid within 2 business days after the meeting.

If the apparent low bid is rejected for failure to meet the GFE or other requirements, the next apparent low bidder's GFE will be reviewed, unless all bids are rejected. Unless all bids are rejected, award of the contract will be made to the lowest bidder with a responsive bid.

The lowest responsive bidder on a project with a specified goal will be required to complete form DOT-289B, as included in the contract documents, when the contract is sent for signature. This form requires a signature from each DBE identified in the low bidder's DBE commitment. A separate form will be supplied for each DBE and will be included in the contract documents.

Bidders are encouraged to assist interested DBEs in obtaining bonding, lines of credit, insurance, necessary equipment, supplies, materials, or other related services.

III. Good Faith Efforts

If a GFE package is requested on a contract with a specified goal, the bidders must submit documentation showing compliance with the following requirements:

A. The bidders will submit a contact log of all solicitation efforts including:

- Name of the DBE firm
- Name and phone number of the individual with whom contact was made
- Date, time, and manner of each and every contact (by phone, in person, fax, mail, e-mail, etc.)
- The DBE's response to the solicitation
- Result of the solicitation effort

An example of a solicitation log is available on the Department's Bid Letting website. When bidding utilizing the South Dakota Department of Transportation Electronic Bid System (SDEBS), SDEBS may be used to document the log of solicitation efforts for the project.

B. The bidders will also submit documentation that shows GFE in relation to the following requirements:

1. The bidder must select contract work items to encourage DBE participation. This includes breaking out contract work items into economically feasible units to facilitate DBE participation, even when the bidder might otherwise prefer to perform these work items with its own forces.

2. The bidder must solicit all certified DBEs that are listed in the appropriate work classifications in the DBE directory and that have indicated in the directory they are willing to work in the project's geographic area. Without exception, all DBEs who are listed on the plan holders list by 10 AM central time 7 calendar days prior to the bid letting must be solicited in accordance with Section III.B.3 of this special provision. If the bidder has not solicited any DBE meeting these requirements, the bidder will provide a detailed written explanation showing why the DBE was not solicited.

3. To provide adequate time for the DBE to respond with a quote in the normal course of business, the bidder must make the initial solicitation at least 6 calendar days by mail or 5 calendar days by phone, fax, or e-mail prior to the letting date. Without exception, all DBEs who are listed on the plan holders list by 10 AM central time 7 calendar days prior to the bid letting must be solicited.

4. If the bidder does not receive a positive contact from a DBE, the bidder must follow up the initial solicitation with a second solicitation by phone, fax, or e-mail to determine whether the DBE is interested in quoting. The bidder must make this second solicitation at least 2 business days prior to the letting.

5. The bidder will provide interested DBEs with adequate and timely information about plans, specifications, and requirements of the contract to assist DBEs in responding to a solicitation.

6. If a bidder rejects a DBE quote because of previous problems with a particular DBE, the bidder must prepare a detailed written explanation of the problem. Additional cost involved in finding and using DBEs is not, in itself, sufficient reason for a bidder to reject a quote. A bidder must not reject a DBE as being unqualified without sound reasons based on a thorough investigation of the DBE's capabilities.

7. Any additional information requested by the Department.

C. The bidder must consider qualified DBEs whose quotes are reasonably competitive. If the bidder rejects any quote because it is considered not to be "reasonably competitive," the bidder must provide copies of all DBE and non-

DBE quotes, and a work item price spreadsheet comparing DBE quotes to non-DBE quotes. The spreadsheet must show which quote was included in the bid for the work items being compared. The ability or desire of a bidder to perform the work with its own forces does not relieve the bidder of the responsibility to make GFE. In the event a bidder elects to use its own forces over a DBE, the bidder must include, on the spreadsheet, documentation of the costs of using the bidder's own forces. This can be shown in a number of ways, which may include submitting portions of the bidder's work sheets used to prepare the bid.

D. The bidder must explain why the specified goal could not be met.

E. The bidder must identify any additional efforts the bidder made to secure DBE participation.

IV. Counting DBE Participation

On projects with a specified goal, the contract commitment, as submitted with the bid, will be documented on form DOT-289R/C as included in the contract documents.

If the project is shown as "Not Specified," the anticipated DBE utilization, as submitted with the bid, will be documented on form DOT-289 R/N – DBE Utilization Form, as included in the contract documents. The DBE utilization shown on this form is not a commitment to use the DBE. This information will be used by the Department to track anticipated DBE usage.

Only the portion of a contract performed by the DBE's own forces will count toward DBE participation. Included is the cost of supplies and materials obtained by the DBE for the contract, including supplies purchased or equipment leased by the DBE. Supplies and equipment the DBE subcontractor purchased or leased from the Contractor or its affiliate is not allowed to be included.

When a DBE performs as a participant in an approved joint venture, only the portion of the total dollar value of the contract equal to the distinct, clearly defined portion of the work of the contract that the DBE performs with its own forces will count toward DBE participation.

A bidder may count toward its DBE participation only that percentage of expenditures to DBEs that perform a commercially useful function (CUF) in the performance of a contract. A DBE performs a CUF when the DBE is responsible for execution of the work of a contract and is carrying out the DBE's responsibilities by actually performing, managing and supervising the work involved. To perform a CUF, the DBE must also be responsible, with respect to materials and supplies used on the contract, for negotiating prices, determining quality and quantity, ordering and installing (where applicable) the materials, and paying for the material itself. To determine whether a DBE is performing a CUF, the Department will

evaluate the amount of work subcontracted, the industry practice, and whether the amount the DBE is to be paid is commensurate with the work it is actually performing, DBE credit claimed for performance of the work, and other relevant factors.

A DBE is not performing a CUF if the DBE performs less than 30% of the total cost of its contract with its own work force, or if its role is limited to that of an extra participant in a transaction, project, or contract through which funds are passed in order to obtain the appearance of DBE participation. In determining whether a DBE is simply an extra participant, the Department will examine similar transactions, particularly those in which DBEs do not participate.

DBE participation will be counted for trucking services as follows:

The bidder/Contractor will receive credit toward DBE participation for the total value of the transportation services the DBE provides on the contract using trucks the DBE owns, insures, and operates and which are driven by drivers the DBE employs.

A DBE may lease trucks from another DBE firm, including an owner-operator who is certified as a DBE. When a DBE leases trucks from another DBE, the bidder/Contractor can count the total value of the transportation services the lessee DBE provides on the contract toward DBE participation.

The DBE may also lease trucks from a non-DBE firm, including an owner-operator. When a DBE leases trucks from a non-DBE, the bidder/Contractor can count toward DBE participation only the fee or commission the DBE receives as a result of the lease arrangement. The bidder/Contractor does not receive credit toward DBE participation for the total value of the transportation services, since all services are not provided by a DBE.

The bidder may count toward DBE participation expenditures to DBE firms for materials, supplies, or services as follows:

If the materials or supplies are obtained from a DBE manufacturer, count 100% of the cost of the materials or supplies toward DBE participation. A manufacturer is a firm that operates or maintains a factory or establishment that produces, on the premises, the materials, supplies, articles, or equipment required under the contract and of general character described by the specifications.

If the materials or supplies are purchased from a DBE regular dealer, count 60% of the cost of the materials or supplies toward DBE participation. A regular dealer is a firm that owns, operates, or maintains a store, warehouse or other establishment in which the materials, supplies, articles, or equipment are

bought, kept in stock, and regularly sold or leased to the public in the usual course of business.

If the materials or supplies are purchased from a DBE which is neither a manufacturer nor a regular dealer, count only the amount of fee or commission charged for assistance in the procurement of the materials or supplies or fee or transportation charges for the delivery of materials or supplies required at the job site toward DBE participation. In order to be counted, the Department must determine the fee to be reasonable and not excessive as compared to fees customarily allowed for similar services. The cost of the materials and supplies themselves will not count toward DBE goals.

The Department will not count toward DBE participation materials or services provided by a DBE who is not currently certified prior to and including the date of the Notice of Award. Additionally, the Department will not count toward DBE participation materials or services provided by a DBE who loses certification at any time after the date of the Notice of Award except in the case of a DBE whose ineligibility is cause solely by having exceeded the size standard.

No intended or actual subcontracting arrangement which is contrived to artificially inflate DBE participation is allowed. This includes, but is not limited to, DBE middlemen which serve no commercially useful function, or arrangements where a DBE is acting essentially as a broker of goods or services, but has been counted as a manufacturer, regular dealer, or subcontractor.

The Department will review and monitor projects for compliance with the bidder's intended DBE participation. Failure by the Contractor to fulfill the contract commitment constitutes a breach of contract. The Department may also investigate the form and substance of particular business arrangements between and among DBE and Contractors with regard to specific contracts. If, as a result of an investigation, the Department determines a particular business arrangement is not allowable, the dollar amount of the unallowable DBE participation will be subtracted from the Contractor's DBE participation on that project. The Contractor will be notified if the apparent DBE participation is not adequate to meet the DBE participation stated on the form DOT-289R/C. The Contractor will be directed to seek additional participation from other DBEs to meet the unallowable portion on that contract.

All Contractors and DBEs shall cooperate fully and promptly with the Department in compliance reviews, investigations, and other requests for information. If the Department determines a Contractor was a knowing and willing participant in an unallowable business arrangement, or in the event of repeated violations, falsification, or misrepresentation, the Department will impose sanctions. Sanctions may include, but are not limited to one or more of the following:

- Assessment of liquidated damages as stated in Section VII of this special provision
- Suspension of bidding privileges or debarment
- Withholding progress payments
- Securing additional DBE participation on future Federal-aid contracts sufficient to make up for the DBE participation found to be unallowable
- Referral of the matter for criminal prosecution

V. Joint Checks to DBEs

A joint check is a check issued by a prime Contractor to a DBE subcontractor and to a material supplier or another third party for items or services to be incorporated into a project. For a prime Contractor to receive DBE credit, the DBE must perform a commercially useful function and be responsible for negotiating price, determining quality and quantity, ordering materials and installing (where applicable) and paying for materials.

To ensure that the DBE is independent of the prime Contractor and in compliance with the regulation, use of joint checks will be reviewed and allowed only under following conditions:

- Issued for valid reasons only, not simply for the convenience of the prime Contractor
- Used for a specific contract or specific time frame and not long-term or open ended
- Payment is made to the DBE and not directly to the supplier
- Requested and received prior written approval from the DBE Compliance Officer.

The request must include the following:

- Name of the DBE
- The DOT contract number(s)
- The DOT PCN number(s)
- The work the DBE will be performing on each contract
- Name of the supplier(s) used by the DBE
- The specific reason(s) for issuing joint checks

The Department will review the request and verify the circumstances indicated in the request with the DBE. A copy of the request and approval will be provided to the prime Contractor and the DBE.

VI. Certification of DBE Performance and Payments

Within 30 calendar days of the date of the Acceptance of Field Work the Contractor is required to submit form DOT-289 (Certification of DBE Performance and

Payments), listing all DBEs that participated in the contract, and the total dollar amount paid (and anticipated to be paid) to each. DBE attainments are compared to commitments on form DOT-289R/C and any payments less than 90% of that commitment, without proper justification and documentation, will have liquidated damages assessed against the contract. The Contractor's final payment is not released until receipt of the form DOT-289.

Contractors are required to maintain a running tally of payments to DBEs. For reports of payments not being made in accordance with the prompt payment provision, alleged discrimination against a DBE or other similar complaint, the tally may be requested for review by the Department. The Department may perform audits of contract payments to DBEs to ensure that the amounts paid were as reported on the form DOT-289. All Contractors participating in Federal-aid contracts are expected cooperate fully and promptly with the Department in compliance reviews, investigations and other requests for information regarding payments to DBEs. Their failure to do so is grounds for appropriate sanctions or action against the Contractor.

The Department will monitor the running tally on a program basis and if reporting issues are identified, additional reporting requirements may be implemented.

The Contractor is required to report payments to DBEs twice a year from the date of the Notice to Proceed until the date of the Acceptance of Field Work. Reporting periods and deadlines for payment reporting submittals will be in accordance with the following:

Reporting Period:	**Reporting Deadline:**
October 1 to March 31	April 30
April 1 to September 30	October 31

For each reporting period, the Contractor is required to submit form DOT-289 listing all DBEs that participated in the contract, the payments to DBEs for that reporting period, and the total dollar amount paid to each DBE. For each reporting period after the Notice to Proceed, the Contractor will mark the form DOT-289 as "On-Going" when reporting payments to DBEs prior to the Date of the Acceptance of Field Work. Within 30 calendar days of the date of the Acceptance of Field Work and all DBE payments have been made, the Contractor is required to submit form DOT-289 and the Contractor will mark the form DOT-289 as "Final".

Each form DOT-289 must be provided to the Engineer by the reporting deadline stated above.

DBE payment are compared to commitment on form DOT-289R/C and any payment less than 90% of that commitment, without proper justification and documentation, will result in the Department assessing liquidated damages

against the contract. The Contractor's final payment will not be released until receipt of the form DOT-289 marked "Final".

VII. Liquidated Damages

A. If the Contractor does not meet its contract commitment documented on form DOT-289 R/C, the Department will assess liquidated damages according to the following schedule:

1. For the first $1,000 DBE deficiency, 100% of the deficiency.

2. For the next $9,000 DBE deficiency, 50% of the deficiency.

3. For the next $10,000 DBE deficiency, 25% of the deficiency.

4. For any remaining DBE deficiency in excess of $20,000, 10% of the deficiency.

This liquidated damage provision will not be applicable where actual payment to a DBE is within 90% of the commitment or where there are good and sufficient reasons, properly documented, for the deficiency such as quantity under-runs, project changes, or other unexpected occurrences.

B. If a Contractor finds it impossible, for reasons beyond its control, to meet the contract commitment on form DOT-289R/C, the Contractor may, at any time prior to completion of the project, provide a written request to the DBE Compliance Officer for a complete or partial waiver of liquidated damages. No request for a waiver will be accepted after Acceptance of Field Work has been issued.

VIII. Termination or Substitution of a DBE

The Contractor will not be allowed to terminate or substitute a DBE without the Department's prior verbal consent followed by written approval. This includes, but is not limited to, instances in where the Contractor desires to perform work originally committed to a DBE with its own forces, with an affiliated company, with a non-DBE, or with another DBE. Department approval is required when the contract contains a "specified goal" on form DOT-289R/C and the DBE to be terminated or substituted is listed as a commitment on the form DOT-289R/C.

The Department will provide written consent only if the Department agrees the Contractor has good cause to terminate the DBE listed on the form DOT-289R/C. Good cause includes the following:

- The DBE fails or refuses to execute a written contract

- The DBE fails or refuses to perform the work of the DBE subcontract in a manner consistent with normal industry standards or Department specifications unless the failure or refusal by the DBE is a result of unfair or discriminatory actions by the Contractor
- The DBE fails or refuses to meet the Contractor's reasonable nondiscriminatory bond requirements
- The DBE becomes bankrupt, insolvent, or exhibits credit unworthiness
- The DBE in ineligible to work on public works projects because of suspension and debarment proceedings pursuant to 2 CFR Parts 180, 215, and 1,200 or applicable state law
- The Department has determined that the DBE is not a responsible Contractor
- The DBE voluntarily withdraws from the project and provided the Department with a written notice of withdrawal
- The DBE is found to be ineligible to receive DBE credit for the type of work required
- A DBE owner dies or becomes disabled with the result that the DBE is unable to complete its work on the contract
- Other documented good cause that the Department determines to substantiate the termination of the DBE.

Good cause does not exist if the Contractor seeks to terminate a DBE so the Contractor can self-perform the work for which the DBE was committed, or so the Contractor can substitute another DBE or non-DBE Contractor after the contract award.

Before submitting a request to terminate or substitute a DBE to the Department, the Contractor must first provide written notice to the DBE, with a copy of the notice to the DBE Compliance Officer, of the Contractor's intent to request to terminate or substitute, and the reason for the request.

The Contractor must give the DBE 5 calendar days to respond to the notice and advise the Department and the Contractor of the reasons, if any, why it objects to the proposed termination of its subcontract and why the Department should not approve the Contractor's action. If required in a particular case as a matter of public necessity (e.g. safety), the Department may provide a response period shorter than 5 calendar days.

When a DBE is terminated or fails to complete its work on the contract for any reason, the Contractor must make good faith efforts to replace the committed DBE with another DBE. The Contractor must make efforts to find another DBE to perform the same amount of work under the contract as the DBE that was terminated. The letter to the Department requesting termination or substitution must include the name of the DBE and dollar amount of the replacement DBE. If the Contractor is unable to find another DBE, the Contractor must provide the

names of the DBEs it contacted and reason why they were unable to use those DBEs.

If the Contractor does not utilize or pay DBEs as required, liquidated damages will be assessed as specified in Section VII of this special provision. In addition, if the Contractor is found to have knowingly and willingly attempted to circumvent the DBE contract provisions, the Department will not make payment for the work that was originally committed to a DBE and the Department may impose sanctions referred to in Section IV of this special provision.

The Contractor does not need Department approval to terminate or substitute a DBE under the following circumstances:

- The DBE is being used on a contact with a “Specified Goal” however the DBE was not listed as a DBE commitment on form DOT-289R/C.
- The DBE was listed as an anticipated utilization on a “Not Specified” DBE goal contract on form DOT-289R/N.

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SPECIAL PROVISION FOR EEO AFFIRMATIVE ACTION REQUIREMENTS ON FEDERAL AND FEDERAL-AID CONSTRUCTION CONTRACTS

FEBRUARY 5, 2024

Notice of Requirement for Affirmative Action To Ensure Equal Employment Opportunity (Executive Order 11246)

1. The Offeror's or Bidder's attention is called to the “Equal Opportunity Clause” and the “Standard Federal Equal Employment Specifications” set forth herein.

2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Goals for minority participation for each trade

Aurora	0.8%	Fall River	7.9%	Marshall	1.3%
Beadle	0.8%	Faulk	1.3%	Meade	3.4%
Bennett	7.9%	Grant	1.3%	Mellette	7.9%
Bon Homme	1.2%	Gregory	0.8%	Miner	0.8%
Brookings	0.8%	Haakon	7.9%	Minnehaha	1.2%
Brown	1.3%	Hamlin	1.3%	Moody	0.8%
Brule	0.8%	Hand	0.8%	Oglala Lakota	7.9%
Buffalo	7.9%	Hanson	0.8%	Pennington	3.4%
Butte	7.9%	Harding	7.9%	Perkins	7.9%
Campbell	7.9%	Hughes	7.9%	Potter	7.9%
Charles Mix	0.8%	Hutchinson	0.8%	Roberts	1.3%
Clark	1.3%	Hyde	7.9%	Sanborn	0.8%
Clay	1.2%	Jackson	7.9%	Spink	1.3%
Codington	1.3%	Jerauld	0.8%	Stanley	7.9%
Corson	7.9%	Jones	7.9%	Sully	7.9%
Custer	7.9%	Kingsbury	0.8%	Todd	7.9%
Davison	0.8%	Lake	0.8%	Tripp	7.9%
Day	1.3%	Lawrence	7.9%	Turner	0.8%
Deuel	1.3%	Lincoln	0.8%	Union	1.2%
Dewey	7.9%	Lyman	7.9%	Walworth	7.9%
Douglas	0.8%	McCook	0.8%	Yankton	1.2%
Edmunds	1.3%	McPherson	1.3%	Ziebach	7.9%

Goals for female participation in each trade

Statewide 6.9%

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this

second area, the contractor also is subject to the goals for both its federally involved and nonfederally involved construction.

The Contractor's compliance with the Executive Order and the regulations in 41 CFR part 60–4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60–4.3(a), and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR part 60–4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of $10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the subcontractor; employer identification number of the subcontractor; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the subcontract is to be performed.

4. As used in this Notice, and in the contract resulting from this solicitation, the “covered area” is shown by county designation on the Title Sheet of the plans.

Standard Federal Equal Employment Opportunity Construction Contract Specifications (Executive Order 11246)

1. As used in these specifications:

a. “Covered area” means the geographical area described in the solicitation from which this contract resulted;

b. “Director” means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;

c. “Employer identification number” means the Federal Social Security number used on the Employer’s Quarterly Federal Tax Return, U.S. Treasury Department Form 941.

d. “Minority” includes:

(i) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);

(ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);

(iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and

(iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of $10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the Contractor is participating (pursuant to 41 CFR 60–4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7 a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered Construction contractors performing construction work in geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall

document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.

D. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.

f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with onsite supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR part 60–3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these Specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the

Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, sexual orientation, gender identity, or national origin.

11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60–4.8.

14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION FOR
REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS
FHWA 1273 (OCTOBER 23, 2023)

OCTOBER 18, 2023

The following are amendments to the above contract provisions.

Section I.4.

Delete this section and replace with the following:

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 Federal-aid construction project unless it is labor performed by convicts who are on parole, supervised release, or probation.

Section IV.

Delete the first three sentences of the first paragraph and replace with the following:

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 and to all portions of Transportation Alternatives Program (TAP) funded projects.

Section IV.3.b.(1)

Delete this section and replace with the following:

The Contractor and each related subcontractor must submit weekly, for each week in which any contract work is performed, an electronic certified weekly payroll report. The Contractor is responsible for the submission of certified payroll reports by all subcontractors. The payroll report must be submitted electronically to the Elation System website. The Contractor must submit a legally valid electronic signature. The Elation System website can be accessed by logging onto the State of South Dakota's single sign-on website at https://mysd.sd.gov/ or can also be accessed at https://elationsys.com/. First time users will need to use the Promotion Code SDDOT-19. The payroll report must be submitted within fourteen (14) calendar days after the end of the workweek.

Section IV.3.b.(2)

Delete the third sentence.

Section IV.3.b.(3)

Delete the first paragraph and replace with the following:

Each certified weekly payroll report must include the most recent South Dakota Department of Transportation (SDDOT) Statement of Compliance Form, signed by the Contractor or related subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract. The Instructions for the SDDOT Statement of Compliance Form are found at https://dot.sd.gov/doing-business/contractors/labor-compliance/certified-payrolls-let-after-6/5/19. The SDDOT will not accept any payroll report which does not include the most recent SDDOT Statement of Compliance Form. The SDDOT Statement of Compliance Form must certify the following:

Section IV.3.b.(4)

Delete this paragraph and replace with the following:

The weekly submission of a properly executed SDDOT Statement of Compliance Form shall satisfy the requirement for submission of the "Statement of Compliance Form" required by paragraph 3.b.(3) of this section.

Section IV.4.a.(1)

Delete the first sentence and replace with the following:

Apprentices will be permitted to work at less than the predetermined rate for the work they perform, but not less than the Common Laborer wage rate contained in the bid documents, when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship (OA), or with a State Apprenticeship Agency recognized by the OA.

* * * * *

REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under title 23, United States Code, as required in 23 CFR 633.102(b) (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services). 23 CFR 633.102(e).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider. 23 CFR 633.102(e).

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services) in accordance with 23 CFR 633.102. The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in solicitation-for-bids or request-for-proposals documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract). 23 CFR 633.102(b).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract. 23 CFR 633.102(d).

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. 23 U.S.C. 114(b). The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors. 23 U.S.C. 101(a).

II. NONDISCRIMINATION (23 CFR 230.107(a); 23 CFR Part 230, Subpart A, Appendix A; EO 11246)

The provisions of this section related to 23 CFR Part 230, Subpart A, Appendix A are applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR Part 60, 29 CFR Parts 1625-1627, 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), and related regulations including 49 CFR Parts 21, 26, and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding $10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR Part 60, and 29 CFR Parts 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), and Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), and related regulations including 49 CFR Parts 21, 26, and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR Part 230, Subpart A, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. Equal Employment Opportunity: Equal Employment Opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (*see* 28 CFR Part 35, 29 CFR Part 1630, 29 CFR Parts 1625-1627, 41 CFR Part 60 and 49 CFR Part 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140, shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR Part 35 and 29 CFR Part 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract. 23 CFR 230.409 (g)(4) & (5).

b. The contractor will accept as its operating policy the following statement:

> "It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, sexual orientation, gender identity, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action or are substantially involved in such action, will be made fully cognizant of and will implement the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer or other knowledgeable company official.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to ensure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action

within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs (i.e., apprenticeship and on-the-job training programs for the geographical area of contract performance). In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. 23 CFR 230.409. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants / Employees with Disabilities: The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established thereunder. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors, suppliers, and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurances Required:

a. The requirements of 49 CFR Part 26 and the State DOT's FHWA-approved Disadvantaged Business Enterprise (DBE) program are incorporated by reference.

b. The contractor, subrecipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate, which may include, but is not limited to:
(1) Withholding monthly progress payments;
(2) Assessing sanctions;
(3) Liquidated damages; and/or
(4) Disqualifying the contractor from future bidding as non-responsible.

c. The Title VI and nondiscrimination provisions of U.S. DOT Order 1050.2A at Appendixes A and E are incorporated by reference. 49 CFR Part 21.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women.

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of more than $10,000. 41 CFR 60-1.5.

As prescribed by 41 CFR 60-1.8, the contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, sexual orientation, gender identity, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location under the contractor's control where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding $2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size), in accordance with 29 CFR 5.5. The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. 23 U.S.C. 113. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. 23 U.S.C. 101. Where applicable law requires that projects be treated as a project on a Federal-aid highway, the provisions of this subpart will apply regardless of the location of the project. Examples include: Surface Transportation Block Grant Program projects funded under 23 U.S.C. 133 [excluding recreational trails projects], the Nationally Significant Freight and Highway Projects funded under 23 U.S.C. 117, and National Highway Freight Program projects funded under 23 U.S.C. 167.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 “Contract provisions and related matters” with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. Minimum wages (29 CFR 5.5)

a. *Wage rates and fringe benefits.* All laborers and mechanics employed or working upon the site of the work (or otherwise working in construction or development of the project under a development statute), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of basic hourly wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. As provided in paragraphs (d) and (e) of 29 CFR 5.5, the appropriate wage determinations are effective by operation of law even if they have not been attached to the contract. Contributions made or costs reasonably anticipated for bona fide fringe benefits under the Davis-Bacon Act (40 U.S.C. 3141(2)(B)) on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.e. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics must be paid the appropriate wage rate and fringe benefits on the wage determination for the classification(s) of work actually performed, without regard to skill, except as provided in paragraph 4. of this section. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided,* That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classifications and wage rates conformed under paragraph 1.c. of this section) and the Davis-Bacon poster (WH–1321) must be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b. *Frequently recurring classifications.* (1) In addition to wage and fringe benefit rates that have been determined to be prevailing under the procedures set forth in 29 CFR part 1, a wage determination may contain, pursuant to § 1.3(f), wage and fringe benefit rates for classifications of laborers and mechanics for which conformance requests are regularly submitted pursuant to paragraph 1.c. of this section, provided that:

(i) The work performed by the classification is not performed by a classification in the wage determination for which a prevailing wage rate has been determined;

(ii) The classification is used in the area by the construction industry; and

(iii) The wage rate for the classification bears a reasonable relationship to the prevailing wage rates contained in the wage determination.

(2) The Administrator will establish wage rates for such classifications in accordance with paragraph 1.c.(1)(iii) of this section. Work performed in such a classification must be paid at no less than the wage and fringe benefit rate listed on the wage determination for such classification.

c. *Conformance.* (1) The contracting officer must require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract be classified in conformance with the wage determination. Conformance of an additional classification and wage rate and fringe benefits is appropriate only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is used in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) The conformance process may not be used to split, subdivide, or otherwise avoid application of classifications listed in the wage determination.

(3) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken will be sent by the contracting officer by email to *DBAconformance@dol.gov*. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30–day period that additional time is necessary.

(4) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer will, by email to *DBAconformance@dol.gov*, refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30–day period that additional time is necessary.

(5) The contracting officer must promptly notify the contractor of the action taken by the Wage and Hour Division under paragraphs 1.c.(3) and (4) of this section. The contractor must furnish a written copy of such determination to each affected worker or it must be posted as a part of the wage determination. The wage rate (including fringe benefits where appropriate) determined pursuant to paragraph 1.c.(3) or (4) of this section must be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

d. *Fringe benefits not expressed as an hourly rate.* Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor may either pay the benefit as stated in the wage determination or may pay another bona fide fringe benefit or an hourly cash equivalent thereof.

e. *Unfunded plans.* If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided,* That the Secretary of Labor has found, upon the written request of the contractor, in accordance with the criteria set forth in § 5.28, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

f. *Interest.* In the event of a failure to pay all or part of the wages required by the contract, the contractor will be required to pay interest on any underpayment of wages.

2. Withholding (29 CFR 5.5)

a. *Withholding requirements.* The contracting agency may, upon its own action, or must, upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to satisfy the liabilities of the prime contractor or any subcontractor for the full amount of wages and monetary relief, including interest, required by the clauses set forth in this section for violations of this contract, or to satisfy any such liabilities required by any other Federal contract, or federally assisted contract subject to Davis-Bacon labor standards, that is held by the same prime contractor (as defined in § 5.2). The necessary funds may be withheld from the contractor under this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract that is subject to Davis-Bacon labor standards requirements and is held by the same prime contractor, regardless of whether the other contract was awarded or assisted by the same agency, and such funds may be used to satisfy the contractor liability for which the funds were withheld. In the event of a contractor's failure to pay any laborer or mechanic, including any apprentice or helper working on the site of the work all or part of the wages required by the contract, or upon the contractor's failure to submit the required records as discussed in paragraph 3.d. of this section, the contracting agency may on its own initiative and after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

b. *Priority to withheld funds.* The Department has priority to funds withheld or to be withheld in accordance with paragraph

2.a. of this section or Section V, paragraph 3.a., or both, over claims to those funds by:

(1) A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;

(2) A contracting agency for its reprocurement costs;

(3) A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;

(4) A contractor's assignee(s);

(5) A contractor's successor(s); or

(6) A claim asserted under the Prompt Payment Act, 31 U.S.C. 3901–3907.

3. Records and certified payrolls (29 CFR 5.5)

a. *Basic record requirements* (1) *Length of record retention.* All regular payrolls and other basic records must be maintained by the contractor and any subcontractor during the course of the work and preserved for all laborers and mechanics working at the site of the work (or otherwise working in construction or development of the project under a development statute) for a period of at least 3 years after all the work on the prime contract is completed.

(2) *Information required.* Such records must contain the name; Social Security number; last known address, telephone number, and email address of each such worker; each worker's correct classification(s) of work actually performed; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in 40 U.S.C. 3141(2)(B) of the Davis-Bacon Act); daily and weekly number of hours actually worked in total and on each covered contract; deductions made; and actual wages paid.

(3) *Additional records relating to fringe benefits.* Whenever the Secretary of Labor has found under paragraph 1.e. of this section that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in 40 U.S.C. 3141(2)(B) of the Davis-Bacon Act, the contractor must maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits.

(4) *Additional records relating to apprenticeship.* Contractors with apprentices working under approved programs must maintain written evidence of the registration of apprenticeship programs, the registration of the apprentices, and the ratios and wage rates prescribed in the applicable programs.

b. *Certified payroll requirements* (1) *Frequency and method of submission.* The contractor or subcontractor must submit weekly, for each week in which any DBA- or Related Acts-covered work is performed, certified payrolls to the contracting agency. The prime contractor is responsible for the submission of all certified payrolls by all subcontractors. A contracting agency or prime contractor may permit or require contractors to submit certified payrolls through an electronic system, as long as the electronic system requires a legally valid electronic signature; the system allows the contractor, the contracting agency, and the Department of Labor to access the certified payrolls upon request for at least 3 years after the work on the prime contract has been completed; and the contracting agency or prime contractor permits other methods of submission in situations where the contractor is unable or limited in its ability to use or access the electronic system.

(2) *Information required.* The certified payrolls submitted must set out accurately and completely all of the information required to be maintained under paragraph 3.a.(2) of this section, except that full Social Security numbers and last known addresses, telephone numbers, and email addresses must not be included on weekly transmittals. Instead, the certified payrolls need only include an individually identifying number for each worker (*e.g.,* the last four digits of the worker's Social Security number). The required weekly certified payroll information may be submitted using Optional Form WH–347 or in any other format desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division website at *https://www.dol.gov/sites/dolgov/files/WHD/legacy/files/wh347/.pdf* or its successor website. It is not a violation of this section for a prime contractor to require a subcontractor to provide full Social Security numbers and last known addresses, telephone numbers, and email addresses to the prime contractor for its own records, without weekly submission by the subcontractor to the contracting agency.

(3) *Statement of Compliance.* Each certified payroll submitted must be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor, or the contractor's or subcontractor's agent who pays or supervises the payment of the persons working on the contract, and must certify the following:

(i) That the certified payroll for the payroll period contains the information required to be provided under paragraph 3.b. of this section, the appropriate information and basic records are being maintained under paragraph 3.a. of this section, and such information and records are correct and complete;

(ii) That each laborer or mechanic (including each helper and apprentice) working on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR part 3; and

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification(s) of work actually performed, as specified in the applicable wage determination incorporated into the contract.

(4) *Use of Optional Form WH–347.* The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH–347 will satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(3) of this section.

(5) *Signature.* The signature by the contractor, subcontractor, or the contractor's or subcontractor's agent must be an original handwritten signature or a legally valid electronic signature.

(6) *Falsification.* The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under 18 U.S.C. 1001 and 31 U.S.C. 3729.

(7) *Length of certified payroll retention.* The contractor or subcontractor must preserve all certified payrolls during the course of the work and for a period of 3 years after all the work on the prime contract is completed.

c. *Contracts, subcontracts, and related documents.* The contractor or subcontractor must maintain this contract or subcontract and related documents including, without limitation, bids, proposals, amendments, modifications, and extensions. The contractor or subcontractor must preserve these contracts, subcontracts, and related documents during the course of the work and for a period of 3 years after all the work on the prime contract is completed.

d. *Required disclosures and access* (1) *Required record disclosures and access to workers.* The contractor or subcontractor must make the records required under paragraphs 3.a. through 3.c. of this section, and any other documents that the contracting agency, the State DOT, the FHWA, or the Department of Labor deems necessary to determine compliance with the labor standards provisions of any of the applicable statutes referenced by § 5.1, available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and must permit such representatives to interview workers during working hours on the job.

(2) *Sanctions for non-compliance with records and worker access requirements.* If the contractor or subcontractor fails to submit the required records or to make them available, or refuses to permit worker interviews during working hours on the job, the Federal agency may, after written notice to the contractor, sponsor, applicant, owner, or other entity, as the case may be, that maintains such records or that employs such workers, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available, or to permit worker interviews during working hours on the job, may be grounds for debarment action pursuant to § 5.12. In addition, any contractor or other person that fails to submit the required records or make those records available to WHD within the time WHD requests that the records be produced will be precluded from introducing as evidence in an administrative proceeding under 29 CFR part 6 any of the required records that were not provided or made available to WHD. WHD will take into consideration a reasonable request from the contractor or person for an extension of the time for submission of records. WHD will determine the reasonableness of the request and may consider, among other things, the location of the records and the volume of production.

(3) *Required information disclosures.* Contractors and subcontractors must maintain the full Social Security number and last known address, telephone number, and email address of each covered worker, and must provide them upon request to the contracting agency, the State DOT, the FHWA, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or other compliance action.

4. Apprentices and equal employment opportunity (29 CFR 5.5)

a. *Apprentices* (1) *Rate of pay.* Apprentices will be permitted to work at less than the predetermined rate for the work they perform when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship (OA), or with a State Apprenticeship Agency recognized by the OA. A person who is not individually registered in the program, but who has been certified by the OA or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice, will be permitted to work at less than the predetermined rate for the work they perform in the first 90 days of probationary employment as an apprentice in such a program. In the event the OA or a State Apprenticeship Agency recognized by the OA withdraws approval of an apprenticeship program, the contractor will no longer be permitted to use apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(2) *Fringe benefits.* Apprentices must be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringe benefits must be paid in accordance with that determination.

(3) *Apprenticeship ratio.* The allowable ratio of apprentices to journeyworkers on the job site in any craft classification must not be greater than the ratio permitted to the contractor as to the entire work force under the registered program or the ratio applicable to the locality of the project pursuant to paragraph 4.a.(4) of this section. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated in paragraph 4.a.(1) of this section, must be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under this section must be paid not less than the applicable wage rate on the wage determination for the work actually performed.

(4) *Reciprocity of ratios and wage rates.* Where a contractor is performing construction on a project in a locality other than the locality in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyworker's hourly rate) applicable within the locality in which the construction is being performed must be observed. If there is no applicable ratio or wage rate for the locality of the project, the ratio and wage rate specified in the contractor's registered program must be observed.

b. *Equal employment opportunity.* The use of apprentices and journeyworkers under this part must be in conformity with

the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

c. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. 23 CFR 230.111(e)(2). The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeyworkers shall not be greater than permitted by the terms of the particular program.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract as provided in 29 CFR 5.5.

6. Subcontracts. The contractor or subcontractor must insert FHWA-1273 in any subcontracts, along with the applicable wage determination(s) and such other clauses or contract modifications as the contracting agency may by appropriate instructions require, and a clause requiring the subcontractors to include these clauses and wage determination(s) in any lower tier subcontracts. The prime contractor is responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this section. In the event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower-tier subcontractors, and may be subject to debarment, as appropriate. 29 CFR 5.5.

7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract as provided in 29 CFR 5.5.

9. Disputes concerning labor standards. As provided in 29 CFR 5.5, disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility. a. By entering into this contract, the contractor certifies that neither it nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of 40 U.S.C. 3144(b) or § 5.12(a).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of 40 U.S.C. 3144(b) or § 5.12(a).

c. The penalty for making false statements is prescribed in the U.S. Code, Title 18 Crimes and Criminal Procedure, 18 U.S.C. 1001.

11. Anti-retaliation. It is unlawful for any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, or to cause any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, any worker or job applicant for:

a. Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the DBA, Related Acts, this part, or 29 CFR part 1 or 3;

b. Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under the DBA, Related Acts, this part, or 29 CFR part 1 or 3;

c. Cooperating in any investigation or other compliance action, or testifying in any proceeding under the DBA, Related Acts, this part, or 29 CFR part 1 or 3; or

d. Informing any other person about their rights under the DBA, Related Acts, this part, or 29 CFR part 1 or 3.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

Pursuant to 29 CFR 5.5(b), the following clauses apply to any Federal-aid construction contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchpersons and guards.

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek. 29 CFR 5.5.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph 1. of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages and interest from the date of the underpayment. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or

mechanic, including watchpersons and guards, employed in violation of the clause set forth in paragraph 1. of this section, in the sum currently provided in 29 CFR 5.5(b)(2)* for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph 1. of this section.

* $31 as of January 15, 2023 (See 88 FR 88 FR 2210) as may be adjusted annually by the Department of Labor, pursuant to the Federal Civil Penalties Inflation Adjustment Act of 1990.

3. Withholding for unpaid wages and liquidated damages

a. *Withholding process.* The FHWA or the contracting agency may, upon its own action, or must, upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to satisfy the liabilities of the prime contractor or any subcontractor for any unpaid wages; monetary relief, including interest; and liquidated damages required by the clauses set forth in this section on this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract subject to the Contract Work Hours and Safety Standards Act that is held by the same prime contractor (as defined in § 5.2). The necessary funds may be withheld from the contractor under this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract that is subject to the Contract Work Hours and Safety Standards Act and is held by the same prime contractor, regardless of whether the other contract was awarded or assisted by the same agency, and such funds may be used to satisfy the contractor liability for which the funds were withheld.

b. *Priority to withheld funds.* The Department has priority to funds withheld or to be withheld in accordance with Section IV paragraph 2.a. or paragraph 3.a. of this section, or both, over claims to those funds by:

(1) A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;

(2) A contracting agency for its reprocurement costs;

(3) A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;

(4) A contractor's assignee(s);

(5) A contractor's successor(s); or

(6) A claim asserted under the Prompt Payment Act, 31 U.S.C. 3901–3907.

4. Subcontracts. The contractor or subcontractor must insert in any subcontracts the clauses set forth in paragraphs 1. through 5. of this section and a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor is responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs 1. through 5. In the event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower-tier subcontractors, and associated liquidated damages and may be subject to debarment, as appropriate.

5. Anti-retaliation. It is unlawful for any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, or to cause any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, any worker or job applicant for:

a. Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the Contract Work Hours and Safety Standards Act (CWHSSA) or its implementing regulations in this part;

b. Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under CWHSSA or this part;

c. Cooperating in any investigation or other compliance action, or testifying in any proceeding under CWHSSA or this part; or

d. Informing any other person about their rights under CWHSSA or this part.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System pursuant to 23 CFR 635.116.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term “perform work with its own organization” in paragraph 1 of Section VI refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions: (based on longstanding interpretation)

(1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
(2) the prime contractor remains responsible for the quality of the work of the leased employees;

(3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and

(4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract. 23 CFR 635.102.

2. Pursuant to 23 CFR 635.116(a), the contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. Pursuant to 23 CFR 635.116(c), the contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract. (based on long-standing interpretation of 23 CFR 635.116).

5. The 30-percent self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements. 23 CFR 635.116(d).

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR Part 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract. 23 CFR 635.108.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR Part 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704). 29 CFR 1926.10.

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR Part 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 11, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT (42 U.S.C. 7606; 2 CFR 200.88; EO 11738)

This provision is applicable to all Federal-aid construction contracts in excess of $150,000 and to all related subcontracts. 48 CFR 2.101; 2 CFR 200.327.

By submission of this bid/proposal or the execution of this contract or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, subcontractor, supplier, or vendor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251-1387). Violations must be reported to the Federal Highway Administration and the Regional Office of the Environmental Protection Agency. 2 CFR Part 200, Appendix II.

The contractor agrees to include or cause to be included the requirements of this Section in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements. 2 CFR 200.327.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost $25,000 or more – as defined in 2 CFR Parts 180 and 1200. 2 CFR 180.220 and 1200.220.

1**. Instructions for Certification – First Tier Participants:**

a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction. 2 CFR 180.320.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default. 2 CFR 180.325.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances. 2 CFR 180.345 and 180.350.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180, Subpart I, 180.900-180.1020, and 1200. “First Tier Covered Transactions” refers to any covered transaction between a recipient or subrecipient of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a recipient or subrecipient of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction. 2 CFR 180.330.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold. 2 CFR 180.220 and 180.300.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. 2 CFR 180.300; 180.320, and 180.325. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. 2 CFR 180.335. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the System for Award Management website (https://www.sam.gov/). 2 CFR 180.300, 180.320, and 180.325.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default. 2 CFR 180.325.

* * * * *

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency, 2 CFR 180.335;.

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property, 2 CFR 180.800;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification, 2 CFR 180.700 and 180.800; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default. 2 CFR 180.335(d).

(5) Are not a corporation that has been convicted of a felony violation under any Federal law within the two-year period preceding this proposal (USDOT Order 4200.6 implementing appropriations act requirements); and

(6) Are not a corporation with any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability (USDOT Order 4200.6 implementing appropriations act requirements).

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant should attach an explanation to this proposal. 2 CFR 180.335 and 180.340.

* * * * *

3. **Instructions for Certification - Lower Tier Participants:**

(Applicable to all subcontracts, purchase orders, and other lower tier transactions requiring prior FHWA approval or estimated to cost $25,000 or more - 2 CFR Parts 180 and 1200). 2 CFR 180.220 and 1200.220.

a. By signing and submitting this proposal, the prospective lower tier participant is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances. 2 CFR 180.365.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180, Subpart I, 180.900 – 180.1020, and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. “First Tier Covered Transactions” refers to any covered transaction between a recipient or subrecipient of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a recipient or subrecipient of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated. 2 CFR 1200.220 and 1200.332.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold. 2 CFR 180.220 and 1200.220.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the System for Award Management website (https://www.sam.gov/), which is compiled by the General Services Administration. 2 CFR 180.300, 180.320, 180.330, and 180.335.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily

excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment. 2 CFR 180.325.

* * * * *

4. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

a. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals:

(1) is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency, 2 CFR 180.355;

(2) is a corporation that has been convicted of a felony violation under any Federal law within the two-year period preceding this proposal (USDOT Order 4200.6 implementing appropriations act requirements); and

(3) is a corporation with any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability. (USDOT Order 4200.6 implementing appropriations act requirements)

b. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant should attach an explanation to this proposal.

* * * * *

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed $100,000. 49 CFR Part 20, App. A.

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such recipients shall certify and disclose accordingly.

XII. USE OF UNITED STATES-FLAG VESSELS:

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, or any other covered transaction. 46 CFR Part 381.

This requirement applies to material or equipment that is acquired for a specific Federal-aid highway project. 46 CFR 381.7. It is not applicable to goods or materials that come into inventories independent of an FHWA funded-contract.

When oceanic shipments (or shipments across the Great Lakes) are necessary for materials or equipment acquired for a specific Federal-aid construction project, the bidder, proposer, contractor, subcontractor, or vendor agrees:

1. To utilize privately owned United States-flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to this contract, to the extent such vessels are available at fair and reasonable rates for United States-flag commercial vessels. 46 CFR 381.7.

2. To furnish within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, ‘on-board’ commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph (b)(1) of this section to both the Contracting Officer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Office of Cargo and Commercial Sealift (MAR-620), Maritime Administration, Washington, DC 20590. (MARAD requires copies of the ocean carrier's (master) bills of lading, certified onboard, dated, with rates and charges. These bills of lading may contain business sensitive information and therefore may be submitted directly to MARAD by the Ocean Transportation Intermediary on behalf of the contractor). 46 CFR 381.7.

ATTACHMENT A - EMPLOYMENT AND MATERIALS PREFERENCE FOR APPALACHIAN DEVELOPMENT HIGHWAY SYSTEM OR APPALACHIAN LOCAL ACCESS ROAD CONTRACTS (23 CFR 633, Subpart B, Appendix B)
This provision is applicable to all Federal-aid projects funded under the Appalachian Regional Development Act of 1965.

1. During the performance of this contract, the contractor undertaking to do work which is, or reasonably may be, done as on-site work, shall give preference to qualified persons who regularly reside in the labor area as designated by the DOL wherein the contract work is situated, or the subregion, or the Appalachian counties of the State wherein the contract work is situated, except:

a. To the extent that qualified persons regularly residing in the area are not available.

b. For the reasonable needs of the contractor to employ supervisory or specially experienced personnel necessary to assure an efficient execution of the contract work.

c. For the obligation of the contractor to offer employment to present or former employees as the result of a lawful collective bargaining contract, provided that the number of nonresident persons employed under this subparagraph (1c) shall not exceed 20 percent of the total number of employees employed by the contractor on the contract work, except as provided in subparagraph (4) below.

2. The contractor shall place a job order with the State Employment Service indicating (a) the classifications of the laborers, mechanics and other employees required to perform the contract work, (b) the number of employees required in each classification, (c) the date on which the participant estimates such employees will be required, and (d) any other pertinent information required by the State Employment Service to complete the job order form. The job order may be placed with the State Employment Service in writing or by telephone. If during the course of the contract work, the information submitted by the contractor in the original job order is substantially modified, the participant shall promptly notify the State Employment Service.

3. The contractor shall give full consideration to all qualified job applicants referred to him by the State Employment Service. The contractor is not required to grant employment to any job applicants who, in his opinion, are not qualified to perform the classification of work required.

4. If, within one week following the placing of a job order by the contractor with the State Employment Service, the State Employment Service is unable to refer any qualified job applicants to the contractor, or less than the number requested, the State Employment Service will forward a certificate to the contractor indicating the unavailability of applicants. Such certificate shall be made a part of the contractor's permanent project records. Upon receipt of this certificate, the contractor may employ persons who do not normally reside in the labor area to fill positions covered by the certificate, notwithstanding the provisions of subparagraph (1c) above.

5. The provisions of 23 CFR 633.207(e) allow the contracting agency to provide a contractual preference for the use of mineral resource materials native to the Appalachian region.

6. The contractor shall include the provisions of Sections 1 through 4 of this Attachment A in every subcontract for work which is, or reasonably may be, done as on-site work.

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION REGARDING
MINIMUM WAGE ON FEDERAL-AID PROJECTS

OCTOBER 24, 2019

This proposal contains a copy of the most recent United States Department of Labor (USDOL) Davis-Bacon Act Wage Decision.

The Contractor and each related subcontractor will pay their respective employees not less than the USDOL minimum wage for each work classification an employee actually performs at the site of the work.

The Contractor and each related subcontractor must submit weekly, for each week in which any contract work is performed, an electronic certified weekly payroll report. The payroll report must be submitted electronically to the Elation System website. The Elation System website can be accessed by logging onto the State of South Dakota's single sign-on website at https://mysd.sd.gov/ or can also be accessed at https://elationsys.com/. First time users will need to use the Promotion Code SDDOT-19. The payroll report must be submitted within fourteen (14) calendar days after the end of the workweek. The payroll reports submitted shall set out accurately and completely all the information required to be maintained under 29 C.F.R. 5.5(a)(3)(i). Weekly transmittals must include an individually identifying number for each employee, such as the last four digits of the employee's social security number, but these weekly transmittals must not include full social security numbers or home addresses. The Contractor is responsible for the submission of certified payroll reports by all subcontractors.

Each certified weekly payroll report must include the most recent South Dakota Department of Transportation (SDDOT) Statement of Compliance Form, signed by the Contractor or related subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract. The Instructions for the SDDOT Statement of Compliance Form are found at https://dot.sd.gov/doing-business/contractors/labor-compliance/certified-payrolls-let-after-6/5/19. The SDDOT will not accept any payroll report which does not include the most recent SDDOT Statement of Compliance Form.

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Wage and Hour Division
U.S. Department of Labor (DOL)
200 Constitution Avenue, N.W.
Washington, DC 20210

Davis-Bacon Act Wage Decisions
State: South Dakota
Construction Types: Heavy and Highway
Counties: South Dakota Statewide

Agency:	U.S. DOL
Wage Decision Number:	**SD20230032 SD1**
Counties:	SD Statewide
Wage Decision Date:	**03/10/2023 (Mod-0)**

***SUSD2023-001 01-11-2023**

	Rates	Fringes
LABORERS		
GROUP GL1		
Air Tool Operator; Common Laborer; Landscape Worker; Flagger; Pilot Car Driver; Trucks under 26,000 GVW; Blue-top Checker; Materials Checker	**22.38**	**0.00**
GROUP GL2		
Mechanic Tender (Helper); Pipe Layer (except culvert); Form Builder Tender; Special Surface Finish Applicator; Striping	**23.16**	**0.00**
GROUP GL3		
Asphalt Plant Tender; Pile Driver Leadsman; Form Setter; Oiler/Greaser	**24.41**	**0.00**
GROUP GL5		
Carpenter; Form Builder	**31.94**	**0.00**
GROUP GL6		
Concrete Finisher; Painter; Grade Checker	**26.45**	**0.00**
POWER EQUIPMENT OPERATORS		
GROUP G01		
Concrete Paving Cure Machine; Concrete Paving Joint Sealer; Conveyor; Tractor (farm type with attachments); Self Propelled Broom; Concrete Routing Machine; Paver Feeder; Pugmill; Skid Steer	**24.57**	**0.00**
GROUP G02		
Bull Dozer 80 HP or less; Front End Loader 1.25 CY or less; Self Propelled Roller (except Hot Mix); Sheepsfoot/50Ton Pneumatic Roller; Pneumatic Tired Tractor or Crawler (includes Water Wagon and Power Spray units); Wagon Drill; Air Trac; Truck Type Auger; Concrete Paving Saw	**24.68**	**0.00**
GROUP G03		
Asphalt Distributor; Bull Dozer over 80 HP; Concrete Paving Finishing Machine; Backhoes/ Excavators 20 tons or less; Crusher (may include internal screening plant); Front End Loader over 1.25 CY; Rough Motor Grader; Self Propelled Hot Mix Roller; Push Tractor; Euclid or Dumpster; Material Spreader; Rumble Strip Machine	**26.07**	**0.00**
GROUP G04		
Asphalt Paving Machine Screed; Asphalt Paving Machine; Cranes/Derricks/Draglines/Pile Drivers/Shovels 30 to 50 tons; Backhoes/Excavators 21 to 40 tons; Maintenance Mechanic; Scrapers; Concrete Pump Truck	**27.18**	**0.00**
GROUP G05		
Asphalt Plant; Concrete Batch Plant; Backhoes/Excavators over 40 Tons; Cranes/ Derricks/Draglines/Pile Drivers/Shovels over 50 tons; Heavy Duty Mechanic; Finish Motor Grader; Automatic Fine Grader; Milling Machine; Bridge Welder	**30.01**	**0.00**
TRUCK DRIVERS		
GROUP GT1		
Tandem Truck without trailer or pup; Single Axle Truck over 26,000 GVW with Trailer	**24.52**	**0.00**
GROUP GT2		
Semi-Tractor and Trailer; Tandem Truck with Pup	**25.88**	**4.28**
ELECTRICIANS		
GROUP E01		
Electrician	**29.78**	**5.04**

WELDERS – Receive rate prescribed for craft performing operation to which welding is incidental.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award, pursuant to 29 CFR 5.5(a)(1)(ii); contractors are responsible for requesting SDDOT to secure necessary additional work classifications and rates.

***** Classifications listed under an "SU" identifier were derived from survey data and the published rate is the weighted average rate of all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates.

Survey wage rates are not updated and will remain in effect until a new survey is conducted.

A COPY OF THIS DOCUMENT, COLORED TAN, MUST BE CONSPICUOUSLY POSTED AT THE PROJECT SITE

Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Davis-Bacon Act Wage Decisions
State: South Dakota
Construction Types: Heavy and Highway
Counties: South Dakota Statewide

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In the listing above, the "SU" identifier indicates the rates were derived from survey data. As these weighted average rates include all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of the survey on which these classifications and rates are based. The next number, 007 in this example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

For SDDOT Defined Work Classifications, please visit: https://dot.sd.gov/doing-business/contractors/labor-compliance

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WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- an existing published wage determination
- a survey underlying a wage determination
- a Wage and Hour Division letter setting forth a position on a wage determination matter
- a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
REGARDING
STORM WATER DISCHARGES
TO WATERS OF THE STATE

MAY 8, 2018

In compliance with the provisions of the South Dakota Water Pollution Control Act and the Administrative Rules of South Dakota (ARSD), Article 74:52, the State of South Dakota has been issued Permit No. SDR10#### "GENERAL PERMIT FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITIES". This permit authorizes the discharge of storm water in accordance with the conditions and requirements set forth in the permit.

The Contractor, by signing the CONTRACTOR AUTHORIZATION FORM and submitting a bid or proposal, certifies the following:

> "I certify under penalty of law that I understand and will comply with the terms and conditions of the Surface Water Discharge General Permit for Storm Water Discharges Associated with Construction Activities for the project identified above."

A copy of the full version of the General Permit for Storm Water Discharges Associated with Construction Activities, dated 04/01/2018, must be posted on the job site. The General Permit for Storm Water Discharges Associated with Construction Activities is available for downloading and printing from the SD DENR website:

https://danr.sd.gov/OfficeOfWater/SurfaceWaterQuality/stormwater/StormWaterConstruction.aspx

The Contractor may also obtain a printed copy of the permit from the SDDOT Project Development office or from the SDDOT Area Office assigned to this project.

* * * * *