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DEPARTMENT OF TRANSPORTATION

NOTICE TO CONTRACTORS,

PROPOSAL, SPECIAL PROVISIONS,

CONTRACT AND CONTRACT BOND

FOR

GRADING, PCC SURFACING, STRUCTURE, CURB & GUTTER, ROADWAY LIGHTING, TRAFFIC SIGNAL, STORM SEWER

FEDERAL PROJECT NO. NH 0100(105)419
(PCN 01V5)

VETERANS PARKWAY

IN MINNEHAHA COUNTY

NOTICE TO ALL BIDDERS

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

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

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

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

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PLANS, PROPOSALS AND ADDENDA

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

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Project Number: NH 0100(105)419

Revised 6/24/15
PCN 01V5

NOTICE TO CONTRACTORS

Bid proposals for this project will be received electronically by the South Dakota Department of Transportation (SDDOT) via the SDDOT secure bid submission site at http://apps.sd.gov/hc65bidletting/bidsubmittallogin.aspx until 10 A.M. Central time, on September 21, 2016, 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 3, 2017**

FIELD WORK COMPLETION: **JULY 20, 2018**

THE DBE GOAL FOR THIS PROJECT IS: **2%**

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

An electronic version of the most recent version of the South Dakota Standard Specifications for Roads and Bridges may be obtained at http://www.sddot.com/business/contractors/specs/2015specbook/Default.aspx

The electronic bid proposal must be submitted by a valid bidder as designated on the Bidding Authorization Form. The Bidder ID and Password, coupled with a previously Department assigned Company ID, will serve as authentication that an individual is a valid bidder and will assure the secure electronic delivery of bid proposals to the Department. This authorization shall 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.

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

Travis Dressen
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. 6/1/16

SPECIAL PROVISIONS

PROJECT NUMBER(S): NH 0100(105)419 PCN: 01V5

TYPE OF WORK: GRADING, PCC SURFACING, STRUCTURE, CURB & GUTTER, ROADWAY LIGHTING, TRAFFIC SIGNAL, STORM SEWER

COUNTY: 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.

Greg Johnson is the official in charge of the Sioux Falls Career Center for Minnehaha County.

THE FOLLOWING ITEMS ARE INCLUDED IN THIS PROPOSAL FORM:

Special Provision for Contract Time, dated 8/19/16.

Special Provision Regarding Right of Entry/Work Limits, dated 8/24/16.

Special Provision for Subletting of Contract, dated 8/19/16.

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

Special Provision Regarding Section 404 of the Clean water Act, dated 8/24/16.

Special Conditions.

Special Provision Regarding Railroad Insurance Requirements, dated 7/11/16.

NOTE: The contractor WILL NOT be granted permission to proceed with any work on Railroad Right-of-Way until he has been notified by the Railroad that his insurance has been approved and the insurances and certificates has been provided to the SDDOT Area Office.

Special Provision For Working on Railroad Property, dated 7/11/16.

Special Provision for Contractor Furnished Mix Designs for PCC Pavement, dated 8/15/16.

Special Provision for Contractor Staking with Machine Control Grading Option, dated 8/19/16.

Agreement to Sell Materials (Judy Roddel, Trustee of the Judy Roddel Trust, Ronald G Tysdal and Jean A Tysdal as Trustees of the Ronald D and Jean A Tysdal Living Trust, and Tysdal Developments Inc)

Special Provision for Optical Activated Emergency Vehicle Pre-Emption System

Special Provision for Controller Cabinet

Special provision for Wireless, Battery-Powered Magnetometer Detection System for Presence Detection Application

Special Provision for Traffic Signal Controller

Special Provision for Traffic Signal Heads

List of Utilities.

Special Provision for Contractor Administered Preconstruction Meeting, dated 4/18/13.
Fuel Adjustment Affidavit, DOT form 208 dated 7/15.
Standard Title VI Assurance, dated 3/1/16.
Special Provision For Disadvantaged Business Enterprise, dated 5/20/15.
Special Provision For EEO Affirmative Action Requirements on Federal and Federal-aid Construction Contracts, dated 9/1/97.
Special Provision For Required Contract Provisions Federal-aid Construction Contracts, Form FHWA 1273 (Rev. May/1/12), dated 4/30/13.
Required Contract Provisions Federal-aid Construction Contracts, Form FHWA 1273 (Rev. 5/1/12).
Special Provision for Cargo Preference Act, dated 1/20/16.
Special Provision Regarding Minimum Wage on Federal-Aid Projects, dated 4/30/13.
Wage and Hour Division US Department of Labor Washington DC.
- US Dept. of Labor Decision Number SD150001, dated 10/9/15.
Special Provision for Supplemental Specifications to 2015 Standard Specifications for Roads and Bridges, dated 6/1/16.
Special Provision for Errata to 2015 Standard Specifications for Roads and Bridges, dated 6/1/16.
Special Provision for Price Schedule for Miscellaneous Items, dated 10/14/15.

Special Provision Regarding Storm Water Discharge, dated 5/3/13.
General Permit for Storm Water Discharges Associated with Construction Activities, dated 2/1/10. http://denr.sd.gov/des/sw/IPermits/ConstructionGeneralPermit2010.pdf

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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
CONTRACT TIME

PROJECT NH 0100(105)419; PCN 01V5
MINNEHAHA COUNTY

AUGUST 19, 2016

Maple Street Intersection Working Day Count Requirement

The Contractor will complete all work for the closure of the Maple Street intersection within 14 working days. The Department will count working days in accordance with Section 8.6 A except the Department will only count working days on days the Contractor has the intersection closed to traffic. The Contractor will place either gravel or permanent surfacing to open the road to traffic.

If the Contractor does not complete the work within the working day completion requirement, the Department will make a disincentive assessment in the amount of $500 per working day.

Substantial Completion

The Contractor will substantially complete the project by the November 3, 2017 substantial completion date.

The Department will consider the work substantially complete when all lanes are opened to unimpeded traffic and all work is completed except the following:

> Permanent pavement markings, placement of granular base for shared use path, asphalt surfacing for shared use path, and permanent erosion control measures.

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, Permanent pavement markings, placement of granular base for shared use path, asphalt surfacing for shared use path, and permanent erosion control measures.). The Department will allow single lane closures during daylight hours only and only when the Contractor is actively performing work. Daylight hours will be defined as sunrise to sunset.

If the Contractor does not substantially complete the project by the substantial completion requirement, the Department will make a disincentive assessment in the

amount of $1500 per working day. The Department will count working days in accordance with Section 8.6 C.

Field Work Completion

The Contractor will complete the project by the July 20, 2018 field work completion date.

Failure to Complete on Time

The Contractor will substantially complete the project prior to the substantial completion requirement or the substantial completion requirement as amended by formally approved time extension. If the Contractor does not complete the work by the substantial completion requirement or the substantial completion requirement as amended by formally approved time extension, the Department will assess liquidated damages in accordance with Section 8.8 in addition to the disincentive assessment for substantial completion. 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 8.6 C.

The Contractor will complete all work on the project prior to the field work completion requirement or the field work completion requirement as amended by formally approved time extension. If the Contractor does not complete all work by the field work completion requirement or the field work completion requirement as amended by formally approved time extension, the Department will assess liquidated damages in accordance with Section 8.8. 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 8.6 C.

Expected Adverse Weather Days

The Department has provided Attachment 1 for information purposes only as a guide to bidders. This table depicts the typical number of adverse weather days expected for any given month, based on historical records. The Department will consider this project a grading project in Zone 6.

The Department will consider expected adverse weather days cumulative in nature over the time period when the Contractor is actively pursuing completion of the work. The Department will not consider adverse weather days during an extended period of time when the Contractor is not pursuing completion of the work. When considering a time extension for working day count completion, substantial completion, or field work completion of the project, the Engineer will compare the total number of expected

adverse weather days against the total number of actual adverse weather days for the time period during which the work was being completed.

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ATTACHMENT 1

Figure A - Expected Adverse Weather Days for South Dakota

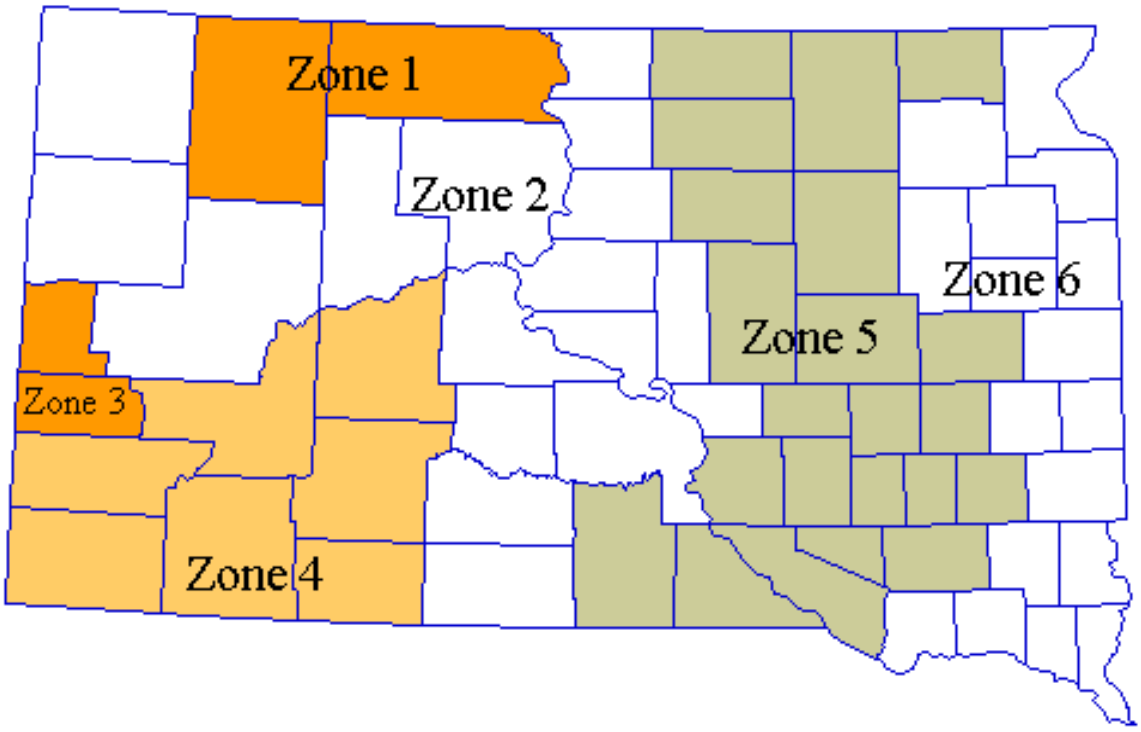

Table 1 - Expected Adverse Weather Days for South Dakota

	Grading Projects						Surfacing and Structural Projects					
	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Jan	18	18	16	16	22	24	18	18	15	16	21	23
Feb	19	18	12	14	19	21	19	18	12	14	19	21
Mar	12	10	9	8	11	13	12	10	9	8	10	12
Apr	6	5	8	5	6	6	5	4	6	4	4	4
May	6	6	8	6	6	6	5	5	6	4	4	5
Jun	7	6	7	6	7	8	5	5	5	4	5	6
Jul	5	5	6	5	6	7	4	4	5	3	4	5
Aug	4	4	5	4	5	6	3	3	4	3	4	4
Sep	3	3	4	3	4	5	2	2	3	2	3	4
Oct	4	3	5	3	4	4	3	3	4	2	3	3
Nov	11	9	8	7	10	12	11	9	8	7	10	11
Dec	21	19	15	14	20	22	21	19	15	14	20	22

NOTE: Includes Holidays and Weekends.

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION(S)
REGARDING
RIGHT OF ENTRY/WORK LIMITS

NH 0100(105)419, PCN 01V5
MINNEHAHA COUNTY

AUGUST 24, 2016

All right of way and/or right of entry for this project has been secured or will be secured prior to the day of the letting, **except for those parcels listed below.** The contractor's work limits shall be confined to the area within the existing right of way for the parcels listed in the table below. The Region Engineer will notify the contractor of the date and time when work outside of the existing right of way may proceed. The anticipated possession date(s) are listed in the table below.

PARCEL	OWNER	ANTICIPATED POSSESSION DATE
88, 89, 89A, 94, 94A, 96, 97, A1	Northern States Power Company	9/21/16
90, 95, 98	Elis & Eastern Company	9/21/16

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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
SUBLETTING OF CONTRACT

PROJECT NH 0100(105)419; PCN 01V5
MINNEHAHA COUNTY

AUGUST 19, 2016

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

The Contractor will be permitted to sublet up to 70 percent of the contract amount, based on the contract unit prices, but shall perform work amounting to not less than 30 percent of the total contract amount with his own organization.

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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION FOR ON-THE-JOB TRAINING PROGRAM

MARCH 10, 2016

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

PURPOSE

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

INTRODUCTION

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

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

SELECTION OF TRAINING PROGRAM

A. The minimum length and type of training for each classification will be as established in the training program selected by the Contractor and approved by the South Dakota Department of Transportation (Department or SDDOT) and the Federal Highway Administration (FHWA).

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

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

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

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

RECRUITMENT AND SELECTION PROCEDURES

A. Prerequisite for Trainees

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

2. No person shall be employed as a trainee in any classification in which that person has successfully completed a training course leading to journeyworker status or in which the individual has been employed as a journeyworker. The Contractor should satisfy this requirement by including appropriate questions in the employee application or by other suitable means. Regardless of the method used, the Contractor's records should document the findings in each case.

B. Licenses

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

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

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

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

C. Recruitment

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

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

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

D. Selection

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

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

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

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

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

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

DEPARTMENT RESPONSIBILITES

The Department (Civil Rights office):

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

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

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

CONTRACTOR RESPONSIBILITIES

The Contractor:

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

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

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

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

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

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

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

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

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

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

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

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

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

ADDITIONAL APPLICABLE PROVISIONS

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

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

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

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

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

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

WAGE RATES

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

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

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

BASIS OF PAYMENT

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

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

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

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

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

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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION REGARDING
SECTION 404 OF
THE CLEAN WATER ACT

NH 0100(105)419, PCN 01V5
MINNEHAHA COUNTY

AUGUST 24, 2016
NATIONWIDE PERMIT NO NWO-2014-0021-PIE

The above referenced project is authorized by the Department of the Army Individual Permit NWO-2013-1283-PIE.

This Individual Permit verification will be valid until February 28, 2017.

The following general condition and special conditions must be adhered to in order for this authorization to be valid:

Please refer to the attached ***Department of the Army Permit NWO-2014-0021-PIE.***

The above authorization permits placement of fill in the drainage crossings or wetlands noted below:

Drainage Crossing(s) Permanent:

Sta. 38+30 to 38+85 Tributary to The Big Sioux River

*** * * ***

DEPARTMENT OF THE ARMY PERMIT

Permittee: **South Dakota Department of Transportation – Kevin Marton**

Permit No.: **NWO 2014-0021-PIE – Phase II**

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 applicant is permitted to fill 1.6 acres of slope wetland and 244 linear feet of intermittent stream channel located within two slope wetland systems which flow to the Big Sioux River. The permitted fill activity will occur as part of the construction of Phase II of the Northern Segment of South Dakota Highway 100 (PCN 00T7). The project will construct a new six-lane regional arterial roadway between Maple Street and Rice Street of the east side of the City of Sioux Falls. To compensate for unavoidable wetland impacts the permitted activity will include the purchase of wetland mitigation credits (23.4 FCU) from a Corps sponsored wetland mitigation bank located within the lower Big Sioux River watershed. The work impacting Waters of the United States shall be completed as described in the attached drawings which are incorporated in and made part of this permit.

Project Location:

The project is located in waters of the United States in Section 6, Township 101 North, Range 48 West and Section 31/36 Township 102 North, Range 48 West, Minnehaha County, South Dakota.

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on **August 3, 2019**. 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 or transfer ownership of the mitigation area 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. A conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as a special condition to this permit. For your convenience, a copy of the certification is attached.

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 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).

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

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

2. Limits of this authorization.

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

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

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

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

_____ _____

(PERMITTEE) *(DATE)*

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

JOHN W. HENDERSON

_____ _____*(DISTRICT*

COMMANDER) *(DATE)*

Colonel, Corps of Engineers

By:_____

STEVEN E. NAYLOR, REGULATORY PROGRAM MANAGER, 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)*

*U.S. GPO: 1988-520-324

DA Permit

No. NWO 2014-0021-PIE – Phase II
South Dakota Department of Transportation – Kevin Marton
Phase II Northern Segment of South Dakota Highway 100
Wetlands abutting unnamed tributary to the Big Sioux River

Special Conditions

a. After a detailed and careful review of all of 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. All construction debris will be disposed of on land in such a manner that it cannot enter a regulated waterway or wetland.

c. Equipment for handling and conveying materials during construction shall be operated to prevent dumping or spilling the materials into regulated wetlands except as approved herein.

d. During construction and subsequent maintenance operations, 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 regulated wetlands and that precautions be taken to prevent entry of these materials into wetlands. All temporary storage facilities for petroleum products, other fuels, and chemicals must be located and protected to prevent accidental spills.

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

f. The clearing of vegetation will be limited to that which is absolutely necessary for construction of the project. Disturbance to the work areas shall be minimized by limiting the working pad surface areas and maintaining the existing vegetation as much as possible.

g. All earthwork operations in uplands will be carried out in such a manner that sediment runoff and soil erosion to the regulated wetlands are controlled.

h. Except as approved herein, all surplus 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 will be taken to insure that the material cannot enter the watercourse through any other means.

i. Temporary erosion and sediment controls shall be left in place until such time as disturbed areas are stabilized and restored.

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.

j. 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.

k. Wetland mitigation (23.4 Function Credit Units) shall be purchased from a Corps sponsored wetland mitigation bank located with the Lower Big Sioux River service area prior to the initiation of work. The Corps shall be provided receipt of the wetland credit purchase within 14 days of the transaction.

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION REGARDING RAILROAD INSURANCE REQUIREMENTS FOR
ELLIS & EASTERN COMPANY

NH 0100(105)419, PCN 01V5, MINNEHAHA COUNTY

HWY 100(VETERANS PARKWAY) FROM
MAPLE STREET TO RICE STREET
CROSSING 186706M @ RR MP 53.27

July 11, 2016

Prior to commencing any work in the vicinity of the railroad property on this project, the successful contractor will provide and maintain in effect insurance covering all of the work and services to be performed by the Contractor and each of its subcontractors in the coverages and minimum amounts as noted below:

(1) Railroad Protective Liability: The **Ellis & Eastern Company will be the Named Insured** for bodily injury and property damage of $2,000,000 per occurrence and $6,000,000 in the aggregate.

(2) Workers' Compensation Insurance: As required under the South Dakota Workmen's Compensation Law.

(3) Commercial General Liability: For public liability, personal injury and property damage, as well as Contractual Liability in the amount of $2,000,000 per occurrence, with an aggregate of $4,000,000.

(4) Automobile Liability: For bodily injury and property damage of at least $1,000,000 combined single limit or the equivalent covering any and all vehicles owned or hired and used in performing services.

Insurances must provide for coverage of incidents occurring within fifty (50) feet of the railroad track, and any provision to the contrary in the insurance policy must be specifically deleted.

POLICY & CERTIFICATE OF INSURANCE

The successful contractor will issue to the following Railroad a Certificate of Insurance evidencing the issuance of insurance coverage as prescribed in 2, 3 and 4 above, **plus** the original Railroad Protective Liability insurance policy, and certify that the Railroad will be given not less than 30 days written notice prior to any material change, substitution or cancellation prior to normal expiration dates. Cancellation expiration of any of said policies of insurance will not preclude Railroad from recovery there under for any liability arising under this contract. Certificate of Insurance and Railroad Protective Liability insurance policy to be issued to:

Ellis & Eastern Company
1500 N. Sweetman Place
PO Box 84140
Sioux Falls, South Dakota 57107

The contractor will submit the original policy and Certificate of Insurance to the Railroad at the following address:

Mr. Jon Mulloy
Vice President/General Manager
Ellis & Eastern Company
PO Box 84140
Sioux Falls, South Dakota 57118
Telephone Number 605-357-6075
Fax Number 605-334-6221

with a certificate for all insurances sent to **Travis Dressen, Sioux Falls Area Engineer, 5316 W. 60th St. N., Sioux Falls, South Dakota 57107, telephone number 605-367-5680.**

The successful contractor will not be granted permission to proceed with any work on, over, or near railroad property (at a minimum of 50 feet from centerline of any track) until the contractor has been notified by the Railroad that the required insurances have been approved and documentation of approval has been provided to the Sioux Falls Area Engineer.

All costs associated with these insurance requirements, including increasing policy limits, when required, will be incidental to the bid item RAILROAD PROTECTIVE INSURANCE.

It is mutually understood and agreed that the purchase of insurance will not in any way limit the liability of the Contractor to the Railroad.

Failure to obtain the required insurances and approvals prior to working on, over, or near Railroad property will result in suspension of all work until required insurances are obtained and approved.

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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION REGARDING WORKING ON RAILROAD PROPERTY FOR
ELLIS & EASTERN COMPANY

NH 0100(105)419, PCN 01V5, MINNEHAHA COUNTY

HWY 100(VETERANS PARKWAY) FROM
MAPLE STREET TO RICE STREET
CROSSING 186706M @ RR MP 53.27

July 11, 2016

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(1) REQUIREMENTS OF THE CONTRACTOR IN RELATION TO THE PROTECTION OF THE RAILROAD PROPERTY AND OPERATIONS FROM HAZARD DUE TO CONSTRUCTION OPERATIONS.

The Contractor is to contact Bill Schmidt, Operations Superintendent, Ellis & Eastern Company, PO Box 84140, Sioux Falls, South Dakota, 57118, cell phone #605-728-2966, at least five working days in advance whenever it is to enter the Railroad right-of-way. However, a **thirty day** notice is required before beginning of project.

Construction activity that is within 25 feet laterally of centerline of track and/or at any distance vertically from top of rail of said track within 50 feet laterally of the centerline of track may require flagging and/or a protective train order, issued by the Railroad, for each train passing through or affected by said construction. **The Contractor's work schedule will be coordinated with the State and Railroad Representatives.**

Contractor will request a train schedule and will not be within 25 feet laterally and/or at any distance vertically of centerline of track when trains are present. Contractor's work or activity will not interfere with or endanger Railroad operations or cause damage to Railroad property.

Railroad flag protection may be required at any time the Railroad Representative believes that it is necessary to safeguard Railroad's operations and property.

In the event a Railroad Representative is required to flag, the Railroad is to submit the billings for flagging directly to the **Sioux Falls Area Engineer, Travis Dressen, 5316 W. 60th Street N., Sioux Falls, SD 57107.** Contractor is to notify Railroad of billing requirement. Flagging will be paid for by the State.

(2) REQUIREMENTS FOR CONTRACTOR WORKING ON RAILROAD RIGHT-OF-WAY.

a. Absolutely no piling of construction materials or any other material, including dirt, sand, etc within 25 feet of center of track or on property of the Railroad not covered by Construction Easement or Contractor's Permit/Lease.

b. No construction will be allowed within 25 feet of center of any track unless authorized by the Railroad Representative and shown on Plan approved by the Railroad. This includes any excavation, slope encroachment and driving of sheet piles.

c. No change will be made to "Construction Plans" without approval by all parties involved. Approved revised plan will be furnished to all parties prior to implementation of changes.

d. No vehicles or machines will remain unattended within 25 feet from center of track.

e. Crossing of any Railroad track must be done at approved locations and must be full depth timbers, rubber, etc. Any equipment with steel wheels, lugs, or tracks must not cross steel rails without aid of rubber tires or other approved protection.

f. All temporary construction crossings must be covered by a "Private Roadway & Crossing Agreement", and must be barricaded when not in use. Installation of temporary crossing is to be coordinated with Railroad. Requests for temporary construction crossings are to be directed to the **Railroad.**

g. Contractor will incur all costs for any track work made necessary due to his construction operations, including but not limited to costs for temporary construction crossings and/or repair of damaged track or crossings.

h. Flagging protection may be required when equipment crosses or is working within 25 feet from center of track.

i. Contractor must furnish details on how he will perform work that will affect existing drainage and/or possible fouling of track ballast as well as **removal of overhead bridges/structure**.

j. Contractor's approved insurance must be in effect prior to entry onto Railroad right-of-way and during entire project.

k. All permits and Agreements must be in effect, payments made, and insurance policies received prior to entering Railroad right-of-way.

l. Important - Disregard of any of these items will result in Contractor being shut down for a minimum of 48 hours on Railroad right-of-way while infraction is investigated. Based on the findings of the investigation, it will be determined if the Contractor will be allowed to work on Railroad right-of-way in the future.

(3) <u>RIGHT OF ENTRY OF THE CONTRACTOR ON THE RAILROAD'S RIGHT-OF-WAY</u>

Right of Entry will not be granted by either the Railroad Representative or State until the Contractor has completed the following:

a. Contractor has provided the Railroad Protective Liability Insurance Policy to the Railroad and furnished a certificate of said insurance to the State.

b. Contractor has been notified that said insurance is approved by the Railroad.

c. Contractor has furnished a certificate of insurance for Commercial General Liability, Worker's Compensation Insurance, and Automobile Liability to the Railroad and State.

d. Contractor has completed satisfactory arrangements with Railroad Representative for progress of work without danger to train operations, without unnecessary interruption to train movements and for flagging protection if necessary.

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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
CONTRACTOR FURNISHED MIX DESIGN
FOR PCC PAVEMENT

AUGUST 15, 2016

This work consists of establishing the mix design and acceptance criteria for Portland Cement Concrete Pavement (PCCP) of sufficient quality to serve the purpose for which the concrete use 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 Acceptance:** The Contractor shall design and the Contractor shall be responsible for the performance, production, and composition of all concrete mixes used in the PCC pavement.

   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 were the Contractor utilizes slip form paving equipment, the following requirements shall apply:

   1. **Mix Design Requirements:** The mix proportions selected shall produce concrete that is sufficiently workable and finishable for all uses intended. All mix designs shall be based off of aggregate specific gravities at saturated surface dry (SSD) condition. All mix designs shall conform to the following requirements.

      a. **Combined Aggregate:** 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.

b. **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.

c. **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.

d. **Water/Cementitious Material Ratio:** The mix design shall establish a maximum water/cementitious material ratio, which shall not exceed 0.42 pounds/pounds.

e. **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.

2. **Laboratory Trial Batch Requirements:** Satisfactory performance of the proposed mix design shall be verified by laboratory tests on trial batches. The trial batches must be performed by an approved testing facility approved by the Department's Concrete Engineer. An on-site inspection of mix design procedures and equipment may be required. Trial batches shall be conducted in accordance with the American Concrete Institute Publication 211.1, ASTM C192 and the following:

   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. **Entrained Air content:** The volumetrics of the mix design shall be based on 6.5% 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.

e. **Trial Batches:** A minimum of four trial batches with different proportions shall be required. Of the minimum four trial batches, two each shall be made at different proportions of aggregates. In addition, each trial batch shall have a minimum of two trial batches at different water/cementitious material ratios or different cement contents. 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 material ratio shall be at least a 0.02 change. A different cement content change shall be an addition or subtraction of at least 20 pounds of cementitious materials.

   The Contractor shall furnish the results of the trial batches including all batched weights, 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) and aggregate quality results to the Engineer at the time the proposed mix design is submitted for verification.

3. **Laboratory Trial Batch Exception:** A concrete mix design that previously has been allowed for use under this provision will be considered for approval if: 1) all proportions are unchanged from those previously used, 2) current aggregate samples show the materials to be used are the same as those used for the original mix design, and 3) the previous project's test results were satisfactory for strength, workability, and performance. The Contractor shall submit aggregate samples for gradation checks along

with the request to use a previously approved mix design a minimum of 40 calendar days prior to the anticipated use in field production.

The Contractor shall submit all modifications to a previously approved mix design including, but not limited to, changes of admixtures and aggregate percentage splits to the Department's Concrete Engineer on a DOT-24 form for approval. Changes in brand name of admixtures and cementitious materials may be made by submitting a revised DOT-24 to the Department's Concrete Engineer for approval; a laboratory trial batch may not be necessary provided the material is the same ASTM designated type of material. If required by the Engineer, the Contractor shall produce a laboratory trial batch prior to use in field production.

4. **Laboratory Trial Batch Verification:** The mix design shall be recorded on a DOT-24 and submitted to the Engineer along with all data, test results, and necessary supporting documentation. Approval of mix designs shall not relieve the Contractor from the responsibility for furnishing a concrete mix that meets specification and workability requirements.

   Mix design verification by the Department will not commence until the Department has received all of the necessary samples, information from lab trials, aggregate tests, and the Contractor's trial batch results having obtained 4000 psi at 7 days or 5200 psi at 28 days. The Contractor shall submit all necessary samples, information for lab trials, aggregate tests and trial batch results for mix design verification a minimum of 40 calendar days prior to the anticipated use in field production.

   The Department will verify one of the submitted mix design trials. The Department's verification can be no more than 10% less than the Contractor's submitted strength. If the Department's verification does not match the Contractor's submittal the first time, the Department will perform a second verification at the Contractor's request. The costs involved with any further mix design verifications will be at the Contractor's expense.

B. **Field Acceptance Criteria:** The Contractor shall produce a concrete mix with a uniform consistency. The Contractor shall produce a concrete paving mix in accordance with the approved mix design and the following:

1. **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.

2. **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 approved air-entraining admixture.

3. **Water/Cementitious Ratio:** The concrete shall have a 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.

4. **Compressive Strength:** Concrete shall exhibit a minimum compressive strength of 4000 psi at 28 days.

5. **Determination of Field 28 Day Compressive Strength and Acceptance Criteria:** The Engineer will be responsible for the sampling, preparing, curing, and testing of all concrete cylinders for concrete compressive strength in accordance with the Department's Materials Manual. The 28 day compressive strength shall be determined in accordance with Section 460.3 B.

6. **Mix Design Modifications:** The Contractor shall submit all modifications to the approved mix design including, but not limited to, changes of admixtures and aggregate percentage splits to the Department's Concrete Engineer on a DOT-24 form for approval. Changes in brand name of admixtures and cementitious materials may be made by submitting a revised DOT-24 to the Department's Concrete Engineer for approval; a verification batch may not be necessary provided the material is the same ASTM designated type of material. Dosage changes to admixtures may be made without submitting a DOT-24. If required by the Engineer, the Contractor shall produce a verification batch prior to resuming field production.

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

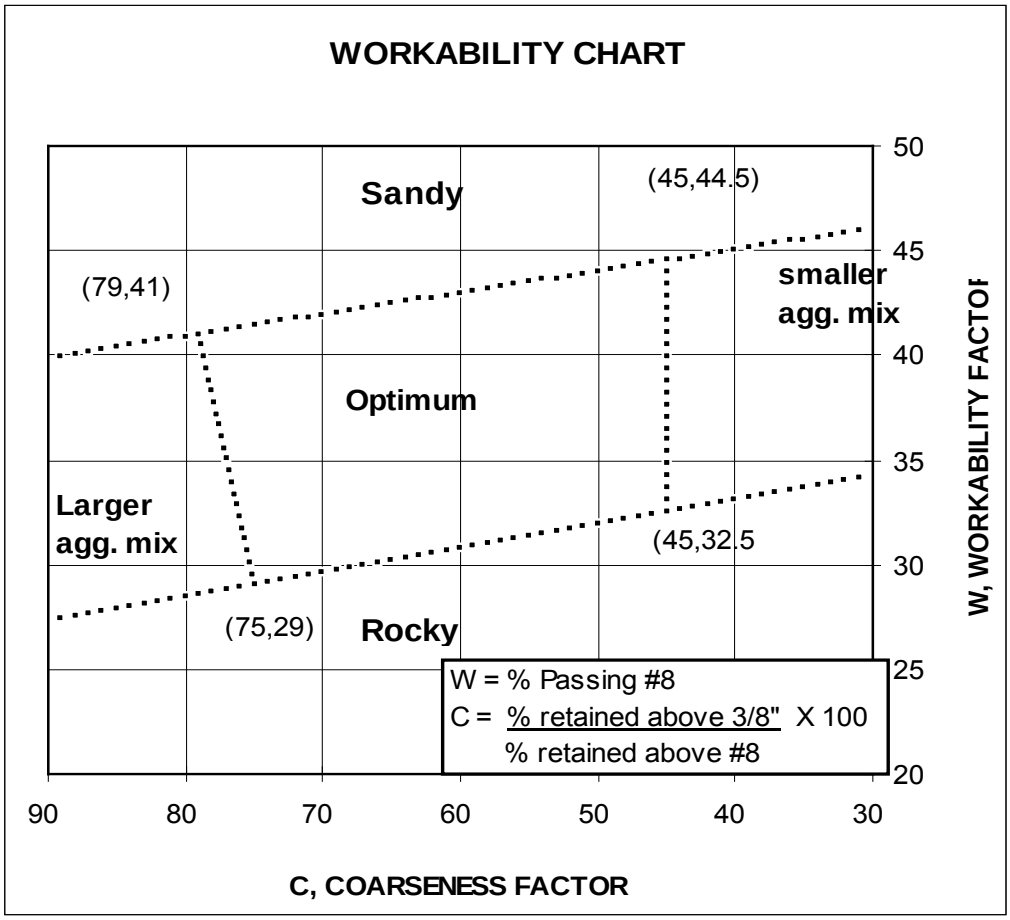


Chart B

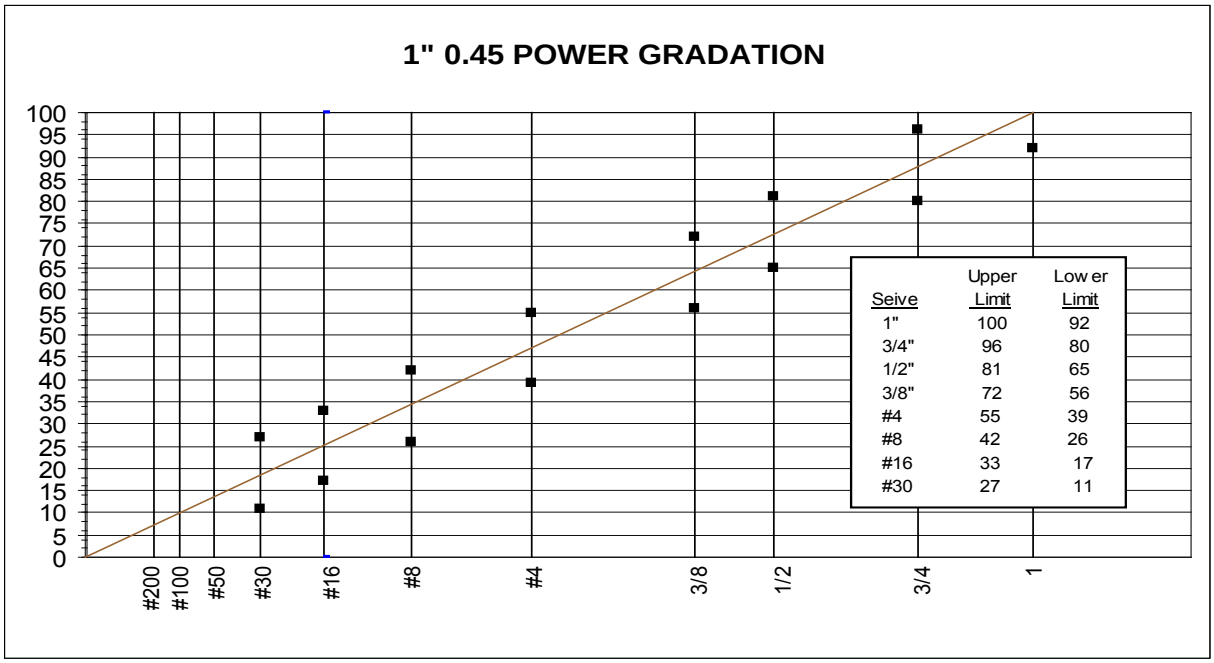
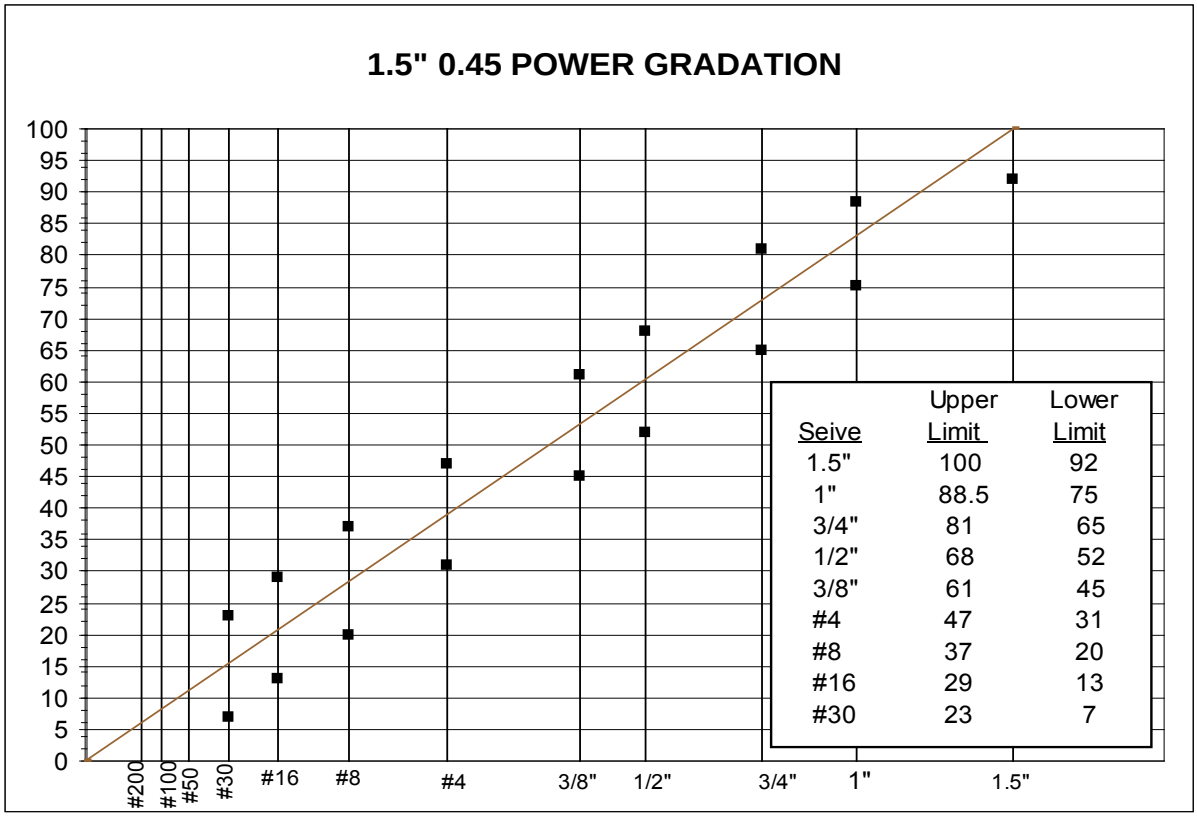


Chart C



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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
CONTRACTOR STAKING
WITH MACHINE CONTROL GRADING OPTION

PROJECT NH 0100(105)419; PCN 01V5
MINNEHAHA COUNTY

AUGUST 19, 2016

Delete Section 5.8 of the specifications and insert the following:

SECTION 5.8
CONSTRUCTION STAKES, LINES AND GRADES
CONTRACTOR GRADE STAKING

A. DESCRIPTION

The Contractor will perform all construction staking. The Contractor may elect to use grading equipment with an automated machine control system for Machine Control Grading (MCG) provided the equipment and methods used provide the same results in the finished work as conventional construction staking. The Engineer may require the Contractor to revert to conventional staking methods for all or part of the work at any point during construction if, in the Engineer's own opinion, the MCG produces unacceptable results.

The Department will not allow the Contractor to use MCG as a substitute for conventional construction staking for slope staking and slope stake referencing, paving hub staking, structure staking, miscellaneous staking, or final cross section surveying.

The staking work includes, but is not limited to, establishing or re-establishing the project centerline; establishing control points and benchmarks as needed; setting additional benchmarks as needed; taking original and final cross sections of all Contractor secured borrow sources and State designated borrow sources; taking cross sections of all topsoil stockpiles; taking final cross sections for earthwork quantities at the slope stake stations and plus stations or by radial surveying methods; and staking right-of-way, easements, and fence.

The Contractor will perform all construction layout and reference staking necessary for the accurate control and completion of all structures, grading, paving, drainage, median crossovers, signing, pavement marking, permanent benchmarks, detours, fence, and all other appurtenances required for the complete construction and acceptance of the work. The layout will include, but is not limited to, staking clearing line, slope staking and slope stake referencing, grade staking (blue tops), paving hub staking, structure staking, and performing the miscellaneous staking as described in the plans and in this specification.

The Department has established horizontal and vertical control as shown on the plans. Each horizontal and vertical control point will be preserved or reset out of the work limits and available during and after construction is complete. Prior to the Department's final acceptance of the project, the Contractor will replace or reset any control that is disturbed during the construction of the project. The Contractor will provide the Department a list of the in-place control points, including coordinates and elevations relevant to the project control, at the end of the project.

The Department will provide a MCG packet to all prospective bidders consisting of a XML file containing the original surface Digital Terrain Model (DTM) and 4 design files for each new alignment on the project. The electronic design files will include, a XML file containing mainline alignment data, a XML file containing mainline design surface DTM, a DGN file containing triangles for mainline surface, and a DWG file containing triangles for mainline surface. The MCG packet will be available on the Department's electronic bid letting website when the project is advertised for bid letting.

The Contractor will convert the electronic information provided by the Department into the format required by the Contractor's MCG system. The Department makes no guarantee the information provided is directly compatible with the Contractor's MCG system.

The information shown in the plans will govern over the provided electronic information. The Contractor assumes the risk of error if the information is used for any purpose for which the information was not intended. The Contractor assumes all risk of any assumptions made regarding the electronic information.

The Contractor bears all costs, including but not limited to the cost of actual reconstruction of work, that may be incurred due to errors in application of MCG techniques. Grade elevation errors, rework resulting from errors or failures of the MCG system, and associated quantity adjustments resulting from the Contractor's activities are at no cost to the Department. Delays due to late submittals or satellite reception of signals to operate the MCG system will not result in adjustment to any contract unit prices or be justification for granting contract extensions.

The electronic information is not to be considered a representation of actual conditions to be encountered during construction. Providing the Contractor this information does not relieve the Contractor from the responsibility of making an investigation of conditions to be encountered, including but not limited to, site visits and basing the bid on information obtained from these investigations and the Contractor's professional interpretations and judgment. The Contractor assumes the risk of error if the information is used for any purposes for which the information was not intended. Any assumptions the Contractor makes from this electronic information or manipulation of the electronic information is at the Contractor's own risk.

The Contractor will perform the staking work in accordance with the Department's Survey Manual, except as modified by this specification.

If the Contractor elects to use MCG, the Contractor will submit a comprehensive written MCG work plan to the Engineer for review prior to scheduling the preconstruction meeting. The Department will review the plan to determine if the plan conforms to the requirements of the contract.

The Contractor will include in the MCG work plan how MCG will be incorporated into other technologies used on the project. The Contractor's MCG work plan will include, but is not limited to, the following:

1. A designation of which portions of the subgrade will be completed using MCG and which portions, if any, will be completed using conventional subgrade staking methods.
2. A description of the manufacturer, model, and software version of all MCG equipment.
3. Information on the qualifications of the Contractor's staff including, but not limited to, formal training and field experience.
4. A designation of a single person as the primary contact for MCG technology issues.
5. A description of site calibration procedures.
6. A description of site calibration and checking frequency and procedures for documenting site calibration and checking.
7. A description of the Contractor's quality control procedures including procedures for checking, mechanical calibration, and maintenance of equipment.
8. A description of the frequency and types of checks the Contractor will perform to ensure the constructed subgrade conforms to the contract requirements.

B. MATERIALS

The Contractor will furnish all staking materials of adequate quality for the purpose intended including all stakes, stake chasers, paint, field note books, and all other materials and equipment necessary to perform the required work.

C. CONSTRUCTION REQUIREMENTS

1. **General:** The Department will set control points. The Contractor is responsible for the preservation of ties and references to all control points necessary for the accurate re-establishment of all base lines and centerlines shown in the plans, whether established by the Contractor or found on or adjacent to the project. The Department will also establish benchmark elevations. It is the responsibility of the Contractor to verify the accuracy of the benchmark elevations prior to use on the project.

   The Engineer may check the accuracy and control of the Contractor's survey, staking work, and MCG at any time. The checks performed by the Engineer will not relieve the Contractor of the responsibility for the accuracy of the survey layout or the construction work. If the random checks show the grade is out of tolerance, the Engineer may require the Contractor to set additional stakes, grade stakes and paving hub stakes at the discretion of the Engineer, at no additional cost to the Department. If the Engineer orders additional stakes, the Contractor will perform the additional staking until the Contractor can show the staking operations achieve the specified grade tolerances.

   Prior to any project staking, the Contractor will run a level circuit to check the plan benchmarks the full length of the project. At structure sites, the circuit will include two benchmarks, one on each end of the structure.

   The Contractor will perform all staking and MCG work under the supervision of a qualified surveyor or engineer who is experienced and competent in road and bridge construction surveying, staking, and MCG procedures. The surveyor or engineer will be available to review work, resolve problems, and make decisions in a timely manner. A crew chief, competent to perform all required surveying duties, will supervise the staking in the absence of the surveyor or engineer from the project. The Contractor will submit the qualifications and work experience history of the surveyor or engineer who will supervise the construction survey and MCG work to the Engineer for review at least 14 calendar days prior to beginning the staking or MCG work.

   a. **Conventional Construction Staking:** The Contractor will also submit the proposed starting date of the staking and the anticipated surveying work schedule.

The Contractor will furnish, set, and properly reference all stakes, references, lines, grades, and batter boards required. Minimum reference notations will be for type, location, and alignment (when there are multiple alignments in the same area). The Contractor will perform the survey and staking work in a manner consistent with standard engineering practices and approved by the Engineer.

The Contractor is solely responsible for the accuracy of the survey and staking work. The Contractor will notify the Engineer of any errors and discrepancies found in previous surveys, plans, specifications, or special provisions prior to proceeding with the survey work.

The Contractor will be responsible for the supervision of the construction staking personnel. The Contractor will correct any deficient survey or staking work that results in construction errors at no additional cost to the Department.

The Contractor will keep field notes in conventional handwritten notebooks or in a computerized form acceptable to the Engineer in a clear, orderly, and neat manner. The notebooks will become the property of the Department upon completion of the project. The notebooks will provide enough information such that quantity measurements are verifiable by the Department. Field notes are subject to inspection by the Engineer at any time.

The Contractor is required to submit any remaining required quantity calculations and notes to the Engineer no later than 60 calendar days after completion of the survey and staking work.

The Contractor will furnish stakes and wooden hubs or steel pins of sufficient length to provide a solid set in the ground. The Contractor will place half-length lath stakes or stake chasers or an alternate, acceptable to the Engineer, adjacent to or on the blue top hubs for guards. The Contractor will place guard stakes or an alternate, acceptable to the Engineer, adjacent to the paving hub with stationing and a grade to the top of slab written on the stake. Stakes set not meeting these requirements will be reset at the Contractors expense. The Contractor will replace stakes and paving hubs damaged, destroyed, or made unusable at no additional expense to the Department.

b. **Machine Control Grading:** If the Contractor elects to use MCG, the Contractor will confirm the design surface DTM agrees with the contract plans, make adjustments to the design surface DTM as approved by the Engineer, and will maintain the design surface DTM for all areas of the project where MCG is used. The Contractor will also provide constructed

surface DTM information to the Department in LandXML or other Engineer approved format.

The Contractor will notify the Department of any errors or discrepancies in Department provided information. The Department will determine what revisions may be required. The Department will revise the contract plans, if necessary, to address errors or discrepancies the Contractor identifies. The Department will provide the best available information related to those contract plan revisions.

The Contractor will revise the design surface DTM as required to support construction operations and to reflect any contract plan revisions the Department makes. The Contractor will perform checks to confirm the revised design surface DTM agrees with the contract plan revisions. The Contractor will provide a copy of the resultant revised design surface DTM to the Engineer in LandXML. The Department will pay for costs incurred to incorporate contract plan revisions as extra work.

The Contractor will designate a set of control points, including a total of at least 6 horizontal and vertical points or 2 per mile, whichever is greater, for site calibration for the portion of the project employing MCG. The Contractor will incorporate the Department provided control framework used for the original survey and design.

The Contractor will calibrate the site by determining the parameters governing the transformation of satellite information into the project coordinate system. The Contractor will use the control points provided by the Department for the initial site calibration. The Contractor will provide the resulting site calibration file to the Engineer before beginning subgrade construction.

In addition to the site calibration, the Contractor will perform site calibration checks at individual control points not used in the initial site calibration. At a minimum, the Contractor will check the calibration at the start of each day as described in the contractor's MCG work plan. The Contractor will report out-of-tolerance checks to the Engineer. The measured position must match the established position at each individual control point within the horizontal tolerance of ±0.1 foot and the vertical tolerance of ±0.05 foot.

The Contractor will construct the subgrade as the Contractor’s MCG work plan indicates and in accordance with the contract requirements. The Contractor will update the plan as necessary during construction of the subgrade. The Contractor will perform periodic sensor calibrations, checks for blade wear, and other routine adjustments as required to ensure the final subgrade conforms to the contract requirements.

2. **Slope Staking:** The Contractor will set slope stakes at the catch points. The slope stake reference hubs will be offset behind the slope stake. The Contractor will place slope stake reference hubs behind the slope stakes at a set distance, at the right-of-way line, or at the easement line, as approved by the Engineer.

   The slope stakes will be set at 100-foot intervals on tangents and at 50-foot intervals in horizontal curves. The horizontal tolerance is ±0.2 foot and the vertical tolerance is ±0.1 foot. The Contractor will reference the subgrade shoulders with slope stake reference hubs set with a horizontal tolerance of ±0.2 foot and a vertical tolerance of ±0.05 foot.

   The Contractor will retain the slope stakes and hub references until the final cross sections are completed and accepted by the Department.

   The Department will provide slope stake notes.

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.

      The Department will provide grade staking (blue top) notes.

      The Contractor will retain the shoulder blue tops and guards through placement of the base course 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 1000 foot intervals on mainline or at least one location for sections less than 1000 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 Department provided grade staking (blue top) notes, plan typical sections, and cross sections. The Contractor will use these stakes to check the accuracy of the MCG during construction. The Contractor will notify the Engineer at least 3 calendar days before making subgrade checks to allow the Engineer to observe the process.

   The Contractor will ensure at least four of any five consecutive conventional construction staking grade finishing stakes (blue tops) locations are within the horizontal and vertical tolerances specified in Section 120.3. The Contractor will notify the Engineer if more than one of any five consecutive conventional construction staking grade finishing stakes (blue tops) locations is not within the horizontal or vertical tolerance.

   The Department may conduct periodic independent subgrade checks. The Department will notify the Contractor if any individual check is not within the horizontal or vertical tolerance.

c. **Paving Hub Staking:** When paving hub staking is required, the Contractor will set paving hubs at a maximum longitudinal distance of double the transverse joint spacing. The paving contractor may require a closer spacing. The horizontal and vertical tolerance for the paving hubs or grade nails is ± 0.02'.

The Department will not provide paving hub notes. The Contractor is responsible for generating the paving hub grades from the blue top notes.

4. **Structure Staking:** The Contractor will stake and reference bridges and box culverts to ensure adequate horizontal and vertical control of the substructure and superstructure components. The Contractor will stake and reference the bridge chord or the bridge tangent and centerline of each pier, bent, and abutments for bridges. The Contractor will stake the box culvert centerline(s) in both longitudinal and transverse directions.

   When the work requires bridge rehabilitation work, the structure staking will include all surveying and staking required for completion of the project. The staking work may include, but not be limited to, setting the rail for the deck overlay. The plans will indicate the grade line for the deck overlay; and if necessary, the Engineer may modify the grade line.

   When staking retaining walls (except Type C), the Contractor will survey and record the original ground profile along the front face of the proposed wall at the elevation break points. The Contractor will supply the wall designer the original ground profile data prior to the wall designer performing the design. Set adequate stakes and references for horizontal and vertical control during construction.

   For structures and retaining walls, the horizontal tolerance is ±0.04 foot and vertical tolerance is ±0.02 foot.

   The Contractor is responsible for all notes required to stake structures including bridges, box culverts, and walls.

5. **Miscellaneous Staking:** Miscellaneous staking includes the following work:

   a. Approach road staking;
   b. Topsoil measurement and computation of quantities;
   c. Special ditch staking;
   d. Staking of signs, delineators, pavement markings, guardrail, curb & gutter, light poles, conduit, junction boxes, and related items (Staking is for all aspects, i.e. detours, temporary and permanent);
   e. Right-of-way staking including easement lines and fence post panels;
   f. Pipe and storm sewer staking including drop inlets, manholes, cattle passes, and related items. If additional pipe, storm sewer, drop inlets, manholes, or cattle passes are required which are not shown on the plans, the staking will be paid in accordance with the bid item Three Man Survey Crew;
   g. Mark limits of removal items (trees, foundations, curb & gutter, sidewalk, etc.);

h. Detours, roadway diversions, and crossovers (The Contractor will furnish all notes required.);
i. Final and original cross sections of Contractor and State furnished borrow pits and computations. The Contractor will perform earthwork computations by the average end area method;
j. Resetting horizontal and vertical control, if disturbed;
k. Approach slab and sleeper slab staking; and,
l. Staking of sidewalks and curb 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. **Three Man Survey Crew:** The use of the three-man survey crew is intended for surveying not included in the plan notes and this special provision. The Contractor may use a three man survey crew to perform additional survey work caused or required by the Department. The Engineer will use a written order to authorize the hourly three man survey crew item and describe the staking work required of the Contractor.

7. **Final Cross Section Survey:** Final Cross Section Survey includes the following work:

   Final earthwork (or terrain data) cross sections at the same intervals, stations, and plus stations as the slope stakes and computations 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.

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. **Three Man Survey Crew:** The Department will measure three man survey crew to the nearest 0.001 hour with the following restrictions:

   The use of a three-man survey crew 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 work. The Department will not include travel time for the survey crew in the measurement.

   The Contractor may use a two-man survey crew with the Engineer's prior approval. When a two-man survey crew is used, measurement for payment will be at 75 percent of the hours for a three-man crew. For example: 8 hours of two-man survey crew will result in 6 hours measured for payment as three-man survey crew time.

   The Contractor may use a one-man survey crew with the Engineer's prior approval. When a one-man survey crew is used, measurement for payment will be at 50 percent of the hours for a three-man crew. For example: 8 hours of a one-man survey crew will result in 4 hours measured for payment as three-man survey crew time.

   The Engineer will issue a DOT 75 ticket for the hours authorized for three-man survey crew.

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 may be decreased if the Contractor and Engineer agree to accept the plan unclassified excavation quantity for any or all earthwork balances.

E. BASIS OF PAYMENT

Payment for all of the 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. **Three Man Survey Crew:** The Department will pay three man survey crew 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.

* * * * *

STATE OF SOUTH DAKOTA
AGREEMENT TO SELL MATERIALS

DOT-44B
(06/2010)

Judy Roddel, Trustee of the Judy Roddel Trust, referred to in this Agreement as the "Owner" (whether one or more), for and in consideration of the mutual promises and agreements contained in this Agreement, the receipt and sufficiency of which is acknowledged, grants a **NON-EXCLUSIVE** option to the **State of South Dakota**, acting by and through its **Department of Transportation**, referred to in this Agreement as the "State," for the purpose of making the necessary tests for and purchasing borrow soil necessary for use in the construction, maintenance, and repair of highways. The Owner will sell, transfer, and convey to the State such material located in and upon the following described real property situated in Minnehaha County, South Dakota, more particularly described as follows, to wit:

> **Southeast Quarter of the Southeast Quarter of the Northeast Quarter (SE1/4 SE1/4 NE1/4), excluding the South 370' of Section Thirteen (13) - Township One Hundred One North (101N) - Range Forty-Nine West (49W) of the 5th P.M. Sioux Falls City unplatted, Minnehaha County, South Dakota**
>
> **and**
>
> **The South 370', excluding Lots H3, H4, H5, H6 and H7, of the Southeast Quarter of the Southeast Quarter of the Northeast Quarter (SE1/4 SE1/4 NE1/4) of Section Thirteen (13) - Township One Hundred One North (101N) - Range Forty-Nine West (49W) of the 5th P.M. Sioux Falls City unplatted, Minnehaha County, South Dakota**.

This Agreement is intended to allow the removal of **dirt**.

The term of this Agreement will be from **Januuary 21**, **2016**, to the completion of Project: **NH 0100(105), PCN 01V5 and IM 0909(75)402, PCN 00WN**.

The Owner agrees that the State, and any and all servants, agents, contractors, or workers authorized by the State, will have full and free right of ingress and egress from the public highway and will have the right to operate all necessary equipment on the real property described in this Agreement for any purpose allowed or required by this Agreement. The term "necessary equipment" will include equipment required to open the pit, produce materials, blend and mix with other materials, haul materials, service equipment, and restore the pit.

The State reserves the right to assign this Agreement to any party or parties performing the contracts for which the material will be required. Upon assignment of said Agreement, said party or parties will have all rights granted to the State under this Agreement and will assume all obligations of the State under this Agreement.

The State will pay to the Owner, from monies withheld from the Contractor, for material removed from said real property at the following rates, based on quantity:

First 0 – 10,000 cubic yards	$.30 (thirty) cents per cubic yard
Next 10,001 – 100,000 cubic yards	$.25 (twenty-five) cents per cubic yard
Over 100,000 cubic yard	$.20 (twenty) cents per cubic yard

The State will restore fencing disturbed by the State's operations under this Agreement to as good a condition as the fencing was in before work started. In the event a temporary fence is required around the pit to protect livestock, the State will erect such fence at the State's expense.

The State will operate the pit and will restore the affected area on completion of operations at the pit site in accordance with the General Provisions of "SOUTH DAKOTA DEPARTMENT of TRANSPORTATION STANDARD SPECIFICATIONS FOR ROADS AND BRIDGES" and the following:

1. The affected area will be restored for use as **cropland**.
2. Topsoil, to be stockpiled separately from the rest of the overburden, will be considered to consist of the upper **9** inches of natural soil.
3. At the completion of removal operations, the State will restore areas disturbed by the State's operations at the pit site with slopes created by material removal left **as shown in the pit design** or flatter.
4. Prior to the beginning of the borrow operations, the Owner or the Owner's representative, the State's Engineer, and the State's contractor will meet and discuss the limits of work and pit operations.
5. The State will pay a one (1) time payment in the amount of **$400.00** per acre per year for **an anticipated 1** year to cover loss of use of the real property.
6. The State will pay a one (1) time payment for crop damage at the rate of $**200.00** per acre; with a minimum payment of $200.00 should the area be less than an acre.
7. Seeding Options: Circle one of A, B, or C (Not applicable) (**Circle One**)
   A. The State will seed, mulch, and fertilize the disturbed area one (1) time only to permanent seed mixtures as shown in the plans; or
   B. The Owner will, after the State replaces the topsoil, re-vegetate or cultivate the area at a time and in a manner consistent with the Owner's farming operations and land use plan. The State will pay a one (1) time payment in the amount of _____ per acre to cover cost of such re-vegetation; or
   (C.) Not applicable.
8. The Owner will remain responsible for controlling all weeds.
9. Other conditions: (if none, enter "none")

   The State will remove all dirt from the property indicated above prior to any dirt removal from the borrow pit on the east side of Highway 100.

This Agreement will be binding on the State, the Owner, and the Owner's successors and assigns.

Owner(s):

Judy Roddel, Trustee

Judy Roddel, Trustee of the Judy Roddel Trust
7600 Pine Lake Drive
Sioux Falls, SD 57110
605-336-8164

Date: 1/25/2016

State of South Dakota
Department of Transportation

By: Joel J. Feller

Its: Chief Materials and Surfacing Engineer

Date: 2-22-2016

Approved as to Form:

William J. Sarin

Special Assistant Attorney General

ACKNOWLEDGMENTS FOLLOW

OWNER'S ACKNOWLEDGMENT

State of South Dakota)
:SS
County of Hughes)

On this the 25th day of January, 2016, before me, Joe Hyde, a notary public, personally appeared Judy Roddel, who acknowledged herself to be the Trustee of the Judy Roddel Trust, and that she, as such Trustee, being authorized so to do, executed the foregoing instrument in the capacity therein stated and for the purposes therein contained.

In witness whereof I hereunto set my hand and official seal.

Notary Public

(Notary Seal)

My Commission Expires: 1/22/2021

STATE ACKNOWLEDGMENT

STATE OF SOUTH DAKOTA)
:SS
COUNTY OF Hughes)

On this the 22nd day of February, 2016, before me, Benjamin J. Brown, a notary public, personally appeared Joe J. Feller, Chief Materials and Surfacing Engineer of the State of South Dakota, Department of Transportation, known to me or satisfactorily proven to be the person described in the foregoing instrument, and acknowledged that he executed the same in the capacity therein stated and for the purposes therein contained.

In witness whereof I hereunto set my hand and official seal.

[Notary Seal]

BENJAMIN J. BROWN
SEAL NOTARY PUBLIC SOUTH DAKOTA SEAL

Notary Public

My commission expires: 1/7/2020

Prepared by:
William J. Nevin
Special Assistant Attorney General
South Dakota Department of Transportation
700 E. Broadway Ave.
Pierre SD 57501-2586
Tel. (605) 773-3262

CERTIFICATE OF TRUSTEE

STATE OF SOUTH DAKOTA)
:SS
COUNTY OF Minnehaha)

Judy Roddel, being first sworn under oath, states as follows:

1. A trust instrument which established the Judy Roddel Trust was executed on December 2, 1997. This trust is still in existence.

2. I am the trustee named in this trust instrument.

3. The name and address of the trustee currently empowered to act under this trust instrument and any amendment to this trust agreement is:

   Judy Roddel
   7600 Pine Lake Drive
   Sioux Falls, SD 57110

4. This Certificate of Trust relates to real property in Minnehaha County, South Dakota, legally described as follows:

   Southeast Quarter of the Southeast Quarter of the Northeast Quarter (SE1/4 SE1/4 NE1/4), excluding the South 370' of Section Thirteen (13) - Township One Hundred One North (101N) - Range Forty-Nine West (49W) of the 5th P.M. Sioux Falls City unplatted, Minnehaha County, South Dakota

   and

   The South 370', excluding Lots H3, H4, H5, H6 and H7, of the Southeast Quarter of the Southeast Quarter of the Northeast Quarter (SE1/4 SE1/4 NE1/4) of Section Thirteen (13) - Township One Hundred One North (101N) - Range Forty-Nine West (49W) of the 5th P.M. Sioux Falls City unplatted, Minnehaha County, South Dakota

5. As trustee, I executed an agreement to allow the removal of dirt relating to this real property between Judy Roddel, as trustee, and the South Dakota Department of Transportation, dated _____.

6. I am empowered by the provisions of the trust to sell, convey, pledge, mortgage, lease, or transfer title to any interest in real property held in trust.

7. The trust has not been terminated or revoked.

8. The trust has not been amended to limit the power of the trustee to execute and deliver the instrument affecting an interest in real property described above.

9. The trust is not supervised by any court.

10. I do not have actual knowledge of any facts indicating that the trust is invalid.

11. The statements contained in this Certificate of Trust are true and correct and there are no other provisions in the trust instrument or amendments to it that limit the powers of the trustee to sell, convey, or transfer title to the real property described above.

Dated this 25th day of January, 2016.

Judy Roddel as Trustee of the Judy Roddel Trust

Judy Roddel, trustee
(Signature)

Date: 1/25/2016

ACKNOWLEDGMENT

STATE OF SOUTH DAKOTA)
:SS
COUNTY OF Minnehaha)

On this the 25th day of January, 2016, before me, [illegible], a notary public, personally appeared Judy Roddel, who acknowledged herself to be the Trustee of the Judy Roddel Trust, and that she, as such Trustee, being authorized so to do, executed the foregoing instrument for the purposes therein contained, by signing the name of the Trust by herself as Trustee.

In witness whereof I hereunto set my hand and official seal.

[illegible]
Notary Public

(Notary Seal)

My Commission Expires: [illegible]

STATE OF SOUTH DAKOTA
AGREEMENT TO SELL MATERIALS

DOT-44B
(06/2010)

Ronald G. Tysdal and Jean A. Tysdal as Trustees of the Ronald G and Jean A Tysdal Living Trust, referred to in this Agreement as the "Owner" (whether one or more), for and in consideration of the mutual promises and agreements contained in this Agreement, the receipt and sufficiency of which is acknowledged, grants a **NON-EXCLUSIVE** option to the **State of South Dakota**, acting by and through its **Department of Transportation**, referred to in this Agreement as the "State," for the purpose of making the necessary tests for and purchasing borrow soil necessary for use in the construction, maintenance, and repair of highways. The Owner will sell, transfer, and convey to the State such material located in and upon the following described real property situated in Minnehaha County, South Dakota, more particularly described as follows, to wit:

> **Southwest Quarter of the Southeast Quarter of the Northeast Quarter (SW1/4 SE1/4 NE1/4), excluding the South 370', of Section Thirteen (13) - Township One Hundred One North (101N)- Range Forty-Nine West (49W) of the 5th P.M, Sioux Falls City unplatted, Minnehaha Coutny, South Dakota**.

This Agreement is intended to allow the removal of **dirt**.

The term of this Agreement will be from **January 21**, **2016**, to the completion of Projects: **NH 0100(105), PCN 01V5 and IM 0909(75)402, PCN 00WN**.

The Owner agrees that the State, and any and all servants, agents, contractors, or workers authorized by the State, will have full and free right of ingress and egress from the public highway and will have the right to operate all necessary equipment on the real property described in this Agreement for any purpose allowed or required by this Agreement. The term "necessary equipment" will include equipment required to open the pit, produce materials, blend and mix with other materials, haul materials, service equipment, and restore the pit.

The State reserves the right to assign this Agreement to any party or parties performing the contracts for which the material will be required. Upon assignment of said Agreement, said party or parties will have all rights granted to the State under this Agreement and will assume all obligations of the State under this Agreement.

The State will pay to the Owner, from monies withheld from the Contractor, for material removed from said real property at the following rates, based on quantity:

First 0 – 10,000 cubic yards	$.30 (thirty) cents per cubic yard
Next 10,001 – 100,000 cubic yards	$.25 (twenty-five) cents per cubic yard
Over 100,000 cubic yard	$.20 (twenty) cents per cubic yard

The State will restore fencing disturbed by the State's operations under this Agreement to as good a condition as the fencing was in before work started. In the event a temporary fence is required around the pit to protect livestock, the State will erect such fence at the State's expense.

DOT Legal: WJN

The State will operate the pit and will restore the affected area on completion of operations at the pit site in accordance with the General Provisions of "SOUTH DAKOTA DEPARTMENT of TRANSPORTATION STANDARD SPECIFICATIONS FOR ROADS AND BRIDGES" and the following:

1. The affected area will be restored for use as **cropland or pasture depending on its initial use**.
2. Topsoil, to be stockpiled separately from the rest of the overburden, will be considered to consist of the upper **9** inches of natural soil.
3. At the completion of removal operations, the State will restore areas disturbed by the State's operations at the pit site with slopes created by material removal left **as shown in the pit design** or flatter.
4. Prior to the beginning of the borrow operations, the Owner or the Owner's representative, the State's Engineer, and the State's contractor will meet and discuss the limits of work and pit operations.
5. The State will pay a one (1) time payment in the amount of **$400.00 for cropland and $200.00 for pasture** per acre per year for **an anticipated 1** year to cover loss of use of the real property.
6. The State will pay a one (1) time payment for crop damage at the rate of $**200.00** per acre; with a minimum payment of $200.00 should the area be less than an acre.
7. Seeding Options: Circle one of A, B, or C (Not applicable) (**Circle One**)
   - (A.) The State will seed, mulch, and fertilize the disturbed area one (1) time only to permanent seed mixtures as shown in the plans; or
   - B. The Owner will, after the State replaces the topsoil, re-vegetate or cultivate the area at a time and in a manner consistent with the Owner's farming operations and land use plan. The State will pay a one (1) time payment in the amount of _____ per acre to cover cost of such re-vegetation; or
   - C. Not applicable.
8. The Owner will remain responsible for controlling all weeds.
9. Other conditions: (if none, enter "none")

   The State will remove all dirt from the property indicated above prior to any dirt removal from the borrow pit on the east side of Highway 100.

This Agreement will be binding on the State, the Owner, and the Owner's successors and assigns.

Owner(s):

Ronald G. Tysdal as Trustee of the Ronald G. and Jean A. Tysdal Living Trust
5800 East 6th Street
Sioux Falls, SD 57110
605-336-8164

Date: 2/1/2016

Owner(s):

Jean A. Tysdal as Trustee of the Ronald G. and Jean A. Tysdal Living Trust
5800 East 6th Street
Sioux Falls, SD 57110
605-336-8164

Date: 2/1/2016

State of South Dakota
Department of Transportation

By: Joe J. Feller

Its: Chief Materials and Surfacing Engineer

Date: 2-22-2016

Approved as to Form:

William J. Nevin
Special Assistant Attorney General

ACKNOWLEDGMENTS FOLLOW

DOT Legal: WJN

OWNER'S ACKNOWLEDGMENT

State of South Dakota)
:SS
County of Minnehaha)

On this the 15th day of February, 2016, before me, Joel Ingle, a notary public, personally appeared Ronald G. Tysdal, who acknowledged himself to be the Trustee of the Ronald G. and Jean A. Tysdal Living Trust, and that he, as such Trustee, being authorized so to do, executed the foregoing instrument in the capacity therein stated and for the purposes therein contained.

In witness whereof I hereunto set my hand and official seal.

Joel Ingle

Notary Public

(Notary Seal)

My Commission Expires: 7/22/2020

State of South Dakota)
:SS
County of Minnehaha)

On this the 15th day of February, 2016, before me, _____, a notary public, personally appeared Jean A. Tysdal, who acknowledged herself to be the Trustee of the Ronald G. and Jean A. Tysdal Living Trust, and that she, as such Trustee, being authorized so to do, executed the foregoing instrument in the capacity therein stated and for the purposes therein contained.

In witness whereof I hereunto set my hand and official seal.

Joel Ingle

Notary Public

(Notary Seal)

My Commission Expires: 7/22/2020

STATE ACKNOWLEDGMENT

STATE OF SOUTH DAKOTA)
:SS
COUNTY OF Hughes)

On this the 22nd day of February, 2016, before me, Benjamin J. Brown, a notary public, personally appeared Joe J. Feller, Chief Materials and Surfacing Engineer of the State of South Dakota, Department of Transportation, known to me or satisfactorily proven to be the person described in the foregoing instrument, and acknowledged that he executed the same in the capacity therein stated and for the purposes therein contained.

In witness whereof I hereunto set my hand and official seal.

[Notary Seal] BENJAMIN J. BROWN NOTARY PUBLIC SOUTH DAKOTA SEAL SEAL

Benjamin J. Brown

Notary Public

My commission expires: 1/7/2020

DOT Legal: WJN

Prepared by:
William J. Nevin
Special Assistant Attorney General
South Dakota Department of Transportation
700 E. Broadway Ave.
Pierre SD 57501-2586
Tel. (605) 773-3262

CERTIFICATE OF TRUSTEE

STATE OF SOUTH DAKOTA)
:SS
COUNTY OF Lincoln)

Ronald G. Tysdal, being first sworn under oath, states as follows:

1. A trust instrument which established the Ronald G. and Jean A Tysdal Living Trust was executed on July 20, 2008. This trust is still in existence.
2. I am the trustee named in this trust instrument.
3. The name and address of the trustee currently empowered to act under this trust instrument and any amendment to this trust agreement is:

   Ronald G. Tysdal
   5800 East 6th Street
   Sioux Falls, SD 57110

4. This Certificate of Trust relates to real property in Minnehaha County, South Dakota, legally described as follows:

   Southwest Quarter of the Southeast Quarter of the Northeast Quarter (SW1/4 SE1/4 NE1/4), excluding the South 370', of Section Thirteen (13) - Township One Hundred One North (101N)- Range Forty-Nine West (49W) of the 5th P.M, Sioux Falls City unplatted, Minnehaha Coutny, South Dakota.

5. As trustee, I executed an agreement to allow the removal of dirt relating to this real property between Ronald G. Tysdal, as trustee, and the South Dakota Department of Transportation, dated _____.
6. I am empowered by the provisions of the trust to sell, convey, pledge, mortgage, lease, or transfer title to any interest in real property held in trust.
7. The trust has not been terminated or revoked.

8. The trust has not been amended to limit the power of the trustee to execute and deliver the instrument affecting an interest in real property described above.

9. The trust is not supervised by any court.

10. I do not have actual knowledge of any facts indicating that the trust is invalid.

11. The statements contained in this Certificate of Trust are true and correct and there are no other provisions in the trust instrument or amendments to it that limit the powers of the trustee to sell, convey, or transfer title to the real property described above.

Dated this 1st day of February, 2016.

Ronald G. Tysdal as Trustee of the Ronald G. and Jean A Tysdal Living Trust

(Signature)

Date: 2/1/2016

ACKNOWLEDGMENT

STATE OF SOUTH DAKOTA)
:SS
COUNTY OF Minnehaha)

On this the 1st day of February, 2016, before me, [illegible], a notary public, personally appeared Ronald G. Tysdal, who acknowledged himself to be the Trustee of the Ronald G. and Jean A. Tysdal Living Trust, and that he, as such Trustee, being authorized so to do, executed the foregoing instrument for the purposes therein contained, by signing the name of the Trust by himself as Trustee.

In witness whereof I hereunto set my hand and official seal.

Notary Public

(Notary Seal)

My Commission Expires: [illegible]

Prepared by:
William J. Nevin
Special Assistant Attorney General
South Dakota Department of Transportation
700 E. Broadway Ave.
Pierre SD 57501-2586
Tel. (605) 773-3262

CERTIFICATE OF TRUSTEE

STATE OF SOUTH DAKOTA)
:SS
COUNTY OF Lincoln)

Jean A. Tysdal, being first sworn under oath, states as follows:

1. A trust instrument which established the Ronald G. and Jean A Tysdal Living Trust was executed on July 30, 2008. This trust is still in existence.

2. I am the trustee named in this trust instrument.

3. The name and address of the trustee currently empowered to act under this trust instrument and any amendment to this trust agreement is:

   Jean A. Tysdal
   5800 East 6th Street
   Sioux Falls, SD 57110

4. This Certificate of Trust relates to real property in Minnehaha County, South Dakota, legally described as follows:

   Southwest Quarter of the Southeast Quarter of the Northeast Quarter (SW1/4 SE1/4 NE1/4), excluding the South 370', of Section Thirteen (13) - Township One Hundred One North (101N)- Range Forty-Nine West (49W) of the 5th P.M, Sioux Falls City unplatted, Minnehaha Coutny, South Dakota.

5. As trustee, I executed an agreement to allow the removal of dirt relating to this real property between Jean A. Tysdal, as trustee, and the South Dakota Department of Transportation, dated _____.

6. I am empowered by the provisions of the trust to sell, convey, pledge, mortgage, lease, or transfer title to any interest in real property held in trust.

7. The trust has not been terminated or revoked.

8. The trust has not been amended to limit the power of the trustee to execute and deliver the instrument affecting an interest in real property described above.

9. The trust is not supervised by any court.

10. I do not have actual knowledge of any facts indicating that the trust is invalid.

11. The statements contained in this Certificate of Trust are true and correct and there are no other provisions in the trust instrument or amendments to it that limit the powers of the trustee to sell, convey, or transfer title to the real property described above.

Dated this 1st day of February, 2016.

Jean A. Tysdal as Trustee of the Ronald G. and Jean A Tysdal Living Trust

Jean A. Tysdal
(Signature)

Date: 2/1/2016

ACKNOWLEDGMENT

STATE OF SOUTH DAKOTA)
:SS
COUNTY OF Minnehaha)

On this the 1st day of February, 2016, before me, Lori Inge, a notary public, personally appeared Jean A. Tysdal, who acknowledged herself to be the Trustee of the Ronald G. and Jean A. Tysdal Living Trust, and that she, as such Trustee, being authorized so to do, executed the foregoing instrument for the purposes therein contained, by signing the name of the Trust by herself as Trustee.

In witness whereof I hereunto set my hand and official seal.

Lori Inge
Notary Public

(Notary Seal)

My Commission Expires: [illegible]

STATE OF SOUTH DAKOTA
AGREEMENT TO SELL MATERIALS

DOT-448
(06/2010)

Tysdal Developments, Inc., referred to in this Agreement as the "Owner" (whether one or more), for and in consideration of the mutual promises and agreements contained in this Agreement, the receipt and sufficiency of which is acknowledged, grants a **NON-EXCLUSIVE** option to the **State of South Dakota**, acting by and through its **Department of Transportation**, referred to in this Agreement as the "State," for the purpose of making the necessary tests for and purchasing borrow soil necessary for use in the construction, maintenance, and repair of highways. The Owner will sell, transfer, and convey to the State such material located in and upon the following described real property situated in Minnehaha County, South Dakota, more particularly described as follows, to wit:

> **Tract 2, excluding the North 1056' and East 225' of the Northeast Quarter (NE1/4) of Section Thirteen (13) - Township One Hundred One North (101N) - Range Forty-Nine West (49W) of the 5th P.M. contained therein and excluding Lots H2, H5, H6 and Tract A in Foss Fields Addition to the City of Sioux Falls, Minnehaha County, South Dakota**.

This Agreement is intended to allow the removal of **dirt**.

The term of this Agreement will be from **January 21**, **2016**, to the completion of Project: **NH 0100(105), PCN 01V5 and IM 0909(75)402, PCN 00WN**.

The Owner agrees that the State, and any and all servants, agents, contractors, or workers authorized by the State, will have full and free right of ingress and egress from the public highway and will have the right to operate all necessary equipment on the real property described in this Agreement for any purpose allowed or required by this Agreement. The term "necessary equipment" will include equipment required to open the pit, produce materials, blend and mix with other materials, haul materials, service equipment, and restore the pit.

The State reserves the right to assign this Agreement to any party or parties performing the contracts for which the material will be required. Upon assignment of said Agreement, said party or parties will have all rights granted under this Agreement to the State and will assume all obligations of the State under this Agreement.

The State will pay to the Owner, from monies withheld from the Contractor, for material removed from said real property at the following rates, based on quantity:

First 0 – 10,000 cubic yards	$.30 (thirty) cents per cubic yard
Next 10,001 – 100,000 cubic yards	$.25 (twenty-five) cents per cubic yard
Over 100,000 cubic yard	$.20 (twenty) cents per cubic yard

The State will restore fencing disturbed by the State's operations under this Agreement to as good a condition as the fencing was in before work started. In the event a temporary fence is required around the pit to protect livestock, The State will erect such fence at the State's expense.

DOT Legal: WJN

OWNER'S ACKNOWLEDGMENT

State of South Dakota)
:SS
County of Minnehaha)

On this the 26th day of January, _____, before me, Joel Ingle, a notary public, personally appeared Joel Ingle, who acknowledged himself/herself to be the President, of Tysdal Developments, Inc., a corporation, and that he/she, as such officer, being authorized so to do, executed the foregoing instrument for the purposes therein contained, by signing the name of the corporation by himself/herself as such officer.

In witness whereof I hereunto set my hand and official seal.

Notary Public

(Notary Seal)

My Commission Expires: 9/22/2021

STATE ACKNOWLEDGMENT

STATE OF SOUTH DAKOTA)
:SS
COUNTY OF Hughes)

On this the 22nd day of February, 2016, before me, Benjamin J. Brown, a notary public, personally appeared Joe J. Feller, Chief Materials and Surfacing Engineer of the State of South Dakota, Department of Transportation, known to me or satisfactorily proven to be the person described in the foregoing instrument, and acknowledged that he executed the same in the capacity therein stated and for the purposes therein contained.

In witness whereof I hereunto set my hand and official seal.

[Notary Seal]
BENJAMIN J. BROWN
SEAL NOTARY PUBLIC SOUTH DAKOTA SEAL

Notary Public

My commission expires: 1/7/2020

DOT Legal:

AMENDMENT NUMBER 1 TO AGREEMENT TO SELL MATERIALS

BACKGROUND:

1. On February 22, 2016, the State of South Dakota, acting by and through its Department of Transportation, referred to in this Amendment as the "State," and Tysdal Developments, Inc., referred to in this Amendment as the "Owner"; entered into an agreement to sell materials for Project Numbers NH 0100(105) PCN 01V5 and IM 0909(75)402 PCN 00WN, which agreement, referred to in this Amendment as the "AGREEMENT," was signed by representatives of each party.

2. The State and the Owner wish to amend the AGREEMENT to correct the legal description.

THE PARTIES MUTUALLY AGREE AS FOLLOWS:

1. The legal description is deleted in its entirety and replaced with the following legal description:

   Tract 2 of Foss Fields Addition to the City of Sioux Falls, Minnehaha County, South Dakota.

2. Except as modified by this Amendment, the terms and conditions of the original AGREEMENT will remain in full force and effect.

This Amendment is binding upon the signatories not as individuals, but solely in their capacities as officials of their respective organizations and acknowledges proper action of the State and the Owner to enter into the same.

Tysdal Developments, Inc.

By: _____

Its: President

Date: _____

(Corporate Seal)

State of South Dakota
Department of Transportation

By: Joe J. Fuller

Its: Chief Materials and Surfacing Engineer

Date: 4-6-16

Approved as to Form:

_____
Special Assistant Attorney General

ACKNOWLEDGMENTS FOLLOW

CORPORATE ACKNOWLEDGMENT

STATE OF South Dakota)
)SS
COUNTY OF Minnehaha)

On this the 11 day of March, 2016, before me, [illegible], a notary public, personally appeared [illegible], who acknowledged himself/herself to be the President of Tysdal Developments, Inc., a corporation, and that he/she, as such officer, being authorized so to do, executed the foregoing instrument for the purposes therein contained, by signing the name of the corporation by himself/herself as such officer.

In witness whereof I hereunto set my hand and official seal.

[illegible]

Notary Public

[Notary Seal]

My commission expires: [illegible]

STATE ACKNOWLEDGMENT

STATE OF SOUTH DAKOTA)
)SS
COUNTY OF Hughes)

On this the 6th day of April, 2016, before me, Benjamin J. Brown, a notary public, personally appeared Joe J. Feller, Chief Materials and Surfacing Engineer, of the State of South Dakota, Department of Transportation, known to me or satisfactorily proven to be the person described in the foregoing instrument, and acknowledged that he executed the same in the capacity therein stated and for the purposes therein contained.

In witness whereof I hereunto set my hand and official seal.

Benjamin J. Brown

Notary Public

[Notary Seal] BENJAMIN J. BROWN SEAL NOTARY PUBLIC SOUTH DAKOTA SEAL

My commission expires: 1/7/2020

SPECIAL PROVISION FOR OPTICAL ACTIVATED EMERGENCY VEHICLE PRE-EMPTION SYSTEM

I. 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 (762m) 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.

II. MATCHED SYSTEM COMPONENTS

The required priority control data-encoded optical communications system will consist of: optical detector, detector cable, signal discriminator and confirmation 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.

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. It will 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.

III. 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.

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 (762m) 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 (549m) 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 (305m) 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 non-spliced distance of 1,000 feet (305m).

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)

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

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

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

7. 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.

8. 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 (-). The drain wire shall be a “bare” wire, with no insulation and shall be wrapped with electrical tape after the outer jacket has been removed.

   c. Yellow for optical detector signal #1

   d. Blue for optical detector signal #2

9. The characteristic impedance of the detector cable shall be:
   0.6 ohms/1000’
   14.3uF/1000’

10. 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 re-settable 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 non-functional 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
½	Steady On	Steady On	Flashing	Flashing
1/3	Flashing	Flashing	Steady On	Steady On
¼	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

IV. 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.

V. 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.

VI. 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 10 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 10-year operational reliability and interface compatibility with future components designed for the system.

VII. 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.

VIII. METHOD OF MEASUREMENT

A. Optical Detectors will be measured per each for the number of optical detectors furnished and installed.

B. Detector Cable will be measured per foot of the cable furnished and installed as shown on the plans.

C. Emergency Vehicle Preemption Unit will be measured per each for the number of units (cards) furnished and installed.

IX. BASIS OF PAYMENT

A. Optical Detectors will be paid at the contract unit price per each. Payment will be full compensation for furnishing and installing the optical detector.

B. Detector Cable will be paid at the contract unit price per foot for “Preemption Cable”. Payment will be full compensation for furnishing and installing the detector cable.

C. Emergency Vehicle Preemption Unit will be paid at the contract unit price per each. Payment will be full compensation for furnishing and installing the Emergency Vehicle Preemption Unit.

Special Provision for Controller Cabinet

Traffic Signal Cabinet

All cabinets shall be provided with a minimum of one each 24-position fiber optic termination box with front panel numbers. This box shall be mounted on the right side panel so as to not block accessibility to traffic control devices nor the dropdown features of the terminal facility.

All cabinets shall be provided with two shelves for holding shelf-mounted equipment. Base-mounted cabinets shall be provided with galvanized anchor bolts and shall be galvanized in accordance with AASHTO M-232 and be a diameter of ***5/8*** inch. Cabinets shall be provided with a natural aluminum finish. Post top cabinets shall not be used unless specified. Cabinets shall be rigid and have reinforced doors and door assemblies. A key/lock arrangement shall be provided for the cabinet main door assembly.

The cabinet interior shall be powder coated white.

All conductors used in the controller cabinet shall be a minimum of No. 22 AWG (or larger, if required by the amperage requirements of the particular circuit), tinned copper conductors with a minimum of 19 strands and shall conform to Federal Specifications MIL-W-16878D, Type B or D, Vinyl-Nylon Jacket, 600 volts, 105 degrees C., equal or better. Conductors used in the controller cabinet shall conform to the NEC color codes:

A. C. Neutral	White
A. C. Line	Black
Chassis, Safety Ground	Green
Control	Any color not listed above.

The safety ground shall be electrically isolated from A. C. Neutral.

The cabinet shall be provided with a full-size door and be mounted utilizing stainless steel hinge and pins. The door shall be weatherproof and the door shall be adequately designed to withstand a ninety MPH wind and buffeting with the door mounted in the 90-degree open latch. The door shall be dust proof and have a neoprene gasket installed with adequate depth as to visually reflect the tightness of the door at all points in contact with the gasket. The door shall be provided with a No. 2 key for the main door and the door shall mate with a 3-point locking mechanism which operates from a single easy turning handle. A single position bar stop shall be provided which holds the door open at 90, 135, and approximately 170 degrees from a closed position. All hinges, hinge pins, and locks shall have a cover to prevent icing and sticking. The main cabinet door shall open from LEFT to RIGHT when facing the cabinet at the front. The door handle shall turn away from the key lock to prevent the key from being broken during the unlock and opening procedure. A hasp shall be provided to allow an external lock to be installed on the door to handle.

The cabinet door shall contain a police door and compartment mounted centered about two-thirds the way up the main door. The police door shall be openable by the use of a standard police key. Two police keys and two No. 2 keys shall be provided with each cabinet. Two switches shall be provided internal to the police compartment. The first switch shall be a “SIGNAL ON/OFF” which shall cause all outputs to the signals to be on or off depending on the switch position. In the “OFF” position, cabinet power shall be unaffected; the signals, either colors or flash, shall be precluded from being displayed. The second switch shall be “FLASH-ON/NORMAL.” The switch in the FLASH-ON mode shall cause the controller to be placed in Stop-Time, with the Stop-Time switch in the NORMAL mode position, and the signal output to be the cabinet FLASH, phase 2 and phase 6 yellow, and all other phases red. With flash switch in the NORMAL position, the output shall be either colors or flash depending on the design and position of the switches internal to the cabinet.

Covering the police switch compartment, internal to the main cabinet, shall be a function panel for the duplex GFI receptacle and a cabinet light and control switches. The GFI shall be a two-position duplex receptacle. The cabinet light shall be a mounted flexible high intensity directional light source which can be directed towards the cabinet terminal facilities or the control equipment. Switches shall include a cabinet light switch, FLASH-ON/NORMAL, a controller ON/OFF, and a Stop-Time switch. The FLASH switch, in the ON position, shall cause the controller to activate the flash relays and output the cabinet FLASH without activating the controller stop-time circuit. The controller ON/OFF switch shall cause control power to be applied/unapplied to the traffic controller only. The Stop-Time switch shall be a three-position switch which shall cause the controller to stop-time, activate a ground true input on the stop-time input, when in the ON position; not allow a ground true input on the stop-time input when in the “RUN” position; and, allow a ground true input (when selected externally) to be placed on the stop-time input when in the “NORMAL” position. The cabinet shall be wired to insure that stop time is set active when the conflict monitor is activated for a failure or conflict.

Two "Relume" Traffic Control Box LED Light Panels shall be installed in the cabinet. The first light panel shall be mounted under the lowest shelf and the second LED panel shall be mounted directly over the door frame.

Each cabinet shall have detector and pedestrian test switches provided on the inside of the door.

The switches shall be properly labeled and rated for the load current. Switch terminals on the main door shall be insulated and protected from possible human contact. The switch nomenclature may be changed slightly to agree with the manufacturer's standard nomenclature subject to approval by the City Traffic Engineer.

The cabinet shall be provided with surge protection and radio interference filters and lightning protection. These functions may be combined into one or more devices. Combining of devices shall be supported by manufacturer's printed literature stating specific compliance to standard industry levels, such as EDCO Model ACP 340 surge protectors, as a minimum. Surge protections shall provide a general cabinet protection as a parallel device. Additional protection shall be provided to all electronic devices such as the traffic controller and conflict monitor via a series surge protector working in conjunction with the general cabinet protection. Surge protection, RFI's, etc. shall be rated at the ampacity of the breaker protection. Main cabinet circuit breakers for eight load switches and below shall be a minimum of 30 amps; and cabinet breakers for above eight load switches shall be a minimum of 50 amps. A minimum of three circuit breakers shall be provided. The main cabinet breaker shall service all controller and terminal facilities. The auxiliary breaker shall provide service to the cabinet detectors, masters, and other electronic equipment. The service breaker shall provide service to the fan, thermostat, cabinet heater, etc. The cabinet shall have two (2) cooling fans, each controlled by its individual thermostat.

All cabinets shall be provided with a minimum of two shelves adjustable and extending the full width of the cabinet. The shelves shall not interfere with the ability to drop the back panel to a down position to allow tests or measurements or corrective maintenance to the back of the terminal facilities. Terminal facilities shall be of a standard 4 phase, eight-load switch load bay for 4 vehicle phases and 4 pedestrian phases, or 8-phase, 12-load switch load bay for 8 vehicle phases and 4 pedestrian phases. All controller and conflict monitor wiring defined by the A-B-C and D connectors shall be terminated in the cabinet on the load bay or an auxiliary logic panel. All overlaps shall be identified and terminated on the main load bay panel adjacent to the associated phase drivers. Detectors shall be mounted such that all shared controller wiring and phase conditioning wiring area available for jumpering. Field wiring to detector loops shall be made on the bottom left panel of the left side of the cabinet. Cabinet drawings shall include a pictorial layout of the intersection **with standard NEMA movement designations without phase numbers and loop placement**.

If a cabinet is specified as a flashing yellow arrow cabinet then all extra work that needs to be done in the cabinet to the back panel wiring and increasing the number of terminal facilities and load switches as necessary for the cabinet to be able to function with up to four flashing yellow arrow indications needs to be done.

Each solid state load switch unit shall conform to NEMA Standards Publication No. TS 1, latest revision, Traffic Control Systems. Load switches shall be rated for 25-amp duty. Each individual traffic signal lamp load circuit shall be optically isolated from each individual traffic signal control circuit.

The cabinet wiring arrangement and design shall be engineered and constructed such that open circuit breakers, blown fuse(s), failed components, or switch positions accidentally set, shall not cause nonstandard indications to be displayed at the intersection.

Each cabinet shall have resistors wired in on all arrow phases, Phase 1, 3, 5, 7.

Each cabinet shall be equipped with a fiber optic termination facility.

Each cabinet shall be equipped **with card rack style vehicle detection facility with two channels of detection per vehicle phase and equipped** to accept two 2-channel emergency vehicle preemption discriminator cards and termination facilities for detection cable termination. **Control for EVP confirmation lights shall be done via the appropriate output from the controller's "D" connector.**

All cabinets shall be wired to show alarm at controller when conflict monitor is tripped.

All cabinets shall be furnished with call switches used to activate detector inputs, panel mounted on inside of door. **All cabinets shall be wired with an Automatic Transfer Switch for future battery backup power system installation.**

Basis of Payment

Payment for the controller cabinets shall be incidental to the contract unit price per each for “Traffic Signal Controller”. Payment will be full compensation for furnishing and installing the controller cabinets.

SPECIAL PROVISION FOR
WIRELESS, BATTERY-POWERED MAGNETOMETER VEHICLE DETECTION SYSTEM FOR PRESENCE DETECTION APPLICATIONS

This specification sets forth the minimum requirements for a system to detect vehicles on a roadway by using battery-powered magnetometer-type sensors that communicate their detection data by radio to a roadside communications hub before the data is relayed to a local traffic controller and, optionally, a central software system or a data server as may be desired.

1 Overview

1.1 The detection system shall provide accurate roadway information as needed to support traffic signal control

1.2 The Wireless Battery-Powered Magnetometer Vehicle Detection System shall consist of the following:

- 1.2.1 Battery-powered sensors installed in-pavement in each traffic lane
- 1.2.2 Access Points (APs) mounted on the side of the roadway, serving as the communications hub for the installation
- 1.2.3 Optional wireless Repeaters (RPs) mounted on the side of the roadway, serving to extend the radio range of an AP
- 1.2.4 Contact Closure Interface (CCI) cards to support the interface between an AP and a standard traffic controller using contact closure signals
- 1.2.5 Software to control and configure the sensors, APs, and RPs
- 1.2.6 Software to store and retrieve detection data

1.3 Communications between the sensors and the AP or RP and between the RP and AP shall be via radio

1.4 Detection data shall be relayed from each AP to a local traffic controller for realtime vehicle presence detection using contact closure signals

1.5 As an option, data shall be capable of being relayed from each AP to a central software system or central server over standard IP (Internet Protocol) networks

2 Functional Capabilities

2.1 Each sensor shall be installed in the roadway using the following procedure:

- 2.1.1 The roadway shall be core drilled to provide a 4” diameter hole, 2.25” deep
- 2.1.2 A small layer of sand or epoxy sufficient to cover the bottom of the hole shall be applied
- 2.1.3 The sensor shall then be placed on top of this layer of sand in the correct orientation as clearly marked on the sensor
- 2.1.4 The sensor shall be fully encapsulated with the epoxy to the lip of the cored hole

2.2 Each sensor shall detect a vehicle by measuring changes in the earth's magnetic field near the sensor as caused by a stopped or passing vehicle (i.e., magnetometer-type detection)

2.2.1 The sensor shall sample the earth's magnetic field at a rate of 128 Hz
2.2.2 The sensor shall communicate time-stamped ON and OFF vehicle detection events
2.2.3 As an option, the sensor shall provide a mode where the complete X-Y-Z magnetic signatures of detected vehicles are transmitted as data
2.2.4 Each sensor shall automatically recalibrate in the event of a detector lock

2.3 Each sensor shall communicate by radio to a nearby AP or RP

2.3.1 Each sensor shall transmit its detection data within 150 ms of a detected event
2.3.2 Each sensor shall automatically re-transmit a detected event if no acknowledgement is received from the AP
2.3.3 Each sensor may stop retransmission after 8 attempts
2.3.4 Each sensor shall transmit a unique identifying code
2.3.5 Each sensor shall respond within 100 seconds when the AP is powered on
2.3.6 When no AP or RP is present or powered on, the sensors are not required to detect vehicles

2.4 The radio links between each sensor and AP or RP and between each RP and AP shall conform to the following:

2.4.1 The physical layer of the radio links (i.e., the over-the-air data rate(s), modulation type(s), forward error correction, bit interleaving, channel coding, and other aspects of the transmitted signal) shall conform to published standards (e.g., IEEE, ITU-T, etc.)
2.4.2 The center frequencies, bandwidths, and transmit power levels of the radio links shall allow operation in an unlicensed frequency band
2.4.3 Frequency channels shall be employed by the sensors, APs, and RPs to avoid interference with other devices operating in the unlicensed band
2.4.3.1 Frequency channels shall be user-configurable
2.4.3.2 At least 16 frequency channels shall be supported
2.4.4 The link budget (i.e., transmit power plus transmit antenna gain plus receive antenna gain minus receive sensitivity, where receive sensitivity shall assume a 1% packet error rate) for all radio links shall be 93 dB or greater

2.4.5 The maximum distance between a sensor installed in the roadway and an AP or an RP with a clear line-of-sight between devices shall be:

2.4.5.1 At least 150 feet / 45.7 meters for an AP or RP installed 24 feet / 7.3 meters above the roadway

2.4.5.2 At least 100 feet / 30.5 meters for an AP or RP installed 18 feet / 5.5 meters above the roadway

2.4.5.3 At least 75 feet / 22.9 meters for an AP or RP installed 12 feet / 3.7 meters above the roadway

2.4.6 The maximum distance between an AP and an RP shall be at least 750 feet / 228.6 meters when both units are installed 18 feet / 5.5 meters above the roadway and with a clear line-of-sight between devices

2.5 Each installation of the Wireless Battery-Powered Magnetometer Vehicle Detection System shall consist of one or more sensors installed in each traffic lane where presence detection is required, avoiding sources of magnetic noise such as underground power cables, overhead high tension power cables, light rail or subway tracks, and power generation stations and sub-stations

2.5.1 The sensors shall be located as specified by the intersection plans, with each sensor's supporting AP or RP installed no farther than the maximum range indicated in Section 2.4.5

2.5.2 After losing radio contact because of stopped vehicles over or near the sensor, each sensor shall be capable of re-establishing the radio link with its supporting AP or RP in less than 2 seconds

2.6 Each sensor in an installation shall be capable of being individually configured with its own sensitivity level

2.6.1 A single sensor shall be capable of being configured with a sensitivity level that approximates the detection zone of a standard 6' x 6' / 1.8m x 1.8m inductive loop

2.6.2 Each sensor shall be capable of being configured with relatively higher or lower sensitivity levels as may be required to detect bicycles, motorcycles, or light rail

2.6.3 Up to two sensors properly configured shall be capable of detecting:

2.6.3.1 Motorcycles in a standard traffic lane
2.6.3.2 Bicycles in a designated bicycle lane

2.7 An AP shall support the relay of sensor detection data through several interfaces as required by the application

2.7.1 Detection data shall be communicated to a standard roadside traffic controller via Contact Closure Interface cards capable of being installed in standard contact closure input shelves, where the following controller types shall be supported:

2.7.1.1 Type 170

2.7.1.2 Type 2070 ATC

2.7.1.3 NEMA TS1

2.7.1.4 NEMA TS2

2.7.2 As an option, detection data shall be communicated over TCP/IP via an integrated 10/100BaseT Ethernet interface

2.7.3 As an option, detection data shall be communicated as IP data over GSM-based cellular data services via an integrated GPRS cellular Modem

2.7.4 As an option, detection data shall be communicated as IP data over CDMA-based cellular data services via an integrated 1xRTT cellular Modem

2.7.5 The AP shall be capable of simultaneously communicating detection data via the contact closure interface, optional Ethernet interface, and optional cellular data modem interface

2.8 Each sensor, AP, and RP shall be capable of accepting software and firmware Upgrades

2.9 The Wireless Battery-Powered Magnetometer Vehicle Detection System shall provide software operating on conventional notebook/portable PCs

2.9.1 To support configuration of a sensor
2.9.2 To support configuration of an AP
2.9.3 To support configuration of an RP
2.9.4 To store and retrieve detection data

3 Sensor Hardware

3.1 All sensor components shall be contained within a single housing

3.1.1 The sensor housing shall conform to NEMA Type 6P and IEC IP68 standards
3.1.2 The sensor components shall be fully encapsulated within the housing to prevent moisture from degrading the components
3.1.3 The sensor housing shall be capable of being installed in a 4-inch / 10-cm diameter hole approximately 2 ¼ inches / 5.7 cm deep

3.2 A sensor shall operate at temperatures from -37 °F /-38.3 °C to +176 °F / +80 °C

3.3 A sensor shall be battery-powered with an average lifetime of ten (10) years when the sensor is configured for and operating under normal traffic conditions

4 Access Point (AP) Hardware

4.1 An AP shall support at least 48 sensors

4.2 An AP shall be factory-configurable to support at least two (2) different power options:

4.2.1 Power shall be supplied via an isolated nominal 48 VDC (36-58 VDC) input, consuming a maximum of 3W and providing 1500 V isolation and 5 kV surge protection
4.2.2 Power shall be supplied via a non-isolated nominal 12 VDC (10-15 VDC) input, consuming a maximum of 2W

4.3 An AP shall operate at temperatures from -37 °F / -38.3 °C to +176 °F / +80 °C

4.4 All AP components shall be contained within a single housing

4.4.1 The AP housing shall conform to NEMA Type 4X and IEC IP67 standards
4.4.2 An AP shall be no larger than 12” H x 8” W x 4” D / 30 cm H x 20 cm W x 10 cm D
4.4.3 An AP shall weigh no more than 4 pounds / 1.8 kg

5 Repeater (RP) Hardware
5.1 An RP shall support at least 10 sensors
5.2 An RP shall be battery-powered
5.3 The RP battery shall be field replaceable
5.4 An RP shall operate at temperatures from -37 °F /-38.3 °C to +176 °F / +80 °C
5.5 All RP components shall be contained within a single housing

5.5.1 The RP housing shall conform to NEMA Type 4X and IEC IP67 standards
5.5.2 An RP shall be no larger than 5” H x 4” W x 4” D / 12.7 cm H x 10 cm W x 10 cm D
5.5.3 An RP shall weigh no more than 4 pounds / 1.8 kg

6 Contact Closure Interface (CCI) Card Hardware

6.1 Each CCI card shall provide detector data as contact closure signals to the traffic Controller

6.1.1 A CCI card shall directly plug in to standard 170/2070 input files or NEMA detector racks

6.1.2 One or more CCI cards shall provide up to 256 channels of detection data from a single AP's supported sensors, where each channel comprises an optically isolated contact closure relay and, if configured for TS2 operation, an additional contact closure relay to indicate the channel status

6.2 Each CCI card shall be configurable

6.2.1 A CCI card shall provide contact closure signals in either presence or pulse mode

6.2.2 A CCI card shall provide up to 31 seconds of delay timing

6.2.3 A CCI card shall provide up to 7.5 seconds of extension (carryover) timing

6.3 The CCI card front panel shall provide status LEDs to monitor:

6.3.1 Detection channel status

6.3.2 Line Quality

6.3.3 Fault Monitor

6.4 The CCI card front panel shall provide switches to select and configure:

6.4.1 Presence or pulse mode

6.4.2 Delay timing

6.4.3 Extension timing

6.5 A CCI card shall be powered by the traffic controller backplane via an 11-26 VDC Input

6.6 A CCI card shall be surge protected to GR-1089 standards

6.7 A CCI card shall operate at temperatures from -37 °F/-38.3 °C to +176 °F/+80 °C

6.8 A CCI card shall operate in humidity up to 95% (non-condensing)

7 Limited Warranty

7.1 The supplier shall provide a limited two-year warranty for the Wireless Battery-Powered Magnetometer Vehicle Detection System

7.2 During the warranty period, technical support shall be available from the supplier via telephone within 24 hours of the time a call is made by a user, where this support shall be provided by factory-authorized personnel or factory-authorized installers

7.3 During the warranty period, standard updates to the software shall be available from the supplier without charge

8 Maintenance and Support

8.1 The supplier shall maintain a sufficient inventory of parts to provide support and maintenance of the system, where these parts shall be available for delivery within 30 days of receipt of a purchase order by the supplier at the supplier's then-current pricing and terms of sale

8.2 The supplier shall maintain an ongoing program for customer support for the system via telephone, email, or trained personnel sent to the installation upon receipt of a purchase order at the supplier's then-current pricing and terms of sale for technical support services.

8.3 Installation and/or training support shall be provided by a factory-authorized Representative

8.4 All documentation shall be provided in the English language

9. Method of Measurement

9.1 Wireless In Pavement Traffic Sensors will be measured per each for the number of wireless in pavement traffic sensors furnished and installed.

9.2 Wireless Access Points will be measured per each for the number of wireless access points furnished and installed.

9.3 Wireless Repeaters will be measured per each for the number of wireless repeaters furnished and installed.

10. Basis of Payment

10.1 Wireless In Pavement Traffic Sensors will be paid at the contract unit price per each. Payment will be full compensation for furnishing and installing the wireless in pavement traffic sensors.

10.2 Wireless Access Points will be paid at the contract unit price per each. Payment will be full compensation for furnishing and installing the wireless access points.

10.3 Wireless Repeaters will be paid at the contract unit price per each. Payment will be full compensation for furnishing and installing the wireless repeaters.

Special Provision for Traffic Signal Controller

Traffic Signal Controller Equipment

The control equipment specified herein shall conform, where applicable, to NEMA Standards Publication No. TS 1, latest revision, Traffic Control Systems, and shall also comply with the additional City requirements. The controller manufacturer may incorporate software and hardware functions defined under NEMA TS 2 to the extent that these changes do not render the installation incompatible with TS 1 terminal facilities.

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. Actuated Controller Unit

The controller unit shall be system compatible with the Central Traffic System Tactics 2.0 that the City of Sioux Falls is currently utilizing. The controller unit shall be provided with an internal fiber optic modem, unless otherwise specified in the bid document, and manufacturer's "D" Cable. The Controller shall have a minimum of 16MHZ processor, TS-2 hardware and software, and a SDLC communications port device. The controller unit shall be the latest software revision of any preapproved device capable of operation in a TS-1 and/or a TS2 facility installation.

The controller shall be provided with a MENU display; English language prompted and shall display all eight phases of data concurrently. The screen shall be an LCD Super Twist series with back light including heaters necessary to retain rapid data screen refreshing during temperatures below 20°F. The display shall be an Alpha-Numeric (8 x 40) LCD display. A single sixteen (16) position keypad shall be provided to enter all data necessary for operation. The front panel shall be fully automated to place the screen in the "sleep" mode and shall not be provided with a switch to deactivate the screen viewing. The screen shall revert to the "sleep" mode ten minutes after the last keystroke has been entered.

The controller shall have sixty-four (64) programmable detectors assignable as vehicle, pedestrian, or special functions and programmable as to the phase assigned regardless of the connector pin assigned on the terminal facility. The software shall be capable of performing eighty (80) separate functions from these forty-eight (48) detector inputs. Up to eight of these detectors shall be assignable as System Detector functions and be capable of storing at the local controller Volume counts, Volume + Occupancy measurements, and Occupancy Percentages necessary for uploading and review at the central office Closed-Loop System. System Detectors shall also be used for operating two each independent dual loop speed traps. Single loop speed traps which assume vehicle length or equivalent variable are unacceptable for this application. The controller must also be capable of logging actual time utilized by phase for all phases during periods of coordination. This phase utilization shall be stored by date, time, and by dial/split/offset. Each start of a new dial/split/offset shall start a new register of times allocated and terminate the prior recording. The detector software shall also be capable of generating volume and occupancy values to select an alternate coordination pattern when sensed field conditions exist. This data shall be uploadable from the controller to the central office Closed-Loop System. Twenty-four detectors shall be provided to log vehicle count data for ninety-six intervals of 15 minutes duration. These detectors shall be assignable in groups of six detectors per approach and provide through, left and right turn traffic counts. As option, the Contractor may supply the TS 2 Type 2 controller timing unit with the internal SDLC communications interface unit capable of direct detector interface for Video Image or Machine Vision technology.

The controller shall be a minimum of a four-ring controller capable of assigning each phase to a ring and a sequence within the ring. The software shall allow a single phase to be assigned to single ring. A typical application is diamond and offset "T" intersections which utilize the following structure:

Ring 1 Phases 1, 2, and 3
Ring 2 Phase 4
Ring 3 Phases 5, 6, and 7
Ring 4 Phase 8

This configuration mandates that Phase 4 is compatible with Phases 1, 2, 5, 6, 7, and 8. Phase 8 is compatible with Phases 1, 2, 3, 4, 5, and 6. Phases 1 and 2 are compatible also with all phases except Phase 3. Phases 5 and 6 are compatible with all phases except Phase 7. Phase 3 is compatible with phases assigned in Rings 3 and 4. Phase 7 is compatible with phases assigned in Rings 1 and 2. As a NEMA-defined phase, each assigned phase shall have the ability to perform all functions required by the Standard.

Phase reversal shall be provided to allow rotation reversal between any two phases in the same ring and within the same barrier. A minimum of 16 patterns of phase reversals shall be provided. Selection of phase reversals shall be selectable on a dial/split/offset basis.

The controller shall be provided with six (6) modes of coordination. Each of the six (6) modes of coordination shall automatically calculate the yield, force, and permissive periods necessary for proper coordination plan operation by the operator only inserting the desired split times directly into the coordination plan. The traditional YIELD mode of release from coordinated phases to any current active demand shall be one mode. The industry standard release from coordinated phases in response to active demand on a permitted phase <PERM>; i.e., window from coordinated phase to next allowable phase in sequence when demand is present, shall be the default mode. Traffic Responsive mode shall be the third mode of which four distinct sub-modes of coordination shall be provided. Each of the four (4) Traffic Responsive modes shall allow as a minimum the extension of the coordinated phase green interval beyond the scheduled time allocated by the programmed plan when demand is maintained active on the coordinated phase as sensed by detectors assigned to the coordinated phase without requiring the cycle length to extend beyond the time programmed as the current active cycle length. Designs where the coordinate phase extends beyond cycle length or where the background cycle loses the sync reference and requires offset correction are not acceptable for this project. When demand is not active on the coordinated phases, the coordinated phases shall release control and window select the next phase in rotation which has demand based on the background cycle. As a minimum, the controller shall be capable of operating with a programmed split assignment that is less than the current active cycle length; i.e., the sum of the intervals equals a value less than the programmed cycle length. This unaccounted time shall be assignable by the controller on a phase-by-phase basis and shall be returned to the coordinated phases under demand and retained by the phases allocated when demand is not present on the coordinated phases [Mode 3]. Another plan [Mode 4] Traffic Responsive shall have a modified operation that precludes the controller once releasing from the coordinated phases from returning early to the coordinated phases. In addition to this fourth mode, the controller shall window release from any phase in rotation to the next allowable phase with demand [Mode 5]. If demand does not exist in the next phase to be serviced, the controller shall dwell in the last phase with demand until the background cycle mandates return to the coordinated phases or demand exists and the next phase in rotation is permitted per the background cycle. The purpose of this fifth mode of operation is to insure non-early return to the coordinated phases, as well as to allow known platoon movements requiring left turn presence to get into position in the left turn bay prior to the controller returning to the coordinated phases prematurely. The last selection of coordination modes [Mode 6] is the ability of the controller to revert to FREE operation except during periods of green band coordination cycle period guarantees. The coordination software shall insure that all parameters of coordination are retained. These requirements completed, the controller shall be allowed to revert to the FREE mode and service any phase in standard rotation so long as the controller can return to the coordinated phase prior or equal to the start of the scheduled green band. Selection of the exact mode of coordination shall be made when programming the dial/split/offset such that selection of the plan, whether by time of day or by traffic responsive operation, shall result in the correct mode being implemented.

The controller shall be capable of six preempt inputs and full function preemption sequences and shall be user defined. Preemption shall be internal to the controller, and each preemption shall be selectable as to railroad, emergency vehicle, or emergency vehicle and priority vehicle. Railroad preemption shall provide a track clearance interval followed by a user selection of flash or limited service phase displays. Emergency vehicle preemption shall include a user programmable minimum time for the current active phase (if different than the desired phase), separate clearance times for the phase(s) being terminated and the selected phase/overlap signal displays during preemption. The clearance times for exiting the preemption phases and the phase to display after leaving preemption shall be user programmable. Priority vehicle preemption shall not allow the controller to skip any valid demand en route to the selected phase for service. Once in the phase, the controller shall dwell in the selected phase(s) until completion of the preemption input being valid.

The controller shall be possible of single isolated intersection operation under central computer monitor operation. In this mode, the controller shall be programmed with the phone number of the central computer monitoring system and selected functions to be monitored, which may include as a minimum, door open, malfunctions, system detector malfunctions, flash mode, etc. In the event of a malfunction selected as critical, the controller shall automatically generate a phone call to the central monitor system and cause the failure to be logged on the printer at the central office. Additionally, when selected, the central monitoring unit shall be capable of time of day scheduled automatically (no operator intervention) dialing the on-street controller and uploading selected data stored at the local controller. **The City currently operates a Central Traffic System Tactics 2.0; and if the equipment to be provided is not compatible with the existing system, the supplier shall provide a complete system, computer with modem and all necessary software to upload/download and operate a remote controller under a 12 channel capability with 10/100 Ethernet monitor operation.**

The controller shall be provided with internal Time Base Control (TBC). The software shall include a minimum of ten (10) unique week programs which when selected operate a complete seven-day plan. The TBC shall provide a minimum of ninety-nine (99) unique day programs selectable as individual days or sub-assigned under the ten weekly programs. A scheduler shall be provided where a minimum of two hundred and fifty (250) events may be programmed. Any event is the ability to select a traffic plan, select auxiliary output or detector counting or diagnostics, select an alternate day or week or select several functions linked under a function mapping. Where design efficiencies have not been obtained, additional event capacity may be required to operate the system effectively. The supplier shall insure adequate event selections to operate a normally busy system design.

The controller unit shall be provided with an internal monitor system to log all operations and inconsistencies of operations for operator assistance. As a minimum, the controller unit shall log cycle faults, cycle failures, coordination failures, voltage monitor activations, conflict flash (when wired in the cabinet), local flash, remote flash (when wired in the cabinet), all preempts, local free, power on/off, communications errors, all data changes by local or remote, detector failures, and all detector counts logged on System Detectors. All reports shall be provided by BOTH front panel viewing and by Computer Upload either at the controller or via a defined system.

The controller unit shall be provided with the NEMA TS 2 coordination structure of four dials, three offsets, and four splits. Each dial split combination shall be capable of providing a unique cycle length (16 each) and three offsets resulting in forty-eight (48) unique plans. Offset correction shall include the ability to select four methods of correction so as to most smoothly transition between plans. Selections shall include as a minimum, Dwell, Dwell with Interrupt, Shortway and Shortway by addition to the cycle—no cycle length reduction. Coordination programming shall also allow the selection of force points to be EITHER by the operator programmed PLAN or by the POINT in CYCLE where the controller must exit to complete the CYCLE in the required time.

The controller shall be capable of implementing, without back panel wiring methods, detector switching and anti-backup techniques as standard programming for operation of permissive/protected left turn operations. The use of terminal facility diodes or the use of auxiliary or special outputs to activate back panel wiring is not acceptable for this application.

All programmed software data shall be stored in an EEPROM and shall not require any battery or capacitor-type devices to retain operator programmable database. A battery or SuperCap may be provided to retain clock operation, if required, so long as the battery or capacitor is used solely for the clock operation and no other functions within the controller.

The controller shall be provided with a minimum of eight internally programmable overlaps. Each overlap shall be provided with a timed extension of green. When a timed green extension is programmed as a non-zero, the controller shall provide a separated timed yellow and red interval for the overlap. When a zero is programmed, the controller shall time the yellow and red interval concurrent with the terminating parent phase. Each of the eight overlaps shall be capable of being programmed with a unique green extension, yellow and red time parameter.

The controller unit shall be provided with internal diagnostics which constantly cross-check the controller's operation to insure proper programming and operation (Software and Mechanical). All basic circuits and memory shall be checked on start-up of the controller unit. When operating, the controller unit shall consistently cross-check for any and all errors possible. An internally diagnosed error shall cause the controller unit to set the intersection into flash operation via the conflict monitor when the error would cause an unsafe field display. Other errors shall revert the controller into a safe operation state and an error log to be made defining the failed condition. If the error can be corrected, the controller unit may restart the intersection in a safe manner up to three times in a single calendar day. Detector diagnostics shall be provided for all detectors permitted as hereinbefore specified. Detector diagnostics shall be provided for vehicle, pedestrian, and special detectors for absence of calls, excess calls per time period, and constant call.

The controller unit shall be provided with internal flash programming. The flash program shall include the ability to select each yellow or red display by phase and overlap and program the indication to be flashed. Additional selection shall include the ability to program the positive or negative flash strobe so as to select the phases which flash concurrently or oppositely.

B. Signal Conflict Monitor Unit

The signal conflict monitor unit specified herein shall conform to NEMA Standards Publication No. TS 1, latest revision, Traffic Controls Systems, Part 6, and shall comply with the drawings as relates to the size and channels required. The monitor unit shall be a separate unit and interchangeable with all other NEMA series monitors. The conflict monitor shall be supplied with the NEMA and NEMA Plus features.

The signal malfunction management unit (MMU) specified herein shall conform to NEMA Standards TS-2 – 2003, Part 4.

The cabinet wiring shall be designed such that the removal of the monitor from the circuit shall cause the cabinet to immediately go to flashing mode of operation. Conflict monitor flash shall be an all red flash for all approaches.

C. Normal Flashing Operation

Equipment for flashing operation of the vehicle signal face shall be provided and wired in the cabinet. The flasher shall comply with NEMA specifications, where applicable, and be a two-circuit flasher and solid state electronics. The flasher shall be rated as 20 amps continuous duty. Flash relays utilized to accomplish cabinet flash shall be heavy-duty, load-rated equivalent to Model 430 flash relays. Selection of phases flashed concurrently shall be selected to insure that the conflict monitor would not activate a conflict or an absence or red signal and require manual reset.

D. Method of Measurement

Traffic Signal Controllers will be measured per each for the number of traffic signal controllers furnished and installed.

E. Basis of Payment

Traffic Signal Controllers will be paid at the contract unit price per each. Payment will be full compensation for furnishing and installing the traffic signal controllers.

Special Provision for Traffic Signal Heads

LED Circular Signal 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.

1.2.3 All LED Traffic Signal Modules shall be produced in a NAFTA-participating country.

1.2.4 All LED Traffic Signal Modules supplied to this specification shall be CSA-approved.

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 have an 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 $Ø_{Vert}$ > -2.5 degrees:

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

For $Ø_{Vert}$ ≤ -2.5 degrees:

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

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

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

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

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

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

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

3.1.1.4 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?

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

$\mathbf{I}_{(-5,\ 10,\ 300,\ Green)} = [0.953*0.678]*475$ cd

$\mathbf{I}_{(-5,\ 10,\ 300,\ Green)} = 0.65*475 = 309$ cd

3.1.1.5 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 27.5 degrees 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: $y = 0.308$;
$y = 0.953 – 0.947x$;
$y = 0.290$:

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

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

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

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

	Green	
Point	*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 a voltage range from 80 to 135 VAC RMS.

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 Section 4.2.1.

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 8 watts, Yellow 12 watts, and Green 9 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 60 months 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 60 months 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.

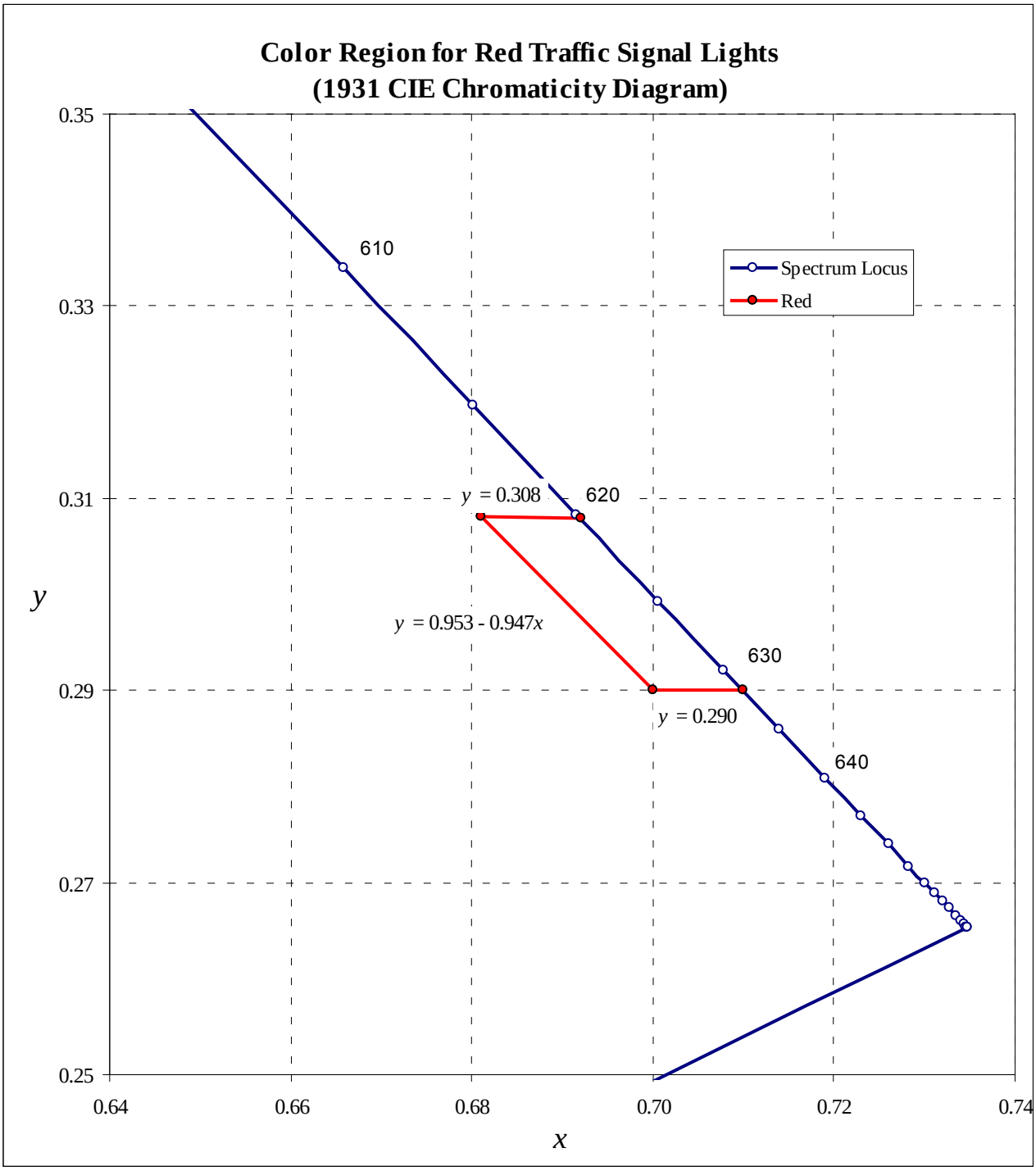


Figure 2a: Color Region for Red Traffic Control Signal Lights

Figure 2 (cont'd)

Color Regions for LED Traffic Control Signal Lights:

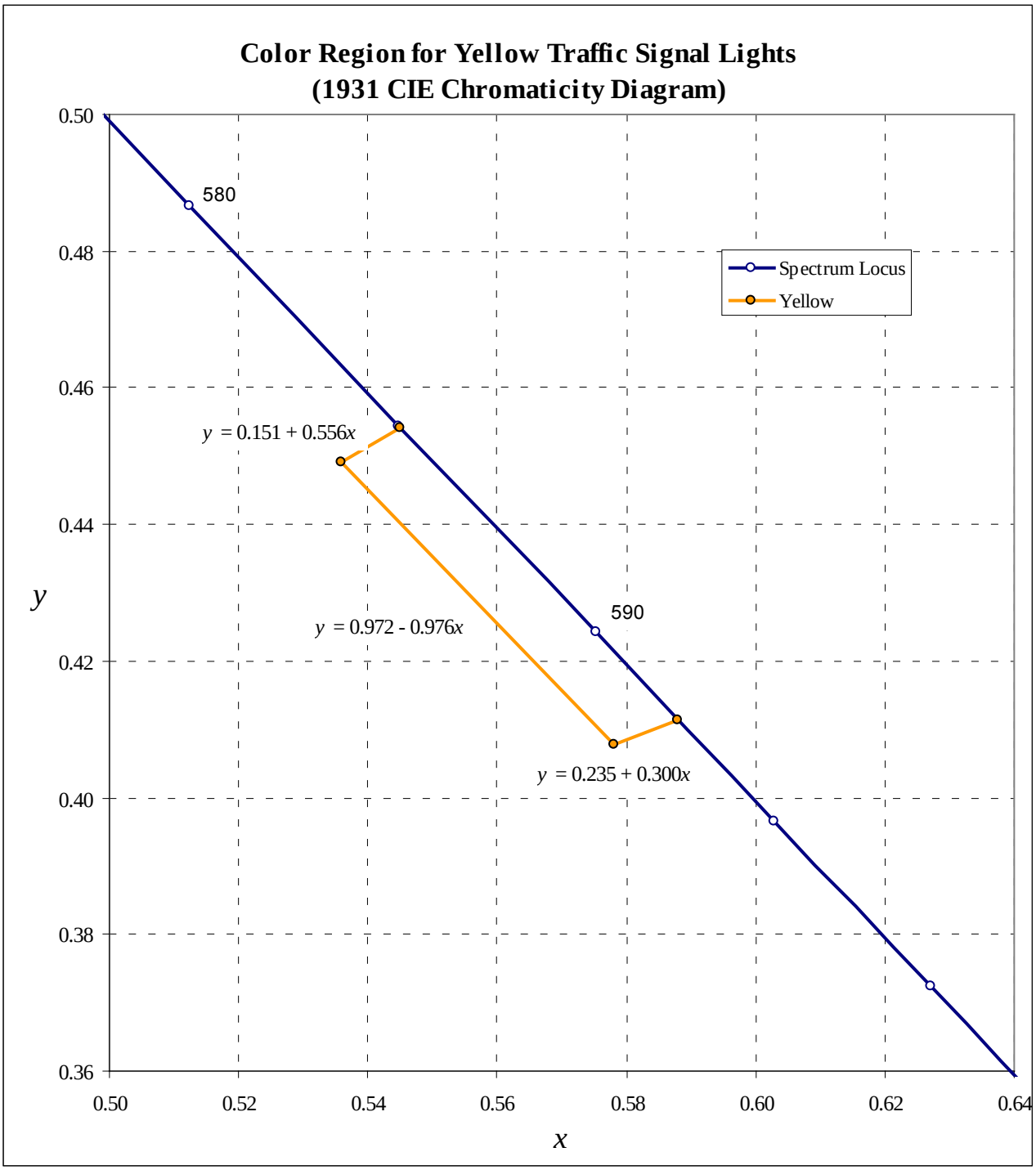


Figure -2b: Color Region for Yellow Traffic Control Signal Lights

Figure 2 (cont'd)

Color Regions for LED Traffic Control Signal Lights:

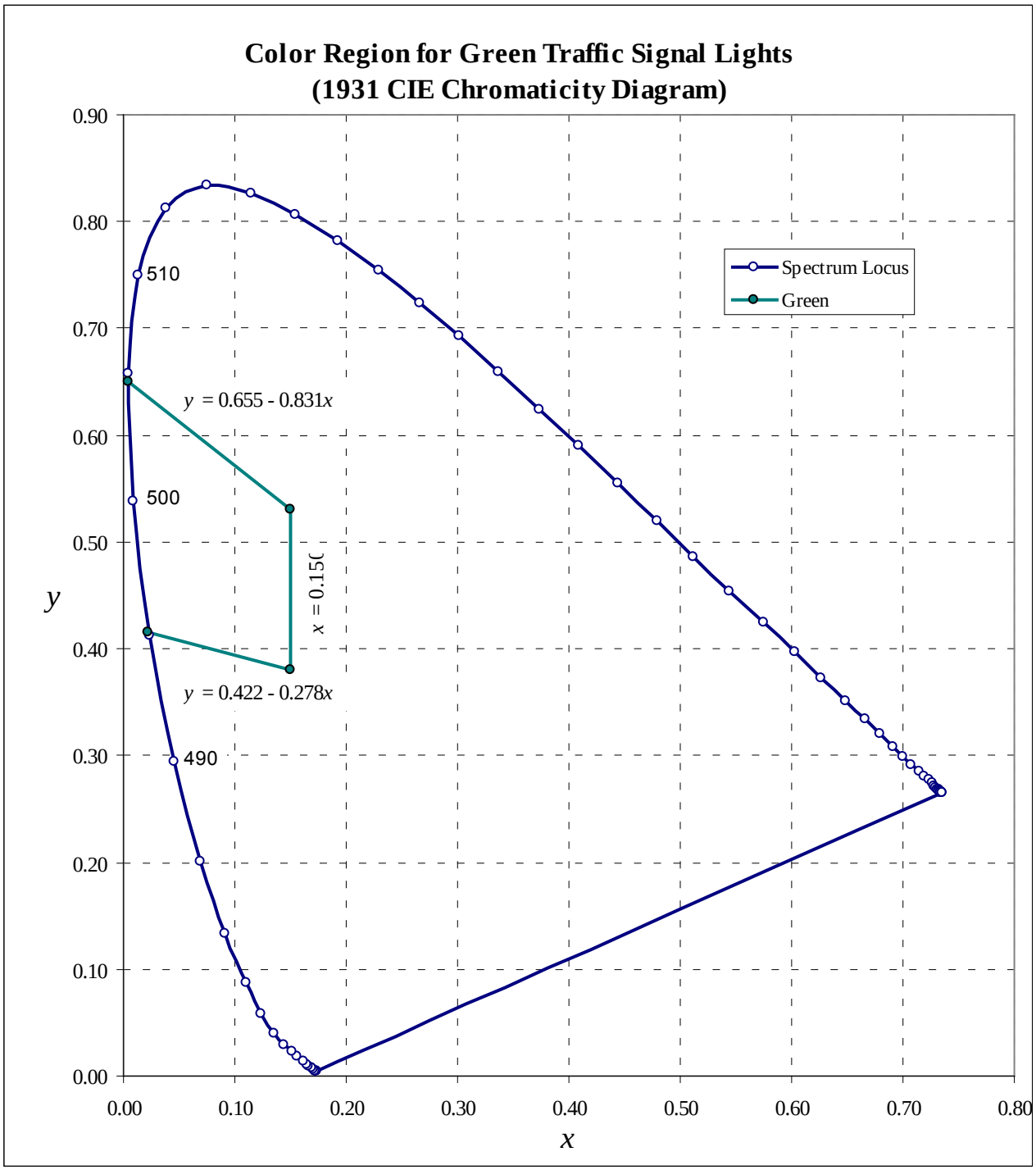


Figure 2c: Color Region for Green Traffic Control Signal Lights

LED Pedestrian Hand/Person/Countdown Modules

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 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 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 AlGaAs technology 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.

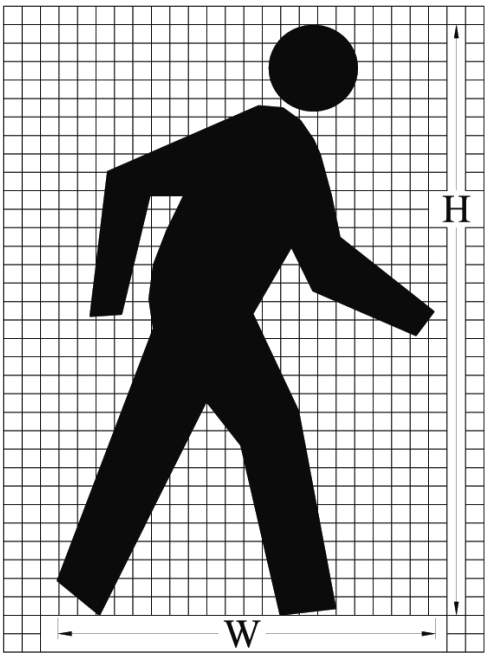


Figure 1—Walking Person icon

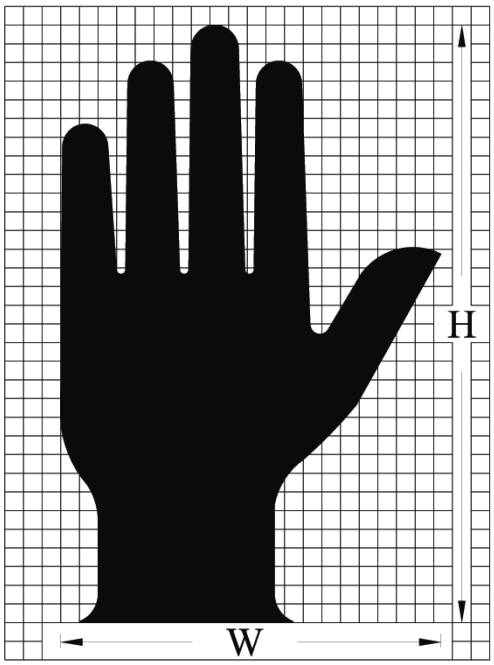


Figure 2—Upraised Hand icon

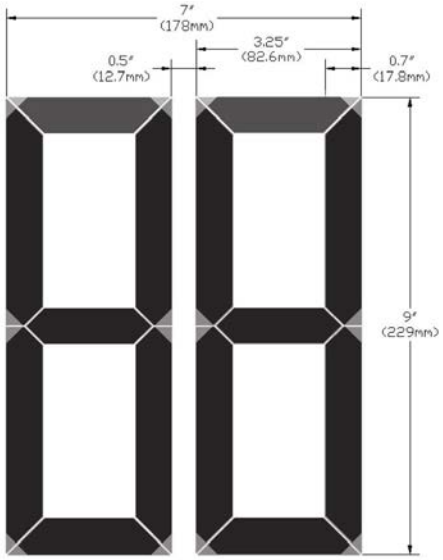


Figure 3—Countdown Display

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 signal housing.

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: $0.280 \leq x < 0.400$
$y = 0.7917 \cdot x + 0.0983$.

2nd Green boundary: $0.400 \leq x < 0.450$
$y = 0.4600 \cdot x + 0.2310$.

Yellow boundary: $x = 0.450$

1st Purple boundary: $0.450 \leq x < 0.400$
$y = 0.4600 \cdot x + 0.1810$.

2nd Purple boundary: $0.400 \leq x < 0.280$
$y = 0.7917 \cdot x + 0.0483$.

	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: $0.600 \leq x \leq 0.680$
$y = 0.990 - x$

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 Section 4.2.1.

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
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

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

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 second by 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 120 VAC.

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 lens to 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 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.

6.0 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 60 months 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 60 months 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.

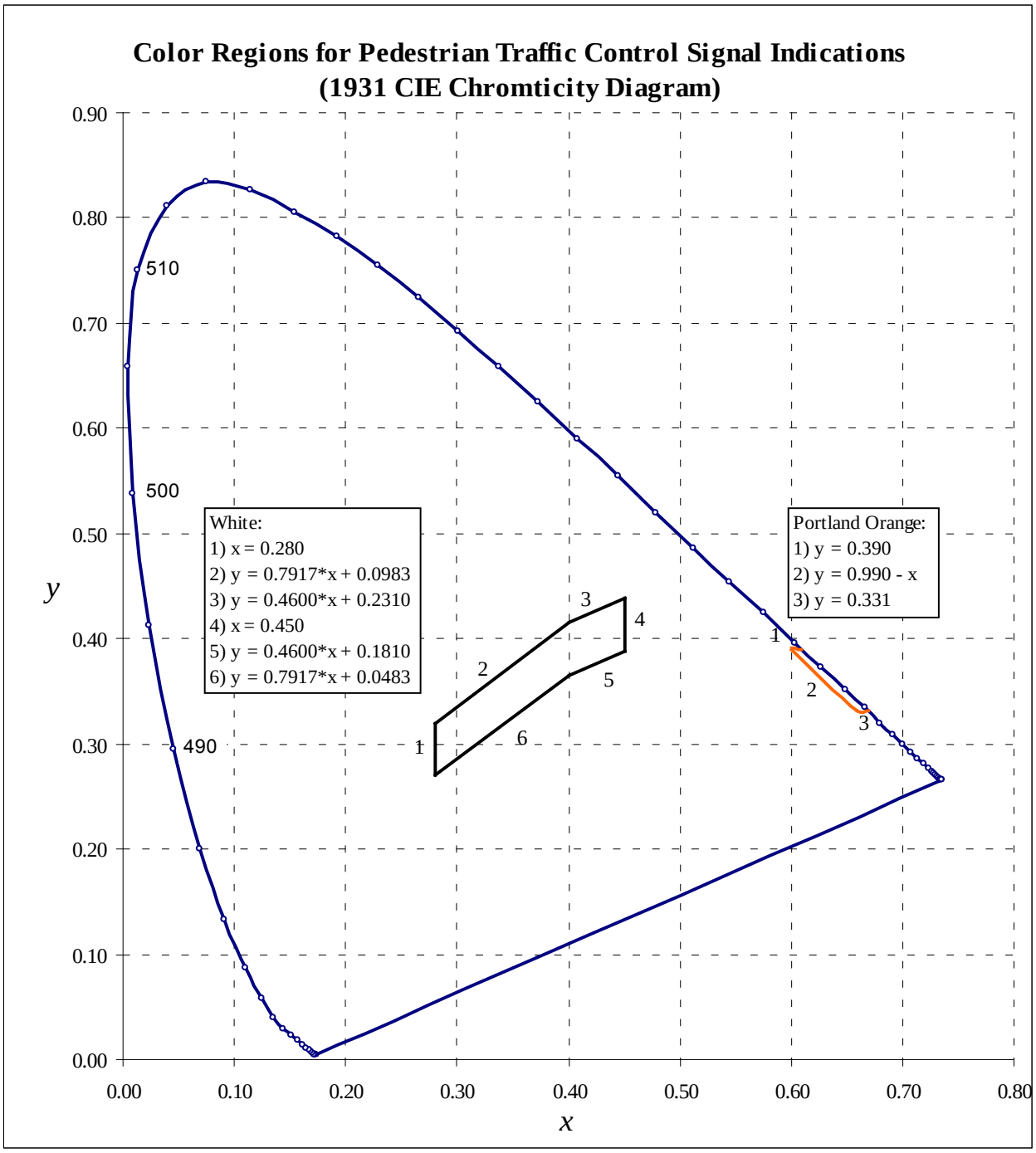
6.1.4.2 The documentation shall clearly disclose:

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 4.
Intertek ETL Verified Label


Color Regions for Pedestrian Traffic Control Signal Indications
(1931 CIE Chromticity Diagram)
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
y
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
x
510
500
490
White:
1) x = 0.280
2) y = 0.7917*x + 0.0983
3) y = 0.4600*x + 0.2310
4) x = 0.450
5) y = 0.4600*x + 0.1810
6) y = 0.7917*x + 0.0483
Portland Orange:
1) y = 0.390
2) y = 0.990 - x
3) y = 0.331
1
2
3
4
5
6

LED Vehicle Arrow Signal Module

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 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.

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

1.2.3 All LED Traffic Signal Modules supplied to this specification shall be CSA-approved.

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

3.1.1.1.3 There are no requirements for the region where $Ø_{OD}$ > 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 VAC RMS.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

a) Wire a 50 kΩ resistor in series with the hot line between the module and the AC power supply. A 100 kΩ shunt resistor shall be wired between the hot line connection and the neutral line connection on the module. A single-pole-single-throw switch shall be wired in parallel with the 50 kΩ resistor. With the switch in the closed position and the LED load disconnected from the module power supply, energize the module for 300 ms to establish the failed-state impedance, Section 4.7.

b) The second part of the failed-state impedance test is conducted to ensure that the appropriate failed-state impedance is established. The switch is opened and the circuit is energized by the 120 VAC voltage supply. The voltage across the 100 kΩ shunt resistor shall be continuously monitored. The voltage shall decay to a value equal to or greater than 70 VAC RMS. For the continuous interval of 500 ms through 1,500 ms, after energizing the circuit with an open switch, the measured voltage shall be 70 VAC RMS or greater. The second part of the test shall be repeated 10 times with the minimum voltage recorded during the continuous interval of 500 ms through 1,500 ms, after energizing the circuit with an open switch, recorded as the final test value.

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

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

6. Warranty Requirements

6.1 Warranty

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

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

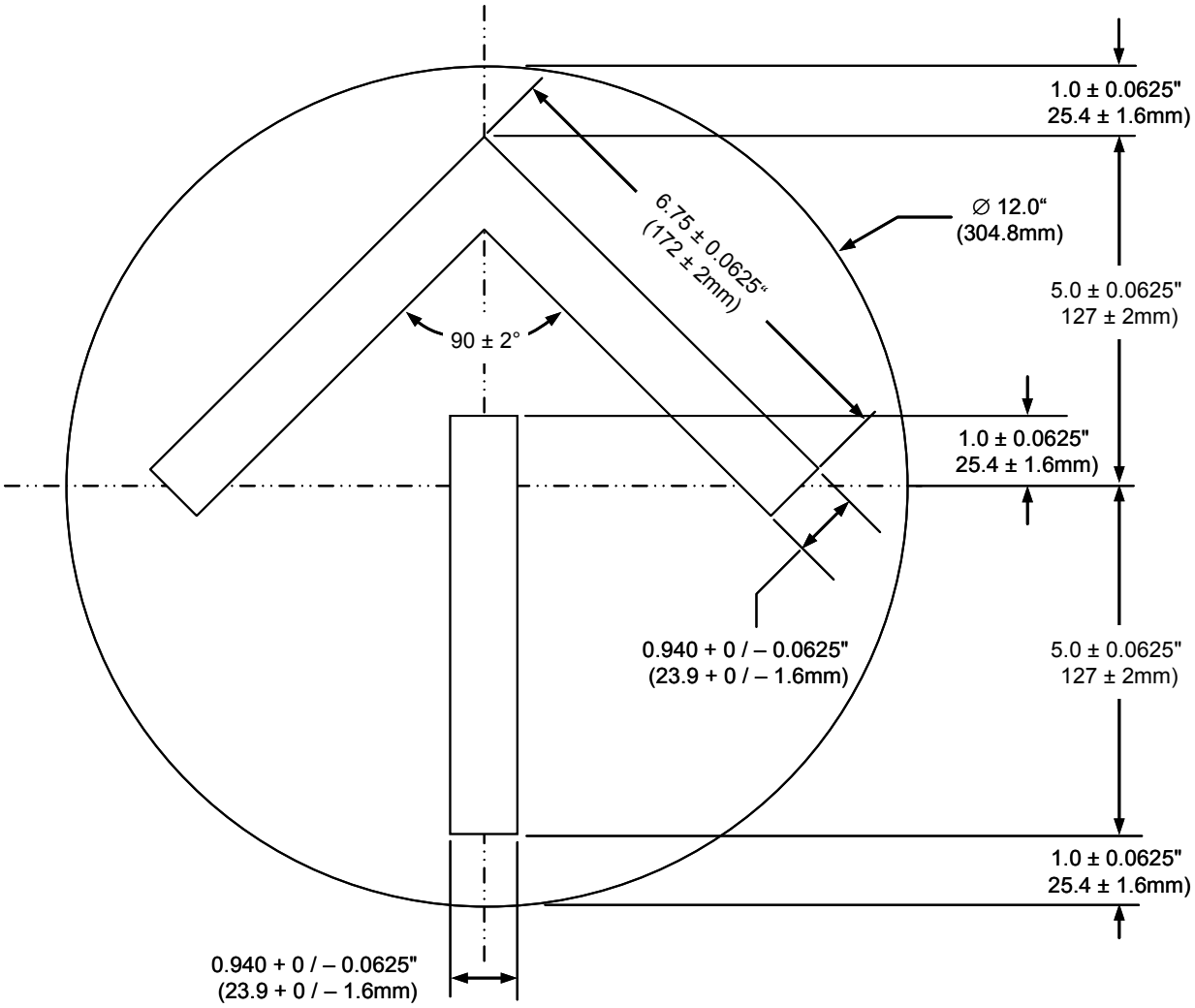
Minimum Maintained Luminous Intensity Value
Per VTCSH LED Vehicle Arrow Traffic Signal, July 1, 2007
(Omni-directional—suitable for mounting in any orientation)

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:



Doors and visors and backplates shall be finished in dull black. The housing shall be Highway Yellow, of best quality and meeting Government Specification T-TE-489B.

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.

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.

7.4 Method of Measurement

Measurement of these items shall be by actual count of signal heads furnished and installed.

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 and installing the 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 typical Detail Plate Nos. 635.01 and 635.04, 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, 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

7.9 Post Top Pole Requirements

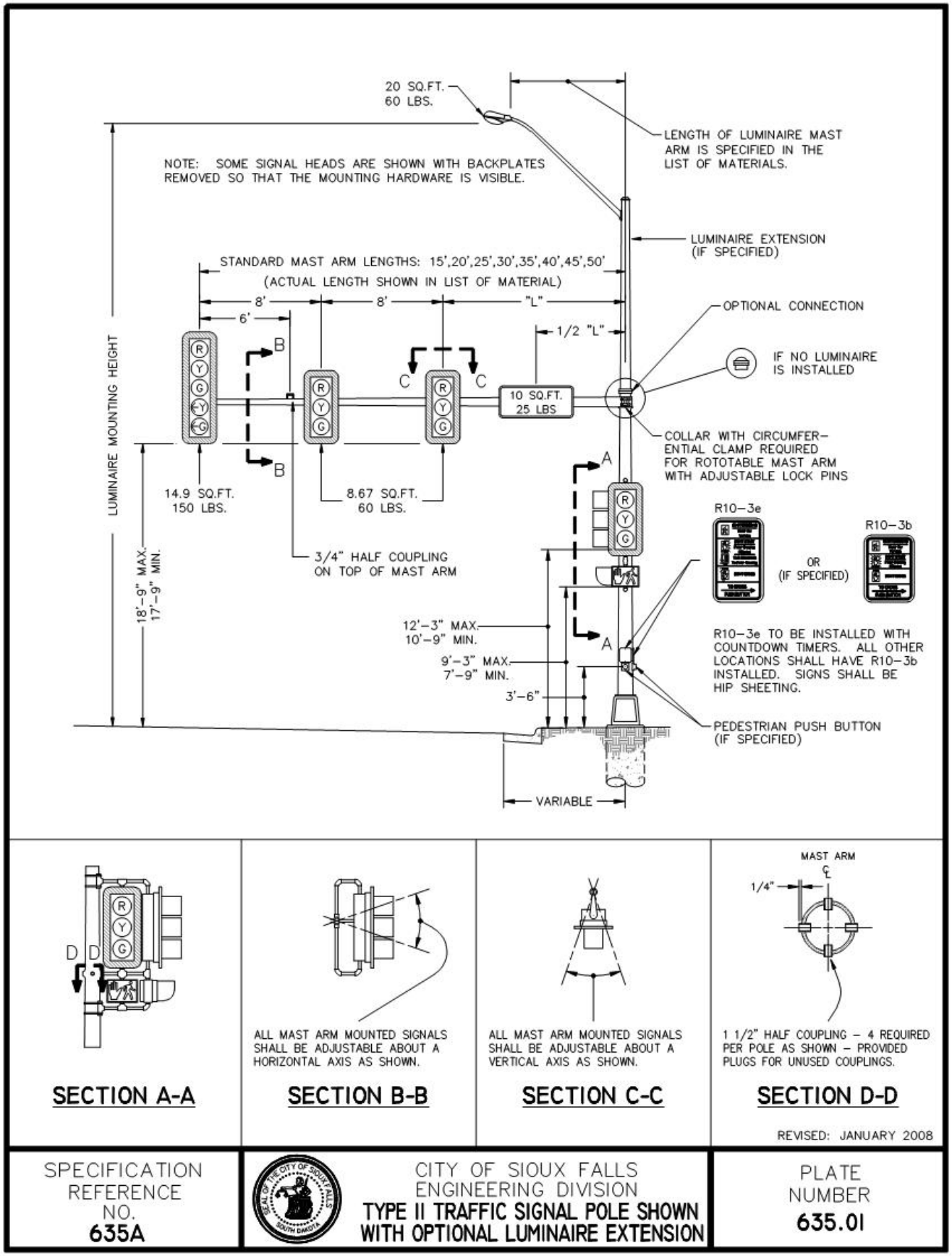
The spun aluminum pole gate shall be 10' in length and conform to the requirements shown on Detail Plate Nos. 635.04.

7.10 Method of Measurement

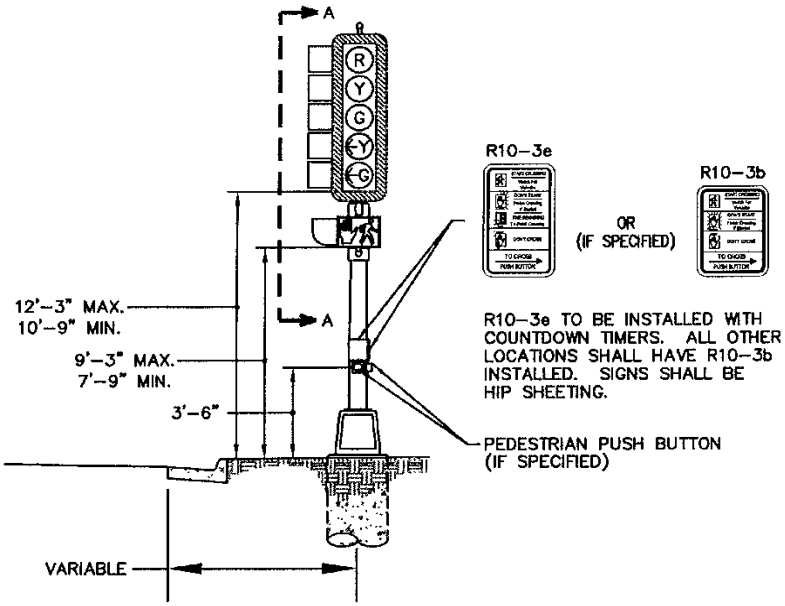
The contract will require supports as necessary for supporting the signal heads but no field measurement will be taken.

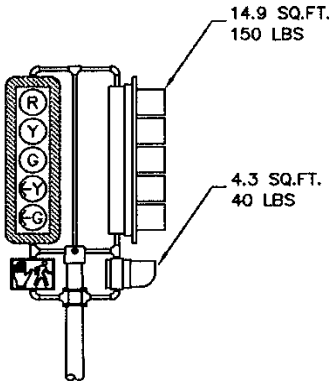
7.11 Basis of Payment

Mounting assemblies shall be considered incidental to the various signal parts they support.


20 SQ.FT.
60 LBS.
LENGTH OF LUMINAIRE MAST ARM IS SPECIFIED IN THE LIST OF MATERIALS.
NOTE: SOME SIGNAL HEADS ARE SHOWN WITH BACKPLATES REMOVED SO THAT THE MOUNTING HARDWARE IS VISIBLE.
LUMINAIRE EXTENSION (IF SPECIFIED)
STANDARD MAST ARM LENGTHS: 15',20',25',30',35',40',45',50'
(ACTUAL LENGTH SHOWN IN LIST OF MATERIAL)
8'
8'
"L"
6'
1/2 "L"
OPTIONAL CONNECTION
IF NO LUMINAIRE IS INSTALLED
LUMINAIRE MOUNTING HEIGHT
10 SQ.FT.
25 LBS
COLLAR WITH CIRCUMFER-ENTIAL CLAMP REQUIRED FOR ROTOTABLE MAST ARM WITH ADJUSTABLE LOCK PINS
14.9 SQ.FT.
150 LBS.
8.67 SQ.FT.
60 LBS.
3/4" HALF COUPLING ON TOP OF MAST ARM
18'-9" MAX.
17'-9" MIN.
R10-3e
R10-3b
OR
(IF SPECIFIED)
12'-3" MAX.
10'-9" MIN.
9'-3" MAX.
7'-9" MIN.
3'-6"
R10-3e TO BE INSTALLED WITH COUNTDOWN TIMERS. ALL OTHER LOCATIONS SHALL HAVE R10-3b INSTALLED. SIGNS SHALL BE HIP SHEETING.
PEDESTRIAN PUSH BUTTON (IF SPECIFIED)
VARIABLE
MAST ARM
1/4"
ALL MAST ARM MOUNTED SIGNALS SHALL BE ADJUSTABLE ABOUT A HORIZONTAL AXIS AS SHOWN.
ALL MAST ARM MOUNTED SIGNALS SHALL BE ADJUSTABLE ABOUT A VERTICAL AXIS AS SHOWN.
1 1/2" HALF COUPLING – 4 REQUIRED PER POLE AS SHOWN – PROVIDED PLUGS FOR UNUSED COUPLINGS.
SECTION A-A
SECTION B-B
SECTION C-C
SECTION D-D
REVISED: JANUARY 2008
SPECIFICATION REFERENCE NO.
635A
CITY OF SIOUX FALLS
ENGINEERING DIVISION
TYPE II TRAFFIC SIGNAL POLE SHOWN WITH OPTIONAL LUMINAIRE EXTENSION
PLATE NUMBER
635.01

NOTE: SOME SIGNAL HEADS ARE SHOWN WITH BACKPLATES REMOVED SO THAT THE MOUNTING HARDWARE IS VISIBLE.

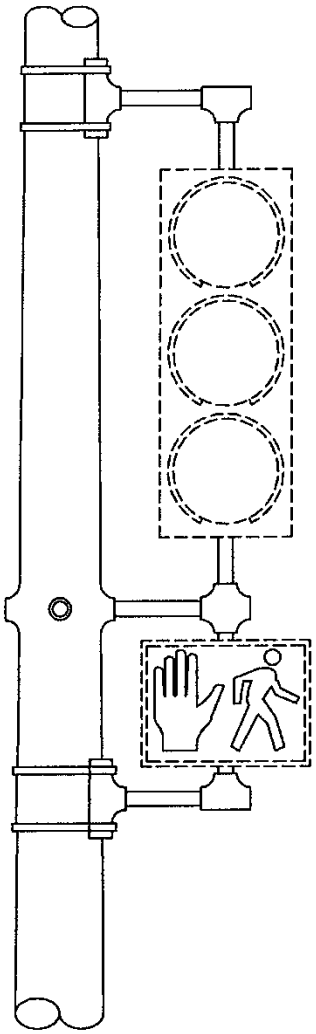




SECTION A-A

REVISED: JANUARY 2008

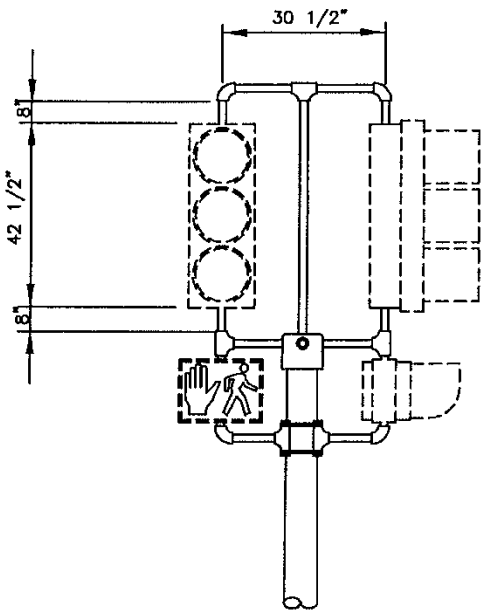
SPECIFICATION REFERENCE NO. 635A		CITY OF SIOUX FALLS ENGINEERING DIVISION SIGNAL PEDESTAL POLE	PLATE NUMBER 635.04



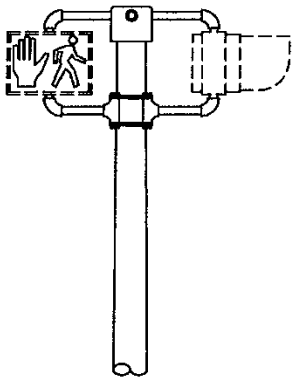
TYPICAL SECTION
TYPE 10B

REVISED: DECEMBER 2007

SPECIFICATION REFERENCE NO. 635A	CITY OF SIOUX FALLS ENGINEERING DIVISION TYPE II SIGNAL AND PEDESTRIAN HEAD MOUNTING BRACKETS	PLATE NUMBER 635.05



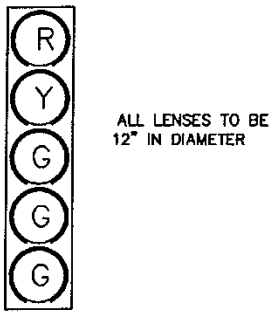
TYPICAL SECTION
TYPE 2C



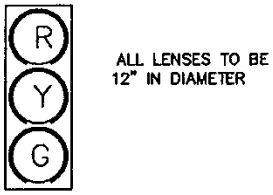
TYPICAL SECTION
TYPE 4D

REVISED: DECEMBER 2007

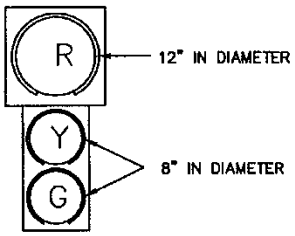
SPECIFICATION REFERENCE NO. 635A	CITY OF SIOUX FALLS ENGINEERING DIVISION PEDESTAL SIGNAL AND PEDESTRIAN HEAD MOUNTING BRACKETS	PLATE NUMBER 635.06



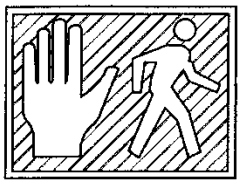
ONE WAY
5–SECTION
TRAFFIC SIGNAL



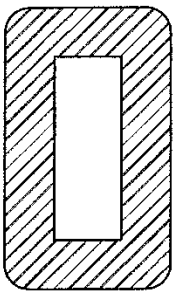
ONE WAY
3–SECTION
TRAFFIC SIGNAL



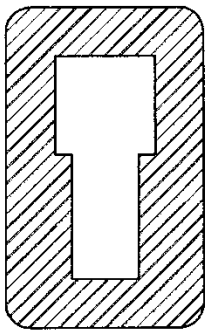
ONE WAY
3–SECTION
TRAFFIC SIGNAL



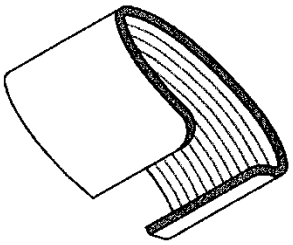
ONE WAY
1–SECTION
PEDESTRIAN SIGNAL



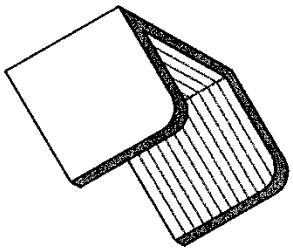
TYPICAL
5" BACK PLATE



TYPICAL
5" BACK PLATE



(V–1)
TUNNEL VISOR



(V–6)
PEDESTRIAN

REVISED: DECEMBER 2007

SPECIFICATION REFERENCE NO. 635A	CITY OF SIOUX FALLS ENGINEERING DIVISION TRAFFIC SIGNAL HEAD AND PEDESTRIAN HEAD PLATE	PLATE NUMBER 635.10

THE FOLLOWING UTILITY COMPANIES ARE INVOLVED ON

PROJECT NH 0100(105)419, Minnehaha County, PCN 01V5

The contractor shall contact the following utilities in a sufficient amount of time prior to starting work. The companies will identify their facilities and it is the responsibility of the contractor and the company to coordinate
their work to avoid damage to existing facilities and to allow for relocation of facilities as may be required for
grading work:

The following utilities were determined to be involved and were formally notified on October 5, 2015, 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) Xcel Energy – Transmission
210 Lime St
Mankato MN 56001
CONTACT: DAVE HAGEMAN, TELE. #612-330-5986
A Utility Conflict Matrix within Section B of the construction plans lists each conflict and its respective resolution for each company. 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.

(2) Xcel Energy – Distribution
500 W Russell St
Sioux Falls SD 57104
CONTACT: AARON BICKETT, TELE. #605-339-8315
A Utility Conflict Matrix within Section B of the construction plans lists each conflict and its respective resolution for each company. The relocation of the Company's facilities will be accomplished as provided by the utility agreement #715822 approved on May 17, 2016. The Company has agreed to complete all necessary relocation of their facilities by no later than September 15, 2016, unless prior arrangements are made with the State and approved, in writing, by the Area Engineer.

(3) Xcel Energy – Gas Transmission
PO Box 2747
Fargo ND 58108
CONTACT: JOHN NESS, TELE. #701-241-8695
A Utility Conflict Matrix within Section B of the construction plans lists each conflict and its respective resolution for each company.

(4) Western Area Power Administration
200 4th St SW
Huron SD 57350
CONTACT: LILA VASELAAR, TELE. #605-353-2556
A Utility Conflict Matrix within Section B of the construction plans lists each conflict and its respective resolution for each company. There is a signed letter of agreement on file in SDDOT's Utilities office for the State to reimburse WAPA their costs incurred to adjust their facilities.

(5) Sioux Valley Energy
PO Box 216
Colman SD 57017-0216
CONTACT: JASON SAGE, TELE. #605-530-9472
A Utility Conflict Matrix within Section B of the construction plans lists each conflict and its respective resolution for each company.

(6) MidAmerican Energy
1200 S Blauvelt
Sioux Falls SD 57105
CONTACT: TIM GALBRAITH, TELE. #605-373-6047
The A Utility Conflict Matrix within Section B of the construction plans lists each conflict and its respective resolution for each company. NOTE: Contractor to adjust subcut and subgrade correction depth to avoid gas lines from 15+00 to 17+00.

(7) ENEL Greenpower
206 W 1st St
Hardwick MN
CONTACT: TONY EDWARDS, TELE. #507-935-8048
A Utility Conflict Matrix within Section B of the construction plans lists each conflict and its respective resolution for each company.

(8) L&O Power Coop
1302 South Union St
Rock Rapids IA 51246
CONTACT: TROY METZGER, TELE. #712-472-2556
A Utility Conflict Matrix within Section B of the construction plans lists each conflict and its respective resolution for each company. The relocation of the Company's facilities will be accomplished as provided by the utility agreement #715772 approved on February 8, 2016. The Company has agreed to complete all necessary relocation of their facilities by no later than October 17, 2016, unless an extension is agreed upon and approved, in writing, by SDDOT's Area Engineer in accordance to the agreement.

(9) East River Electric
211 S Harth Ave
Madison SD 57042
CONTACT: CASEY SICHMELLER, TELE. #605-256-8020
A Utility Conflict Matrix within Section B of the construction plans lists each conflict and its respective resolution for each company. The relocation of the Company's facilities will be accomplished as provided by the utility agreement #715823 approved on May 17, 2016. The Company has agreed to complete all necessary relocation of their facilities by no later than September 15, 2016, unless prior arrangements are made with the State and approved, in writing, by the Area Engineer.

(10) Midco
3507 S Duluth Ave
Sioux Falls SD 57105-6452
CONTACT: AL MULLINIX, TELE. #605-274-8546
A Utility Conflict Matrix within Section B of the construction plans lists each conflict and its respective resolution for each company.

(11) CenturyLink
125 S Dakota Ave
Sioux Falls SD 57104-0002
CONTACT: TREVOR JANSSEN, TELE. #605-977-2848
A Utility Conflict Matrix within Section B of the construction plans lists each conflict and its respective resolution for each company.

(12) Alliance Communications
113 N Splitrock Blvd
Brandon SD 57030-0349
CONTACT: STEVE KOLBECK, TELE. #605-594-8229
A Utility Conflict Matrix within Section B of the construction plans lists each conflict and its respective resolution for each company. The Company plans to repair/replace their facility crossing HWY 100 at station 800+18 only if necessary during the highway construction. The facility is on private easement and therefore eligible for reimbursement.

(13) SDN Communications
2900 W 10th St
Sioux Falls SD 57104
CONTACT: LAWRENCE ESCOBIN, TELE. #605-978-1094
A Utility Conflict Matrix within Section B of the construction plans lists each conflict and its respective resolution for each company.

(14) MCI/Verizon
2400 North Glenville
Richardson TX 75082
CONTACT: DEAN BOYERS, TELE. #972-729-6322
A Utility Conflict Matrix within Section B of the construction plans lists each conflict and its respective resolution for each company.

(15) Sprint
849 Earl St
St Paul MN 55106
CONTACT: DAN HILLIARD, TELE. #612-414-2089
A Utility Conflict Matrix within Section B of the construction plans lists each conflict and its respective resolution for each company.

(16) Minnehaha Community Water
47381 – 248th St
Dell Rapids SD 57022
CONTACT: RYAN ALLEN, TELE. #605-428-3374
A Utility Conflict Matrix within Section B of the construction plans lists each conflict and its respective resolution for each company.

(17) Enventis
2730 3rd Ave PO Box 3288
Mankato MN 56002-3288
CONTACT: JONI MCCABE, TELE. #507-387-1770
A Utility Conflict Matrix within Section B of the construction plans lists each conflict and its respective resolution for each company.

(18) Minnehaha County
2124 E 60th St N
Sioux Falls SD 57104
CONTACT: SHANNON SCHULTZ, TELE. #605-367-4316
A Utility Conflict Matrix within Section B of the construction plans lists each conflict and its respective resolution for each company.

(19) City of Brandon – Stockwell Engineers
600 N Main Ave STE 100
Sioux Falls SD 57104
CONTACT: PAUL SANOW, TELE. #605-261-9100
A Utility Conflict Matrix within Section B of the construction plans lists each conflict and its respective resolution for each company.

(20) City of Sioux Falls
224 W 9th St
Sioux Falls SD 57104-6407
CONTACT: SHANNON AUSEN, TELE. #605-367-8600
A Utility Conflict Matrix within Section B of the construction plans lists each conflict and its respective resolution for each 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
FOR
CONTRACTOR ADMINISTERED PRECONSTRUCTION MEETING

APRIL 18, 2013

I. DESCRIPTION

This work consists of the Contractor scheduling and conducting a preconstruction meeting prior to beginning work on this contract. Additionally this work consists of the Contractor providing the Area Engineer a completed list of required submittals.

II. MATERIALS (Not Specified)

III. CONSTRUCTION REQUIREMENTS

For the purposes of this special provision, a business day is any calendar day except Saturdays, holidays, and days designated by the Governor of this State as an administrative leave day for state employees.

The Department will provide the Contractor a list of required submittals and the Authorization Form for Preconstruction Meeting (Form DOT-270) within five (5) business days of the date of the Notice to Proceed.

The Contractor's Required Submittals Form (Form DOT-272) is a document outlining information required prior to the completion of the project. This list will include two types of submittals; 1) information required before scheduling a preconstruction meeting and 2) information required before the Contractor begins related work. The Department reserves the right to request additional information not included in the original list of required submittals. The list of required submittals will include, but is not limited to, proposed sequence changes, shop drawings, permits, certifications, mix designs, labor compliance, equal employment opportunity, and disadvantaged business enterprise documents.

Prior to scheduling the preconstruction meeting, the Contractor will complete and provide the Area Engineer all items on the list of required submittals that are required as described in 1) above. If the Contractor cannot complete and provide a submittal item required prior to scheduling the preconstruction meeting, the Contractor will contact the Area Engineer to establish a mutually agreed upon

date when the required submittal will be completed and provided to the Area office.

The Contractor will not begin work on an item until the Contractor has provided the Area Engineer with all required information for the applicable work item and the appropriate office has approved the information, if necessary. The Contractor will make every reasonable effort to deliver the required submittals at the earliest possible time.

The Contractor's authorized representative as indicated on the Signature Authorization Form (Form DOT-209) will complete, in its entirety, the first page of the Authorization Form for Preconstruction Meeting and will initial each proceeding section. By initialing each section, the Contractor is confirming comprehension of each section.

When the Contractor has provided the Area Engineer all required submittals, unless the Contractor and Department have established an agreement in writing providing future dates of outstanding required submittal items, the Contractor will schedule a preconstruction meeting with the Area Engineer.

Within two (2) business days following the Contractor scheduling the preconstruction meeting, the Area Engineer will prepare and send the Contractor a meeting confirmation and the Preconstruction Meeting Outline (Form DOT-271) of discussion items including specific Department items.

The Contractor will complete the Contractor's portion of the Preconstruction Meeting Outline and will add additional discussion items as needed. The Contractor will send the meeting notice and final Preconstruction Meeting Outline to the Area Engineer, all subcontractors, utility companies, and all suppliers at least five (5) business days prior to the preconstruction meeting.

The Area Engineer will send the notice of the meeting and the final Preconstruction Meeting Outline of discussion items to any other government entities and other principle stakeholders involved in the project at least three (3) business days prior to the preconstruction meeting.

At the discretion of the Area Engineer, the preconstruction meeting may be held in person, videoconference, or over the phone. The Contractor's competent superintendent, as required by Section 5.5, who will be working on this project, is required to attend the preconstruction meeting.

The Contractor will lead the meeting discussion as described in the Preconstruction Meeting Outline. The Area Engineer will prepare the meeting minutes including any unresolved items and distribute them to all attendees and principle stakeholders within five (5) business days following the preconstruction meeting.

IV. METHOD OF MEASUREMENT

The Department will not make a separate measurement for the preconstruction meeting.

V. BASIS OF PAYMENT

The Department will not make a separate payment for the preconstruction meeting. All costs associated with the preconstruction meeting will be incidental to other contract items.

* * * * *

FUEL ADJUSTMENT AFFIDAVIT

Project Number _____
PCN _____
County _____

For project let using the SDEBS) and in accordance with Section 9.12, the bidder is not required to notify the Department at the time of submitting bids whether the Contractor will or will not participate in the fuel cost adjustment program. Prior to execution of the contract, the successful bidder must submit this completed form to the Department for approval. The Fuel Adjustment Affidavit shall include the anticipated fuel cost of subcontractors.

Does your company elect to participate in a fuel adjustment for this contract for the fuels that do not have a fixed price? No adjustments in fuel prices will be made if "No" is checked.

☐ Yes ☐ No

If yes, provide the total dollars for each of the applicable fuels. No adjustments in fuel price will be made for the fuel types that are left blank or completed with a $0.00 value.

Diesel (x) $_____

Unleaded (y) $_____

Burner Fuel (z) $_____ Type of Burner Fuel Used: _____

Sum (x + y + z) = $_____

Note: The sum of the x, y, and z may not exceed 15% of the original contract amount.

The following must be completed regardless of whether the Contractor elects to participate in the fuel adjustment affidavit

Under the penalty of law for perjury or falsification, the undersigned, _____,
(Printed Name)

_____ of _____,
(Title) *(Contractor)*

hereby certifies that the documentation is submitted in good faith, that the information provided is accurate and complete to the best of their knowledge and belief, and that the monetary amount identified accurately reflects the cost for fuel, and that they are duly authorized to certify the above documentation on behalf of the company.

I hereby agree that the Department or its authorized representative shall have the right to examine and copy all Contractor records, documents, work sheets, bid sheets, and other data pertinent to the justification of the fuel costs shown above.

Dated _____ Signature _____

Notarization is required only when the Contractor elects to participate in the fuel adjustment affidavit

Subscribed and sworn before me this _____ day of _____ , 20___.

_____ _____
Notary Public *My Commission Expires*

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

STANDARD TITLE VI / NONDISCRIMINATION ASSURANCES
APPENDIX A & E

MARCH 1, 2016

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. **Compliance with Regulations**: The contractor (hereinafter includes consultants) will comply with the Acts and the Regulations relative to Non-discrimination in Federally-assisted programs of the U.S. Department of Transportation, Federal Highway Administration, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.

2. **Non-discrimination**: The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part 21.

3. **Solicitations for Subcontracts, Including Procurements of Materials and Equipment**: In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and the Acts and the Regulations relative to Non-discrimination on the grounds of race, color, or national origin.

4. **Information and Reports**: The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Recipient or the Federal Highway Administration to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the contractor will so certify to the Recipient or the Federal Highway Administration, as appropriate, and will set forth what efforts it has made to obtain the information.

5. **Sanctions for Noncompliance**: In the event of a contractor's noncompliance with the Non-discrimination provisions of this contract, the Recipient will impose such contract sanctions as it or the Federal Highway Administration may determine to be appropriate, including, but not limited to:

   a. withholding payments to the contractor under the contract until the contractor complies; and/or
   b. cancelling, terminating, or suspending a contract, in whole or in part.

6. **Incorporation of Provisions**: The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as the Recipient or the Federal Highway Administration may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or

is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request the Recipient to enter into any litigation to protect the interests of the Recipient. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

Pertinent Non-Discrimination Authorities:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d et seq., 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin); and 49 CFR Part 21.
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Federal-Aid Highway Act of 1973, (23 U.S.C. § 324 et seq.), (prohibits discrimination on the basis of sex);
- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 et seq.), as amended, (prohibits discrimination on the basis of disability); and 49 CFR Part 27;
- The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 et seq.), (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131-12189) as implemented by Department of Transportation regulations at 49 C.F.R. parts 37 and 38;
- The Federal Aviation Administration's Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures Non-discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of Limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1681 et seq).

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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
DISADVANTAGED BUSINESS ENTERPRISE

MAY 20, 2015

The Contractor, subrecipient, or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The Contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of Department-assisted contracts. Failure by the Contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the Department deems appropriate.

I. Definitions

A. Specified Goal: A DBE participation goal for a contract as indicated by a specific numerical percentage of the total dollar amount of the contract in the bidding documents.

B. Not Specified: No specific DBE participation goal is specified for a contract.

C. Disadvantaged Business Enterprise (DBE): A for-profit small business that is certified by the Department and is listed in the DBE Directory available on the Department's web site.

D. Good Faith Effort (GFE): Efforts to achieve a DBE goal which; by their scope, intensity, and appropriateness to the objective; can reasonably be expected to meet the objective of the Department's DBE program pursuant to 49 CFR 26.1.

E. Positive Contact: Communication between the bidder and the DBE in which the bidder receives an oral or written response from the DBE stating the DBE's intention to quote or not quote a project.

F. Commitment: The dollar amount of work to be subcontracted to DBEs, according to the bidder's bid. The commitment may be compared to the dollar amount of all contract items in the bidder's bid and expressed as a percentage of the total bid amount.

II. Bidding Requirements

A bidder must not discriminate on the basis of race, color, national origin, or sex in the solicitation or award to subcontractors and material suppliers. Bidders who demonstrate a pattern of possible discrimination through consistent and repeated under-utilization of DBEs may be subject to investigation and sanctions allowed by regulation, administrative rule, or law.

The Bidder's failure to carry out the requirements of this special provision will be treated as a non-responsive bid.

On contracts that specify a specific DBE contract participation goal, all bidders must include their DBE commitment for the contract in the bidding files provided by the Department.

If the contract indicates "Not Specified," all bidders are encouraged to include their anticipated DBE utilization for the contract in the bidding files provided by the Department.

Each bidder must submit a list of all subcontractors and suppliers (DBEs and non-DBEs) the bidder received quotes from for that contract with the bid files.

A Contractor must make reasonable efforts to provide opportunities for DBEs to participate on Federal-aid contracts throughout the life of the contract.

On contracts let with a specified DBE contract participation goal, where the low bidder has not met or exceeded that goal, the bidder must provide GFE documentation as indicated in Section III of this special provision.

When the DBE participation is "Not Specified" on a contract, each bidder is encouraged to use DBE Contractors; however no bidder will be required to furnish GFE documentation.

The apparent low bidder must submit GFE documentation, when requested by the Department, within 2 business days from the date the apparent low bidder is contacted by the Department. Section III of this special provision provides information on the types of action bidders should make as part of their GFE to obtain DBE participation. The apparent low bidder may submit documentation with the bidding files provided all pertinent information is included. The apparent low bidder must submit any missing documentation within 2 business days from the date the Department contacts the low bidder.

If the apparent low bidder does not provide documentation showing GFE as required by this special provision, the Department will consider that bid nonresponsive and may either award the contract to the next lowest responsible bidder with a responsive bid, or reject all bids. Subsequent to the DBE

committee's decision that the apparent low bidder's efforts do not establish GFE, the apparent low bidder will be notified that the bid is not responsive. The apparent low bidder will have 2 business days from the date of notification to contact the Bid Letting Engineer to arrange a meeting with the Department Secretary, or the Secretary's designee, to present documentation and argument about why the bid should not be rejected. The Department Secretary or the Secretary's designee will issue a written decision on responsiveness of the bid within 2 business days after the meeting.

If the apparent low bid is rejected for failure to meet the GFE or other requirements, the next apparent low bidder will be notified, unless all bids are rejected. The next apparent low bidder's DBE commitment will also be reviewed, and GFE documentation may be requested. Unless all bids are rejected, award of the contract will be made to the lowest bidder with a responsive bid.

The lowest responsive bidder will be required to complete form DOT-289B, as included in the contract documents, when the contract is sent for signature. This form requires a signature from each DBE identified in the low bidder's DBE commitment. A separate form will be supplied for each DBE and will be included in the contract documents.

Bidders are encouraged to assist interested DBEs in obtaining bonding, lines of credit, insurance, necessary equipment, supplies, materials, or other related services.

III. Good Faith Efforts

If a GFE package is requested on a contract with a specified goal, the apparent low bidder must submit documentation showing compliance with the following requirements:

A. The apparent low bidder will submit a contact log of all solicitation efforts including:

- Name of the DBE firm
- Name and phone number of the individual with whom contact was made
- Date, time, and manner of each and every contact (by phone, in person, fax, mail, e-mail, etc.)
- The DBE's response to the solicitation
- Result of the solicitation effort

An example of a solicitation log is available on the Department's Bid Letting website. When bidding utilizing the South Dakota Department of Transportation Electronic Bid System (SDEBS), SDEBS may be used to document the log of solicitation efforts for the project.

B. The apparent low bidder will also submit documentation that shows GFE in relation to the following requirements:

1. The bidder must select contract work items to encourage DBE participation. This includes breaking out contract work items into economically feasible units to facilitate DBE participation, even when the bidder might otherwise prefer to perform these work items with its own forces.

2. The bidder must solicit all certified DBEs that are listed in the appropriate work classifications in the DBE directory and that have indicated in the directory they are willing to work in the project's geographic area. Without exception, all DBEs who are listed on the plan holders list by 10 AM central time 7 calendar days prior to the bid letting must be solicited in accordance with Section III.B.3 of this special provision. If the bidder has not solicited any DBE meeting these requirements, the bidder will provide a detailed written explanation showing why the DBE was not solicited.

3. To provide adequate time for the DBE to respond with a quote in the normal course of business, the bidder must make the initial solicitation at least 6 calendar days by mail or 5 calendar days by phone, fax, or e-mail prior to the letting date. Without exception, all DBEs who are listed on the plan holders list by 10 AM central time 7 calendar days prior to the bid letting must be solicited.

4. If the bidder does not receive a positive contact from a DBE, the bidder must follow up the initial solicitation with a second solicitation by phone, fax, or e-mail to determine whether the DBE is interested in quoting. The bidder must make this second solicitation at least 2 business days prior to the letting.

5. The bidder will provide interested DBEs with adequate and timely information about plans, specifications, and requirements of the contract to assist DBEs in responding to a solicitation.

6. If a bidder rejects a DBE quote because of previous problems with a particular DBE, the bidder must prepare a detailed written explanation of the problem. Additional cost involved in finding and using DBEs is not, in itself, sufficient reason for a bidder to reject a quote. A bidder must not reject a DBE as being unqualified without sound reasons based on a thorough investigation of the DBE's capabilities.

7. Any additional information requested by the Department.

C. The bidder must consider qualified DBEs whose quotes are reasonably competitive. If the bidder rejects any quote because it is considered not to be

"reasonably competitive," the bidder must provide copies of all DBE and non-DBE quotes, and a work item price spreadsheet comparing DBE quotes to non-DBE quotes. The spreadsheet must show which quote was included in the bid for the work items being compared. The ability or desire of a bidder to perform the work with its own forces does not relieve the bidder of the responsibility to make GFE. In the event a bidder elects to use its own forces over a DBE, the bidder must include, on the spreadsheet, documentation of the costs of using the bidder's own forces. This can be shown in a number of ways, which may include submitting portions of the bidder's work sheets used to prepare the bid.

D. The bidder must explain why the specified goal could not be met.

E. The bidder must identify any additional efforts the bidder made to secure DBE participation.

IV. Counting DBE Participation

On projects with a specified goal, the contract commitment, as submitted with the bid, will be documented on form DOT-289R/C as included in the contract documents.

If the project is shown as "Not Specified," the anticipated DBE utilization, as submitted with the bid, will be documented on form DOT-289 R/N – DBE Utilization Form, as included in the contract documents. The DBE utilization shown on this form is not a commitment to use the DBE. This information will be used by the Department to track anticipated DBE usage.

Only the portion of a contract performed by the DBE's own forces will count toward DBE participation. Included is the cost of supplies and materials obtained by the DBE for the contract, including supplies purchased or equipment leased by the DBE. Supplies and equipment the DBE subcontractor purchased or leased from the Contractor or its affiliate is not allowed to be included.

When a DBE performs as a participant in an approved joint venture, only the portion of the total dollar value of the contract equal to the distinct, clearly defined portion of the work of the contract that the DBE performs with its own forces will count toward DBE participation.

A bidder may count toward its DBE participation only that percentage of expenditures to DBEs that perform a commercially useful function (CUF) in the performance of a contract. A DBE performs a CUF when the DBE is responsible for execution of the work of a contract and is carrying out the DBE's responsibilities by actually performing, managing and supervising the work involved. To perform a CUF, the DBE must also be responsible, with respect to materials and supplies used on the contract, for negotiating prices, determining

quality and quantity, ordering and installing (where applicable) the materials, and paying for the material itself. To determine whether a DBE is performing a CUF, the Department will evaluate the amount of work subcontracted, the industry practice, and whether the amount the DBE is to be paid is commensurate with the work it is actually performing, DBE credit claimed for performance of the work, and other relevant factors.

A DBE is not performing a CUF if the DBE performs less than 30% of the total cost of its contract with its own work force, or if its role is limited to that of an extra participant in a transaction, project, or contract through which funds are passed in order to obtain the appearance of DBE participation. In determining whether a DBE is simply an extra participant, the Department will examine similar transactions, particularly those in which DBEs do not participate.

DBE participation will be counted for trucking services as follows:

The bidder/Contractor will receive credit toward DBE participation for the total value of the transportation services the DBE provides on the contract using trucks the DBE owns, insures, and operates and which are driven by drivers the DBE employs.

A DBE may lease trucks from another DBE firm, including an owner-operator who is certified as a DBE. When a DBE leases trucks from another DBE, the bidder/Contractor can count the total value of the transportation services the lessee DBE provides on the contract toward DBE participation.

The DBE may also lease trucks from a non-DBE firm, including an owner-operator. When a DBE leases trucks from a non-DBE, the bidder/Contractor can count toward DBE participation only the fee or commission the DBE receives as a result of the lease arrangement. The bidder/Contractor does not receive credit toward DBE participation for the total value of the transportation services, since all services are not provided by a DBE.

The bidder may count toward DBE participation expenditures to DBE firms for materials, supplies, or services as follows:

If the materials or supplies are obtained from a DBE manufacturer, count 100% of the cost of the materials or supplies toward DBE participation. A manufacturer is a firm that operates or maintains a factory or establishment that produces, on the premises, the materials, supplies, articles, or equipment required under the contract and of general character described by the specifications.

If the materials or supplies are purchased from a DBE regular dealer, count 60% of the cost of the materials or supplies toward DBE participation. A regular dealer is a firm that owns, operates, or maintains a store, warehouse

or other establishment in which the materials, supplies, articles, or equipment are bought, kept in stock, and regularly sold or leased to the public in the usual course of business.

If the materials or supplies are purchased from a DBE which is neither a manufacturer nor a regular dealer, count only the amount of fee or commission charged for assistance in the procurement of the materials or supplies or fee or transportation charges for the delivery of materials or supplies required at the job site toward DBE participation. In order to be counted, the Department must determine the fee to be reasonable and not excessive as compared to fees customarily allowed for similar services. The cost of the materials and supplies themselves will not count toward DBE goals.

The Department will not count toward DBE participation materials or services provided by a DBE who is not currently certified.

No intended or actual subcontracting arrangement which is contrived to artificially inflate DBE participation is allowed. This includes, but is not limited to, DBE middlemen which serve no commercially useful function, or arrangements where a DBE is acting essentially as a broker of goods or services, but has been counted as a manufacturer, regular dealer, or subcontractor.

The Department will review and monitor projects for compliance with the bidder's intended DBE participation. Failure by the Contractor to fulfill the contract commitment constitutes a breach of contract. The Department may also investigate the form and substance of particular business arrangements between and among DBE and Contractors with regard to specific contracts. If, as a result of an investigation, the Department determines a particular business arrangement is not allowable, the dollar amount of the unallowable DBE participation will be subtracted from the Contractor's DBE participation on that project. The Contractor will be notified if the apparent DBE participation is not adequate to meet the DBE participation stated on the form DOT-289R/C. The Contractor will be directed to seek additional participation from other DBEs to meet the unallowable portion on that contract.

All Contractors and DBEs shall cooperate fully and promptly with the Department in compliance reviews, investigations, and other requests for information. If the Department determines a Contractor was a knowing and willing participant in an unallowable business arrangement, or in the event of repeated violations, falsification, or misrepresentation, the Department will impose sanctions. Sanctions may include, but are not limited to one or more of the following:

- Assessment of liquidated damages as stated in Section VII of this special provision
- Suspension of bidding privileges or debarment

- Withholding progress payments
- Securing additional DBE participation on future Federal-aid contracts sufficient to make up for the DBE participation found to be unallowable
- Referral of the matter for criminal prosecution

V. Joint Checks to DBEs

A joint check is a check issued by a prime Contractor to a DBE subcontractor and to a material supplier or another third party for items or services to be incorporated into a project. For a prime Contractor to receive DBE credit, the DBE must perform a commercially useful function and be responsible for negotiating price, determining quality and quantity, ordering materials and installing (where applicable) and paying for materials.

To ensure that the DBE is independent of the prime Contractor and in compliance with the regulation, use of joint checks will be reviewed and allowed only under following conditions:

- Issued for valid reasons only, not simply for the convenience of the prime Contractor
- Used for a specific contract or specific time frame and not long-term or open ended
- Payment is made to the DBE and not directly to the supplier
- Requested and received prior written approval from the DBE Compliance Officer.

The request must include the following:

- Name of the DBE
- The DOT contract number(s)
- The DOT PCN number(s)
- The work the DBE will be performing on each contract
- Name of the supplier(s) used by the DBE
- The specific reason(s) for issuing joint checks

The Department will review the request and verify the circumstances indicated in the request with the DBE. A copy of the request and approval will be provided to the prime Contractor and the DBE.

VI. Certification of DBE Performance and Payments

Within 30 calendar days of the date of the Acceptance of Field Work the Contractor is required to submit form DOT-289 (Certification of DBE Performance and Payments), listing all DBEs that participated in the contract, and the total dollar amount paid (and anticipated to be paid) to each. DBE attainments are compared to commitments on form DOT-289R/C and any payments less than

90% of that commitment, without proper justification and documentation, will have liquidated damages assessed against the contract. The Contractor's final payment is not released until receipt of the form DOT-289.

Contractors are required to maintain a running tally of payments to DBEs. For reports of payments not being made in accordance with the prompt payment provision, alleged discrimination against a DBE or other similar complaint, the tally may be requested for review by the Department. The Department may perform audits of contract payments to DBEs to ensure that the amounts paid were as reported on the form DOT-289. All Contractors participating in Federal-aid contracts are expected cooperate fully and promptly with the Department in compliance reviews, investigations and other requests for information regarding payments to DBEs. Their failure to do so is grounds for appropriate sanctions or action against the Contractor.

The Department will monitor the running tally on a program basis and if reporting issues are identified, additional reporting requirements may be implemented.

The Contractor is required to report payments to DBEs twice a year from the date of the Notice to Proceed until the date of the Acceptance of Field Work. Reporting periods and deadlines for payment reporting submittals will be in accordance with the following:

Reporting Period:	**Reporting Deadline:**
October 1 to March 31	April 30
April 1 to September 30	October 31

For each reporting period, the Contractor is required to submit form DOT-289 listing all DBEs that participated in the contract, the payments to DBEs for that reporting period, and the total dollar amount paid to each DBE. For each reporting period after the Notice to Proceed, the Contractor will mark the form DOT-289 as "On-Going" when reporting payments to DBEs prior to the Date of the Acceptance of Field Work. Within 30 calendar days of the date of the Acceptance of Field Work and all DBE payments have been made, the Contractor is required to submit form DOT-289 and the Contractor will mark the form DOT-289 as "Final".

Each form DOT-289 must be provided to the Engineer by the reporting deadline stated above.

DBE payment are compared to commitment on form DOT-289R/C and any payment less than 90% of that commitment, without proper justification and documentation, will result in the Department assessing liquidated damages against the contract. The Contractor's final payment will not be released until receipt of the form DOT-289 marked "Final".

VII. Liquidated Damages

A. If the Contractor does not meet its contract commitment documented on form DOT-289 R/C, the Department will assess liquidated damages according to the following schedule:

1. For the first $1,000 DBE deficiency, 100% of the deficiency.

2. For the next $9,000 DBE deficiency, 50% of the deficiency.

3. For the next $10,000 DBE deficiency, 25% of the deficiency.

4. For any remaining DBE deficiency in excess of $20,000, 10% of the deficiency.

This liquidated damage provision will not be applicable where actual payment to a DBE is within 90% of the commitment or where there are good and sufficient reasons, properly documented, for the deficiency such as quantity under-runs, project changes, or other unexpected occurrences.

B. If a Contractor finds it impossible, for reasons beyond its control, to meet the contract commitment on form DOT-289R/C, the Contractor may, at any time prior to completion of the project, provide a written request to the DBE Compliance Officer for a complete or partial waiver of liquidated damages. No request for a waiver will be accepted after Acceptance of Field Work has been issued.

VIII. Termination or Substitution of a DBE

The Contractor will not be allowed to terminate or substitute a DBE without the Department's prior verbal consent followed by written approval. This includes, but is not limited to, instances in where the Contractor desires to perform work originally committed to a DBE with its own forces, with an affiliated company, with a non-DBE, or with another DBE. Department approval is required when the contract contains a "specified goal" on form DOT-289R/C and the DBE to be terminated or substituted is listed as a commitment on the form DOT-289R/C.

The Department will provide written consent only if the Department agrees the Contractor has good cause to terminate the DBE listed on the form DOT-289R/C. Good cause includes the following:

- The DBE fails or refuses to execute a written contract
- The DBE fails or refuses to perform the work of the DBE subcontract in a manner consistent with normal industry standards or Department specifications unless the failure or refusal by the DBE is a result of unfair or discriminatory actions by the Contractor

- The DBE fails or refuses to meet the Contractor's reasonable nondiscriminatory bond requirements
- The DBE becomes bankrupt, insolvent, or exhibits credit unworthiness
- The DBE in ineligible to work on public works projects because of suspension and debarment proceedings pursuant to 2 CFR Parts 180, 215, and 1,200 or applicable state law
- The Department has determined that the DBE is not a responsible Contractor
- The DBE voluntarily withdraws from the project and provided the Department with a written notice of withdrawal
- The DBE is found to be ineligible to receive DBE credit for the type of work required
- A DBE owner dies or becomes disabled with the result that the DBE is unable to complete its work on the contract
- Other documented good cause that the Department determines to substantiate the termination of the DBE.

Good cause does not exist if the Contractor seeks to terminate a DBE so the Contractor can self-perform the work for which the DBE was committed, or so the Contractor can substitute another DBE or non-DBE Contractor after the contract award.

Before submitting a request to terminate or substitute a DBE to the Department, the Contractor must first provide written notice to the DBE, with a copy of the notice to the DBE Compliance Officer, of the Contractor's intent to request to terminate or substitute, and the reason for the request.

The Contractor must give the DBE 5 calendar days to respond to the notice and advise the Department and the Contractor of the reasons, if any, why it objects to the proposed termination of its subcontract and why the Department should not approve the Contractor's action. If required in a particular case as a matter of public necessity (e.g. safety), the Department may provide a response period shorter than 5 calendar days.

When a DBE is terminated or fails to complete its work on the contract for any reason, the Contractor must make good faith efforts to replace the committed DBE with another DBE. The Contractor must make efforts to find another DBE to perform the same amount of work under the contract as the DBE that was terminated. The letter to the Department requesting termination or substitution must include the name of the DBE and dollar amount of the replacement DBE. If the Contractor is unable to find another DBE, the Contractor must provide the names of the DBEs it contacted and reason why they were unable to use those DBEs.

If the Contractor does not utilize or pay DBEs as required, liquidated damages will be assessed as specified in Section VII of this special provision. In addition, if

the Contractor is found to have knowingly and willingly attempted to circumvent the DBE contract provisions, sanctions referred to in Section IV of this special provision may be imposed.

The Contractor does not need Department approval to terminate or substitute a DBE under the following circumstances:

- The DBE is being used on a contact with a “Specified Goal” however the DBE was not listed as a DBE commitment on form DOT-289R/C.
- The DBE was listed as a commitment on a “Not Specified” DBE goal contract on form DOT-289R/N.

* * * * *

SPECIAL PROVISION FOR
EEO AFFIRMATIVE ACTION REQUIREMENTS ON
FEDERAL AND FEDERAL-AID CONSTRUCTION CONTRACTS

SEPTEMBER 1, 1997

APPENDIX A

Notice or Requirement for Affirmative Action to Ensure Equal Employment Opportunity (Executive Order 11246)

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.

2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

GOALS FOR MINORITY PARTICIPATION FOR EACH TRADE

Aurora	0.8%	Fall River	7.9%	Marshall	1.3%
Beadle	0.8%	Faulk	1.3%	Meade	3.4%
Bennett	7.9%	Grant	1.3%	Mellette	7.9%
Bon Homme	1.2%	Gregory	0.8%	Miner	0.8%
Brookings	0.8%	Haakon	7.9%	Minnehaha	1.2%
Brown	1.3%	Hamlin	1.3%	Moody	0.8%
Brule	0.8%	Hand	0.8%	Pennington	3.4%
Buffalo	7.9%	Hanson	0.8%	Perkins	7.9%
Butte	7.9%	Harding	7.9%	Potter	7.9%
Campbell	7.9%	Hughes	7.9%	Roberts	1.3%
Charles Mix	0.8%	Hutchinson	0.8%	Sanborn	0.8%
Clark	1.3%	Hyde	7.9%	Shannon	7.9%
Clay	1.2%	Jackson	7.9%	Spink	1.3%
Codington	1.3%	Jerauld	0.8%	Stanley	7.9%
Corson	7.9%	Jones	7.9%	Sully	7.9%
Custer	7.9%	Kingsbury	0.8%	Todd	7.9%
Davison	0.8%	Lake	0.8%	Tripp	7.9%
Day	1.3%	Lawrence	7.9%	Turner	0.8%
Deuel	1.3%	Lincoln	0.8%	Union	1.2%
Dewey	7.9%	Lyman	7.9%	Walworth	7.9%
Douglas	0.8%	McCook	0.8%	Yankton	1.2%
Edmunds	1.3%	McPherson	1.3%	Ziebach	7.9%

GOALS FOR FEMALE PARTICIPATION IN EACH TRADE

Statewide - - - - - - - - - - 6.9%

These goals are applicable to all the contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its federally involved and nonfederally involved construction.

The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3 (a), and its efforts to meet the goals established for the geographical area where the contract resulting from this solicitation is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project

for the sole purpose of meeting the contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor when requesting permission to sublet shall provide written notification to the Department of Transportation as specified in Section 8.1 of the Standard Specifications for Roads and Bridges. When the subcontract is in excess of $10,000, the request for permission to sublet shall list the name, address and telephone number of subcontractor; employer identification number; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the contract is to be performed. The Department of Transportation will then provide written notification to the Director of the Office of Federal Contract Compliance Programs through proper channels.

4. As used in this Notice, and in the contract resulting from this solicitation, the "covered area" is as shown by county designation on the Title Sheet of the plans.

APPENDIX B

Standard Federal Equal Employment Opportunity Construction Contract Specifications (Executive Order 11246)

1. As used in these specifications:

   a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;

   b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;

   c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.

   d. "Minority" includes:

      (I) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);

      (II) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);

      (III) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and

      (IV) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of $10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor of Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed

as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered Construction contractors performing construction work in geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office, from Federal procurement contracting officers or from the South Dakota Department of Transportation. The Contractor is expected to make substantially uniform progress toward its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully and shall implement affirmative action steps at least as extensive as the following:

    a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

    b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its union have employment opportunities available, and maintain a record of the organization's responses.

    c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or if referred, not employed by the Contractor, this shall be documented in the file with the reason thereof, along with whatever additional actions the Contractor may have taken.

    d. Provide immediate written notification to the Director when the union with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

    e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources complied under 7b above.

    f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc., by specific review of the policy

with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with onsite supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractors and Subcontractors with whom the Contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's workforce.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc. such opportunities.

m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligation.

8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor association, joint contractor-union contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these specifications provided that the contractor actively participates in the group, makes every effort to assure that the group, has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goal and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply,

however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. The Contractor in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

*** * * ***

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION FOR
REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS
FHWA 1273 (MAY 1, 2012)

APRIL 30, 2013

The following are amendments to the above contract provisions.

Section I.4.

Delete this section and replace with the following:

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

Section IV.

Delete the first 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.

Section IV.3.b.(1)

Delete the first sentence and replace with the following:

The contractor and each related subcontractor must submit weekly, for each week in which any contract work is performed, a copy of a completed certified weekly payroll report to the South Dakota Department of Transportation (SDDOT) Labor Compliance Officer (LCO) within fourteen (14) calendar days of the end of the workweek. The address of the Labor Compliance Officer is: South Dakota Department of Transportation, Labor Compliance Program, 700 E. Broadway Avenue, Pierre, SD 57501-2586.

Section IV.3.b.(2)

Delete the first paragraph and replace with the following:

Each submitted certified weekly payroll report must set out accurately and completely all information required by the Instructions for SDDOT Statement of Compliance & Certified Payroll Report (located on the SDDOT Labor Compliance website). Each certified weekly payroll report must include the most recent 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 SDDOT will not accept any payroll report which does not include the most recent SDDOT Statement of Compliance Form. This SDDOT Statement of Compliance Form must certify the following:

Section IV.3.b.(3)

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.(2) of this section.

Section IV.4.a

Delete the first sentence of the third paragraph and replace with the following:

Every apprentice must be paid the higher of the Common Laborer wage rate contained in the bid documents or the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination.

* * * * *

REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS

I. General
II. Nondiscrimination
III. Nonsegregated Facilities
IV. Davis-Bacon and Related Act Provisions
V. Contract Work Hours and Safety Standards Act Provisions
VI. Subletting or Assigning the Contract
VII. Safety: Accident Prevention
VIII. False Statements Concerning Highway Projects
IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
X. Compliance with Governmentwide Suspension and Debarment Requirements
XI. Certification Regarding Use of Contract Funds for Lobbying

ATTACHMENTS

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23 (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services). The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in bid proposal or request for proposal documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract).

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

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

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

II. NONDISCRIMINATION

The provisions of this section related to 23 CFR Part 230 are applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding $10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR 230, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. Equal Employment Opportunity: Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under

this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are

applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants / Employees with Disabilities: The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurance Required by 49 CFR 26.13(b):

a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.

b. The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the contracting agency deems appropriate.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor

will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more.

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding $2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 “Contract provisions and related matters” with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. Minimum wages

a. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.d. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph 1.b. of this section) and the Davis-Bacon poster (WH–1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b.(1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is utilized in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. The Wage and Hour Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or

will notify the contracting officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

d. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding

The contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and basic records

a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

b.(1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g. , the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division Web site at http://www.dol.gov/esa/whd/forms/wh347instr.htm or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency..

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH–347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(2) of this section.

(4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and trainees

a. Apprentices (programs of the USDOL).

Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

b. Trainees (programs of the USDOL).

Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

d. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

6. Subcontracts. The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility.

a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The following clauses apply to any Federal-aid construction contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1.) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1.) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1.) of this section.

3. Withholding for unpaid wages and liquidated damages. The FHWA or the contacting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2.) of this section.

4. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1.) through (4.) of this section.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term “perform work with its own organization” refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:

(1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
(2) the prime contractor remains responsible for the quality of the work of the leased employees;
(3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and
(4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 306 of the Clean Air Act.
2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost $25,000 or more – as defined in 2 CFR Parts 180 and 1200.

1**. Instructions for Certification – First Tier Participants:**

a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. “First Tier Covered Transactions” refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (https://www.epls.gov/), which is compiled by the General Services Administration.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

* * * * *

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. **Instructions for Certification - Lower Tier Participants:**

(Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost $25,000 or more - 2 CFR Parts 180 and 1200)

a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. “First Tier Covered Transactions” refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (https://www.epls.gov/), which is compiled by the General Services Administration.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the

department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

* * * * *

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

* * * * *

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed $100,000 (49 CFR 20).

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such recipients shall certify and disclose accordingly.

ATTACHMENT A - EMPLOYMENT AND MATERIALS PREFERENCE FOR APPALACHIAN DEVELOPMENT HIGHWAY SYSTEM OR APPALACHIAN LOCAL ACCESS ROAD CONTRACTS

This provision is applicable to all Federal-aid projects funded under the Appalachian Regional Development Act of 1965.

1. During the performance of this contract, the contractor undertaking to do work which is, or reasonably may be, done as on-site work, shall give preference to qualified persons who regularly reside in the labor area as designated by the DOL wherein the contract work is situated, or the subregion, or the Appalachian counties of the State wherein the contract work is situated, except:

a. To the extent that qualified persons regularly residing in the area are not available.

b. For the reasonable needs of the contractor to employ supervisory or specially experienced personnel necessary to assure an efficient execution of the contract work.

c. For the obligation of the contractor to offer employment to present or former employees as the result of a lawful collective bargaining contract, provided that the number of nonresident persons employed under this subparagraph (1c) shall not exceed 20 percent of the total number of employees employed by the contractor on the contract work, except as provided in subparagraph (4) below.

2. The contractor shall place a job order with the State Employment Service indicating (a) the classifications of the laborers, mechanics and other employees required to perform the contract work, (b) the number of employees required in each classification, (c) the date on which the participant estimates such employees will be required, and (d) any other pertinent information required by the State Employment Service to complete the job order form. The job order may be placed with the State Employment Service in writing or by telephone. If during the course of the contract work, the information submitted by the contractor in the original job order is substantially modified, the participant shall promptly notify the State Employment Service.

3. The contractor shall give full consideration to all qualified job applicants referred to him by the State Employment Service. The contractor is not required to grant employment to any job applicants who, in his opinion, are not qualified to perform the classification of work required.

4. If, within one week following the placing of a job order by the contractor with the State Employment Service, the State Employment Service is unable to refer any qualified job applicants to the contractor, or less than the number requested, the State Employment Service will forward a certificate to the contractor indicating the unavailability of applicants. Such certificate shall be made a part of the contractor's permanent project records. Upon receipt of this certificate, the contractor may employ persons who do not normally reside in the labor area to fill positions covered by the certificate, notwithstanding the provisions of subparagraph (1c) above.

5. The provisions of 23 CFR 633.207(e) allow the contracting agency to provide a contractual preference for the use of mineral resource materials native to the Appalachian region.

6. The contractor shall include the provisions of Sections 1 through 4 of this Attachment A in every subcontract for work which is, or reasonably may be, done as on-site work.

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
CARGO PREFERENCE ACT

JANUARY 20, 2016

In accordance with the Cargo Preference Act of 1954 and 46 CFR 381.7 the following shall apply:

A. Agreement Clauses - Use of United States-flag vessels:

1. Pursuant to Pub. L. 664 (43 U.S.C. 1241(b)) at least 50% of any equipment, materials or commodities procured, contracted for or otherwise obtained with funds granted, guaranteed, loaned, or advanced by the U.S. Government under this agreement, and which may be transported by ocean vessel, shall be transported on privately owned United States-flag commercial vessels, if available.

2. Within 20 business days following the date of loading for shipments originating within the United States or within 30 business 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 A.1 of this special provision shall be furnished to both the Engineer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Division of National Cargo, Office of Market Development. Maritime Administration, Washington, DC 20590.

B. Contractor and Subcontractor Clauses - Use of United States-flag vessels, the Contractor agrees:

1. To utilize privately owned United States-flag commercial vessels to ship at least 50% of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to this contract, to the extent such vessels are available at fair and reasonable rates for United States-flag commercial vessels.

2. To furnish within 20 business days following the date of loading for shipments originating within the United States or within 30 business 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 special provision to both the Department

(through the prime contractor in the case of subcontractor bills-of-lading) and to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590.

3. To insert the substance of the provisions of this clause in all subcontracts issued pursuant to this contract.

* * * * *

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION REGARDING
MINIMUM WAGE ON FEDERAL-AID PROJECTS

APRIL 30, 2013

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, a copy of a completed certified weekly payroll report to the South Dakota Department of Transportation (SDDOT) Labor Compliance Officer (LCO) within fourteen (14) calendar days of the end of the workweek.

Each certified weekly payroll report must include the most recent SDDOT Statement of Compliance Form. The Department will not accept any payroll report which does not include the most recent SDDOT Statement of Compliance Form.

* * * * *

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

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

Agency: U.S. DOL
Wage Decision Number: **SD150001 SD1**
Counties: SD Statewide
Wage Decision Date: **10/09/2015**

***SUSD2015-001 08-13-2015**

	Rates	Fringes
LABORERS		
GROUP GL1		
Air Tool Operator; Common Laborer; Landscape Worker; Flagger; Pilot Car Driver; Trucks under 26,000 GVW; Blue-top Checker; Materials Checker	15.74	0.00
GROUP GL2		
Mechanic Tender (Helper); Pipe Layer (except culvert); Form Builder Tender; Special Surface Finish Applicator; Striping	17.51	0.00
GROUP GL3		
Asphalt Plant Tender; Pile Driver Leadsman; Form Setter; Oiler/Greaser	18.95	0.00
GROUP GL5		
Carpenter; Form Builder	22.77	0.00
GROUP GL6		
Concrete Finisher; Painter; Grade Checker	21.41	0.00
POWER EQUIPMENT OPERATORS		
GROUP G01		
Concrete Paving Cure Machine; Concrete Paving Joint Sealer; Conveyor; Tractor (farm type with attachments); Self Propelled Broom; Concrete Routing Machine; Paver Feeder; Pugmill; Skid Steer	16.85	0.00
GROUP G02		
Bull Dozer 80 HP or less; Front End Loader 1.25 CY or less; Self Propelled Roller (except Hot Mix); Sheepsfoot/50Ton Pneumatic Roller; Pneumatic Tired Tractor or Crawler (includes Water Wagon and Power Spray units); Wagon Drill; Air Trac; Truck Type Auger; Concrete Paving Saw	18.13	0.00
GROUP G03		
Asphalt Distributor; Bull Dozer over 80 HP; Concrete Paving Finishing Machine; Backhoes/ Excavators 20 tons or less; Crusher (may include internal screening plant); Front End Loader over 1.25 CY; Rough Motor Grader; Self Propelled Hot Mix Roller; Push Tractor; Euclid or Dumpster; Material Spreader; Rumble Strip Machine	19.89	0.00
GROUP G04		
Asphalt Paving Machine Screed; Asphalt Paving Machine; Cranes/Derricks/Draglines/Pile Drivers/Shovels 30 to 50 tons; Backhoes/Excavators 21 to 40 tons; Maintenance Mechanic; Scrapers; Concrete Pump Truck	20.30	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	22.75	0.00
TRUCK DRIVERS		
GROUP GT1		
Tandem Truck without trailer or pup; Single Axle Truck over 26,000 GVW with Trailer	16.57	0.00
GROUP GT2		
Semi-Tractor and Trailer; Tandem Truck with Pup	18.82	0.00
ELECTRICIANS		
GROUP E01		
Electrician	22.79	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.

*Classifications listed under an "SU" identifier were derived from survey data and the published rate is the weighted average rate of all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates.

Survey wage rates are not updated and will remain in effect until a new survey is conducted.

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

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

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

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In the listing above, the "SU" identifier indicates the rates were derived from survey data. As these weighted average rates include all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of the survey on which these classifications and rates are based. The next number, 007 in this example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

For SDDOT Defined Work Classifications, please visit: http://www.sddot.com/business/contractors/labor/wcwr/Default.aspx

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WAGE DETERMINATION APPEALS PROCESS

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

- an existing published wage determination
- a survey underlying a wage determination
- a Wage and Hour Division letter setting forth a position on a wage determination matter
- a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

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

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

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

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
SUPPLEMENTAL SPECIFICATIONS TO
2015 STANDARD SPECIFICATIONS FOR ROADS AND BRIDGES

JUNE 1, 2016

The Supplemental Specifications dated June 1, 2016 are in effect for and made a part of this contract.

The Supplemental Specifications may be obtained from the Department website or the local Area Office or by contacting the Operations Support Office.

Department Website:
http://www.sddot.com/business/contractors/specs/2015specbook/Default.aspx

Operations Support:
605-773-3571

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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
SUPPLEMENTAL SPECIFICATIONS FOR
ERRATA
TO 2015 STANDARD SPECIFICATIONS FOR ROADS AND BRIDGES

JUNE 1, 2016

The Supplemental Specifications for Errata dated June 1, 2016 are in effect for and made a part of this contract.

The Supplemental Specifications for Errata may be obtained from the Department website or the local Area Office or by contacting the Operations Support Office.

Department Website:
http://www.sddot.com/business/contractors/specs/2015specbook/Default.aspx

Operations Support:
605-773-3571

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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
PRICE SCHEDULE FOR MISCELLANEOUS ITEMS

OCTOBER 14, 2015

The following unit bid prices have been established by the South Dakota Department of Transportation Commission.

These prices will be pre-entered in the bidding package for each project or will establish a standard price to be used whenever no project contract unit price exists for that item.

Each unit price listed is considered full compensation for the cost of labor, material, and equipment to provide the item of work and/or material, complete in place, including (but not limited to) royalty, waste of unsuitable materials, equipment rental, overhead, profit, and incidentals.

Items specified in this document may be paid for on progressive estimates without the benefit of a prior approved Construction Change Order.

Specification Section Number	Specification Section Name	Item Name	Price per Item
5.8	Construction Stakes, Lines and Grades	Three-Man Survey Crew	$160.00/hour
7.7	Public Convenience and Safety	Water	$15.00/M.Gal
9.3	Payment for extra haul of Materials	Extra Haul	$0.15/ton mile
120.5 A.5.	Roadway and Drainage Exc. & Emb.	Unclassified Excavation Digouts	$8.00/cu.yd.
120.5 H.	Roadway and Drainage Exc. & Emb.	Extra Haul	$0.05/cu.yd. station
120.5 I.	Roadway and Drainage Exc. & Emb.	Water for Embankment	$15.00/M.Gal
421.5	Undercutting Pipe & Plate Pipe	Undercutting Culverts	$12.00/cu.yd.
510.5 D.	Timber, Prestressed, and Steel Piles	Timber Pile Splice	$550.00/each

		Steel Pile Splices (*All Weights)	Splice made after one of the pieces has been driven.
		8 HP*	$220.00/each
		10 HP*	$300.00/each
		12 HP*	$360.00/each
		14 HP*	$420.00/each
			Splice made before either of the pieces has been driven.
		8 HP*	$105.00/each
		10 HP*	$125.00/each
		12 HP*	$140.00/each
		14 HP*	$160.00/each
510.5 E	Timber, Prestressed, and Steel Piles	Pile Shoes (Timber Pile)	$110.00/each
510.5.H	Timber, Prestressed, and Steel Piles	Pile Tip Reinforcement (Steel Pile)	
		10” HP Tip Reinforced	$120.00/each
		12” HP Tip Reinforced	$140.00/each
		14” HP Tip Reinforced	$170.00/each
601.5	Haul Roads	Granular Material	$12.00/ton
601.5	Haul Roads	Asphalt Concrete (including asphalt)	$80.00/ton
601.5	Haul Roads	Cover Aggregate	$25.00/ton
601.5	Haul Roads	Asphalt for Prime	$700.00/ton
601.5	Haul Roads	Asphalt (Tack, Flush & Surface Treatment)	$450.00/ton
601.5	Haul Roads	Water	$15.00/M.Gal
601.5	Haul Roads	Dust Control Chlorides	$0.35/lb
634.5	Temporary Traffic Control	Flagging	$24.19/hour
634.5	Temporary Traffic Control	Pilot Car	$38.35/hour

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STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
REGARDING
STORM WATER DISCHARGES
TO WATERS OF THE STATE

MAY 3, 2013

In compliance with the provisions of the South Dakota Water Pollution Control Act and the Administrative Rules of South Dakota (ARSD) Chapters 74:52:01 through 74:52:11, the State of South Dakota has been issued Permit No. SDR10#### "GENERAL PERMIT FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITIES". This permit authorizes the discharge of storm water in accordance with the conditions and requirements set forth in the permit.

The Contractor, by signing the CONTRACTOR CERTIFICATION FORM and submitting a bid or proposal, certifies the following:

> "I certify under penalty of law that I understand and will comply with the terms and conditions of the Surface Water Discharge General Permit for Storm Water Discharges Associated with Construction Activities for the project identified above."

A copy of the full version of the General Permit for Storm Water Discharges Associated with Construction Activities, dated 02/01/2010 must be posted on the job site. The General Permit for Storm Water Discharges Associated with Construction Activities is available for downloading and printing from the SD DENR website:

http://denr.sd.gov/des/sw/IPermits/ConstructionGeneralPermit2010.pdf

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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