DEPARTMENT OF TRANSPORTATION

Planning & Engineering
Office of Project Development
700 East Broadway Avenue
Pierre, South Dakota 57501-2586
O: 605.773.3275
dot.sd.gov

September 11, 2026

To Whom it May Concern,

Beginning with the 10/7/2026 letting, the SDDOT will be using the new Electronic Standard Specifications for Roads and Bridges, 10-7-26 Version. The Standard Specifications for Roads and Bridges is available for download and viewing at https://dot.sd.gov/doing-business/contractors/standard-specifications . A printed version of the Standard Specifications for Roads and Bridges will not be provided.

A revised Buy America specification is in effect beginning with the 10/7/26 letting, which aligns with the expiration of the Federal Manufactured Products General Waiver. Contractors should be aware that new provisions for manufactured products, along with updates to material classifications, documentation requirements, and compliance procedures, are included in Section 6.9 of the Standard Specifications (10/07/2026 version). All contractors and suppliers are strongly encouraged to review the updated specification in full. Contractors are encouraged to attend the Buy America Informational Webinar being put on by the SDDOT and AGC. Information on the webinar can be found at:
https://dot.sd.gov/doing-business/contractors/webinars/

FHWA has updated the FHWA-1273 commonly known as the “Pink Sheets”. The new FHWA-1273 will be incorporated into all contracts awarded after 10/7/26. Additional information regarding the updated FHWA-1273 can be found at:
https://www.fhwa.dot.gov/construction/cqit/form1273.cfm

Sincerely,
SDDOT – Bid Letting Office

DEPARTMENT OF TRANSPORTATION

DEPARTMENT OF TRANSPORTATION

NOTICE TO CONTRACTORS,

PROPOSAL, SPECIAL PROVISIONS,

CONTRACT AND CONTRACT BOND

FOR

GRADING, PCC SURFACING, STRUCTURES (5-10X5 CIP, 12X10 CIP, 4-10X5 CIP, 2-12X5 CIP, 12X5 PRECAST, 5-10X5 CIP), CURB & GUTTER, STORM SEWER, SIGNALS, LIGHTING

FEDERAL PROJECT NO. **NH-EM-TA 0100(107)411, P 1432(00), P 1440(00)**
(PCN 01VA, 08DK, 08DJ)

SOUTH VETERANS PARKWAY

IN LINCOLN, MINNEHAHA COUNTIES

October 21, 2026

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.

*** * * ***

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.

*** * * ***

Project Number: NH-EM-TA 0100(107)411, P 1432(00), P 1440(00)
Revised 10/8/25

PCN 01VA, 08DK, 08DJ

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 21, 2026, 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):

SUBSTANTIAL COMPLETION: **NOVEMBER 17, 2028**

FIELD WORK COMPLETION: **JULY 13, 2029**

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

THE DBE GOAL FOR THIS PROJECT IS: **N/A**

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

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

The South Dakota Standard Specifications for Roads and Bridges, 10-7-26 Version, 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 9/1/26

INDEX OF SPECIAL PROVISIONS

PROJECT NUMBER(S): NH-EM-TA 0100(107)411, P 1432(00), P 1440(00)PCN: 01VA, 08DK, 08DJ

TYPE OF WORK: GRADING, PCC SURFACING, STRUCTURES (5-10X5 CIP, 12X10 CIP, 4-10X5 CIP, 2-12X5 CIP, 12X5 PRECAST, 5-10X5 CIP), CURB & GUTTER, STORM SEWER, SIGNALS, LIGHTING

COUNTIES: LINCOLN, MINNEHAHA

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, Minnehaha Counties.

THE FOLLOWING ITEMS ARE INCLUDED IN THIS PROPOSAL FORM:

Special Provision for Contract Time, dated 9/15/26.

Special Provision Regarding Combination Bids, dated 9/15/26.

Special Provision for Traffic Control Supervisor, dated 9/8/26.

Department of the Army Permit.

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

Special Provision for Contractor Staking with Machine Control Grading Option, dated 9/8/26.

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

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

Special Provision for Optical Activated Emergency Vehicle Preemption System, dated 9/11/26.

Special Provision for ATC Traffic Signal Controller Cabinet.

Special Provision for Traffic Signal Heads (LED Modules).

List of Utilities.

Special Provision Regarding Lewis and Clark Crossing Requirements, dated 8/6/25.

Special Provision for Acknowledgment and Certification Regarding Article 3, Section 12 of the South Dakota Constitution, dated 8/24/23.
Fuel Adjustment Affidavit, DOT form 208 dated 11/25.
Standard Title VI Assurance, dated 3/1/16
Special Provision for Equal Employment Opportunity Requirements for Highway Construction Contracts, dated 10/7/26.
Special Provision for Contract Provisions for Federal-Aid Construction Contracts, Form FHWA 1273 (Rev. June 25, 2026), dated 10/7/26.
Contract Provisions for Federal-Aid Construction Contracts, Form FHWA 1273 (Rev. 6/25/26).
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 SD20260001, dated 1/30/26.
Special Provision Regarding Stormwater Discharges to Waters of the State, dated 11/5/25.
General Permit Authorizing Stormwater Discharges Associated with Construction Activities, dated 11/1/23.
https://danr.sd.gov/OfficeOfWater/SurfaceWaterQuality/stormwater/StormWaterConstruction.aspx

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
CONTRACT TIME

PROJECT NH-TA 0100(107)411, P 1440(00), P 1432(00)
PCN 01VA, 08DJ, 08DK

LINCOLN & MINNEHAHA COUNTY

SEPTEMBER 15, 2026

April 5, 2027 Work Restriction

The Contractor will not begin work that affects traffic on the project prior to April 5, 2027, unless approved by the Engineer.

Harmodon Park Access

The Contractor will not close the Harmodon Park Road prior to August 23, 2027. If work requiring the closure of Harmodon Park Road continues in 2028, the Contractor will not close the Harmodon Park Road prior to August 28, 2028. (See Section A plans Environmental Commitment M1 and Section C plans.)

2027 Work Requirements and Restrictions

The Contractor will complete Veterans Parkway, 69th Street (west of SD11), and realigned SD11 (outside the limits of existing SD11) roadway embankment in place with storm sewer and ditch sections shaped for drainage by the November 19, 2027 interim completion requirement.

If the Contractor does not complete the work by the interim completion requirement, the Department will make a disincentive assessment in the amount of $1000 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.

57th St west of Veteran's Parkway

The Contractor will complete all 57th Street traffic lanes west of Veterans Parkway and open the lanes to traffic by the November 19, 2027 interim completion requirement. The Contractor may close 57th Street for a maximum of 60 calendar days. The Department will begin counting days once the Contractor begins any work affecting traffic. The Department will continue to count calendar days until the Contractor completes the work and the Contractor opens all lanes and traffic can move unimpeded on 57th St. The Department will count calendar days in accordance with Section 8.7 C.

If the Contractor does not complete the work within the calendar day completion requirement, the Department will make a disincentive assessment amounting to $8,000 per calendar day. A contract item for incentive/disincentive pay is included in the bid schedule for the Department's use in assessing disincentives. The Department will use a negative quantity of days for assessing disincentives.

The Contractor will not begin Veteran's Parkway, 69th Street, or SD11 curb and gutter or permanent roadway surfacing on the project in 2027 except in sections with centerline fill heights less than 5 feet.

2028 Work Requirements and Restrictions

SD11

SD11 must remain open to traffic until Veterans Parkway lanes and median landscaping are complete and open to traffic. The Contractor may close SD11 for a maximum of 60 calendar days.

The Department will begin counting days once the Contractor closes SD11 to through traffic. The Department will continue to count calendar days until the Contractor completes the work required to open one lane of traffic in each direction and the Contractor opens one lane of traffic in each direction on SD11. The Department will count calendar days in accordance with Section 8.7 C.

If the Contractor does not complete the work within the calendar day completion requirement, the Department will make a disincentive assessment amounting to $10,000 per calendar day. A contract item for incentive/disincentive pay is included in the bid schedule for the Department's use in assessing disincentives. The Department will use a negative quantity of days for assessing disincentives.

November 17, 2028 Substantial Completion Requirements

The Contractor will substantially complete the project by the November 17, 2028 substantial completion date.

The Department will consider the work substantially complete when all lanes on Veteran's Parkway, SD11, 69th Street, and 57th Street are opened to unimpeded traffic, and all work is completed except the following:

> Shared use path, permanent pavement markings, sidewalks, topsoil, seeding, mulching, and permanent erosion control measures.

The Engineer will determine when the project is substantially complete.

Following the substantial completion of the project, the Department will allow single lane closures for the completion of the remaining items of work (including, but not limited to, shared use path, permanent pavement markings, sidewalks, topsoil, seeding, mulching, and permanent erosion control measures). The Department will allow single lane closures only when the Contractor is actively performing work.

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

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

July 13, 2029 Field Work Completion Requirements

The Contractor will complete the project by the July 13, 2029 field work completion date.

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 REGARDING
COMBINATION BIDS

NH-EM-TA 0100(107)411, P 1432(00), P 1440(00), PCN 01VA, 08DK, 08DJ GRADING, PCC SURFACING, STRUCTURES (5-10X5 CIP, 12X10 CIP, 4-10X5 CIP, 2-12X5 CIP, 12X5 PRECAST, 5-10X5 CIP), CURB & GUTTER, STORM SEWER, SIGNALS, LIGHTING
LINCOLN, MINNEHAHA COUNTY

SEPTEMBER 15, 2026

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

CIP 11120( ), PCN X06Y
SOUTH VETERANS PKWY
WATERMAIN AND SANITARY SEWER
LINCOLN COUNTY

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

Work on PCN (X06Y) 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 NH-TA 0100(107)411, P 1432(00), P 1440(00)
PCN 01VA, 08DK, 08DJ
LINCOLN & MINNEHAHA COUNTY

SEPTEMBER 8, 2026

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.

* * * * *

DEPARTMENT OF THE ARMY PERMIT

Permittee: South Dakota Department of Transportation — Jacob Cadwell

Permit No.: NWO-2021-00187-PIE (Phase IV)

Issuing Office **Corps of Engineers, Omaha District, Pierre SD Regulatory Office**

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.

Project Description:

The Permittee is authorized to construct the final segment of South Veterans Parkway which totals 2.059 miles (PCN 01VA between Sycamore Avenue and 57th Street) in addition to improving two intersecting arterials connecting to South Veterans Parkway: 69th Street (PCN 08DJ) which also connects to SD Highway 11 totaling 1.276 miles of roadway and the 57th Street intersection (PCN 08DK). South Veterans Parkway is an 8.5-mile limited access regional arterial roadway running from 1-29 (Exit 73) to just North of 57th Street. Phase IV of the project will convert 7.35 acres of waters of the United States to dry ground. The project will also temporarily impact 4.23 acres of waters of the United States. The work will be completed in accordance with the plans and drawings, attached hereto, which are incorporated in and made part of this permit.

Project Location:

The project center point is located at Latitude 43.4883°, Longitude -96.6544°; and occurs within Sections 36, Township 101 North, Range 49 West, Section 31, Township 101 North, 48 West, and Sections 8, 9, 16, 17, Township 100 North, Range 49 West, Lincoln and Minnehaha County, South Dakota, in wetlands adjacent to and tributaries of the Big Sioux River.

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on ___ August 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:

See page 4 of 4 for a list of special conditions.

Further Information:

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

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

( ) 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 project.

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 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 to 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: 2025.09.22 13:23:59 -05'00'

(JACOB CADWELL - SDDOT) *(DATE)*

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

2025/09/24

ROBERT J. NEWBAUER
Colonel, Corps of Engineers
District Commander

(DATE)

By:
NATHAN.M. MOREY, REGULATORY SECTION
CHEIF, SOUTH DAKOTA

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.

(TRANSFEREE) *(DATE)*

Special Conditions

a. After a detailed and careful review of all the conditions contained in this permit, the permittee acknowledges that, although said conditions were required by the Corps of Engineers, nonetheless the permittee agreed to those conditions voluntarily to facilitate issuance of the permit; the permittee will comply fully with all the terms of all the permit conditions.

b. The project must be built as shown on the construction plans and cross sections received by this office on 28 April 2025, and as described in the Application and all supporting documents submitted to this office. Preconstruction notification is required if there are proposed changes that affect waters of the US, including wetlands.

c. Compensatory mitigation in the amount of 40.44 released wetland credits (Functional Capacity Units – Any HGM Class) shall be purchased to offset an unavoidable loss of 7.35 acres of waters of the United States. Wetland credits must be purchased from a Corps approved compensatory mitigation site located in the Lower Big Sioux River Geographic Service Area (HUC 10170203). A receipt of the credit purchase shall be provided to the South Dakota Corps of Engineers Regulatory Office prior to initiating work associated with the authorized activity.

d. All construction debris will be disposed of on land in such a manner that it cannot enter a waterway or wetland.

e. All earthwork operations will be carried out in such a manner that sediment runoff and soil erosion to the water are controlled.

f. During construction, no petroleum products, chemicals, or other deleterious materials shall be allowed to enter or be disposed of in such a manner that they could enter the stream.

g. The clearing of vegetation will be limited to that which is necessary for construction of the project.

h. Except as approved herein, all dredged or excavated materials and material stockpiles will be placed for either temporary or permanent disposal on an upland site, above the ordinary high-water line, in a confined area, not classified as a wetland, and measures taken to ensure that the material cannot enter the watercourse through any other means.

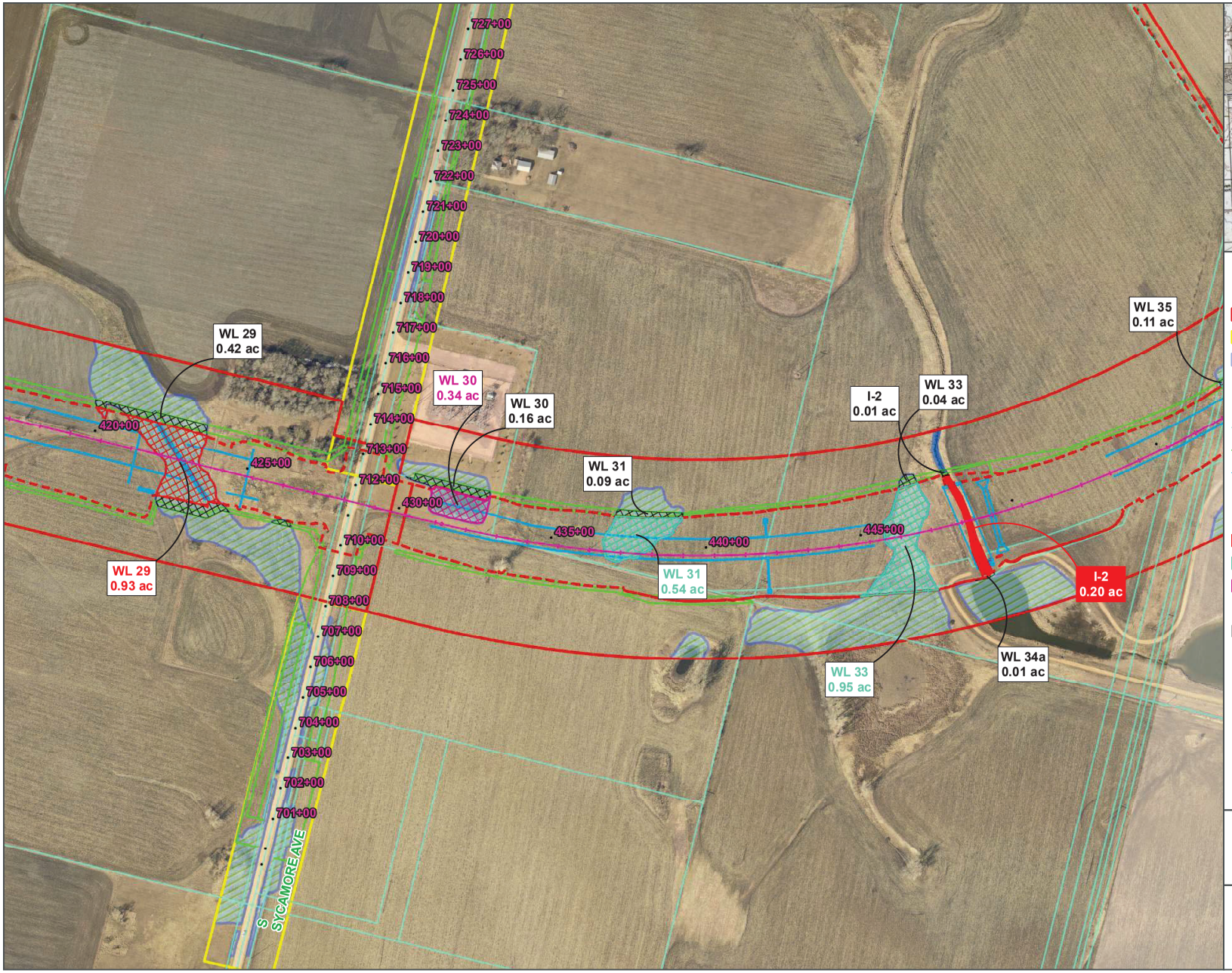
i. All fill material shall be free of substances in quantities, concentrations, or combinations which are toxic to aquatic life.

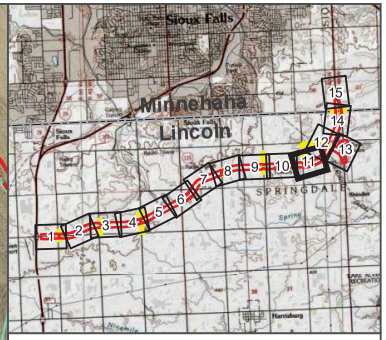
j. If/when the District Commander has been notified that the construction activity is adversely affecting fish or wildlife resources or the harvest thereof and the District Commander subsequently directs remedial measures, the permittee will comply with such directions as may be received to suspend or modify the activity to the extent necessary to mitigate or eliminate the adverse effect as required.

k. The permittee is responsible for ensuring that the contractor(s) and/or workers executing the activities authorized by this permit have full knowledge of the terms and conditions of the authorization and that a copy of the permit instrument is at the project site throughout the period work is underway.

l. Disturbed areas shall be monitored following the project construction and noxious weeds (i.e., Canada thistle, purple loosestrife, leafy spurge, and other invasive exotic species) controlled in accordance with South Dakota State law.

m. Waters of the United States impacted by temporary fills (4.21 acres of wetlands and 0.02 acres of stream) shall be restored to pre-disturbance contours, vegetation type and soil type.





Legend

- Study Area (South Veterans Parkway)
- Study Area (CIP)
- Delineated Wetlands
- Streams
- Grading_Limits
- ROW
- Easements
- Stormwater Pipes

Aquatic Resource Impacts

Impact Type (NWO-2021-00187-PIE)

- Permanent Jurisdictional
- Permanent Non-Jurisdictional (Isolated)
- Permanent Non-Jurisdictional (Preamble)
- Permanent Stream Impacts
- Temporary Impacts

WATER/WETLAND IMPACT MAP

WETLAND FINDING REPORT
SOUTH VETERANS PARKWAY

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HDR

FIGURE 1-11

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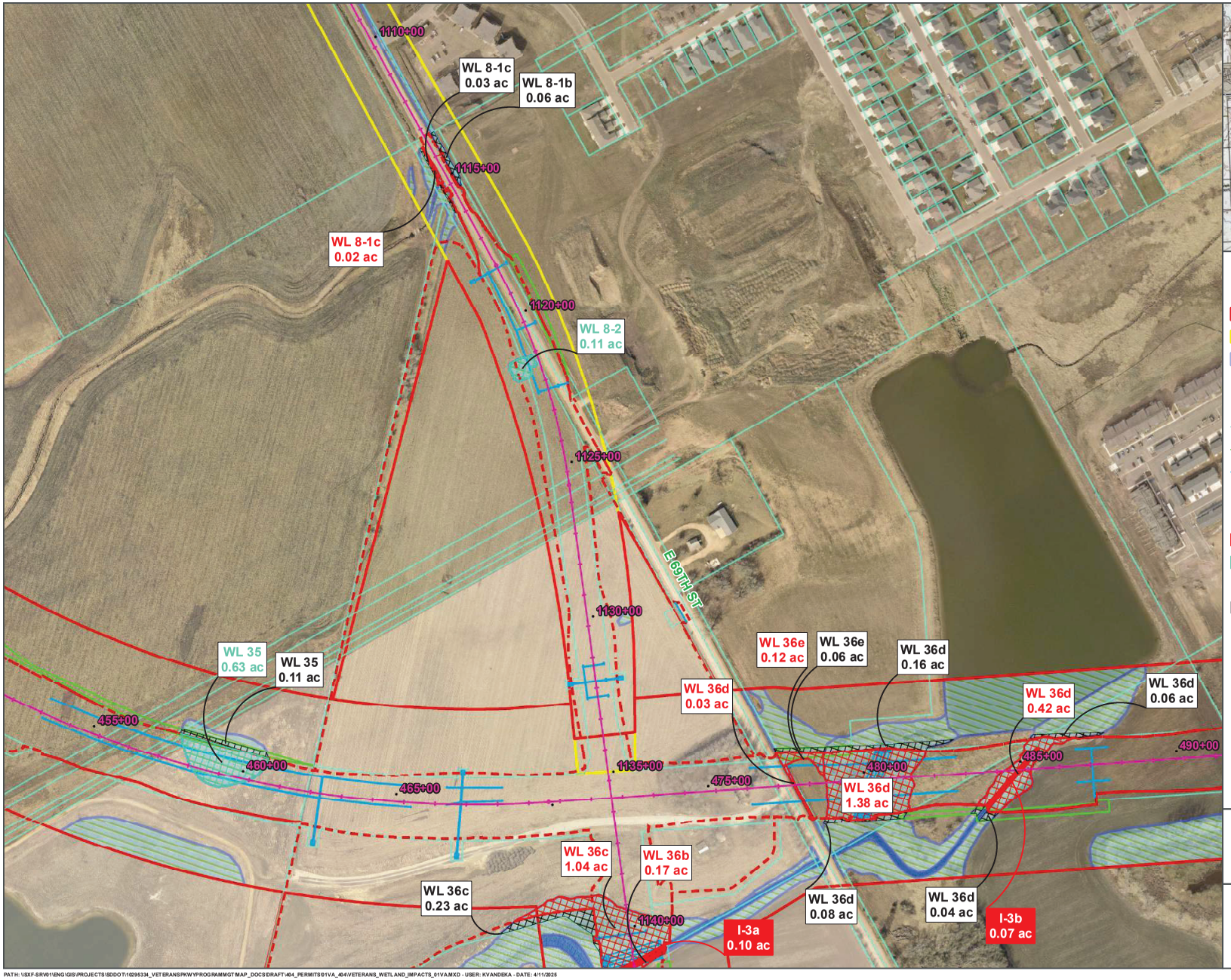

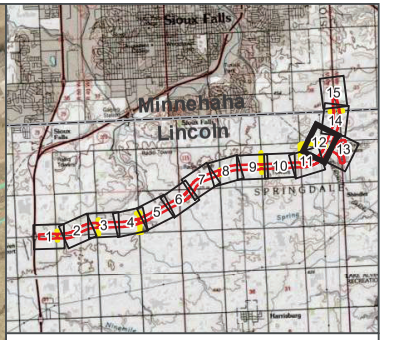

Legend

- Study Area (South Veterans Parkway)
- Study Area (CIP)
- Delineated Wetlands
- Streams
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- Stormwater Pipes

Aquatic Resource Impacts

Impact Type (NWO-2021-00187-PIE)

- Permanent Jurisdictional
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- Permanent Stream Impacts
- Temporary Impacts

WATER/WETLAND IMPACT MAP

WETLAND FINDING REPORT
SOUTH VETERANS PARKWAY

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FIGURE 1-12

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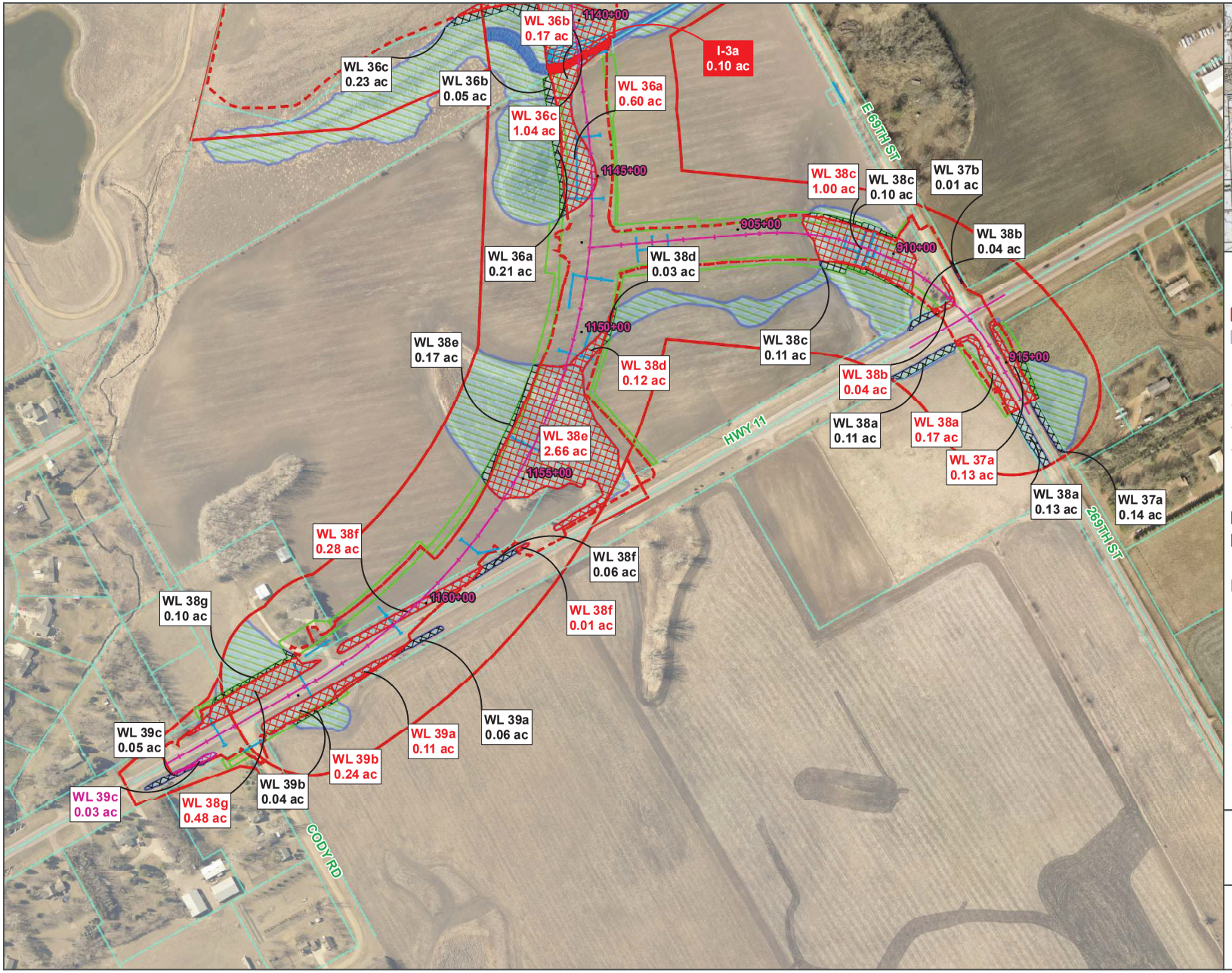

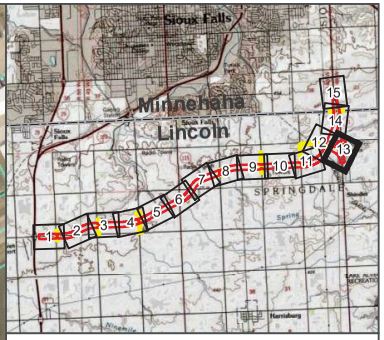

Legend

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- Delineated Wetlands
- Streams
- Grading_Limits
- ROW
- Easements
- Stormwater Pipes

Aquatic Resource Impacts

Impact Type (NWO-2021-00187-PIE)

- Permanent Jurisdictional
- Permanent Non-Jurisdictional (Preamble)
- Permanent Stream Impacts
- Temporary Impacts

WATER/WETLAND IMPACT MAP

WETLAND FINDING REPORT
SOUTH VETERANS PARKWAY

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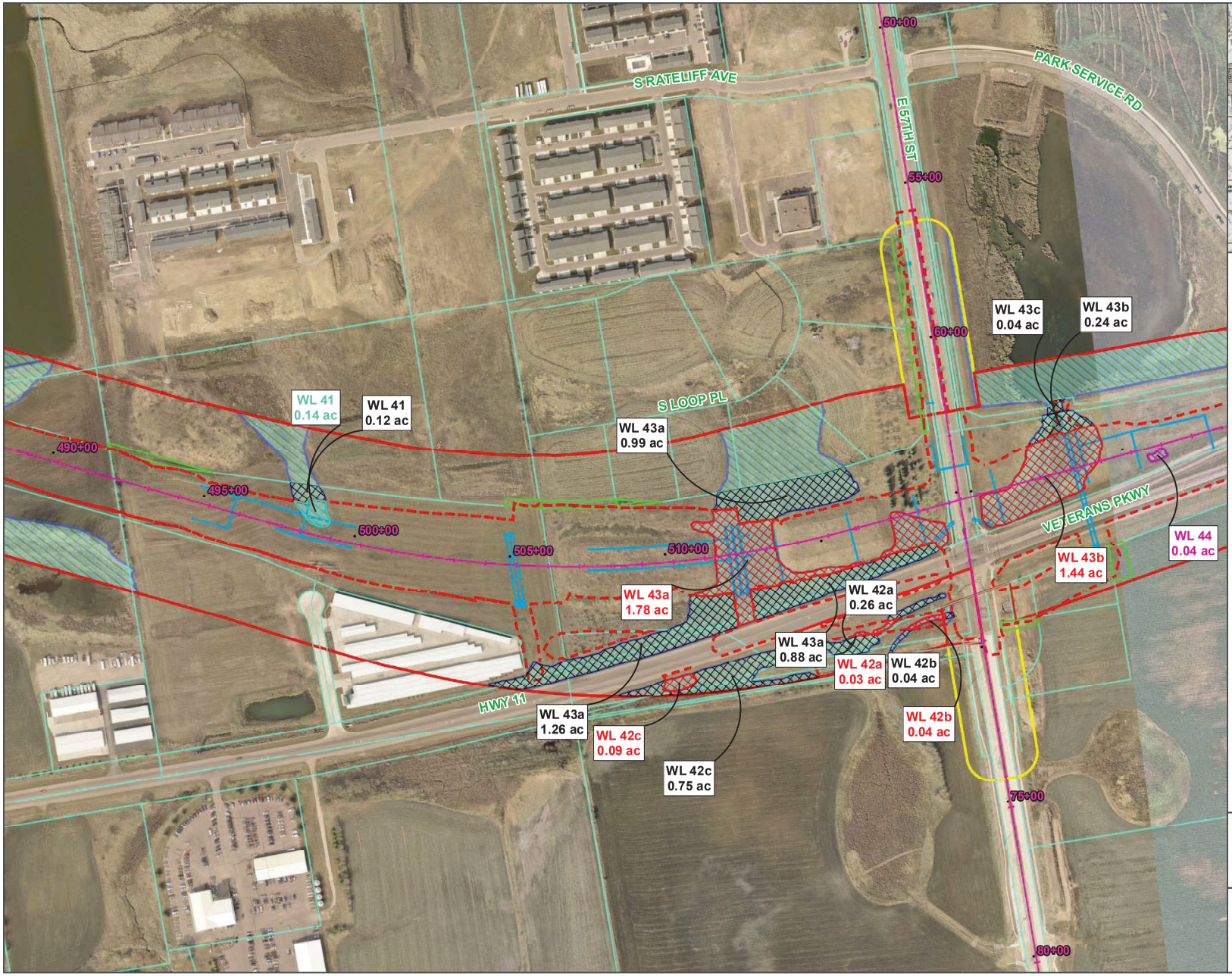
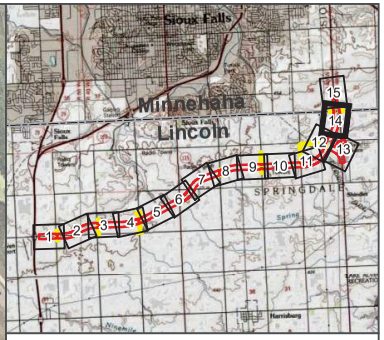
FIGURE 1-13

PATH: \\SXF-SRV01\ENG\GIS\PROJECTS\SDDOT\10295334_VETERANSPKWYPROGRAMMGT\MAP_DOCS\DRAFT\404_PERMITS\01VA_404\VETERANS_WETLAND_IMPACTS_01VA.MXD - USER: KVANDEKA - DATE: 4/11/2025





Legend

- Study Area (South Veterans Parkway)
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- Delineated Wetlands
- Grading_Limits
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Aquatic Resource Impacts

Impact Type (NWO-2021-00187-PIE)

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- Permanent Non-Jurisdictional (Isolated)
- Permanent Non-Jurisdictional (Preamble)
- Temporary Impacts

WATER/WETLAND IMPACT MAP

WETLAND FINDING REPORT
SOUTH VETERANS PARKWAY

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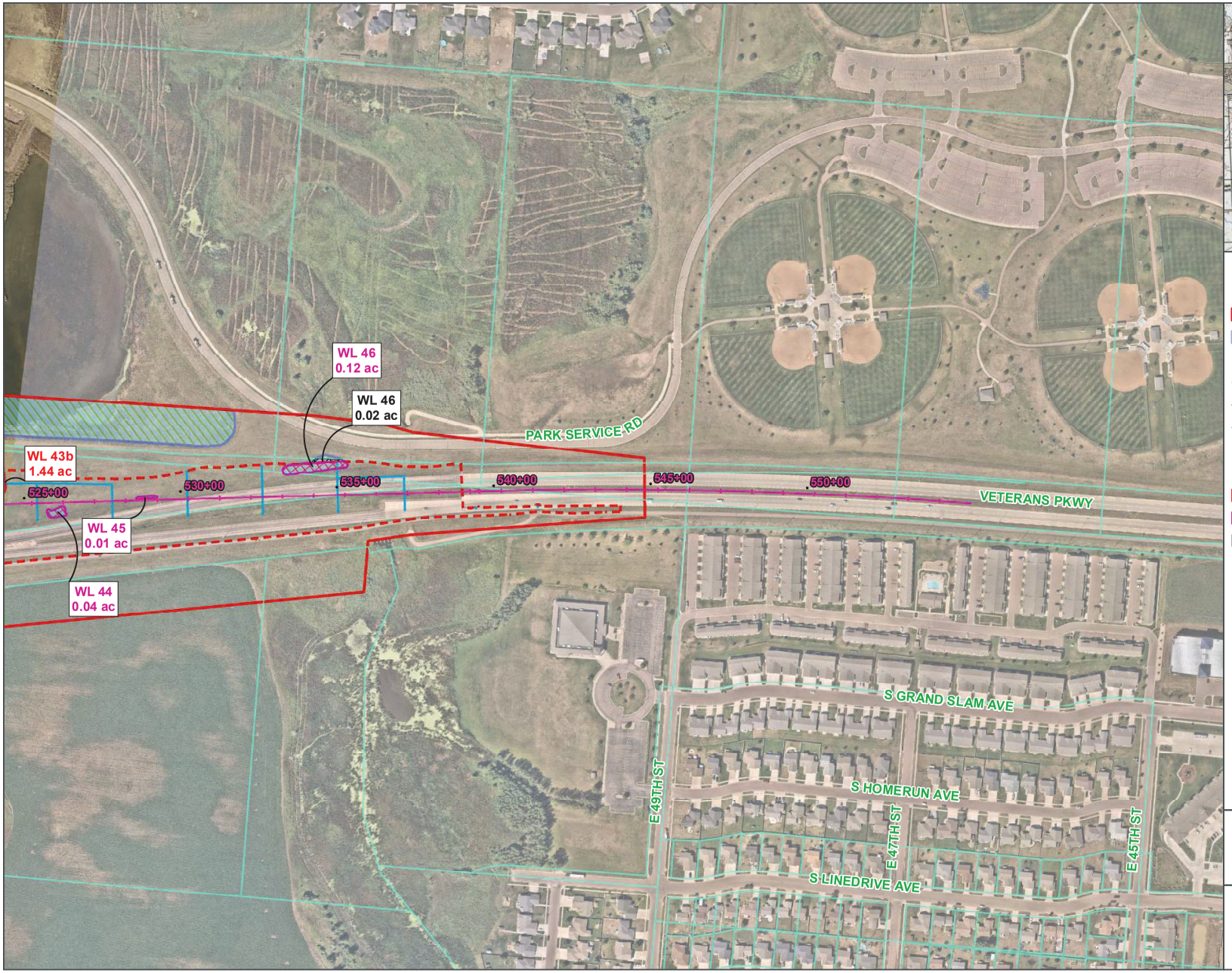
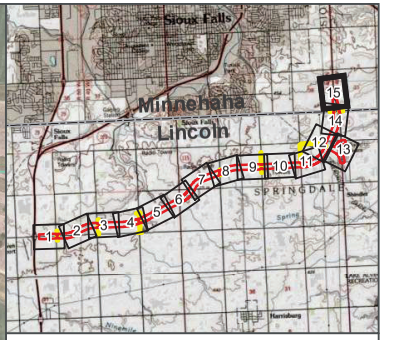
FIGURE 1-14

PATH: \\SXF-SRV01\ENG\GIS\PROJECTS\SDDOT\10295334_VETERANSPKWYPROGRAMMGT\MAP_DOCS\DRAFT\404_PERMITS\01VA_404\VETERANS_WETLAND_IMPACTS_01VA.MXD - USER: KVANDEKA - DATE: 4/11/2025





Legend

- Study Area (South Veterans Parkway)
- Delineated Wetlands
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- ROW
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- Stormwater Pipes

Aquatic Resource Impacts

Impact Type (NWO-2021-00187-PIE)

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- Temporary Impacts

WATER/WETLAND IMPACT MAP

WETLAND FINDING REPORT
SOUTH VETERANS PARKWAY

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FEET

HDR

FIGURE 1-15

PATH: \\SXF-SRV01\ENG\GIS\PROJECTS\SDDOT\10295334_VETERANSPKWYPROGRAMMGT\MAP_DOCS\DRAFT\404_PERMITS\01VA_404\VETERANS_WETLAND_IMPACTS_01VA.MXD - USER: KVANDEKA - DATE: 4/11/2025

DEPARTMENT of AGRICULTURE and NATURAL RESOURCES
JOE FOSS BUILDING
523 E CAPITOL AVE
PIERRE SD 57501-3182
danr.sd.gov

June 13, 2025

SD DOT
Jacob Cadwell
700 E Broadway Avenue
Pierre, SD 57501

RE: South Veterans Parkway – Segment 4
NWO-2021-00187-PIE 401 Water Quality Certification

Dear Mr. Cadwell:

The South Dakota Department of Agriculture and Natural Resources (SD DANR) has reviewed the application requesting 401 Water Quality Certification for the proposed South Veterans Parkway – Segment 4 and intersecting city arterials (69th Street and 57th Street). The South Dakota Department of Transportation (SD DOT) is proposing the construction of approximately 3.3 miles of roadway, primarily consisting of six 12-foot-wide lanes (three in each direction), a 32-foot-wide divided median, and a 10-foot-wide shared-use path on the road's south and east sides. The proposed work would discharge approximately 40,700 cubic yards of road fill, 211.3 cubic yards of riprap, and multiple culverts into 12.77 acres of jurisdictional Waters of the United States. The project purpose is to 1) Adequately prepare the City of Sioux Falls for the year 2026 and 2050 transportation system needs consistent with planning decisions and future construction of other public and private infrastructure investments; 2) Prevent deficiencies that will occur within the Sioux Falls transportation network by the years 2026 and 2050 if nothing is done (travel delays, service failures, worsening accessibility); and 3) Accommodate the 2026 and 2050 traffic growth needs of the study area.

Segment 4 of the South Veterans Parkway project extends from the end of North Veterans Parkway at 57th Street and the previously permitted and soon to be constructed South Veterans Parkway ending at Sycamore Ave with a center point at approximately Latitude 43.4901 and Longitude -96.6544, in Sioux Falls, South Dakota. SD DOT will purchase wetland mitigation credits from a Corps-approved mitigation bank.

This certification has met applicable public notice requirements per ARSD 74:51:01:64, 74:51:01:64.01, 74:51:01:64.02, and 74:51:01:64.03 pursuant to CWA 401(a)(1).

Section 401 of the Clean Water Act requires the department’s review of this project before the US Army Corps of Engineers grants a 404 permit. This 401 water quality certification is specific to this proposed project and is valid until the completion of the project. SD DANR is granting water quality certification with conditions. These conditions provide reasonable assurance that South Dakota water quality is protected, that the activity will be conducted in a manner that will not violate water quality standards, and the health and integrity of South Dakota waterbodies are maintained. The following conditions apply to the water quality certification:

1.) A Storm Water Construction Permit must be obtained from the South Dakota Department of Agriculture and Natural Resources. A copy of the general permit and the notice of intent (application) for coverage are available on DANR's website at: https://danr.sd.gov/OfficeOfWater/SurfaceWaterQuality/stormwater/StormWaterConstruction.aspx. Under the general permit, SD DANR requires that the project proponent prepare a Storm Water Pollution Prevention Plan for this project. The Storm Water Pollution Prevention Plan must include the required components as directed by the general permit and include construction site inspection frequency and post-construction inspection frequency to ensure erosion control is functional. This requirement is authorized under Administrative Rule of South Dakota (ARSD) 74:52:02:36 and South Dakota Codified Law (SDCL) 34A-2-36.

2.) During construction activities and until restoration is complete, stormwater construction BMPs must be installed in accordance with the Stormwater Pollution Prevention Plan. Construction activities and/or erosion may not cause downstream exceedances to water quality standards or impact other downstream uses. This condition is authorized under ARSD 74:51:01 and SDCL 34A-2-11.

3.) Excavated and dredged material from wetland areas must be hauled off site and disposed of in an upland location away from streams and wetlands. Return water from excavated or dredged material may not be allowed to re-enter waters of the state. This condition is authorized under ARSD 74:51:01:12 and SDCL 34-A-2-21.

4.) Methods shall be implemented to minimize the spillage of petroleum, oils, and lubricants used in equipment, machinery, and vehicles during construction activities. If a spill occurs during construction activity, that spill must be reported to SD DANR at (605) 773-3296 (605-773-3231 after hours). These materials may not be discharged or caused to be discharged into waters of the state per ARSD 74:51:01:06 and 74:51:01:10 and SDCL 34A-2-93.

This certification does not authorize the above referenced activity. The activity may occur only by issuance of the appropriate approvals or permits by the US Army Corps of Engineers. If you have questions pertaining to this certification, please contact Shannon Minerich at Shannon.Minerich@state.sd.us or call 605-773-4055. Thank you for ensuring the continued protection of our natural resources.

Sincerely,

Hunter Roberts
Secretary

cc: Brian Korman, USACE
Stormwater@state.sd.us
Estella Moore, Region 8 USEPA
Aaron Blair, Region 8 USEPA
r8cwa401@epa.gov
Kendall Vande Kamp, HDR

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
FOR
CONTRACTOR STAKING
WITH MACHINE CONTROL GRADING OPTION

PROJECT NH-TA 0100(107)411, P 1432(00), P 1440(00)
PCN 01VA, 08DK, 08DJ
LINCOLN & MINNEHAHA COUNTY

SEPTEMBER 8, 2026

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 Contractor may use MCG as a substitute for conventional construction staking for grade staking only but will not use MCG for slope staking and slope stake reference hubs, 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; perform measurement and volume calculations for earthwork quantities; 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 easement lines, staking clearing line, slope staking and slope stake reference hubs, 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 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, illegible, or made unusable at no additional expense to the Department.

b. Machine Control Grading: If the Contractor elects to use MCG as a substitute for conventional staking for grade staking, 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 the right-of-way line, easement line, or other locations as approved by the Engineer.

   The slope stakes will be set at 200-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. Easement line for items including, but not limited to, setting temporary fence, utility relocation, and landowner reference and property use;
   b. Clearing line for items identified by the clearing contract unit item when provided in the plans;
   c. 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;
   d. 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;
   e. Special ditch staking;
   f. 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);
   g. Right-of-way staking including fence post panels;
   h. 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;
   i. Mark limits of removal items (trees, foundations, curb & gutter, sidewalk, etc.);
   j. 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.);
   k. 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;
   l. Resetting horizontal and vertical control, if disturbed;
   m. Approach slab and sleeper slab staking;

n. Staking of sidewalks and curb ramps; and,
o. 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 both blue top and paving hub stakes are required, the Department will base and calculate the plan quantity to include each type 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 and office time dedicated to the work specific to engineer directed surveying/staking. The Department will not include travel time for the survey crew in the measurement.

   The Contractor will provide the Engineer documentation, such as an invoice, showing the actual days/hours worked.

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.

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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

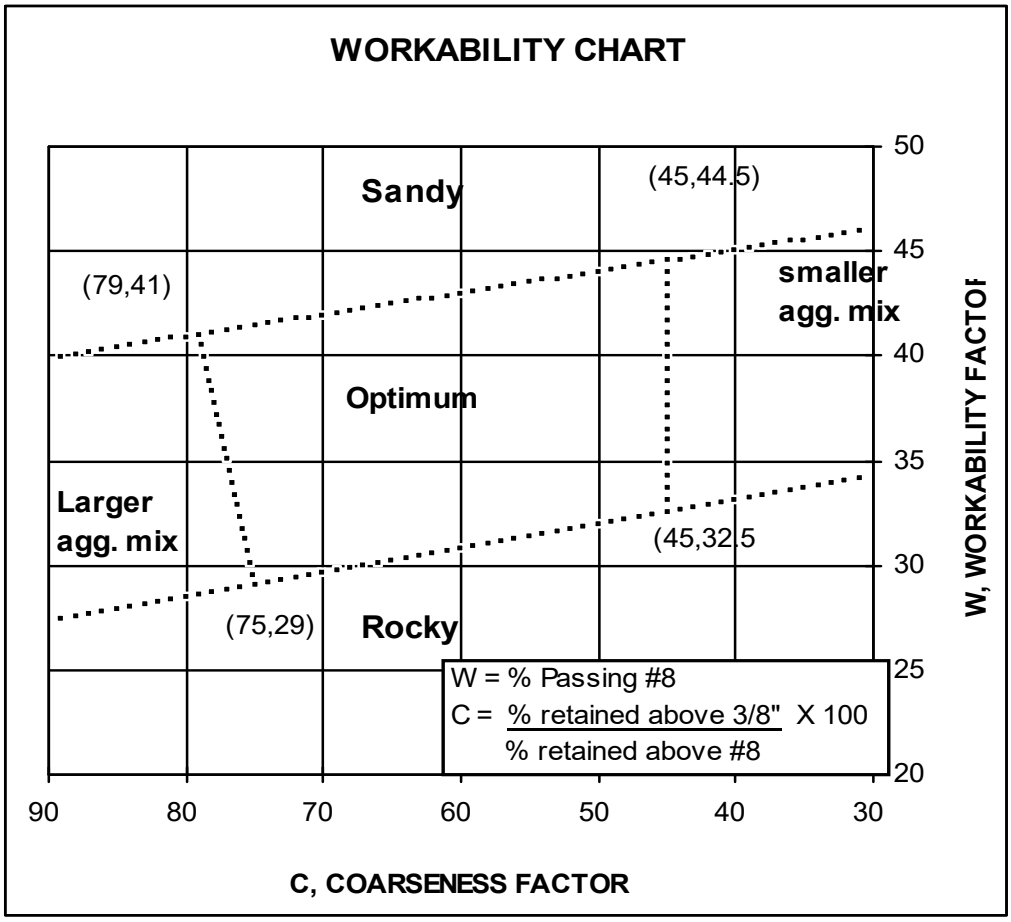


Chart B

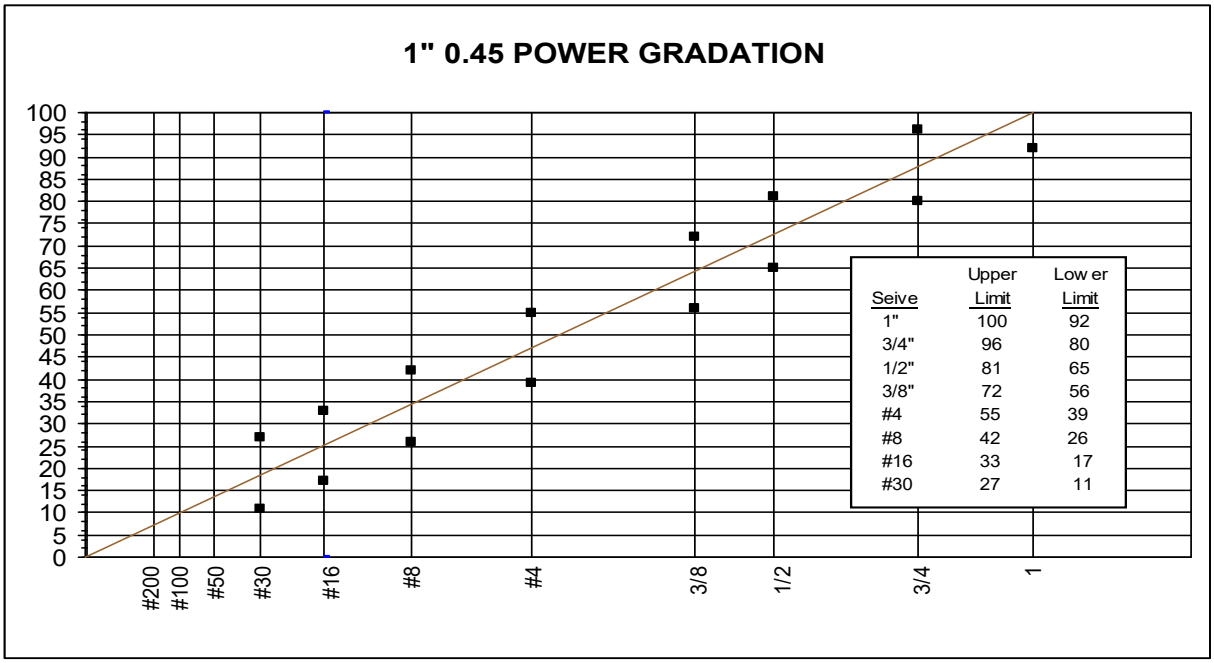
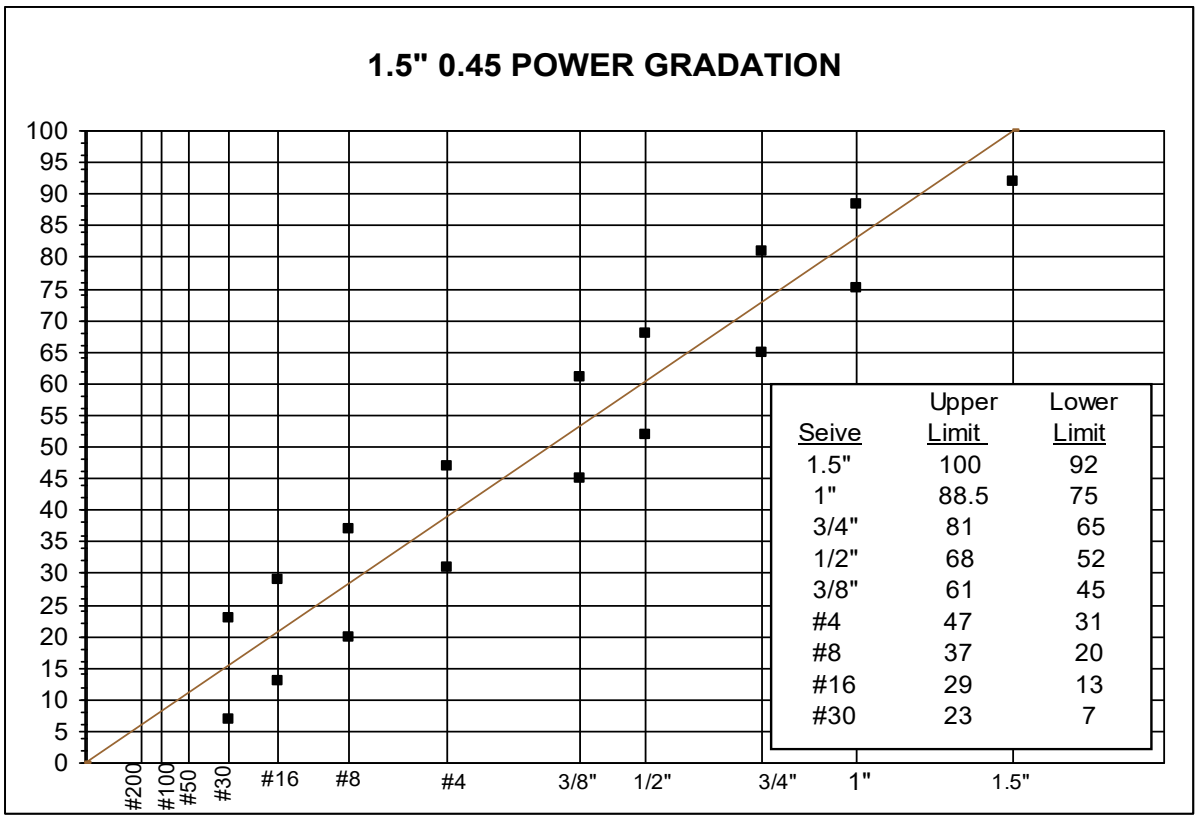


Chart C



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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
CYLINDRICAL CONCRETE FOOTINGS

PROJECT NH-TA 0100(107)411, P 1432(00), P 1440(00)
PCN 01VA, 08DK, 08DJ
LINCOLN & MINNEHAHA 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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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 Miovision 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
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 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 the module.

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 $\varnothing_{Vert}$ > -2.5 degrees:

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

For $\varnothing_{Vert}$ ≤ -2.5 degrees:

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

where: $\varnothing_{Vert}$ 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: $\varnothing_{Horiz}$ 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 C for 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 120 VAC.

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% 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.

5.4.4.2 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% duty cycle.

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.

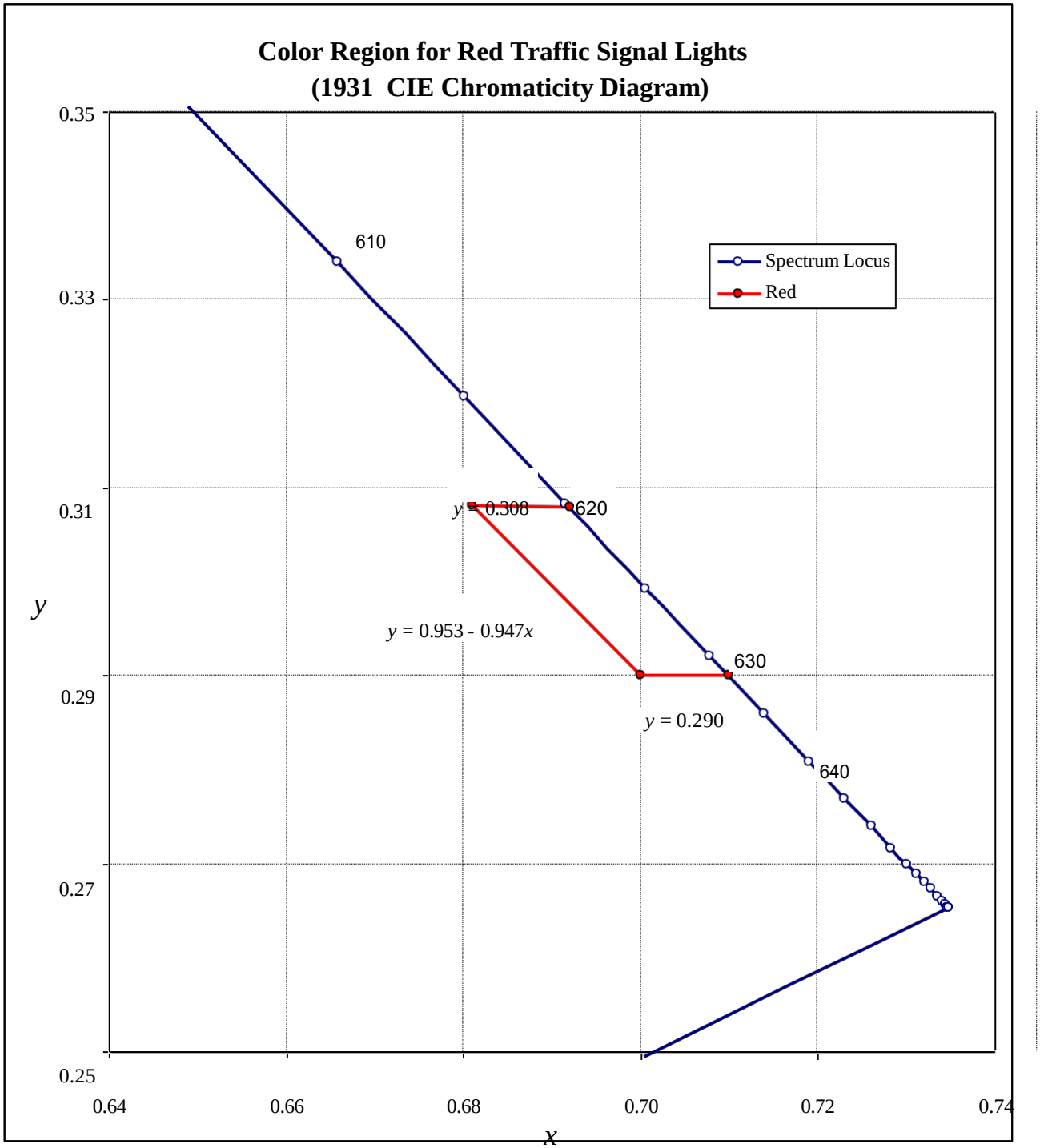


Figure 2a: Color Region for Red Traffic Control Signal Lights

Figure 2 (cont'd)

Color Regions for LED Traffic Control Signal Lights:

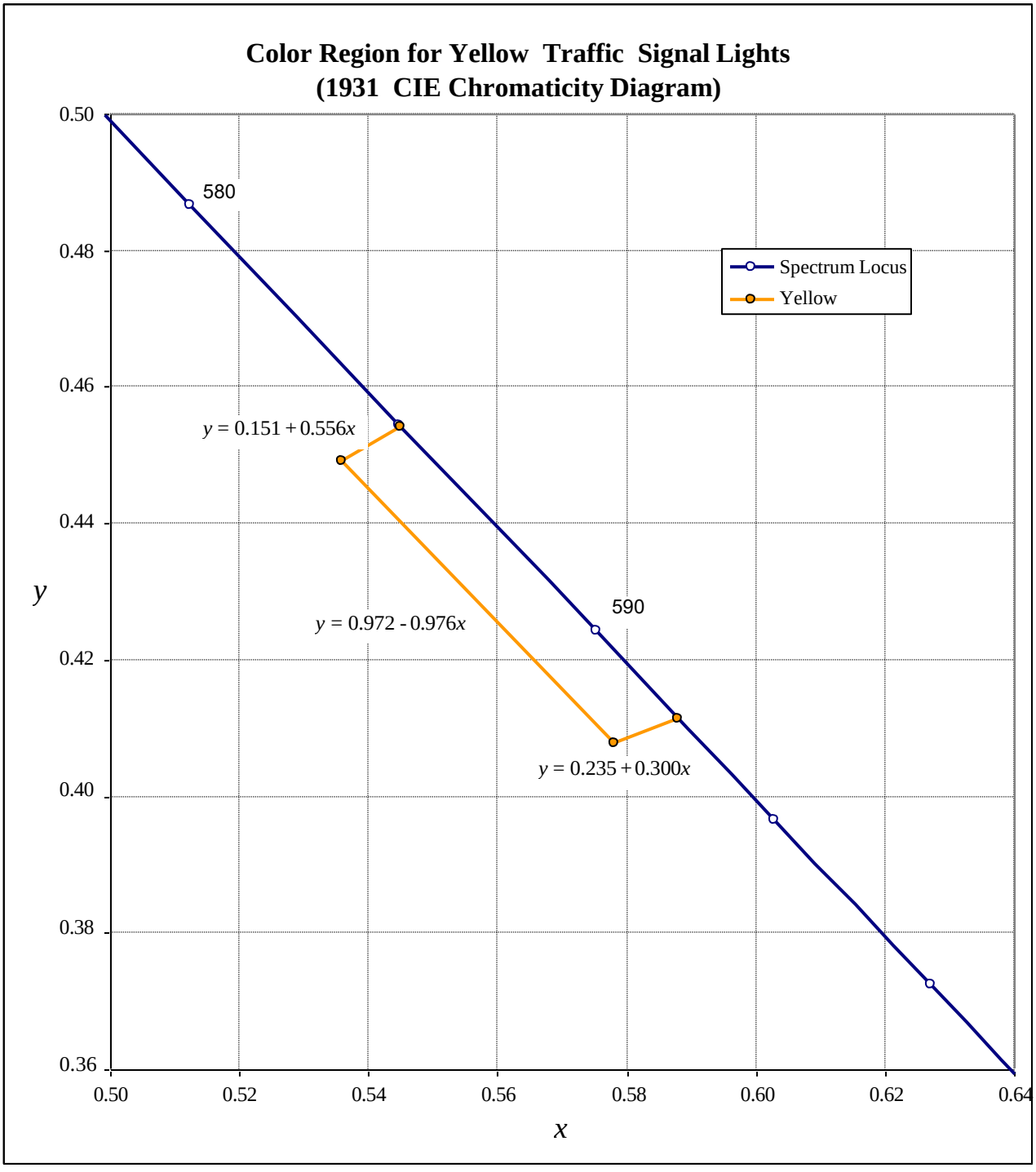


Figure -2b: Color Region for Yellow Traffic Control Signal Lights

Figure 2 (cont'd)

Color Regions for LED Traffic Control Signal Lights:

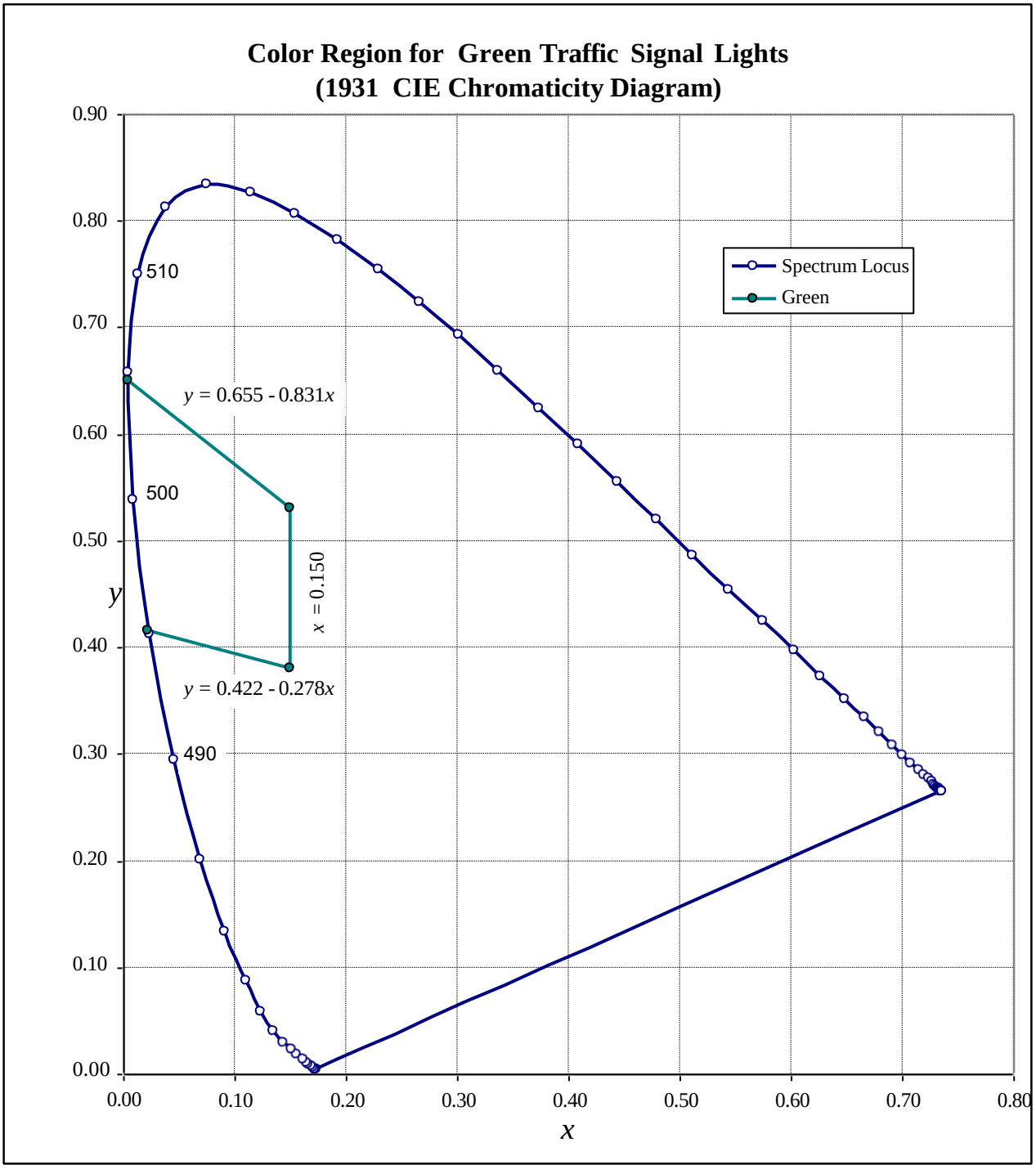


Figure 2c: Color Region for Green Traffic Control Signal Lights

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.

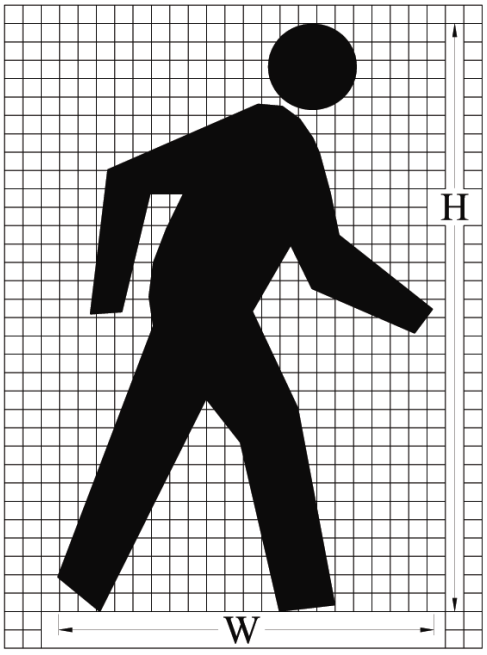


Figure 1—Walking Person icon

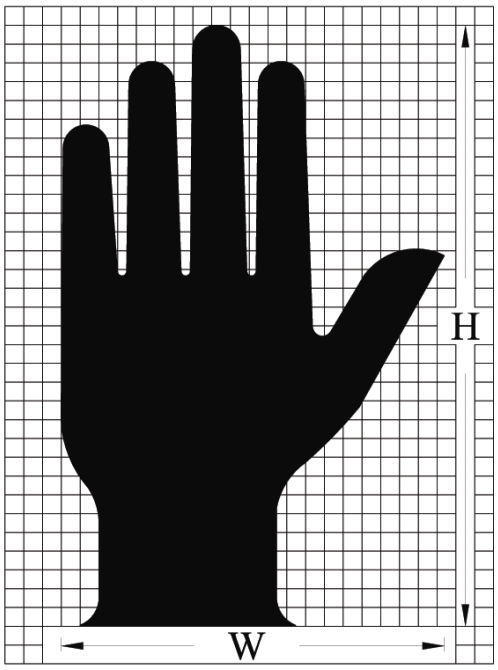


Figure 2—Upraised Hand icon

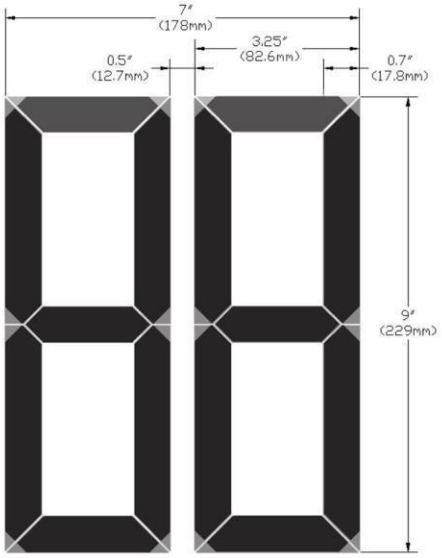


Figure 3—Countdown Display

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:	$0.400 \le x < 0.280$
	$y = 0.7917 \cdot x + 0.0483.$

	White	
Point	*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:	$y = 0.331.$

	Portland Orange	
Point	*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 next cycle.

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 shall be 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 the recorded 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:

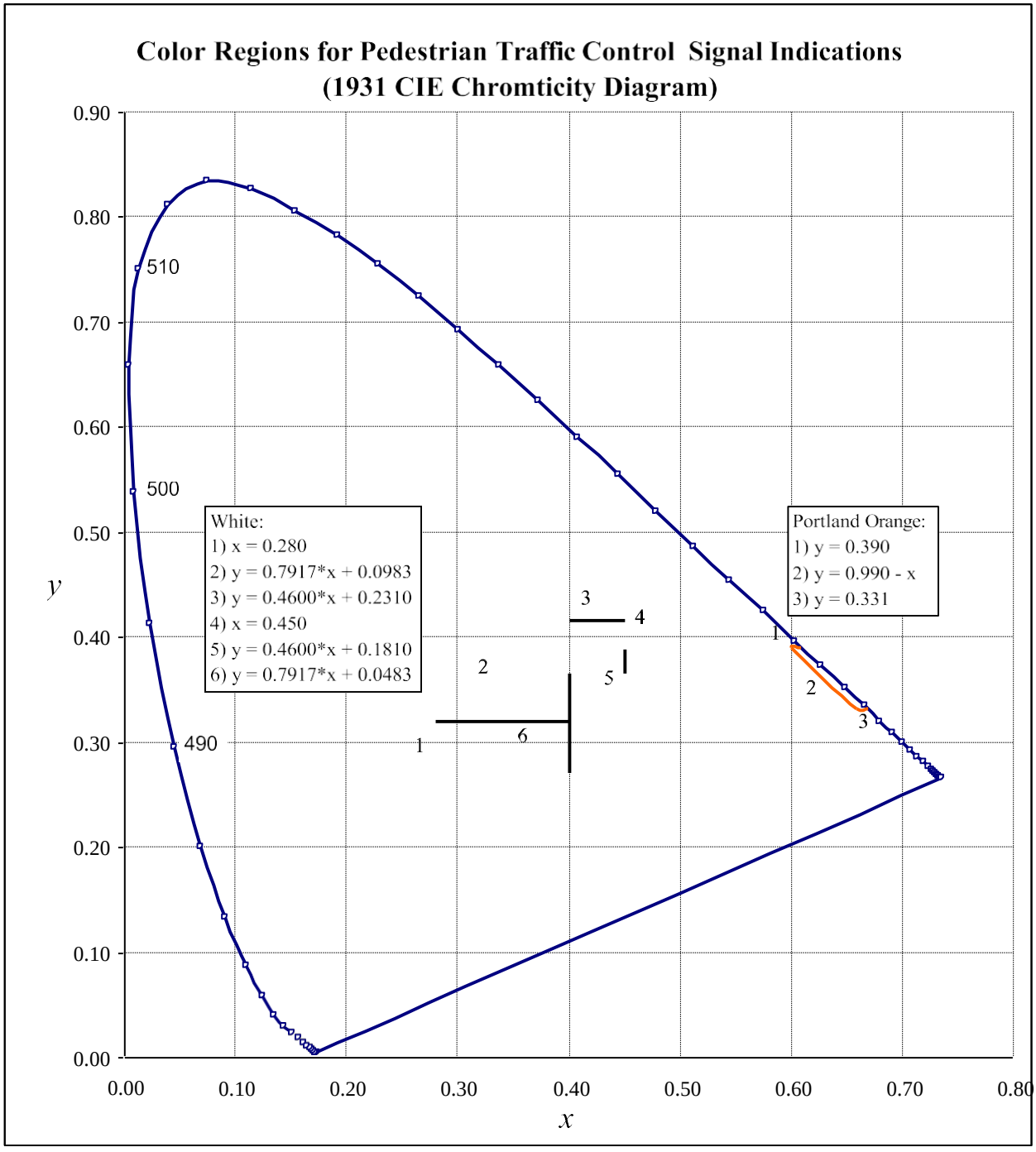
a) The country in which the factory of module origin is located.

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:

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

where: $\varnothing_{OD} = \cos^{-1}(\cos(\varnothing_{Vert})*\cos(\varnothing_{Horiz}))$, $\varnothing_{Vert}$ is the angle measured above or below a horizontal plane perpendicular to the face of the module lens, and $\varnothing_{Horiz}$ 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 $\varnothing_{Vert}$ is between 2.5 degrees up and 2.5 degrees down, and $\varnothing_{Horiz}$ is between 2.5 degrees left and 2.5 degrees right, the values shall be the same as those calculated for $\varnothing_{Vert}$ = 2.5 degrees and $\varnothing_{Horiz}$ = 2.5 degrees.

3.1.1.1.3 There are no requirements for the region where $\varnothing_{OD}$ > 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% 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% 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.

5.4.4.2 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 lessthan 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.

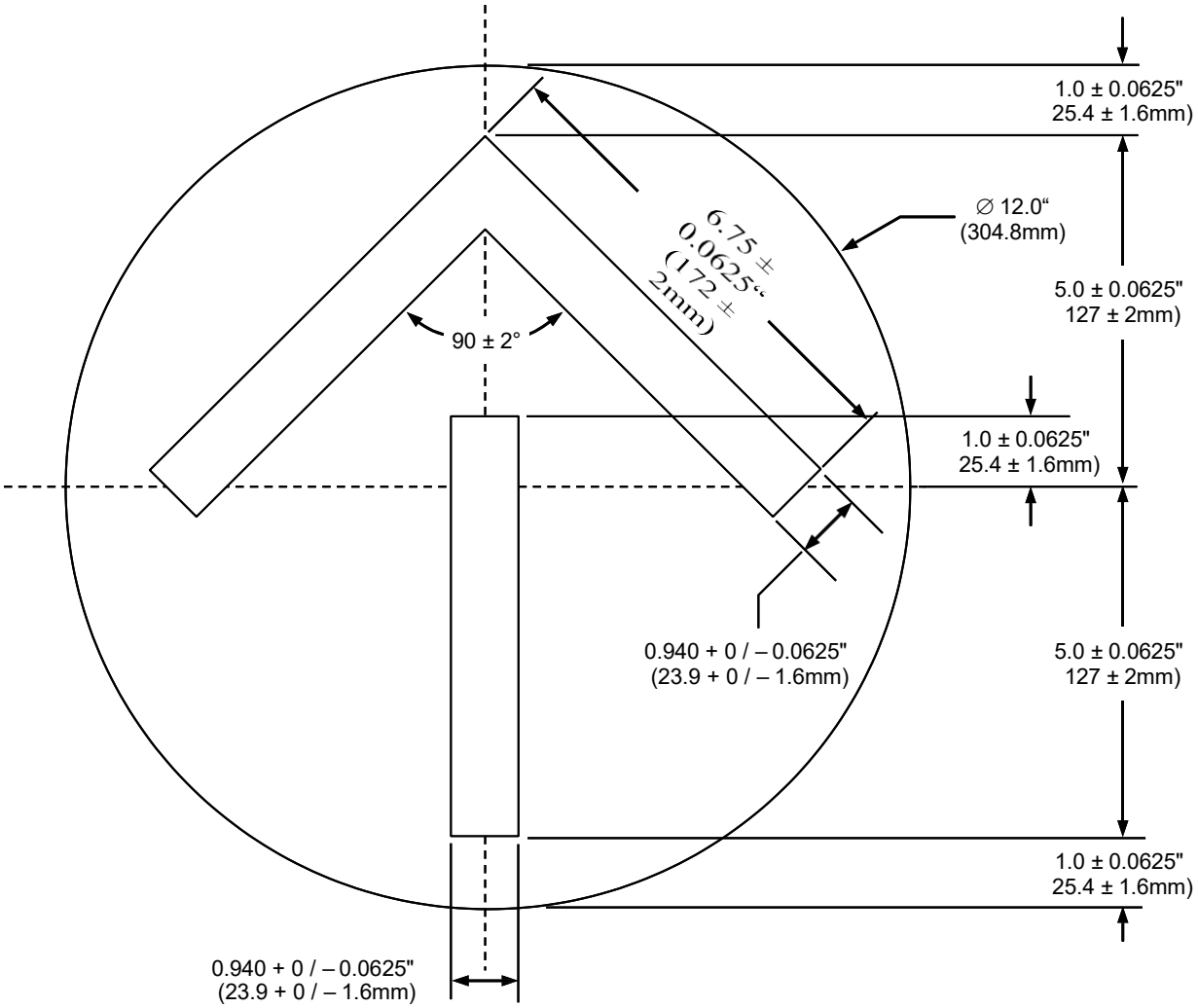
Minimum Maintained Luminous Intensity Value
Per VTCSH LED Vehicle Arrow Traffic Signal, July 1, 2007
(Omni-directional—suitable for mounting in any orientation)

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 Highway Yellow, 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. 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 retro-reflective borders. The borders shall include a 3’ wide, 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 of Highway Yellow.

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.

THE FOLLOWING UTILITY COMPANIES ARE INVOLVED IN

PROJECT **NH 0100(107)411, Lincoln County PCN01VA, PCN 08DK & PCN 08DJ**

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 in February 2022, 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. **Alliance Communications**
   1400 E Aspen Blvd
   Brandon, SD 57005
   CONTACT: JEFF HOVE, TELE. # 605-594-8229
   The Company has existing fiber lines approximately 40-inches deep on the east side of SD11 running north and south from 49th Street to 69th Street. Through coordination, the Company has indicated that the fiber lines can be adjusted during the construction of the proposed SD11 as necessary and will not conflict with the project schedule. The Company has an existing vital transport cable at the box culvert at Sta. 522+79 that will require coordination with the contractor during construction for protection.

   The proposed Veterans Parkway and 57th Street intersection is shifting to the west, and existing fiber pedestals located north of 57th Street may be in conflict with the proposed grading. Through coordination, it has been determined that the pedestal and underground fiber can be relocated during construction of the proposed intersection as necessary and will not conflict with the project schedule.

   As the Company's facilities are in existing public right of way, any relocation/adjustment necessary to accommodate the highway construction will be accomplished at no cost to the State of South Dakota (State) and performed in coordination with the highway construction. The Company will work with the contractor during construction to determine if fiber will need to be relocated or abandoned.

2. **Bluepeak**
   5009 S. Western Avenue, Suite 200-201
   Sioux Falls, SD 57106
   CONTACT: JORDAN HUBER, TELE. # 605-498-4922 or CELL # 605-366-1360
   The Company has an existing 72-fiber line in the proposed 57th Street and SD11 intersection. Through coordination, it has been determined that the fiber line will need to be relocated.

   The Company has a fiber line that runs down the west side of SD11 down to Canton.

   Conflict is to be expected at Cody Road with at-grade culverts and where Veterans Parkway merges with SD11 at approximately Sta. 1166+00. Through coordination, it has been determined that the fiber line can be adjusted during construction, and if locates are necessary, contact Jordan Huber at email Jordan.huber@mybluepeak.com or office # 605-498-4922.

   The Company has a junction box on the existing southwest corner of 57th Street and the SD11 intersection that can be adjusted during construction if necessary.

As the Company's facilities are in existing public right of way, any relocation/adjustment necessary to accommodate the highway construction will be accomplished at no cost to the State and performed in coordination with the highway construction. The Company will work with the contractor during construction to determine if fiber will need to be relocated or abandoned.

3. **City of Harrisburg**
   47631 274th Street
   Harrisburg, SD 57032
   CONTACT: DUSTIN PREHEIM, TELE. # 605-351-9879
   The Company has an existing forcemain in the existing right of way on the north side of 69th Street that runs east and west. HDR has taken the forcemain into consideration for the plans and proposed utilities. There are no concerns or conflicts with the forcemain expected.

   The Company has no objections to the existing out-of-service forcemain located beneath Veterans Parkway.

   The Company has been involved with the project design and conflict resolution throughout the completion of the design. As the Company's facilities are in existing public right of way, any relocation/adjustment necessary to accommodate the highway construction will be accomplished at no cost to the State and performed in coordination with the highway construction. The Company has requested the contractor provide notification when work is being performed over their existing main. The Company has reviewed the construction plans and adjustments/relocations are not anticipated as indicated in the plans.

4. **City of Sioux Falls**
   231 N. Dakota Avenue
   Sioux Falls, SD 57104
   CONTACT: JEFF RAGSDALE, TELE. # 605-367-8267 OR CELL # 605-951-4256
   Water main and sanitary sewer upgrades throughout the project limits have been designed by HDR under contract with the City of Sioux Falls. The improvements will be included with the Veterans Parkway bid package.

   All City of Sioux Falls streetlights, signals, and wiring will be replaced as per the Section L (Signals and Lighting) plans. The upgraded City of Sioux Falls innerduct/communication system is also included in the Section L plans. These plans were reviewed by both SDDOT and the City of Sioux Falls.

5. **East River Electric Power Cooperative**
   5800 W 69th St
   Sioux Falls, SD 57108
   CONTACT: ERIK TRAXLER, TELE. # 605-300-0008
   The Company has existing poles currently in the roadway of the proposed Veterans Parkway that will need to be relocated prior to construction. The Company will move the poles on the south side of their substation on the east side of Sycamore Avenue prior to construction. The agreement between the SDDOT and the Company has been executed, and facility relocations are scheduled to be completed prior to construction. The Company does not anticipate a conflict with the construction schedule.

   The Company will need to access the existing substation on Sycamore Avenue at all times during construction.

   The Company has existing poles located on the west side of SD11 that will need to be moved for construction. The Company has finalized the design and cost estimate to complete the permitting

process for relocating the existing power poles outside of the work limits, to avoid conflicts with the proposed Veterans Parkway as a part of the executed force agreement with the SDDOT. The Company plans to have poles and other facilities relocated by the fall of 2026 and does not anticipate a conflict with the construction schedule.

It is noted in the plans that the contractor will need to contact East River Electric Cooperative two days in advance when working around their lines. Contact Erik Traxler at cell # 605-300-0008.

6. **Lewis & Clark Regional Water *HP***
1800 Monty Street
Tea, SD 57064
CONTACT: CLINTON KOEHN, TELE. # 605-368-2400
The Company is designated as a High-Profile Utility with SD One Call.

The Contractor shall comply with the Company's Crossing Requirements at all times. No heavy equipment shall operate, park, or be placed over the top of the Company's pipe. No excess soil shall be placed or stored over the top of the Company's pipe. No equipment shall traverse across the Company's pipe, except on the pavement surface of SD11. Contractor shall provide notice to the Company in accordance with the Crossing Requirements prior to any work on or near the Lewis & Clark Regional Water pipe or within their easement.

Lewis & Clark Regional Water System
1800 Monty Street
Tea, SD 57064
Justin Walsh – L&C – 605-310-8780
Water Treatment Plant – 605-624-8700
Main office – 605-368-2400

IN CASE OF EMERGENCY CALL 866-572-8688

Any loss of water service for any situation in this portion of the pipeline may result in an economic loss for the Company's Regional Water System. This portion of the 30-inch diameter pipeline serves MCWC, Rock County Rural Water, Lincoln-Pipestone Rural Water, City of Rock Rapids, IA, City of Luverne, MN, and the City of Worthington, MN.

The Company has an existing water main crossing SD11 buried approximately 10 feet deep north of Cody Road. The existing water main encasement crossing extends slightly beyond the west and east sides of the proposed right of way locations.

The Company requests a minimum clearance of 2 feet between their water main crossing and any new or existing utilities, in accordance with their crossing requirements.

The Company has been involved with the project design and conflict resolution throughout completion of design and has reviewed the construction plans. Plan comments have been added as requested by the Company.

7. **Lincoln County Rural Water System, Inc.**
27066 Henry Place
Sioux Falls, SD 57108
CONTACT: ROBIN DYKSTRA, TELE. # 605-767-2966
The Company has an existing 6-inch water main on the west side of SD11 at or beyond the right of way that extends north of 69th Street and south beyond the project limits. This water main is planned to be abandoned, as the Company has installed a water main on the east side of SD11

from approx. 100' south of 69th Street and extends to just north of Cody Road. The Company intends to bore across 69th Street east of the project limits to make a connection to the existing water main. The Company also plans to make a connection at Cody Road and cross SD11 paralleling Lewis and Clark Rural Water System, Inc. (L&C) existing water main crossing SD11 north of Cody Road. The proposed water main will be located 15 ft south of the existing L&C line and will be a foot to a foot and a half higher. This work will be completed prior to PCN01VA starting.

The Company has an existing encasement pipe on the north side of 69th Street on the west side of SD11 in the right of way that will likely not need to be lengthened during construction due to the intersection not being widened. The Company will work with the contractor to connect the existing 8-inch water to the existing 6-inch water main just north of 69th Street on the west side of SD11. The Company will have their engineer design this work in a separate set of plans.

There is an existing 8-inch water main, which runs east and west across SD11 just beyond the project limits on the north side of 69th Street outside of the existing right of way. This water main crosses 69th Street to the south side just west of the proposed location where Veterans Parkway crosses the existing 69th Street corridor. This water main then extends west beyond the 69th Street project limits. The Company has coordinated with the City of Sioux Falls to provide service to customers on this existing water main. Should the City of Sioux Falls agree to this, the Company will abandon this existing water main. Should the City of Sioux Falls not agree to this, the Company will make improvements to this water main, mainly consisting of downsizing the existing water main to a 4" water main, and will be able to use the existing 8" water main as an encasement, therefore not impacting this project. The north side of Pond A and Pond D were designed to avoid impacts to the Company's existing water main on the south side of 69th Street.

The Company has a meter pit on the corner of Sycamore Avenue and 69th Street and will not be impacted by this project.

The Company has been involved with the project design and conflict resolution throughout the completion of design. The Company has reviewed the construction plans and agrees the plans are complete and accurately depict existing facilities and proposed utilities. Plan comments have been added as requested by the Company.

8. Lumen/Century Link
125 S. Dakota Avenue
Sioux Falls, SD 57104
CONTACT: ANDREW WIXON, CELL # 605-681-2049
The Company has an existing 900-pair copper cable located on the north side of 57th Street to the east side of SD11. It then transitions into a 600-pair cable on the east side of SD11. The cable turns south and transitions to a 200-pair cable on the east side of SD11 for approximately 400 feet. The Company does not anticipate a conflict with this cable.

The cable then crosses over to the west side of SD11 and continues south to 271st Street. Through coordination, it has been determined that this fiber is tentatively scheduled to be abandoned. The Company also stated that they will determine the cable depths to avoid conflicts during construction and will coordinate the adjustment of existing utilities as necessary in the spring of 2026.

The Company has an existing above-ground pedestal at the northwest corner of 57th Street and SD11, at approximately Sta. 62+00 LT. Upon coordination, it was determined that the existing pedestal will not be disturbed as it is west of the removal/grading limits/tie-in to the existing roadway.

There will likely be no impact on Lumen's utilities concerning the proposed pedestrian box relocation on SD11 at approximately Sta. 537+00.

As the Company's facilities are in existing public right of way, any relocation/adjustment necessary to accommodate the highway construction will be accomplished at no cost to the State and performed in coordination with the highway construction. The Company will work with the contractor during construction to determine if fiber will need to be relocated or abandoned and will not have an impact on the project schedule. The Company has reviewed the construction plans and agrees the plans are complete and accurately depict existing facilities and proposed utilities.

9. MCI/Verizon
1200 Washington Avenue N
Minneapolis, MN 55401
CONTACT: GREG ALLEN, TELE. # 612-619-9602 AND TOM GASCA, TELE. # 605-351-1873, LUCAS FONTANA, TELE. # 952-426-0699
The Company has a fiber optic line along the fence line on the west side of SD11 from 69th Street to the south of Canton, approximately four to five feet deep located in the right of way.

Fiber optic is located on the south side of 69th Street, where it was found through coordination that they can potentially adjust their fiber optic line during construction if needed.

The Company has an existing fiber optic line that runs along SD11 in the right of way through the proposed detention pond at approximately Sta. 1152+00-LT. HDR verified private utilities along SD11 by completing locates.

There are four proposed stormwater laterals from Sta. 1160+00 to 1167+00 on SD11 that could potentially impact the existing fiber optic line. The Company will be able to adjust their fiber optic line during construction if necessary.

As the Company's facilities are in existing public right of way, any relocation/adjustment necessary to accommodate the highway construction will be accomplished at no cost to the State and performed in coordination with the highway construction. The Company will work with the contractor during construction to determine if fiber will need to be relocated or abandoned and will not have an impact on the project schedule. The Company has reviewed the construction plans and agrees the plans are complete and accurately depict existing facilities and proposed utilities.

10. MidAmerican Energy
1200 S Blauvelt Ave
Sioux Falls, SD 57105
CONTACT: RYAN HENDRIKS, TELE. # 605-373-6061
There is an existing gas valve at the southwest corner of the 57th Street and Veterans Parkway intersection, which is a 6-inch plastic pipe up to the valve and reduces to a 4-inch pipe past the valve going east across Veterans Parkway.

The Company is also planning additional work at the 57th Street intersection, including an above-ground station. There is a 4-inch plastic gas main on the east side of SD11, that runs from 57th Street southward to Frankman Motors. There is a 2-inch plastic gas main that crosses SD11 at E Dalco Place.

There is a 2-inch plastic gas main stubbed out on the south side of Coneflower Avenue and 69th Street, where the end cap is on the south side of 69th Street and Coneflower Avenue at approximately 35-inches deep. As a part of the 01VA utility plans, a water main is proposed at the

intersection of Coneflower Avenue and Veterans Parkway, which may conflict with the existing gas line in this area. The Company will relocate this gas line upon request to eliminate conflict and ensure the valve is accessible.

There is a steel 8-inch gas main located on the south side of 69th Street and Leubecher Avenue. The Company proposes to extend this line out to align with the new Veterans Parkway corridor and extend it to 57th Street in the west right of way of the new Veterans Parkway corridor from east 69th Street to east 57th Street. This will create a high-pressure (210psig) loop and increase the pressure in this area. The Company proposes to complete this work after the grading is complete and prior to final restoration.

There is also a 4-inch plastic gas main that crosses east 69th Street at the east side of the intersection with south Leubecher Avenue and continues east along the north side of east 69th Street to the northeast corner of south Sycamore Avenue & east 69th Street.

There is an existing 6-inch plastic gas line that runs east and west along the south side of 57th Street, right behind the sidewalk, which may be in conflict with proposed storm drainage improvements and the addition of a right turn lane. The proposed storm pipe will tie into the existing pipe, and the outlets will need to be set at the approximate depth of the existing ditch grade.

As the Company's facilities are in existing public right of way, any relocation/adjustment necessary to accommodate the highway construction will be accomplished at no cost to the State and performed in coordination with the highway construction. The proposed work as described will not have an impact on the project schedule. The Company will coordinate with the contractor near the end of construction after grading is completed and prior to restoration to trench in the new line to align with the new Veterans Parkway corridor up to 57th Street and to install the above-ground station at the 57th Street intersection. The Company has reviewed the construction plans and agrees the plans are complete and accurately depict existing facilities and proposed utilities.

11. MidContinent Communications

3901 N Louise Avenue
Sioux Falls, SD 57107
CONTACT: DYLAN HAAS, TELE. # 605-231-0340

The Company does not anticipate any conflicts for the 01VA portion of the project. The Company has indicated through coordination that their utility in this area can be adjusted during construction.

As the Company's facilities are in existing public right of way, any relocation/adjustment necessary to accommodate the highway construction will be accomplished at no cost to the State and performed in coordination with the highway construction. The Company will work with the contractor during construction to determine if fiber will need to be relocated or abandoned and will not have an impact on the project schedule. The Company has reviewed the construction plans and agrees the plans are complete and accurately depict existing facilities and proposed utilities.

12. Northwestern Energy

3010 West 69th Street
Sioux Falls, SD 57108
CONTACT: LANDON SCHULTE, TELE. # 605-978-2981

The Company has an existing 4-inch plastic line extending north and south on the west side of SD11 and crosses at approximately Sta. 1163+00 to the east side of SD11 up to 69th Street. The line continues east along the south side of 69th Street. Coordination for East River Electric

Cooperative proposed power pole relocations in the same vicinity will need to be completed by the respective utility companies during construction.

There may be a conflict at Sta. 1163+00-LT on the west side of SD11. There is a 4-inch plastic service line and a home service line on the northwest side of the Cody Road and SD11 intersection.

The Company indicated the existing lines can be adjusted to a range of depth down to 5 feet typically without issues. Through coordination, the Company has indicated that the gas main can be adjusted during the construction and will not have an impact on the project schedule.

The Company has been involved with the project design and conflict resolution throughout completion of design. The Company has reviewed the construction plans and agrees the plans are complete and accurately depict existing facilities and proposed utilities. Plan comments have been added as requested by the Company.

13. SDN Communications
2900 W. 10th Street
Sioux Falls, SD 57104
CONTACT: TYLER LARSON, TELE. # 605-978-7134
The Company does not anticipate any conflicts for the 01VA portion of the project. The Company has indicated through coordination that their utility in this area can be adjusted during construction and will not have an impact on the project schedule.

As the Company's facilities are in existing public right of way, any relocation/adjustment necessary to accommodate the highway construction will be accomplished at no cost to the State and performed in coordination with the highway construction. The Company will work with the contractor during construction to determine if fiber will need to be relocated or abandoned. The Company has reviewed the construction plans and agrees the plans are complete and accurately depict existing facilities and proposed utilities.

14. Southeastern Electric Cooperative
47077 276th Street
Lennox, SD 57039
CONTACT: ADAM STARK, CELL # 605-368-4000
The Company is located along the east side of Sycamore Avenue.

The Company has 3-phase lines and conduits located on the north side of the proposed 57th Street intersection.

The Company will need to relocate six lines and multiple conduits at the corner of the proposed 57th Street intersection. Agreements to complete this work have been executed and coordinated with the Company and the SDDOT and will not have an impact on the project schedule.

The Company has a three-phase line located along the south side of 69th Street to SD11. The Company would likely need to install multiple new facilities, including relocation of transformers/pedestals near the corner of the proposed 69th Street and SD11 intersection, which they will coordinate during construction. Through coordination, the Company has also indicated a temporary feeder line will need to be installed prior to construction for a backfeed to the substation on Sycamore Avenue. This will be completed independent of the Veterans Parkway project.

The Company has a crossing at approximately Sta. 1163+00-L/R on SD11. The line is currently 4-5 feet deep at this crossing.

The Company has been involved with the project design and conflict resolution throughout completion of design. The Company has reviewed the construction plans and agrees the plans are complete and accurately depict existing facilities and proposed utilities. Plan comments have been added as requested by the Company.

Information provided by Southeastern Electric:
Sta 472+50 to Sta 473+50:
3ph UG cables running N-S along W side of old farmstead at 47771 E 69th ST on Parcel 100.49.17.1020
3ph UG cables running E-W across new Veterans Pkwy
Sta 520:
2 separate runs of 3ph UG cables, and an open conduit running E-W along the N side of 57th ST and crossing Veterans Pkwy
Sta 1113+25 to Sta 1124+50:
3ph UG cables running E-W along S side of existing 69th ST
Sta 910 to Sta 916+22.57:
3ph UG cables running E-W along N and S sided of existing 69th ST
Sta 913+75:
3ph UG cables running N-S along E side of existing Hwy 11
Sta 1163:
3ph UG cables running E-W across Veterans Pkwy / existing Hwy 11
Pad-mounted gear on E side of existing Hwy 11
Pad-mounted switch on W side of existing Hwy 11
Sta 1163 to Sta 1167:
3ph UG cables running N-S along the W side of existing Hwy 11
1ph UG cable running N-S along the E side of existing Hwy 11
Present 69th ST from Sta 1113+25, East along existing road ROW of 69th ST to Sta 916+22.57:
3ph UG cables running E-W along the S side of existing 69th ST

15. WAPA
200 4th Street SW Ste 410
Huron, SD 57350
CONTACT: KATIE BALL, TELE. # 605-570-1475
The Company has an existing structure 7/6 located adjacent to and on the south side of 69th Street at approximately Sta. 26+00-LT. This structure will not be relocated per coordination and agreements with the City of Sioux Falls and the SDDOT and the final construction plans for PCN 01VA include the work necessary.

The Company has structure 7/9 located in the south section of Veterans Parkway at approximately Sta. 456+00-CL. This structure will be removed and proposed temporary structures will be installed prior to construction of Veterans Parkway to not impact the project schedule. Permanent structures are proposed to be installed in the future and upon completion of Veterans Parkway construction. Agreements to complete this work have been executed and coordinated with the Company and the SDDOT. The Company anticipates the proposed temporary structures work will be installed in the fall of 2026.

HDR has included in the plans and utility certification agreement that a WAPA representative will need to be on site to watch the WAPA structures during construction.

The Company has been involved with the project design and conflict resolution throughout completion of design. The Company has reviewed the construction plans and agrees the plans

are complete and accurately depict existing facilities and proposed utilities. Plan comments have been added as requested by the Company.

16. **Xcel Energy – Distribution**
    500 West Russell Street
    Sioux Falls, SD 57104
    CONTACT: AARON BICKETT, TELE. # 605-339-8315 or CELL # 605-261-1354
    The Company does not have any existing facilities in the Veterans Parkway 01VA portion of the project.

    The Company has been involved with the project design and conflict resolution throughout completion of design. The Company has reviewed the construction plans and agrees the plans are complete and accurately depict existing facilities and proposed utilities.

17. **Xcel Energy – Gas**
    2302 Great Northern Dr
    Fargo, ND 58102
    CONTACT: JADE BROWN, TELE. # 701-241-8695
    The Company has an existing high-pressure gas line located within an existing 100-foot permanent easement. The encroachment agreement for the 69th Street and Veterans Parkway roadway and the proposed culvert crossing between Ponds A and Pond B between the SDDOT and the Company is executed. Construction equipment lists and details on weights are required to be provided by the contractor to determine the protection of the existing Xcel Energy gas main. This will likely be fill placed over the existing gas main.

    HDR has added in the plan notes a Watch and Protect statement for the Xcel Energy gas line.

    The Company has been involved with the project design and conflict resolution throughout completion of design. The Company has reviewed the construction plans and agrees the plans are complete and accurately depict existing facilities and proposed utilities. Plan comments have been added as requested by the Company.

18. **Xcel Energy – Transmission**
    414 Nicollet Mall, 5th Floor
    Minneapolis, MN 55401
    CONTACT: JOSH TOMLINSON, TELE. # 719-355-9126
    The Company has an overhead 69k volt transmission line crossing Veterans Parkway at Sta. 441+00 and is in an existing permanent easement. The existing adjacent Structure 0877-65 to the right of Veterans Parkway alignment has been determined not to be relocated based on revisions to the plans to accommodate the existing location. The encroachment agreement between the City of Sioux Falls and the Company has been executed.

    The Company has been involved with the project design and conflict resolution throughout the completion of the design. The Company has reviewed the construction plans and agrees the plans are complete and accurately depict existing facilities and proposed utilities. Plan comments have been added as requested by the Company.

The requirements relating to Cooperation Between Contractors, as set forth in Section 5.7 of the Standards Specifications for Roads and Bridges, 2015 edition, shall prevail throughout the limits of this project.

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
REGARDING
LEWIS AND CLARK CROSSING REQUIREMENTS

NH 0100(107)401 PCN 01VA; P 1440(00) PCN 08DJ
P 1432(00) PCN 08DK
LINCOLN COUNTY/ MINNEHAHA COUNTY

AUGUST 6, 2025

The Contractor will comply with the following two sheets when working in the vicinity of the existing Lewis and Clark Water System pipeline at SD11 station 1165+94.

*****

Lewis & Clark
REGIONAL WATER SYSTEM
1800 Monty Street
Tea, SD 57064
www.lcrws.org
Phone: 605.368.2400
Fax: 605.368.2800

Crossing Requirements

Lewis & Clark Regional is designated as a High-Profile Utility with SD One Call, as such, certain conditions must be met when working around our pipelines. We have easement rights and restrictions to protect our pipe. This document does not supersede our easement rights. The following are minimum requirements for crossing L&C pipelines and appurtenances. We may require additional documentation and design information from a registered engineer licensed in SD, MN or IA. We also may have L&C engineers review details of any planned crossing or paralleling of L&C pipelines to ensure our facilities are protected.

1. L&C staff must be present when actively crossing any L&C infrastructure.
2. As required by law, Utility Company must have performed One-Call locates in area of work.
3. Contractors/Utility companies shall provide 48 hours prior notice to L&C Operations Staff to ensure a L&C staff member can be present when work is actually being performed by Contractor/Utility company. One-Call locates alone are not adequate notice for L&C to have staff available.
4. When working **parallel** to L&C pipe, a minimum horizontal separation of fifteen feet (15') shall be maintained from the centerline of the L&C pipeline to the utility/product being installed. (see details)
5. When perpendicularly crossing over L&C pipeline via **open cut method** a minimum separation of two feet (24") above the top of L&C pipe shall be maintained. Visual verification of the depth of the L&C pipeline and cathodic protection system by the Contractor/Utility is required before starting work. A possible exception would be for sewer line when grade controls the utility elevation and 24 inches is not possible. In such cases, encasement may be required. Ten States Standards shall be met. Perpendicular, open-cut crossings under L&C infrastructure are not to be considered. Contractor/Utility company plans must be presented in writing and must be approved by L&C staff or Engineer as referenced at the beginning of this document. (see details)
6. When **perpendicularly crossing under or over L&C pipeline via directional drilling, jack and auger bore or other similar method**, a minimum separation of two feet (24") above the top of L&C pipe and three feet (36") below the L&C pipe shall be maintained. Additionally, the Contractor/Utility company must have provided "viewports" of the L&C pipeline via vac-truck located at the centerline of the L&C pipe to verify depth of L&C pipe and 10 feet on either side of the L&C pipe so the passing bore method can be verified to not have made contact with L&C pipe in any way and does not throughout the duration of the activity. (see details)
7. If a connection to a foreign line cathodic protection system or other corrosion protection equipment is needed, L&C staff shall perform all work associated with cadwelding wires to L&C pipe. Details of said cathodic protection system must be approved by L&C engineers. Any required modifications to L&C cathodic protection systems will be paid for by the Contractor/Utility owner.
8. Once Contractor/Utility Company has finished installation of said utility near L&C pipeline facilities, the L&C pipeline shall be backfilled with similar bedding or otherwise approved materials by L&C staff, in a careful manner to ensure protection of L&C pipe. (see details)
9. Any costs arising from damage to L&C infrastructure, caused by Contractor/Utility shall be incurred by the Contractor/Utility company.

L&C Emergency contacts: L&C Water Treatment Plant – 605-624-8700

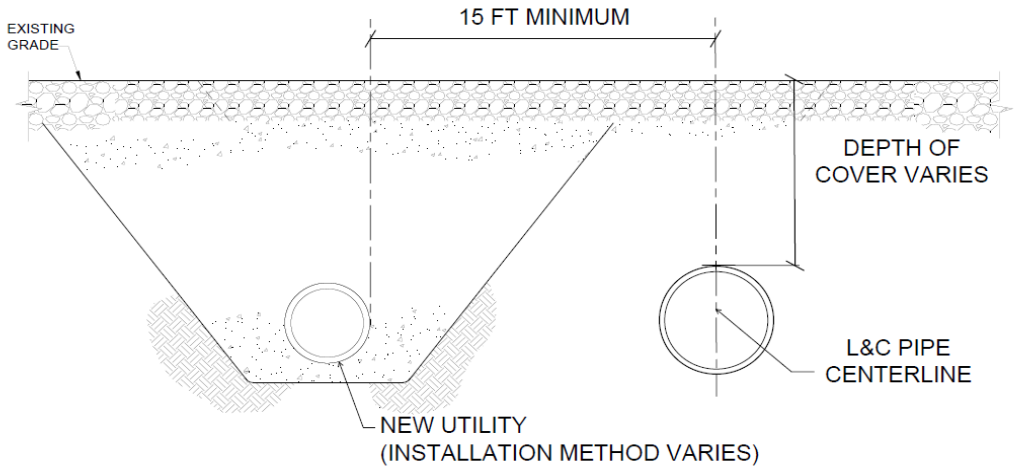
Justin Walsh – L&C Distribution Operator – 605-310-8780, jwalsh@lcrws.org
Jay Nelson - L&C Distribution Operator – 605-661-9189, jnelson@lcrws.org

A Vision for the Future

Approved by L&C Board of Directors on April, 24, 2025

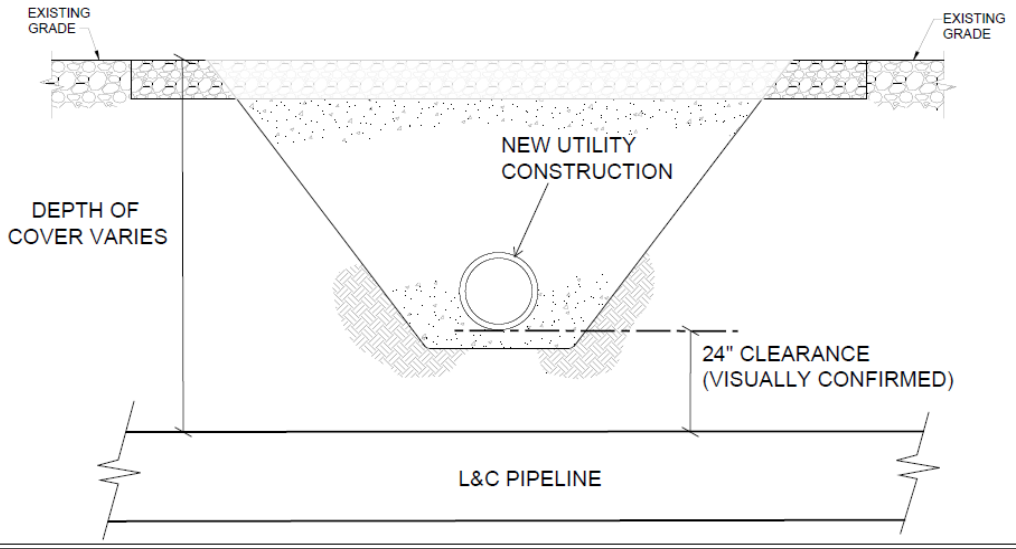
MINIMUM SEPARATION DISTANCE FOR PARALLEL UTILITY INSTALLATION

NO SCALE



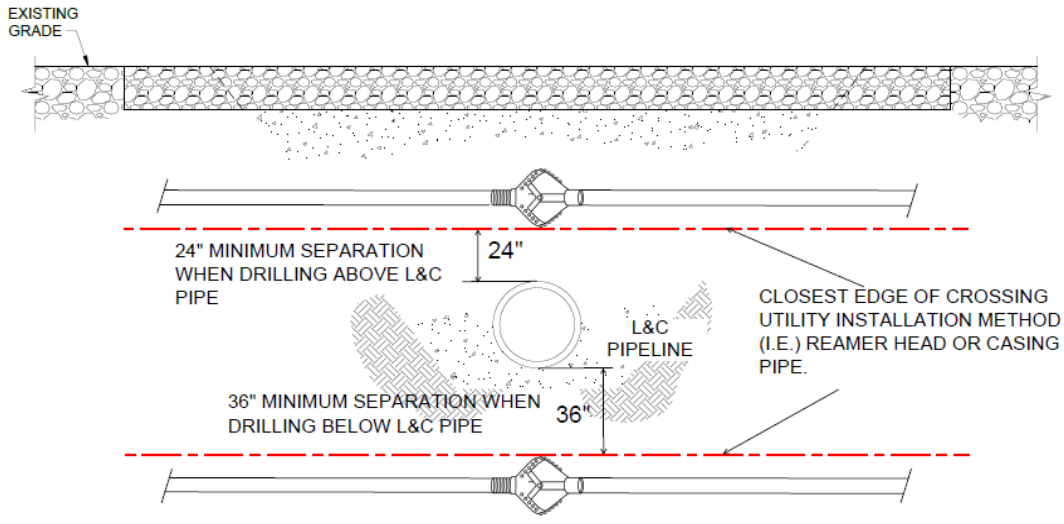
MINIMUM SEPARATION DISTANCE FOR OPEN-CUT UTILITY INSTALLATION OVER L&C PIPELINE

NO SCALE



MINIMUM SEPARATION DISTANCES FOR PERPENDICULAR CROSSING VIA HDD, JACK & AUGER BORE OR SIMILAR METHOD

NO SCALE



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.

* * * * *

DOT-208
(11/25)

FUEL ADJUSTMENT AFFIDAVIT

Project Number _____
PCN _____
County _____

For projects let using the SDEBS) and in accordance with Section 9.10, 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 will 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 must 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 will 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 EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS FOR HIGHWAY CONSTRUCTION CONTRACTS

OCTOBER 7, 2026

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1. General

a. Equal employment opportunity requirements prohibiting discrimination, imposed pursuant to 23 U.S.C. §140, Section 22 of the Federal-Aid Highway Act of 1968, and 23 CFR 230, apply to this contract. This Special Provision constitutes the specific equal employment opportunity requirements for all project activities and supplements those found in the Standard Title VI / Nondiscrimination Assurances Appendix A & E and the FHWA 1273 Contract Provisions for Federal-aid Construction Contracts.

b. The Contractor will work with the Department and the Federal Government in meeting equal employment opportunity obligations and participating in reviews of Contractor activities under the contract.

c. The Contractor and all subcontractors (excluding material suppliers) holding subcontracts of $10,000 or more will comply with the minimum equal employment opportunity requirements in this Special Provision. The Contractor will include these requirements in every subcontract of $10,000 or more, modifying language as needed to ensure they are binding on the subcontractor.

2. Equal Employment Opportunity Policy

The Contractor adopts the following operating policy to ensure equal employment opportunity for all persons without regard to race, color, religion, sex, national origin, age, or disability:

Company Policy Statement:
It is the policy of this company to ensure that applicants are employed, and employees are treated during employment without regard to race, color, religion, sex, national origin, age, or disability. This includes actions related to employment, upgrading, demotion, transfer, recruitment, recruitment advertising, layoff, termination, rates of pay, other compensation, and selection for training—including apprenticeship, pre-apprenticeship, and on-the-job training.

3. Equal Employment Opportunity Officer

The Contractor will designate an Equal Employment Opportunity Officer (EEO Officer) and provide that information to the Department. The EEO Officer must be

capable of effectively administering and promoting an active equal employment opportunity program and must have sufficient authority and responsibility to do so.

4. Dissemination of Policy

a. All members of the Contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's equal employment opportunity policy and contractual responsibilities to provide equal employment opportunity 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:

1) 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 equal employment opportunity policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer or other knowledgeable company official.

2) All new supervisory or personnel office employees will be given a thorough orientation by the EEO Officer or other knowledgeable company official, covering all major aspects of the Contractor's equal employment opportunity obligations within thirty days following their reporting for duty with the contractor.

3) All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer or appropriate company official in the contractor's procedures for locating and hiring employees.

b. In order to make the Contractor's equal employment opportunity policy known to all employees, prospective employees, and potential sources of employees, *i.e.*, schools, employment agencies, labor unions (where appropriate), college placement officers, etc., the Contractor will take the following actions:

1) Notices and posters setting forth the Contractor's equal employment opportunity policy and identifying the Company EEO Officer or Project EEO Representative will be placed in areas readily accessible to employees, applicants for employment and potential employees at the home office and project site (EEO #7 Poster).

2) The Contractor's equal employment opportunity 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.

5. **Recruitment**

   a. **Advertising**
   All employment advertisements will include the phrase “An Equal Opportunity Employer” and must be published in media with broad circulation in the project’s recruitment area.

   b. **Direct Recruitment**
   Unless precluded by a valid bargaining agreement, the Contractor will conduct systematic and direct recruitment through sources likely to yield qualified applicants, including state employment agencies, schools, colleges, and community organizations. The EEO Officer will identify referral sources and establish procedures for referring applicants to the Contractor.

   Where exclusive hiring or bargaining agreements exist, the Contractor will follow their provisions to the extent they permit compliance with equal employment opportunity requirements.

   c. **Employee Referrals**
   The Contractor will encourage current employees to refer applicants by posting notices and discussing referral procedures with employees.

6. **Personnel Actions**
   All personnel actions—including wages, working conditions, benefits, hiring, upgrading, promotion, transfer, demotion, layoff, and termination—must be conducted without regard to race, color, religion, sex, national origin, age, or disability. The Contractor will:

   a. Conduct periodic inspections of project sites to ensure working conditions and facilities do not indicate discriminatory treatment.

   b. Periodically evaluate wage spreads within each classification to detect potential discriminatory practices.

   c. Review selected personnel actions to determine whether discriminatory patterns exist and promptly correct any identified issues.

   d. Investigate all complaints of alleged discrimination, resolve them when possible, take appropriate corrective action within a reasonable time, and upon completion of each investigation, notify complainants of all available avenues of appeal.

7. **Training and Promotion**

   a. Assist in locating, qualifying, and improving the skills of current employees and applicants.

b. Utilize training programs—such as apprenticeship and on-the-job training—as permitted under Federal and State regulations. Where feasible, 25% of apprentices or trainees in each occupation will be in their first year of apprenticeship or training. (If a Training Special Provision applies, it supersedes this subparagraph.)

c. Inform employees and applicants of available training programs and entrance requirements.

d. Periodically review employees' training and promotion potential and encourage eligible employees to apply.

8. Unions

If unions are used as a source of employees, the Contractor will make best efforts to secure their cooperation in supporting equal employment opportunity. Contractor's actions will include:

a. Working with unions to develop joint training programs that expand opportunities for employees.

b. Incorporate an equal employment opportunity clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age, or disability.

c. Obtaining information about union referral practices and policies. Contractor will certify to the Department its efforts made to acquire the information where the union refuses to provide such information.

d. Using independent recruitment efforts to fill vacancies if union referrals are insufficient and notifying the Department if union practices impede compliance.

9. Subcontracting

a. The Contractor will make best efforts to solicit bids from and utilize Disadvantaged Business Enterprise (DBE) subcontractors. All certified DBEs are listed in the State's DBE Directory.

b. The Contractor will ensure that all subcontractors comply with equal employment opportunity requirements.

c. The Contractor will insert this Special Provision, the Contract Provisions for Federal-aid Construction Contracts (FHWA 1273)and the Special Provision for Contract Provisions for Federal-aid Construction Contracts FHWA 1273 in all subcontracts.

10. Records and Reports

a. Required Records

The Contractor will maintain records necessary to determine compliance with equal employment opportunity requirements. The records kept by the Contractor will be designed to indicate:

1) Number of employees in each work classification, identified by minority status and sex.

2) Efforts made in cooperation with unions to improve employment opportunities (for Contractors relying on unions).

3) Progress and efforts made to locate, hire, train, qualify, and upgrade employees.

4) Progress and efforts made to secure DBE subcontractors.

b. Retention

Records must be retained for three years after project completion and be available at reasonable times and places for inspection by the Department and the Federal Highway Administration.

c. Annual Report

Each July, the Contractor will submit a consolidated Form PR-1391 to the Department reporting the number of minority, women, and non-minority employees in each work classification engaged on all projects worked during the reporting period.

* * * * *

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION FOR
CONTRACT PROVISIONS FOR
FEDERAL-AID CONSTRUCTION CONTRACTS
FHWA 1273 (JUNE 25, 2026)

OCTOBER 7, 2026

This Special Provision must be physically incorporated in each construction contract. The Contractor (or subcontractor) must insert this Special Provision in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements, and other agreements for supplies or services).

The following are amendments to the Contract Provisions for Federal-aid Construction Contract FHWA 1273.

Section I.1.

Delete the first paragraph of this section and replace it with the following:

Form FHWA-1273 must be physically incorporated in each construction contract. 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).

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 III.

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 III.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 III.3.b.(2)

Delete the third sentence.

Section III.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 III.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 III.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.

* * * * *

CONTRACT PROVISIONS FOR FEDERAL-AID CONSTRUCTION CONTRACTS

I. GENERAL

1. Historically, contracting agencies using Federal-aid highway funds were required to ensure Form FHWA-1273 was physically incorporated into all contracts and subcontracts. Effective June 10, 2026, this requirement was eliminated [91 FR 25492]. Future use of Form FHWA-1273 is now optional on the part of the contracting agency using Federal-aid highway funds. FHWA continues to make Form FHWA-1273 available as a convenience to contracting agencies. Contracting agencies must continue to ensure compliance with the provisions cited in Form FHWA-1273 in accordance with the provisions regardless of the use of Form FHWA-1273. Accordingly, the contracting agency retains the authority to determine whether the contractor must use Form FHWA-1273 to physically incorporate required contract provisions in each subcontract and in lower tier contracts. Where permitted by the contracting agency, the contractor may choose other ways to include required contract provisions in each subcontract, besides incorporating Form FHWA-1273. Contract provisions in Form FHWA-1273 are not required to be physically included in subcontracts for design services on Federal-aid design-build contracts, or in purchase orders, rental agreements and other agreements for supplies or services.

The applicable provisions 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 or 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.

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. 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

The contractor and all subcontractors must comply with the following policies: 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, including any amendments thereto.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with 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, including any amendments thereto.

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.

1. Assurances Required:

a. The requirements of 49 CFR Part 26, including any amendments thereto, 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, including any amendments thereto, 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, including any amendments thereto, are incorporated by reference. 49 CFR Part 21.

III. 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 IV, 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 29 CFR part 30, including any amendments thereto.

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 III. 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 in any subcontracts the clauses set forth in paragraphs (1) through (11) of this section, 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.

IV. 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.

* $33 as of January 15, 2025 (See 90 FR 1859) 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 III 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.

V. 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 this section 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 this section 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).

VI. 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).

VII. 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."

VIII. 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.

IX. 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.

* * * * *

X. 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.

XI. 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 (40 U.S.C. sections 14501(d) and 14701 and the Appalachian Regional Commission Code as authorized under 40 U.S.C. section 14302)
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 40 U.S.C. 14501 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 Decision
State: South Dakota
Construction Types: Heavy and Highway
Counties: South Dakota Statewide

Agency: U.S. DOL
Wage Decision Number: **SD20260001 SD1**
Counties: SD Statewide
Wage Decision Date: **01/30/2026 (Mod-0)**

***SASD2025-001 12/12/2024**

	Rates	Fringes
LABORERS		
Group GL1		
Air Tool Operator; Common Laborer; Landscape Worker; Flagger; Pilot Car Driver; Trucks under 26,000 GVW; Materials Checker, Special Surface Finish Applicator	**26.93**	**0.00**
Group GL2		
Mechanic Tender; Pipe Layer (except culvert); Form Builder Tender	**26.96**	**0.00**
Group GL3		
Asphalt Plant Tender; Pile Driver Leadsman; Form Setter; Oiler/Greaser	**28.97**	**0.00**
Group GL5		
Carpenter; Form Builder	**31.94**	**0.00**
Group GL6		
Concrete Finisher; Grade Checker	**29.81**	**0.00**
POWER EQUIPMENT OPERATORS		
Group G01		
Tractor (farm type with attachments, including loaders but excluding Backhoe); Self Propelled Broom; Concrete Routing Machine; Paver Feeder; Pugmill; Skid Steer	**30.16**	**0.00**
Group G02		
Concrete Paving Cure Machine; Concrete Paving Joint Sealer; Bull Dozer 80 HP or less; Front End Loader 1.25 CY or less; Self Propelled Roller (except Hot Mix); Sheepsfoot/Pneumatic Roller; Pneumatic Tired Tractor or Crawler (includes Water Wagon and Power Spray units); Wagon Drill (Air Trac – Trac Drill); Truck Type Auger; Concrete Paving Saw; Concrete Grooving	**31.73**	**0.00**
Group G03		
Asphalt Distributor; Bull Dozer over 80 HP; 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 or Pull Tractor; Off-Highway Haul Trucks; Material Spreader or Placer; Rumble Strip Machine; Pavement Marking Grinding Equipment	**31.56**	**0.00**
Group G04		
Concrete Paving Finishing Machine; 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 (wheel or tracks); Concrete Pump Truck	**32.49**	**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	**34.96**	**8.36**
TRUCK DRIVERS		
Group GT1		
Tandem Truck without trailer or pup; Single Axle Truck over 26,000 GVW with Trailer	**30.01**	**0.00**
Group GT2		
Semi-Tractor and Trailer; Tandem Truck with Pup or Trailer	**32.07**	**8.42**

Wage and Hour Division
U.S. Department of Labor (DOL)
200 Constitution Avenue, N.W.
Washington, DC 20210

Davis-Bacon Act Wage Decision
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Counties: SD Statewide
Wage Decision Date: **01/30/2026 (Mod-0)**

***SASD2025-001 12/12/2024**

	Rates	Fringes
ELECTRICIANS		
Group E01		
Electrician	**35.43**	**8.69**
IRON WORKERS		
Group I01		
Position and secure steel bars or mesh in concrete for reinforcement, steel tiers, saw. Carrying, placing, tying, reinforcing steel under supervision, cutting. Placing steel or prefabricated reinforcement assembly for placement in concrete forms.	**26.93**	**0.00**
Group I02		
Erect, place and join steel girders, columns, structural framework, air wrenches, spud bars, grinders, drills, sledgehammers, tag lines, plumb bobs, lasers, levels, bolts, wire, welds, shears, rod-bending machines, torches.	**28.97**	**0.00**
PAINTERS		
Group P01		
Line striping machine, paint trucks, epoxy trucks, thermoplastic trucks, cold applied plastic/and preformed thermoplastic pavement marking equipment. Operate pavement marking equipment to include epoxies, paints, primers, sealers, cold applied tapes, thermoplastics used for traffic marking purposes.	**26.96**	**0.00**
Group P02		
Painting or protective coating bridges, apply varnish, anti-rust materials, prepare steel or other surfaces with primer or sandblasting, paints structural framework of bridges, guardrails and cables of bridges and other structures.	**29.81**	**0.00**

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.

The "SA" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R. 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the "SA" identifier took effect under state law in the state from which the rates were adopted.

For SDDOT Defined Work Classifications, please visit: https://dot.sd.gov/doing-business/contractors/labor-compliance

A COPY OF THIS DOCUMENT, COLORED **GREEN**, **MUST** BE CONSPICUOUSLY POSTED AT THE PROJECT SITE

Wage and Hour Division
U.S. Department of Labor (DOL)
200 Constitution Avenue, N.W.
Washington, DC 20210

Davis-Bacon Act Wage Decision
State: South Dakota
Construction Types: Heavy and Highway
Counties: South Dakota Statewide

SD20260001 SD1 01/30/2026 (Mod-0)

WAGE DETERMINATION APPEALS PROCESS

1) Has there been an initial decision in the matter? This can be:

   a) a survey underlying a wage determination
   b) an existing published wage determination
   c) an initial WHD letter setting forth a position on a wage determination matter
   d) an initial conformance (additional classification and rate) determination

   On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

   Branch of Wage Surveys
   Wage and Hour Division
   U.S. Department of Labor
   200 Constitution Avenue, N.W.
   Washington, DC 20210

   Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail 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 an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail 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 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.

END OF GENERAL DECISION

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
REGARDING
STORMWATER DISCHARGES
TO WATERS OF THE STATE

NOVEMBER 5, 2025

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 AUTHORIZING STORMWATER 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 Stormwater Discharges Associated with Construction Activities for the project identified above."

A copy of the full version of the General Permit Authorizing Stormwater Discharges Associated with Construction Activities, dated 11/01/2023, must be available on the job site. The permit is available for downloading and printing from the SD DANR 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.

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