



**CONTRACT DOCUMENTS
AND SPECIFICATIONS FOR
THE TOWN OF VARNVILLE
HIGHWAY 278 STREETScape PROJECT**

VARNVILLE, SOUTH CAROLINA

RFB NO: 4-CE-15-008

APRIL 19, 2018

CONTRACTOR: _____

ADDRESS: _____

SET #: _____



DENNIS
CORPORATION

**Dennis Corporation
1800 Huger Street
Columbia, South Carolina**



HIGHWAY 278 STREETSCAPE PROJECT

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SECTION A: REQUEST FOR BIDS

Town of Varnville, South Carolina is soliciting sealed bids from qualified Contractors for: **RFB NO: 4-CE-15-008, HIGHWAY 278 STREETSCAPE PROJECT.**

Project Description:

The project consists of the streetscape and related improvements to the intersection of US-278 and Main Street (SC-63) / Hickory Hill Road (S-50) in downtown Varnville, SC. The work consists of full-depth reclamation and HMA paving, new concrete sidewalk/curb and gutter, mast arm and traffic signal installation, new striping and pavement markings, installation of new light poles, and landscaping. An alternate bid item includes an adder if contract completion duration is decreased by thirty (30) days to 110 days.

Sealed Bids Clearly Marked "RFB NO: 4-CE-15-008 HIGHWAY 278 STREETSCAPE PROJECT", with bidders name, address, and South Carolina Contractor's License Number on the outside of the envelope shall be accepted by the Town of Varnville, 95 East Palmetto Avenue, Varnville, South Carolina 29944, until **2:00 PM, Thursday, May 24, 2018**. Mailed bids are to be delivered to the Town of Varnville, PO Box 308, Varnville, South Carolina 29944, and must be received prior to the time and date indicated above. No bids will be accepted after the above date and time. After closing, the bids will be opened publicly in the Town Hall Conference Room located at 95 East Palmetto Avenue, Varnville, South Carolina 29944. **Bid Prices shall remain valid for 90 days following the bid opening.**

Owner

Town of Varnville
95 East Palmetto Avenue
Varnville, SC 29944

Engineer

Dennis Corporation
1800 Huger Street
Columbia, SC 29201

Pre-Bid Conference: A pre-bid conference shall be held **Thursday, May 3, 2018, at 11:00 AM** at the Town Hall Conference Room located at 95 East Palmetto Avenue, Varnville, South Carolina 29944. The pre-bid conference is non-mandatory, but is highly recommended for any contractor submitting a bid for this project.

Drawings and Specifications Will Be Available for examination in the following location:

- Lowcountry Council of Governments procurement: <http://www.lowcountrycog.org/solicitations/index.php>
- Dennis Corporation Office, Columbia SC - 1800 Huger Street, Columbia, SC 29201

Bidding Documents, including drawings and specifications may be obtained from the office of the Engineer, Dennis Corporation, 1800 Huger Street, Columbia SC 29201, by emailing alindler@denniscorporation.com, for a non-refundable charge of \$150.00. When requesting drawings, specifications or contract documents, provide the following information about your company: mailing address, street address, e-mail address (if applicable), telephone number, and fax number.

Bidders must obtain Bidding Documents/Plans from the above listed source(s) to be listed as an official plan holder. Only those Bidding Documents/Plans obtained from the above listed source(s) are official. Bidders that rely on copies of Bidding Documents/Plans obtained from any other source do so at their own risk. All written communications with official plan holders & bidders WILL be via email or website posting.

Questions concerning the bid documents shall be addressed to Dennis Corporation, Attn: Ashley Lindler, 1800 Huger Street, Columbia, SC 29201, email alindler@denniscorporation.com. All questions must be in writing and submitted before **Noon on May 17, 2018**.

Bids Will Not Be Considered unless the bidder is legally qualified under the provisions of the South Carolina Contractor's Licensing Law (South Carolina Code of Laws as amended). No bidder may withdraw the bid within 90 business days after the actual date of the opening.

Bids Will Not Be Considered unless sealed and accompanied by a bidder's bond for five percent (5%) of the amount of the bid. Bid bond will be duly executed by the bidder as principal & having as surety thereon a surety company licensed to do business in the State of South Carolina. Successful bidder will be required to furnish a satisfactory performance & payment bond, each in the amount of one hundred percent (100%) of the bid.

All Work On The Project Must Be Completed within 140 Days.

Town of Varnville Reserves the Right in all cases to reject any and/or all bids, or parts of bids, to waive technicalities, and to make such an award as is deemed in the best interest of the Town and in accordance with all federal CDBG requirements. The Town also reserves the right to waive informalities, to negotiate further with the Contractor of its choice, to request additional information, to interview, and to make an award deemed in its own best interest. All submittals shall become property of the Town and is subject to the Freedom of Information Act (FOIA) regulations.

This project is being funded in whole or in part by the Community Development Block Grant Program (CDBG). All federal CDBG requirements will apply to the contract. All contractors and subcontractors are required to be registered in the federal System for Award Management (SAM). Bidders on this work will be required to comply with the President's Executive Order No. 11246 & Order No. 11375 which prohibits discrimination in employment regarding race creed, color, sex, or national origin. Bidders must comply with Title VI of the Civil Rights Act of 1964, the Davis-Bacon Act, the Anti-Kickback Act, the Contract Work Hours and Safety Standards Act and 40 CFR 33.240.

Bidders must also make positive efforts to use small and minority-owned business and to offer employment, training and contracting opportunities in accordance with Section 3 of the Housing and Urban Development Act of 1968. Attention of bidders is particularly called to the requirements as to conditions of employment to be observed and minimum wage rates to be paid under the contract.

"EQUAL EMPLOYMENT OPPORTUNITY"

SECTION B: GENERAL CONDITIONS

INSTRUCTIONS TO BIDDERS

1. GENERAL:

- a. Proposals shall be publicly opened as indicated in the Request for Bids and shall be conducted in the "TOWN HALL CONFERENCE ROOM, 95 EAST PALMETTO AVENUE, VARNVILLE, SOUTH CAROLINA 29944."
- b. Sealed bids shall be enclosed and secured in an envelope. The name, address, and South Carolina Contractor's License Number of the bidder shall be displayed on the envelope. Bids shall be addressed to the Town of Varnville, PO Box 308, Varnville, South Carolina 29944. Hand carried bids shall be delivered to the Town of Varnville, 95 East Palmetto Avenue, Varnville, South Carolina 29944.
- c. Bids shall be submitted no later than 2:00 PM in the places and manners as described in paragraph (b) above and on the date indicated by the request for Bids. Bids received after these times are considered late bids. Late bids shall not be accepted or considered, unless the delay was caused by improper handling by the Town's employees.
- d. The Town of Varnville shall not accept responsibility for unidentified bids.
- e. In the event that a bid is unintentionally opened prior to the official time set for the bid opening, the employee opening such bid shall immediately inform the Procurement Officer or designee who shall, in the presence of another of equal rank or above, immediately contact the vendor submitting the bid.
- f. The vendor so contacted will be informed as to the circumstances and shall be invited to come to the office of the Procurement Officer or designee to reseal and submit or withdraw the bid, if the vendor elects to reseal and submit the bid, such vendor shall be required to sign, date and indicate the time of resealing on the bid envelope. If the vendor directs the Procurement Officer or designee to reseal the bid, both the employee making the contact to the vendor and the Town witness present, shall sign, date and indicate the time of sealing on the bid envelope.
- g. In the event that the Procurement Officer or designee is directed by the vendor to return the bid, a statement properly witnessed stating the action taken and when, shall be duly filed.
- h. All prices and quotations shall be entered in ink or typewritten and shall remain firm for no less than ninety (90) days from the date of the bid. Mistakes may be crossed out and corrections inserted adjacent there to and shall be initialed in ink by the person signing the bid. The bidder shall insert the net price per stated unit and the extension against each item, which he/she proposed to deliver. The price shall include in the grand total column all delivery charges, installation and applicable taxes when necessary.

2. TAXES: When applicable, South Carolina sales tax shall be shown as a separate entry on the bid total summation. In other words, there shall be a bid subtotal with South Carolina tax added in to create a grand total. When required, exemption certificates shall be furnished on forms provided by the vendor.

3. PROPRIETARY INFORMATION: Bidders shall visibly mark as "CONFIDENTIAL" each part of their bid which considers proprietary information. Price may not be considered confidential proprietary information.

4. AMBIGUOUS BIDS: Bids which are uncertain as to terms, delivery, quantity, or compliance with requirements and/or specifications may be rejected or otherwise disregarded.

5. COVENANT AGAINST CONTINGENT FEES: The vendor warrants that no person or selling agency has been employed or retained to solicit or secure this contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the vendor for the purpose of securing business. For breach or violation of this warranty, the Town shall have the right to annul this contract without liability or in its discretion to deduct from the contract price or consideration, or otherwise recover the full amount of such commission, percentage, brokerage, or contingent fee.

6. BIDDER'S QUALIFICATIONS: Bids shall be considered only from bidders who are regularly established in the business called for and who in the judgment of the Owner are financially responsible and able to show evidence of their reliability, ability, experience, equipment supervised by them to render prompt and satisfactory service in the volume called for under this contract.

6. ACKNOWLEDGEMENT OF AMENDMENTS TO REQUEST FOR BIDS:

- a. Bidders shall acknowledge receipt of any amendments to this solicitation either by signing and returning one (1) copy of the amendment or by letter or by telegram or by fax, or by acknowledging the amendment on the Bid Form.

- b. The Town of Varnville must receive the acknowledgment by the time, date, and at the place specified for receipt of bids.
7. AFFIRMATIVE ACTION: The successful bidder will take affirmative action in complying with all Federal and State requirements concerning fair employment, employment of the handicapped, and concerning the treatment of all employees, without regard or discrimination by reason of race, color, religion, sex, national origin and/or physical handicap and to ENSURE EQUAL EMPLOYMENT OPPORTUNITY is provided for as applicable.
8. EXPLANATION TO PROSPECTIVE BIDDERS:
 - a. Any prospective bidder desiring an explanation or interpretation of this solicitation shall request it in writing in accordance with the request for bids.
 - b. Oral explanation and/or instructions given before the award of the contract shall not be binding.
 - c. Any information given to a prospective bidder pertaining to this solicitation shall be furnished promptly to other prospective bidders as an amendment, if that information is necessary in submitting bids or if the lack of it would be prejudicial to other prospective bidders.
9. AWARDING POLICY: This contract shall be awarded pursuant to the Town of Varnville's Procurement Ordinance. The Town of Varnville reserves the right to select and award on an individual item basis, lot (group) basis or an "all or none" basis, whichever the Town determines to be most advantageous. Therefore, individual prices per item must be indicated on the bid form. Bidders are encouraged to offer discounts for consideration of consolidated award. Furthermore, the Town in determining the lowest responsible bidder on each of the items shall consider, in addition to the bid prices, the quality, training, suitability and adaptability of the services required by this solicitation. The Town reserves the right to reject or accept any or all bids and to waive any informalities and/or irregularities thereof.
10. WITHDRAWAL OF BIDS: Any bidder may withdraw his bid prior to the closing time scheduled for the receipt of bids. No bid shall be withdrawn for a period of ninety (90) days after the schedule closing time for the receipt of bids. The Town reserves the right to award contracts for a period of ninety (90) days.
11. SUBMISSION OF DATA: Each bidder, upon request, shall submit evidence of liability insurance, Workmen's Compensation (if required), and other data regarding experience relating to this bid and proposes to satisfy the requirements of this solicitation and fulfillment of a contract.
12. ACCIDENTS: The vendor shall hold the Town harmless from any and all damages and claims that may arise by reason of any negligence on the part of the vendor, his agents or employees in the performance of this contract. In case any action is brought against the Town or any of its agents or employees, the vendor shall assume full responsibility for the defense thereof. Upon his failure to do so after proper notice, the Town reserves the right to defend such motion and charge all costs thereof to the vendor. The vendor shall take all precautions necessary to protect the public against injury.
13. STATEMENT OF COMPLIANCES AND ASSURANCES: By submitting a bid and signing the bid schedule, vendors are providing written assurance of non-collusion and understanding and acceptance of all general and special conditions stated in this contract. In addition, this signature certifies that the firm or agency represented in the bid submitted complies with all applicable federal and state laws and regulations.
14. BIDDERS RESPONSIBILITY: Each bidder shall fully acquaint himself/herself with conditions relating to the scope and restrictions attending the execution of the work under the conditions of this bid. It is expected that this will sometimes require on-site observation. The failure or omission of a bidder to acquaint himself/herself with existing conditions shall in no way relieve the bidder of any obligations with respect to this bid or contract.
15. FAILURE TO SUBMIT BID: Recipients of this solicitation not responding with a bid should not return this solicitation, unless specified otherwise. Instead, they should advise the issuing office by letter or postcard whether they want to receive future consideration for similar requirements. If a recipient does not submit a bid or fails to respond by submitting a "no bid" for three (3) consecutive bids for the same commodity, they shall be removed from the applicable vendor list.

16. EXAMINATION OF RECORDS:

- a. The Procurement Officer or designee of the Town of Varnville shall, until three (3) years after final payment under this contract, have access to and the right to examine any of the Contractors' directly pertinent books, documents, papers or other records involving transactions related to this contract.
- b. He/She agrees to include in first-tier subcontracts under this contract a clause to the effect that the Procurement Officer or designee shall, until three (3) years after final payment under the subcontract, have access to and the right to examine any of the subcontractors' directly pertinent books, documents, papers or other records involving transactions related to the subcontract(s).

17. MATERIALS REQUIRED: Materials required must be in conformity with the specifications and shall be subject to inspection and approval after delivery, and shall comply in quality and type of material and method of manufacture with all applicable local or state laws pertaining thereto. The right is reserved to reject and return at the risk and expense of the vendor such portions of any shipment which may be defective or fail to comply with specifications and without validating the remainder of the order.18. "OR APPROVED EQUAL" CLAUSES: Certain processes, types of equipment or kinds of materials are described in the specifications and on the drawings by means of trade names and catalog numbers. In each instance where this occurs, it is understood and inferred that such description is followed by the words "or approved equal". Such method of description is intended merely as a means of establishing a standard of comparison. However, the Town reserves the right to select the items which, in the judgment of the Town, are best suited to the needs of the Town, based on price, quality, service, availability and other relative factors. Bidders must indicate brand name, model, model number, size, type, weight, color, etc., of the item bid if not exactly the same as the item specified. Vendor's stock number or catalog number is not sufficient to meet this requirement. If any bidder desires to furnish an item different from that specifically mentioned in the specifications, he/she shall submit with his bid the information, data, pictures, cuts, designs, etc., of the material he/she plans to furnish so as to enable the Town to compare the material specified; and, such material will be given due consideration. The Town reserves the right to insist upon and receive the items as specified, if the submitted items do not meet the Town's standards for acceptance.19. PATENTS: The vendor shall hold the Town, its officers, agents, and employees harmless from liability of any nature or kind whatsoever, on account of use by the publisher or author, manufacturer or agent, of any copyrighted or non-copyrighted composition, secret process, article or appliance furnished or used under this bid.20. INSTALLATION: Where equipment is called for to be installed under this bid, it shall be placed, leveled and accurately fastened into place by the vendor. He/she shall be responsible for obtaining dimensions and other such data which may be required to assure exact fit to work under another contract or as intended by the Town. The vendor shall be responsible providing an appropriate amount of lead-in to equipment requiring electrical, water or other basic service. The Town will normally be responsible for bringing the appropriate service to the lead-in. The vendor shall completely remove from the premises all packing, crating, and other litter due to his/her work. He/she shall also be responsible for the cost of repair of any damage to existing work which is caused by his/her equipment.21. GUARANTEE: The vendor shall supply a guarantee for all workmanship for the equipment he/she is furnishing for a period comparable to the standards in the industry. When defects or faulty material is discovered during the guarantee period, the vendor shall, immediately, upon notification by the Town, proceed at his/her own expense, to repair or replace the same, together with any damage to all finishes, equipment, and furnishings that may have been damaged as a result of the defective equipment or workmanship.22. PROPER INVOICE: Invoices submitted for payment for goods or services provided under this contract shall contain, as a minimum, the following information:

- Name of business concern
- Contract number or other authorization for delivery of service or property
- Complete description
- Price and quantity of property or service actually delivered or executed
- Name where applicable
- Title, telephone number and complete mailing address of responsible official to whom payment is to be sent; and
- Other substantiating documentation of information as required by the contract or owner.

23. CONFLICTS IN SPECIFICATIONS: When contract language or specifications are in conflict, the Engineer shall choose the language/specification that is applicable to the project condition covered, and shall generally choose the more stringent, restrictive or costly language/specification.
24. SERVICE FACILITIES: In considering the services bid upon, the Town shall take into consideration past performance of existing work and installations, service and facilities provided by the bidder. The bidder shall have available a local organization that is trained in proper construction methods.
25. S.C. LAW CLAUSE: Upon award of a contract under this bid, the person, partnership, association, or corporation to whom the award is made must comply with the laws of South Carolina which require such person or entity to be authorized and/or licensed to do business in this State. Notwithstanding the fact that applicable statutes may exempt or exclude the successful bidder from requirements that it be authorized and/or licensed to do business in this State, by submission of this signed bid, the bidder agrees to subject itself to the jurisdiction and process of the courts of the State of South Carolina as to all matters and disputes arising or to arise under the contract and the performance thereof, including any questions as to the liability for taxes, licenses, or fees levied by the State.
26. COMPETITION: There are no Federal or State laws that prohibit bidders from submitting a bid lower than a price or bid given to the United States Government. Bidders may bid lower than the United States Government Contract price without any liability because the State is exempt from provisions of the Robinson-Patman Act and other related laws.
27. EXCUSABLE DELAY: The Contractor shall not be liable for any excess costs of the failure to perform the contract arising out of causes beyond the control and without the fault or negligence of the Contractor. Such causes may include, but are not restricted to acts of God or of the public enemy, acts of the Government in either its sovereign or contractual capacity, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and unusually severe weather; but, in every case the failure to perform must be beyond the control and without the fault or negligence of the Contractor. If the failure to perform is caused by the default of a subcontractor, and if such default arises out of causes beyond the control of both the Contractor and subcontractor, and without the fault or negligence of either of them, the Contractor shall not be liable for any excess costs or failure to perform, unless the supplies or services to be furnished by the subcontractor were obtainable from other sources in sufficient time to permit the Contractor to meet the required delivery schedule.
28. ASSIGNMENT: No contract may be assigned, sublet, or transferred without a written consent of the Procurement Officer or designee of the Town of Varnville.
29. SPECIFICATIONS: Any deviation from specifications indicated herein must be clearly pointed out; otherwise, it will be considered that items offered are in strict compliance with these specifications, and the successful bidder shall be held responsible thereof.
30. INCORPORATION BY REFERENCE: The contents of this Request for Bids, including all drawings, attachments, specifications, and any addenda, will become part of the contract for this Project.
31. PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS:
 - a. The Contractor shall preserve and protect all structures, equipment, and vegetation (such as grass, trees, and shrubs) on or adjacent to the work site, which are not to be removed and which do not unreasonably interfere with the work required under this contract. The Contractor shall only remove trees when specifically authorized to do so, and shall avoid damaging vegetation that will remain in place. If any limbs or branches of trees are broken during contract performance, or by any careless operation of equipment, or by workman, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with tree pruning compound as directed by the Engineer.
 - b. The Contractor shall protect from damage all existing improvements and utilities at or near the work site and on adjacent property of a third party, the locations of which are known to or should be known by the Contractor. The Contractor shall repair any damage to those facilities, including those that are the property of a third party resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work. If the Contractor fails or refuses to repair the damage promptly, the Town representatives(s) may recommend that the necessary work be performed and charge the cost to the Contractor.
32. BID FORMS: Documentation contained in Section "E" shall be completed and submitted along with the Proposal. A bid bond as required by these General Conditions shall also be included.

33. TERMINATION: Subject to the provisions below, the contract may be terminated by the Procurement Officer or designee providing a thirty (30) day advance notice in writing is given to the Contractor.
- Termination for Convenience
In the event that this contract is terminated or cancelled upon request and for the convenience of the Town without the required thirty (30) day advance notice, then the Town shall negotiate reasonable termination costs, if applicable.
 - Termination for Cause.
Termination by the Town for cause, default or negligence on the part of the Contractor shall be excluded from the foregoing provisions; termination costs, if any, shall not apply. The thirty (30) day advance notice requirement is waived and the default provision in this bid shall apply.
34. SAFETY AND PROTECTION: Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to all persons on the Site or who may be affected by the Work, all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
35. SECURITY REQUIRED:
- Bid Security
Each Bid must be accompanied by a Bid Bond acceptable to the Town. Bid Bonds must be issued by a corporate surety registered and authorized to do business in the State of South Carolina. (see Attached "Sample Forms") Bid Bonds shall be payable to the Town, shall be for at least five (5%) percent of the total amount of the Bid, and shall serve as a guarantee deposit that the bid will be carried out to the complete satisfaction of the Town.
 - Forfeiture of Bid Security
Nonperformance by the successful Bidder, or its failure to execute the Contract, or its failure to meet performance and payment bond requirements and insurance requirements within five (5) calendar days of notification by the Owner or his designee, shall result in its bid security being forfeited as liquidated damages, and the Notice of Award and Contract will be rescinded and awarded to another Bidder. Withdrawal or attempted withdrawal of a Bid after the closing date and time but prior to ninety (90) calendar days after the closing date may also result in forfeiture of bid security.
 - Return of Bid Security
Bid security will be returned to all bidders after the successful Bidder has executed the Contract and delivered all required bonds and insurance certificates. Unsuccessful Bidders will not be entitled to any interest earnings on returned funds.
 - Payment and Performance Security
 - The successful Bidder shall provide Performance and Payment Bonds, in a form satisfactory to the Owner (see Attached "Required Contract Forms"), in the following amounts within five (5) calendar days of notification by the Owner or his designee and prior to execution of the Contract:
 - Payment Bond: 100% of the total amount of the Contract.
 - Performance Bond: 100% of the total amount of the Contract.
 - The aforesaid Payment and Performance Bonds must be issued by a corporate surety registered and authorized to do business in South Carolina and must be counter-signed by a licensed, authorized South Carolina agent.
 - Attorneys-in-fact who sign Bid Bonds or Performance Bonds must file with each Bond a certified and effective, dated copy of their power of attorney.
 - The time to be covered by the Performance Bond shall commence on the date of execution of any contract

resulting from this RFB and terminate upon final payment to Bidder by Town. The time to be covered by the Payment Bond shall commence on the date of execution of any contract resulting from this RFB and terminate twelve (12) months after the date of final acceptance of the Work by the Town.

- (v) Prior to execution of the contract, and upon notification by the Owner or his designee, the successful bidder shall submit all Required Contract Forms, including Performance and Payment Bonds, for review by South Carolina Department of Commerce (SCDOC). All parties shall execute the attached Form of Agreement at the Preconstruction Conference to be scheduled following receipt of approval by SCDOC.

36. CHANGE ORDER

1. A Change Order is a written order to the Contractor, signed by the authorized Town representative, directing changes in the work within the provisions of the Contract.
2. A Change Order is used to change contract quantities for items with unit prices, provide for incentives, penalties, and adjustments for unit price items as provided in the original Contract, delete contract items, and revise contract time.
3. A Change Order may include written agreement made and entered into by and between the Contractor and the Department, covering alterations and unforeseen work incidental to the proper completion of the project, when such work is paid for at an agree unit or lump sum price. Such Change Order becomes a part of the Contract when approved and properly executed.
3. All Change Orders , for time or money, must be approved by SC Department of Commerce before they can be executed.

37. PERMITS/LICENSING

It shall be the responsibility of the contractor to comply with Town Ordinances by securing the necessary p e r m i t s and licenses.

38. ENVIRONMENTAL MANAGEMENT:

Vendor/Supplier/Contractor will be responsible for complying with all federal, state and local environmental regulations relating to transportation, handling, storage, spillage and any other aspect of providing the services specified herein, as applicable.

39. SITE INSPECTION

The bidder is expected to have become familiar with and take into consideration, site conditions which may affect the work and to check all dimensions at the site.

Each bidder shall acquaint themselves thoroughly as to the character and nature of the work to be done. Each bidder furthermore shall make a careful examination of the site of the work and inform themselves fully as to the difficulties to be encountered in performance of the work, the facilities for delivering, storing and placing materials and equipment and other conditions relating to construction and labor.

The bidder shall examine the premises and the site and compare them with any applicable drawings and specifications. He/she shall familiarize themselves with the existing conditions such as obstructive area levels and any problems related to erecting the required systems.

No plea of ignorance of conditions that exist or may hereafter exist on the site of the work, or difficulties that may be encountered in the execution of the work, as a result of failure to make necessary investigations and examinations, will be accepted as an excuse for any failure or omission on the part of the Contractor to fulfill in every detail all the requirements of the contract documents and to complete the work for the consideration set forth therein, or as a basis for any claim whatsoever.

Insofar as possible, the Contractor, in carrying out his/her work, must employ such methods or means as will not cause interruption of or interference with the work of any other Contractor, or Town personnel at the site.

10/2017

ARCHITECT/ENGINEER'S CERTIFICATION**COMPLIANCE WITH MINIMUM STANDARDS FOR
ACCESSIBILITY BY THE PHYSICALLY DISABLED**

Note: This form is applicable to all buildings and other public facilities which require compliance with the Architectural Barriers Act of 1968, as amended.

| Grant Number(s): 4-CE-15-008

| Project Title: HIGHWAY 278 STREETScape PROJECT

Pursuant to the requirements of the Architectural Barriers Act of 1968, 42 USC 4151, and the regulations issued subsequent thereto, the undersigned certifies that the design of the above-mentioned project is in conformance with the minimum standards contained in the American Standard Specifications for Making Building and Facilities Accessible To and Usable By the Disabled, Number A-117.1R.1971 (as modified by 41 CFR 101-19.603).

Architect/Engineer for the Project: DENNIS CORPORATION

(Legal name and address) DENNIS CORPORATION

1800 HUGER STREET

COLUMBIA, SC 29201

DENNIS CORPORATION

Typed Name of Architect/Engineer

Signature

Date

TOWN OF VARNVILLE

Typed Name of Local Government

Signature

Date

General Decision Number: SC180047 01/05/2018 SC47

Superseded General Decision Number: SC20170047

State: South Carolina

Construction Type: Highway

Counties: Allendale, Bamberg, Barnwell, Beaufort, Colleton, Georgetown, Hampton, Jasper, Newberry, Orangeburg and Williamsburg Counties in South Carolina.

DOES NOT INCLUDE SAVANNAH RIVER SITE IN ALLENDALE AND BARNWELL COUNTIES

HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels, building structures in rest area projects & railroad construction; bascule, suspension & spandrel arch bridges designed for commercial navigation, bridges involving marine construction; and other major bridges).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.35 for calendar year 2018 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.35 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2018. The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/05/2018

SUSC2011-038 09/15/2011

	Rates	Fringes
CARPENTER (Form Work Only).....	\$ 14.47	
CEMENT MASON/CONCRETE FINISHER...	\$ 14.11	
IRONWORKER, REINFORCING.....	\$ 15.64	
LABORER		
Asphalt, Includes Asphalt		

Distributor, Raker, Shoverler, and Spreader.....	\$ 10.96
Colleton.....	\$ 10.16
Common or General	
Beaufort.....	\$ 10.15
Colleton.....	\$ 10.16
Georgetown, Hampton, Jasper.....	\$ 10.07
Newberry, Allendale, Bamberg, Barnwell.....	\$ 11.82
Orangeburg.....	\$ 12.63
Williamsburg.....	\$ 10.01
Luteman.....	\$ 11.71
Pipelayer.....	\$ 13.87
Traffic Control-Cone Setter	
Allendale, Bamber, Barnwell, Newberry, Orangeburg.....	\$ 12.98
Beaufort, Colleton, Georgetown, Hampton, Jasper, Williamsburg.....	\$ 12.84
Traffic Control-Flagger.....	\$ 11.68

POWER EQUIPMENT OPERATOR:

Backhoe/Excavator/Trackhoe	
Allendale, Bamberg, Barnwell, Newberry, Orangeburg.....	\$ 17.56
Beaufort.....	\$ 15.20
Colleton.....	\$ 17.78
Georgetown, Hampton, Jasper, Williamsburg.....	\$ 17.23
Bulldozer.....	\$ 20.12
Crane.....	\$ 16.62
Grader/Blade.....	\$ 16.62
Loader (Front End).....	\$ 15.51
Mechanic.....	\$ 18.22
Milling Machine.....	\$ 18.83
Paver	
Allendale, Bamberg, Barnwell, Newberry, Orangeburg, Williamsburg...	\$ 15.01
Beaufort.....	\$ 14.96
Colleton, Georgetown, Hampton, Jasper.....	\$ 13.67
Roller.....	\$ 12.76
Screed.....	\$ 13.01
Tractor.....	\$ 13.26

TRUCK DRIVER

Dump Truck.....	\$ 12.00
Lowboy Truck.....	\$ 14.43
Single Axle, Includes	
Pilot Car.....	\$ 12.04
Tractor Haul Truck.....	\$ 16.25

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on 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. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

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

Town of Varnville – Highway 278 Streetscape – CDBG # 4-CE-15-008**Mitigation Measures and Conditions [40 CFR 1505.2(c)]**

Summarize below all mitigation measures adopted by the Responsible Entity to reduce, avoid, or eliminate adverse environmental impacts and to avoid non-compliance or non-conformance with the above-listed authorities and factors. These measures/conditions must be incorporated into project contracts, development agreements, and other relevant documents. The staff responsible for implementing and monitoring mitigation measures should be clearly identified in the mitigation plan.

Law, Authority, or Factor	Mitigation Measure
<p>Historic Preservation National Historic Preservation Act of 1966, particularly sections 106 and 110; 36 CFR Part 800</p>	<p><i>According to a letter from the South Carolina Archives and History Center dated 10/28/15 and 3/21/16, if archaeological materials are encountered during construction, the procedures codified at 36 CFR 800.13(b) will apply and their office should be contacted immediately. Archaeological materials consist of any items, fifty years old or older, which were made or used by man. These items include, but are not limited to, stone projectile points (arrowheads), ceramic shards, bricks, worked wood, bone and stone, metal and glass objects, and human skeletal materials.</i></p> <p><i>John Sylvest State Historic Preservation Office</i></p>
<p>Floodplain Management Executive Order 11988, particularly section 2(a); 24 CFR Part 55</p>	<p><i>Department of the Army HH&G Section letter dated 3/21/16 stated project is located in Zone X, areas determined to be outside the 0.2% Annual Chance floodplain. If the above referenced project requires any alteration areas, a DOA permit will be required.</i></p>
<p>Endangered Species Endangered Species Act of 1973, particularly section 7; 50 CFR Part 402</p>	<p><i>Letter dated 9/21/16 from Fish & Wildlife stated that obligations under the ESA must be reconsidered if: 1. New information reveals impacts of this identified action may affect any listed species or critical habitat in a manner not previously considered; 2. This action is subsequently modified in a manner, which was not considered in this assessment; or 3. A new species is listed or critical habitat is designated that may be affected by the identified action.</i></p>
<p>DHEC Bureau of Water</p>	<p><i>Letter dated 4/21/14, SCDHEC, Bureau of Water – 1. Any non-point discharges into a stream or river from construction areas of one acre or more will require a Bureau administered Stormwater Management and Sediment Control Permit. Construction areas of one or more acre will also be subject to NPDES Stormwater permit regulations. 2. Any placement of fill material or dredging in waters of the United States, including jurisdictional wetlands and non-</i></p>

	<i>jurisdictional wetlands will require a Bureau administered Section 401 Certification and an Army Corps of Engineers administered Section 404 Permit. When evaluating application for fill in wetlands, demonstration of avoidance and minimization of wetland impacts and mitigation of unavoidable wetland impacts provides assurances that impacts have been lessened to the extent possible and that water quality standards will be upheld. Documentation of these measures will be required. 3. Sewer system construction requires a permit from the Bureau. Our review of acceptability will occur with review of application for a permit. Also, the applicant should check with the local water utility on available capacity.</i>

FORM OF AGREEMENT**BETWEEN OWNER AND CONTRACTOR FOR
CONSTRUCTION CONTRACT**

THIS AGREEMENT is by and between

TOWN OF VARNVILLE

(Owner) and

(Contractor).

Owner and Contractor, in consideration of the mutual covenants set forth herein, agree as follows:

ARTICLE 1 - WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

The project consists of the streetscape and related improvements to the intersection of US-278 and Main Street (SC-63) / Hickory Hill Road (S-50) in downtown Varnville, SC. The work consists of full-depth reclamation and HMA paving, new concrete sidewalk/curb and gutter, mast arm and traffic signal installation, new striping and pavement markings, installation of new light poles, and landscaping.

ARTICLE 2 - THE PROJECT

2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

Highway 278 Streetscape Project, RFB NO: 4-CE-15-008

ARTICLE 3 - ENGINEER

3.01 The Project has been designed by

DENNIS CORPORATION
1800 Huger Street
Columbia, SC 29201

(Engineer), who is to act as Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 - CONTRACT TIME

4.01 Time is of the Essence

A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 Days to Achieve Substantial Completion and Final Payment

A. The Work will be substantially completed within 140 days, after the date when the Contract Time commences to run as provided in the General Conditions.

4.03 Liquidated Damages

A. Contractor and Owner recognize that time is of the essence of this Agreement and that Owner will suffer financial loss if the Work is not completed within the times specified in Paragraph 4.02 above, plus any extensions thereof

allowed in accordance with the General Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty), Contractor shall pay Owner \$500.00 for each day that expires after the time specified in Paragraph 4.02 for Substantial Completion until the Work is substantially complete. After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by Owner, Contractor shall pay Owner \$500.00 for each day that expires after the time specified in Paragraph 4.02 for completion and readiness for final payment until the Work is completed and ready for final payment.

ARTICLE 5 - CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to Paragraphs 5.01.A, 5.01.B, and 5.01.C below:

- A. For all Work other than Unit Price Work, a Lump Sum of:

All specific cash allowances are included in the above price and have been computed in accordance with the General Conditions.

N/A		(\$N/A)
	(words)	(numerals)

- B. For all Unit Price Work, an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work times the estimated quantity of that item as indicated in this paragraph 5.01.B:
- C. For all Work, at the prices stated in Contractor's Bid, attached hereto as an exhibit.

As provided in the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by the Engineer as provided in the General Conditions. Unit prices have been computed as provided in the General Conditions.

EXAMPLE ONLY

UNIT PRICE

Item No.	Description	Unit	Quantity	Unit Price	Total Price
1031000	Mobilization	LS			
1071000	Traffic Control	LS			
1050800	Construction, Stakes, Lines & Grades	EA			
2033000	Contingent Borrow Excavation (Shoulder Dressing)	CY			
4030340	HMA Surface Course Type C (2" Uniform)	TON			
4011004	Liquid Asphalt Binder PG64-22	TON			
3063306	Cement Modified Recycled Base (6" Uniform)	SY			
3072000	Portland Cement for Cement Modified Subbase	TON			
3069900	Contingent Maintenance Stone	TON			
8156490	Stabilized Construction Entrance	SY			
6051120	Permanent Construction Signs (Scheme E)	SY			
6271025	24" White Solid Lines (STOP/DIAG Lines) - THERMO.- 125 MIL	LF			
6271074	4" Yellow Solid Lines (PVT. EDGE Lines) - THERMO. - 90 MIL	LF			
6301100	Permanent Yellow Pavement Marker BI-DIR - 4"x4"	EA			

TOTAL PRICE _____
(numerals)

(words)

ARTICLE 6 - PAYMENT PROCEDURES

6.01 Submittal and Processing of Payments

- A. Contractor shall submit Applications for Payment in accordance with the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.02 Progress Payments; Retainage

- A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the 10th day of each month during performance of the Work as provided in Paragraphs 6.02.A.1 and 6.02.A.2 below. All such payments will be measured by the schedule of values established as provided

in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements:

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Engineer may determine or Owner may withhold, including but not limited to liquidated damages, in accordance with the General Conditions:
 - a. 90 percent of Work completed (with the balance being retainage). If the Work has been 50 percent completed as determined by Engineer, and if the character and progress of the Work have been satisfactory to Owner and Engineer, Owner, on recommendation of Engineer, may determine that as long as the character and progress of the Work remain satisfactory to them, there will be no additional retainage; and
 - b. 90 percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).
2. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 100 percent of the Work completed, less such amounts as Engineer shall determine in accordance with the General Conditions and less 100 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the tentative list of items to be completed or corrected attached to the certificate of Substantial Completion.

6.03 Final Payment

- A. Upon final completion and acceptance of the Work in accordance with the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided.

ARTICLE 7 – INCORPORATION BY REFERENCE:

- 7.01 The contents of the Request for Bids, including all drawings, attachments, specifications, and any addenda, will become part of the contract for this Project.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

- 8.01 In order to induce Owner to enter into this Agreement Contractor makes the following representations:
 - A. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.
 - B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 - C. Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.
 - D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in the General Conditions and (2) reports and drawings of a Hazardous Environmental Condition, if any, at the Site which has been identified in the Supplementary Conditions as provided in the General Conditions.
 - E. Contractor has obtained and carefully studied (or assumes responsibility for doing so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents, and safety precautions and programs incident thereto.
 - F. Contractor does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

- G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
- H. Contractor has correlated the information known to Contractor, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.
- I. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
- J. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

ARTICLE 9 - CONTRACT DOCUMENTS

9.01 Contents

- A. The Contract Documents consist of the following:
 - 1. This Agreement
 - 2. Performance bond
 - 3. Payment bond
 - 4. General Conditions
 - 5. Special and Supplementary Provisions and Specifications
 - 6. Standard Specifications and Drawings as referenced in bid documents.
 - 7. The contents of the Request for Bids, including all drawings, attachments, specifications, and any addenda.
 - 8. Addenda (numbers 0 to 0, inclusive).
 - 9. Exhibits to this Agreement (enumerated as follows):
 - a. Contractor's Bid
 - 10. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
 - a. Notice to Proceed
 - b. Work Change Directives.
 - c. Change Order(s).
- B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 9.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in the General Conditions.

ARTICLE 10 - MISCELLANEOUS

10.01 Terms

- A. Terms used in this Agreement will have the meanings stated in the General Conditions and the Special and Supplementary Conditions.

10.02 Assignment of Contract

- A. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any

written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03 Successors and Assigns

- A. Owner and Contractor each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

10.04 Severability

- A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

REMAINDER OF PAGE INTENTIONALLY LEFT BLANK

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement in duplicate. One counterpart each has been delivered to Owner and Contractor. All portions of the Contract Documents have been signed or identified by Owner and Contractor or on their behalf.

This Agreement will be effective on _____, 2018 (which is the Effective Date of the Agreement).

CONTRACTOR:

By:

Title:

[CORPORATE SEAL]

Attest:

Title:

Address for giving notices:

OWNER:

By:

Title:

[TOWN SEAL]

Attest:

Title:

Address for giving notices:

License No.:

SC Contractors

Agent for service or process:

(If Contractor is a corporation or a partnership,
attach evidence of authority to sign.)

11/97

NOTICE OF INTENT TO AWARD

OWNER: Town of Varnville
(Name)

PROJECT: 4-CE-15-008 Highway 278 Streetscape
(Number) (Name)

TO ALL BIDDERS

This is to notify all bidders that it is the intent of the owner to award a contract as follows:

NAME OF BIDDER: _____

DATES BIDS WERE RECEIVED: _____

AMOUNT OF BASE BID: \$ _____

ALTERNATE(S) ACCEPTED: # \$ _____

TOTAL AMOUNT OF BASE BID WITH ALTERNATE(S): \$ _____

The owner has determined that the above named bidder is responsible and has submitted the lowest responsive bid. The owner may enter into a contract with this bidder subject to the contract review by Department of Commerce, Grants Administration.

Nathaniel A. Shaffer Mayor
(PRINT OR TYPE NAME) (AWARD AUTHORITY TITLE)

(SIGNATURE)

(DATE POSTED)

.....
POST A COPY OF THIS FORM AT THE LOCATION ANNOUNCED AT BID OPENING

NOTICE OF AWARD

TO: **Company**
 Address

OWNER: **Town of Hampton**
 95 E. Carolina Avenue, Varnville, SC 29944

PROJECT DESCRIPTION:

The owner has considered the bid dated _____ submitted by you for the above described work in response to its Advertisement for Bids and its Information for Bidders.

You are hereby notified that your base bid has been accepted in the total amount of _____ dollars and _____ cents (\$).

You are required by the Information for Bidders to execute the Agreement and furnish the required Contractor's performance bond, payment bond, and certificates of insurance with ten (10) calendar days from the date of this notice to you. If you fail to execute said agreement and to furnish said bonds within ten (10) days from the date of the notice, said Owner will be entitled to consider all your rights arising out of the Owner's acceptance of you bid abandoned and as a forfeiture of your bid bond. The Owner will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this Notice of Award to the Owner.

Dated this _____ day of _____, 2017.

Town of Varnville

Owner

(Signature)

By: _____
Nathaniel A. Shaffer

(Print Name)

Title: _____
Mayor

Acceptance of Notice

Receipt of the above Notice of Award is hereby acknowledged by _____ this the _____ day of _____, 2017.

By: _____

Title: _____

12/2005

SAMPLE NOTICE TO PROCEED

TO: (Contractor's name/address)

DATE: _____

PROJECT: 4-CE-15-008
(Number)Highway 278 Streetscape
(Name)

You are hereby notified to commence WORK in accordance with the Agreement

executed _____, on or before _____, and

you are to complete the WORK within _____ consecutive calendar days thereafter. The

date of completion of all WORK is therefore _____ .

OwnerBy: Nathaniel A. ShafferTitle: Mayor

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby

acknowledged by _____
Contractor

this the _____ day of _____, 2017.

By: _____

Title: _____

CONSTRUCTION INVOICE

CONTRACTOR:

Job No. 4-CE-15-008 INVOICE NO. 1

Project Name: Highway 278 Streetscape Project

COUNTY: Hampton

Period Ending:

CONTRACT				PERFORMANCE TO DATE				
Notice to Proceed DATE	WORKING DAYS	ORIGINAL CONTRACT AMOUNT	REVISED CONTRACT AMOUNT	WORK STARTED	WORKING DAYS CHARGED	PERCENT OF TIME EXPIRED	PERCENT CONTRACT COMPLETED	ESTIMATED COMPLETION DATE

WORK SUMMARY

JOB NO.	TOTAL VALUE	LESS		10.00%	DUE THIS INVOICE:			TOTAL
	CONTRACT WORK TO DATE	AMOUNT RETAINED	PREVIOUS PAYMENTS		CONTRACT WORK	FORCED ACCOUNT	MISC.	
	\$0.00	\$0.00	\$0.00		\$0.00			\$0.00
TOTALS	\$0.00	\$0.00	\$0.00		\$0.00	\$0.00	\$0.00	\$0.00

CONTRACTOR CERTIFICATION

The undersigned Contractor certifies that to the best of his knowledge, information, and belief, that (1) the work covered by this application for payment has been completed in accordance with the Contract documents, (2) all previous process payments received from Owner on account of work done under the Contract referred to above have been applied to discharge in full all obligations of Contractor incurred in connection with work covered by prior Construction Invoices, and (3) title to materials and equipment incorporated in said work or otherwise listed in or covered by this Invoice for Payment will pass to Owner at time of payment free and clear of liens, claims, security interest and encumbrances (except such as covered by Bond acceptable to Owner).

Printed Name

Title

Date

Signature

ENGINEER'S CERTIFICATION

We have examined this application for payment and certify to the best of our knowledge and belief that the material used and the construction accomplished meet the requirements of the Plans and Specifications, and payment of the amount due this Application is recommended.

Printed Name

Inspector

Title

Date

Printed Name

Construction Manager

Title

Date

Signature

OWNERS APPROVAL FOR PAYMENT

Printed Name

Title

Date

Signature

DENNIS CORPORATION
REV. 8/06

SHEET 2 OF 2

PROJECT NAME: Highway 278 Streetscape Project

CONTRACTOR: _____

WORK SHEET FOR INVOICE NO: _____

PROJECT NO: 4-CE-15-008

PREPARED BY: _____

PERIOD ENDING: _____
ROAD/ROUTE: _____
TITLE: _____

[illegible]

SE-380

CHANGE ORDER NO.: _____

CHANGE ORDER TO CONSTRUCTION CONTRACTAGENCY: Town of VarnvillePROJECT NAME: Highway 278 Streetscape ProjectPROJECT NUMBER: 4-CE-15-008

CONTRACTOR: _____ CONTRACT DATE: _____

This Contract is changed as follows: *(Insert description of change in space provided below)***ADJUSTMENTS IN THE CONTRACT SUM:**

1. Original Contract Sum:		\$
2. Change in Contract Sum by previously approved Change Orders:		
3. Contract Sum prior to this Change Order		\$ 0.00
4. Amount of this Change Order:		
5. New Contract Sum, including this Change Order:		\$ 0.00

ADJUSTMENTS IN THE CONTRACT TIME:

1. Original Substantial Completion Date:		
2. Sum of previously approved increases and decreases in Days:		Days
3. Change in Days for this Change Order		Days
4. New Substantial Completion Date:		

CONTRACTOR ACCEPTANCE:BY: _____ Date: _____
(Signature of Representative)

Print Name: _____

A/E RECOMMENDATION FOR ACCEPTANCE:BY: _____ Date: _____
(Signature of Representative)

Print Name: _____

AGENCY ACCEPTANCE AND CERTIFICATION:BY: _____ Date: _____
(Signature of Representative)

Print Name: _____

Change is within Agency Construction Contract Change Order Certification of: \$ _____ Yes ☐ No ☐**Office of the State Engineer Authorization for change exceeding Agency Construction Contract Change Order Certification:**AUTHORIZED BY: _____ DATE: _____
(OSE Project Manager)**SUBMIT THE FOLLOWING TO OSE**

1. SE-380, fully completed and signed by the Contractor, A/E and Agency;
2. Detailed back-up information from the Contractor/Subcontractor(s) that justifies the costs and schedule changes shown.
3. If any item exceeds Agency certification, OSE will authorize the SE-380 and return to Agency.

SECTION C: REQUIRED CONTRACT FORMS

PERFORMANCE BOND

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address):

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address):

CONTRACT

Date:

Amount:

Description (Name and Location):

BOND

Bond Number:

Date (Not earlier than Contract Date):

Amount:

Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Performance Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Company:

Signature: _____ (Seal)

(Seal)

Name and Title:

Surety's Name and Corporate Seal

By: _____

Signature and Title

(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

Attest: _____

Signature and Title

CONTRACTOR AS PRINCIPAL

SURETY

Company:

Signature: _____ (Seal)

(Seal)

Name and Title:

Surety's Name and Corporate Seal

By: _____

Signature and Title

(Attach Power of Attorney)

Attest: _____

Signature and Title:

EJCDC No. C-610 (2002 Edition)

Originally prepared through the joint efforts of the Surety Association of America, Engineers Joint Contract Documents Committee, the Associated General Contractors of America, and the American Institute of Architects.

1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner for the performance of the Contract, which is incorporated herein by reference.
2. If Contractor performs the Contract, Surety and Contractor have no obligation under this Bond, except to participate in conferences as provided in Paragraph 3.1.
3. If there is no Owner Default, Surety's obligation under this Bond shall arise after:
 - 3.1. Owner has notified Contractor and Surety, at the addresses described in Paragraph 10 below, that Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with Contractor and Surety to be held not later than 15 days after receipt of such notice to discuss methods of performing the Contract. If Owner, Contractor and Surety agree, Contractor shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive Owner's right, if any, subsequently to declare a Contractor Default; and
 - 3.2. Owner has declared a Contractor Default and formally terminated Contractor's right to complete the Contract. Such Contractor Default shall not be declared earlier than 20 days after Contractor and Surety have received notice as provided in Paragraph 3.1; and
 - 3.3. Owner has agreed to pay the Balance of the Contract Price to:
 1. Surety in accordance with the terms of the Contract;
 2. Another Contractor selected pursuant to Paragraph 4.3 to perform the Contract.
4. When Owner has satisfied the conditions of Paragraph 3, Surety shall promptly and at Surety's expense take one of the following actions:
 - 4.1. Arrange for Contractor, with consent of Owner, to perform and complete the Contract; or
 - 4.2. Undertake to perform and complete the Contract itself, through its agents or through independent Contractors; or
 - 4.3. Obtain bids or negotiated proposals from qualified Contractors acceptable to Owner for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by Owner and Contractor selected with Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Contract, and pay to Owner the amount of damages as described in Paragraph 6 in excess of the Balance of the Contract Price incurred by Owner resulting from Contractor Default; or
 - 4.4. Waive its right to perform and complete, arrange for completion, or obtain a new Contractor and with reasonable promptness under the circumstances:
 1. After investigation, determine the amount for which it may be liable to Owner and, as soon as practicable after the amount is determined, tender payment therefore to Owner; or
 2. Deny liability in whole or in part and notify Owner citing reasons therefore.
5. If Surety does not proceed as provided in Paragraph 4 with reasonable promptness, Surety shall be deemed to be in default on this Bond 15 days after receipt of an additional written notice from Owner to Surety demanding that Surety perform its obligations under this Bond, and Owner shall be entitled to enforce any remedy available to Owner. If Surety proceeds as provided in Paragraph 4.4, and Owner refuses the payment tendered or Surety has denied liability, in whole or in part, without further notice Owner shall be entitled to enforce any remedy available to Owner.
6. After Owner has terminated Contractor's right to complete the Contract, and if Surety elects to act under Paragraph 4.1, 4.2, or 4.3 above, then the responsibilities of Surety to Owner shall not be greater than those of Contractor under the Contract, and the responsibilities of Owner to Surety shall not be greater than those of Owner under the Contract. To a limit of the amount of this Bond, but subject to commitment by Owner of the Balance of the Contract Price to mitigation of costs and damages on the Contract, Surety is obligated without duplication for:
 - 6.1. The responsibilities of Contractor for correction of defective Work and completion of the Contract;
 - 6.2. Additional legal, design professional, and delay costs resulting from Contractor's Default, and resulting from the actions or failure to act of Surety under Paragraph 4; and
 - 6.3. Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of Contractor.
7. Surety shall not be liable to Owner or others for obligations of Contractor that are unrelated to the Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than Owner or its heirs, executors, administrators, or successors.
8. Surety hereby waives notice of any change, including changes of time, to Contract or to related subcontracts, purchase orders, and other obligations.
9. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located and shall be instituted within two years after Contractor Default or within two years after Contractor ceased working or within two years after Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
10. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the address shown on the signature page.
11. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
12. Definitions.
 - 12.1. Balance of the Contract Price: The total amount payable by Owner to Contractor under the Contract after all proper adjustments have been made, including allowance to Contractor of any amounts received or to be received by Owner in settlement of insurance or other Claims for damages to which Contractor is entitled, reduced by all valid and proper payments made to or on behalf of Contractor under the Contract.
 - 12.2. Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.
 - 12.3. Contractor Default: Failure of Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.
 - 12.4. Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract or to perform and complete or comply with the other terms thereof.

FOR INFORMATION ONLY – Name, Address and Telephone
 Surety Agency or Broker
 Owner's Representative (engineer or other party) Dennis Corporation 1800 Huger Street Columbia SC 29201

PAYMENT BOND

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address):

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address):

CONTRACT

Date:

Amount:

Description (Name and Location):

BOND

Bond Number:

Date (Not earlier than Contract Date):

Amount:

Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Payment Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Company:

Signature: _____ (Seal)

Name and Title:

(Seal)

Surety's Name and Corporate Seal

By:

Signature and Title

(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

Attest:

Signature and Title

CONTRACTOR AS PRINCIPAL

SURETY

Company:

Signature: _____ (Seal)

Name and Title:

(Seal)

Surety's Name and Corporate Seal

By:

Signature and Title

(Attach Power of Attorney)

Attest:

Signature and Title:

EJCDC No. C-615 (2002 Edition)

Originally prepared through the joint efforts of the Surety Association of America, Engineers Joint Contract Documents Committee, the Associated General Contractors of America, the American Institute of Architects, the American Subcontractors Association, and the Associated Specialty Contractors.

1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner to pay for labor, materials, and equipment furnished by Claimants for use in the performance of the Contract, which is incorporated herein by reference.
2. With respect to Owner, this obligation shall be null and void if Contractor:
 - 2.1. Promptly makes payment, directly or indirectly, for all sums due Claimants, and
 - 2.2. Defends, indemnifies, and holds harmless Owner from all claims, demands, liens, or suits alleging non-payment by Contractor by any person or entity who furnished labor, materials, or equipment for use in the performance of the Contract, provided Owner has promptly notified Contractor and Surety (at the addresses described in Paragraph 12) of any claims, demands, liens, or suits and tendered defense of such claims, demands, liens, or suits to Contractor and Surety, and provided there is no Owner Default.
3. With respect to Claimants, this obligation shall be null and void if Contractor promptly makes payment, directly or indirectly, for all sums due.
4. Surety shall have no obligation to Claimants under this Bond until:
 - 4.1. Claimants who are employed by or have a direct contract with Contractor have given notice to Surety (at the addresses described in Paragraph 12) and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.
 - 4.2. Claimants who do not have a direct contract with Contractor:
 1. Have furnished written notice to Contractor and sent a copy, or notice thereof, to Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials or equipment were furnished or supplied, or for whom the labor was done or performed; and
 2. Have either received a rejection in whole or in part from Contractor, or not received within 30 days of furnishing the above notice any communication from Contractor by which Contractor had indicated the claim will be paid directly or indirectly; and
 3. Not having been paid within the above 30 days, have sent a written notice to Surety and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to Contractor.
 5. If a notice by a Claimant required by Paragraph 4 is provided by Owner to Contractor or to Surety, that is sufficient compliance.
 6. When a Claimant has satisfied the conditions of Paragraph 4, the Surety shall promptly and at Surety's expense take the following actions:
 - 6.1. Send an answer to that Claimant, with a copy to Owner, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.
 - 6.2. Pay or arrange for payment of any undisputed amounts.
 7. Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by Surety.
 8. Amounts owed by Owner to Contractor under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any performance bond. By Contractor furnishing and Owner accepting this Bond, they agree that all funds earned by Contractor in the performance of the Contract are dedicated to satisfy obligations of Contractor and Surety under this Bond, subject to Owner's priority to use the funds for the completion of the Work.
 5. Surety shall not be liable to Owner, Claimants, or others for obligations of Contractor that are unrelated to the Contract. Owner shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.
 10. Surety hereby waives notice of any change, including changes of time, to the Contract or to related Subcontracts, purchase orders and other obligations.
 11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by Paragraph 4.1 or Paragraph 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
 12. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by Surety, Owner, or Contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.
 13. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory Bond and not as a common law bond.
 14. Upon request of any person or entity appearing to be a potential beneficiary of this Bond, Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.
 15. DEFINITIONS
 - 15.1. Claimant: An individual or entity having a direct contract with Contractor, or with a first-tier subcontractor of Contractor, to furnish labor, materials, or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Contract, architectural and engineering services required for performance of the Work of Contractor and Contractor's SubContractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.
 - 15.2. Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.
 - 15.3. Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract or to perform and complete or comply with the other terms thereof.

FOR INFORMATION ONLY – Name, Address and Telephone

Surety Agency or Broker

Owner's Representative (engineer or other party) Dennis Corporation 1800 Huger Street Columbia SC

Form **W-9**
(Rev. December 2014)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

**Give Form to the
requester. Do not
send to the IRS.**

Print or type See Specific Instructions on page 2.	1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.	
	2 Business name/disregarded entity name, if different from above	
	3 Check appropriate box for federal tax classification; check only one of the following seven boxes: <input type="checkbox"/> Individual/sole proprietor or single-member LLC <input type="checkbox"/> C Corporation <input type="checkbox"/> S Corporation <input type="checkbox"/> Partnership <input type="checkbox"/> Trust/estate <input type="checkbox"/> Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=partnership) ▶ _____ Note. For a single-member LLC that is disregarded, do not check LLC; check the appropriate box in the line above for the tax classification of the single-member owner. <input type="checkbox"/> Other (see instructions) ▶ _____	4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3): Exempt payee code (if any) _____ Exemption from FATCA reporting code (if any) _____ <i>(Applies to accounts maintained outside the U.S.)</i>
	5 Address (number, street, and apt. or suite no.)	Requester's name and address (optional)
	6 City, state, and ZIP code	
7 List account number(s) here (optional)		

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

Note. If the account is in more than one name, see the instructions for line 1 and the chart on page 4 for guidelines on whose number to enter.

Social security number	
<div style="border: 1px solid black; width: 100px; height: 20px; margin: 0 auto;"></div>	<div style="border: 1px solid black; width: 100px; height: 20px; margin: 0 auto;"></div>
or	
Employer identification number	
<div style="border: 1px solid black; width: 100px; height: 20px; margin: 0 auto;"></div>	<div style="border: 1px solid black; width: 100px; height: 20px; margin: 0 auto;"></div>

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions on page 3.

**Sign
Here**

Signature of
U.S. person ▶

Date ▶

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. Information about developments affecting Form W-9 (such as legislation enacted after we release it) is at www.irs.gov/fw9.

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following:

- Form 1099-INT (interest earned or paid)
- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)

- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding? on page 2.

By signing the filled-out form, you:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
2. Certify that you are not subject to backup withholding, or
3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income, and
4. Certify that FATCA code(s) entered on this form (if any) indicating that you are exempt from the FATCA reporting, is correct. See *What is FATCA reporting?* on page 2 for further information.

Note. If you are a U.S. person and a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien;
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States;
- An estate (other than a foreign estate); or
- A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax under section 1446 on any foreign partners' share of effectively connected taxable income from such business. Further, in certain cases where a Form W-9 has not been received, the rules under section 1446 require a partnership to presume that a partner is a foreign person, and pay the section 1446 withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid section 1446 withholding on your share of partnership income.

In the cases below, the following person must give Form W-9 to the partnership for purposes of establishing its U.S. status and avoiding withholding on its allocable share of net income from the partnership conducting a trade or business in the United States:

- In the case of a disregarded entity with a U.S. owner, the U.S. owner of the disregarded entity and not the entity;
- In the case of a grantor trust with a U.S. grantor or other U.S. owner, generally, the U.S. grantor or other U.S. owner of the grantor trust and not the trust; and
- In the case of a U.S. trust (other than a grantor trust), the U.S. trust (other than a grantor trust) and not the beneficiaries of the trust.

Foreign person. If you are a foreign person or the U.S. branch of a foreign bank that has elected to be treated as a U.S. person, do not use Form W-9. Instead, use the appropriate Form W-8 or Form 8233 (see Publication 515, Withholding of Tax on Nonresident Aliens and Foreign Entities).

Nonresident alien who becomes a resident alien. Generally, only a nonresident alien individual may use the terms of a tax treaty to reduce or eliminate U.S. tax on certain types of income. However, most tax treaties contain a provision known as a "saving clause." Exceptions specified in the saving clause may permit an exemption from tax to continue for certain types of income even after the payee has otherwise become a U.S. resident alien for tax purposes.

If you are a U.S. resident alien who is relying on an exception contained in the saving clause of a tax treaty to claim an exemption from U.S. tax on certain types of income, you must attach a statement to Form W-9 that specifies the following five items:

1. The treaty country. Generally, this must be the same treaty under which you claimed exemption from tax as a nonresident alien.
2. The treaty article addressing the income.
3. The article number (or location) in the tax treaty that contains the saving clause and its exceptions.
4. The type and amount of income that qualifies for the exemption from tax.
5. Sufficient facts to justify the exemption from tax under the terms of the treaty article.

Example. Article 20 of the U.S.-China income tax treaty allows an exemption from tax for scholarship income received by a Chinese student temporarily present in the United States. Under U.S. law, this student will become a resident alien for tax purposes if his or her stay in the United States exceeds 5 calendar years. However, paragraph 2 of the first Protocol to the U.S.-China treaty (dated April 30, 1984) allows the provisions of Article 20 to continue to apply even after the Chinese student becomes a resident alien of the United States. A Chinese student who qualifies for this exception (under paragraph 2 of the first protocol) and is relying on this exception to claim an exemption from tax on his or her scholarship or fellowship income would attach to Form W-9 a statement that includes the information described above to support that exemption.

If you are a nonresident alien or a foreign entity, give the requester the appropriate completed Form W-8 or Form 8233.

Backup Withholding

What is backup withholding? Persons making certain payments to you must under certain conditions withhold and pay to the IRS 28% of such payments. This is called "backup withholding." Payments that may be subject to backup withholding include interest, tax-exempt interest, dividends, broker and barter exchange transactions, rents, royalties, nonemployee pay, payments made in settlement of payment card and third party network transactions, and certain payments from fishing boat operators. Real estate transactions are not subject to backup withholding.

You will not be subject to backup withholding on payments you receive if you give the requester your correct TIN, make the proper certifications, and report all your taxable interest and dividends on your tax return.

Payments you receive will be subject to backup withholding if:

1. You do not furnish your TIN to the requester,
2. You do not certify your TIN when required (see the Part II instructions on page 3 for details),

3. The IRS tells the requester that you furnished an incorrect TIN,

4. The IRS tells you that you are subject to backup withholding because you did not report all your interest and dividends on your tax return (for reportable interest and dividends only), or

5. You do not certify to the requester that you are not subject to backup withholding under 4 above (for reportable interest and dividend accounts opened after 1983 only).

Certain payees and payments are exempt from backup withholding. See *Exempt payee code* on page 3 and the separate Instructions for the Requester of Form W-9 for more information.

Also see *Special rules for partnerships* above.

What is FATCA reporting?

The Foreign Account Tax Compliance Act (FATCA) requires a participating foreign financial institution to report all United States account holders that are specified United States persons. Certain payees are exempt from FATCA reporting. See *Exemption from FATCA reporting code* on page 3 and the Instructions for the Requester of Form W-9 for more information.

Updating Your Information

You must provide updated information to any person to whom you claimed to be an exempt payee if you are no longer an exempt payee and anticipate receiving reportable payments in the future from this person. For example, you may need to provide updated information if you are a C corporation that elects to be an S corporation, or if you no longer are tax exempt. In addition, you must furnish a new Form W-9 if the name or TIN changes for the account; for example, if the grantor of a grantor trust dies.

Penalties

Failure to furnish TIN. If you fail to furnish your correct TIN to a requester, you are subject to a penalty of \$50 for each such failure unless your failure is due to reasonable cause and not to willful neglect.

Civil penalty for false information with respect to withholding. If you make a false statement with no reasonable basis that results in no backup withholding, you are subject to a \$500 penalty.

Criminal penalty for falsifying information. Willfully falsifying certifications or affirmations may subject you to criminal penalties including fines and/or imprisonment.

Misuse of TINs. If the requester discloses or uses TINs in violation of federal law, the requester may be subject to civil and criminal penalties.

Specific Instructions

Line 1

You must enter one of the following on this line; **do not** leave this line blank. The name should match the name on your tax return.

If this Form W-9 is for a joint account, list first, and then circle, the name of the person or entity whose number you entered in Part I of Form W-9.

a. **Individual.** Generally, enter the name shown on your tax return. If you have changed your last name without informing the Social Security Administration (SSA) of the name change, enter your first name, the last name as shown on your social security card, and your new last name.

Note. ITIN applicant: Enter your individual name as it was entered on your Form W-7 application, line 1a. This should also be the same as the name you entered on the Form 1040/1040A/1040EZ you filed with your application.

b. **Sole proprietor or single-member LLC.** Enter your individual name as shown on your 1040/1040A/1040EZ on line 1. You may enter your business, trade, or "doing business as" (DBA) name on line 2.

c. **Partnership, LLC that is not a single-member LLC, C Corporation, or S Corporation.** Enter the entity's name as shown on the entity's tax return on line 1 and any business, trade, or DBA name on line 2.

d. **Other entities.** Enter your name as shown on required U.S. federal tax documents on line 1. This name should match the name shown on the charter or other legal document creating the entity. You may enter any business, trade, or DBA name on line 2.

e. **Disregarded entity.** For U.S. federal tax purposes, an entity that is disregarded as an entity separate from its owner is treated as a "disregarded entity." See Regulations section 301.7701-2(c)(2)(iii). Enter the owner's name on line 1. The name of the entity entered on line 1 should never be a disregarded entity. The name on line 1 should be the name shown on the income tax return on which the income should be reported. For example, if a foreign LLC that is treated as a disregarded entity for U.S. federal tax purposes has a single owner that is a U.S. person, the U.S. owner's name is required to be provided on line 1. If the direct owner of the entity is also a disregarded entity, enter the first owner that is not disregarded for federal tax purposes. Enter the disregarded entity's name on line 2, "Business name/disregarded entity name." If the owner of the disregarded entity is a foreign person, the owner must complete an appropriate Form W-8 instead of a Form W-9. This is the case even if the foreign person has a U.S. TIN.

Line 2

If you have a business name, trade name, DBA name, or disregarded entity name, you may enter it on line 2.

Line 3

Check the appropriate box in line 3 for the U.S. federal tax classification of the person whose name is entered on line 1. Check only one box in line 3.

Limited Liability Company (LLC). If the name on line 1 is an LLC treated as a partnership for U.S. federal tax purposes, check the "Limited Liability Company" box and enter "P" in the space provided. If the LLC has filed Form 8832 or 2553 to be taxed as a corporation, check the "Limited Liability Company" box and in the space provided enter "C" for C corporation or "S" for S corporation. If it is a single-member LLC that is a disregarded entity, do not check the "Limited Liability Company" box; instead check the first box in line 3 "Individual/sole proprietor or single-member LLC."

Line 4, Exemptions

If you are exempt from backup withholding and/or FATCA reporting, enter in the appropriate space in line 4 any code(s) that may apply to you.

Exempt payee code.

- Generally, individuals (including sole proprietors) are not exempt from backup withholding.
- Except as provided below, corporations are exempt from backup withholding for certain payments, including interest and dividends.
- Corporations are not exempt from backup withholding for payments made in settlement of payment card or third party network transactions.
- Corporations are not exempt from backup withholding with respect to attorneys' fees or gross proceeds paid to attorneys, and corporations that provide medical or health care services are not exempt with respect to payments reportable on Form 1099-MISC.

The following codes identify payees that are exempt from backup withholding. Enter the appropriate code in the space in line 4.

- 1—An organization exempt from tax under section 501(a), any IRA, or a custodial account under section 403(b)(7) if the account satisfies the requirements of section 401(f)(2)
- 2—The United States or any of its agencies or instrumentalities
- 3—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities
- 4—A foreign government or any of its political subdivisions, agencies, or instrumentalities
- 5—A corporation
- 6—A dealer in securities or commodities required to register in the United States, the District of Columbia, or a U.S. commonwealth or possession
- 7—A futures commission merchant registered with the Commodity Futures Trading Commission
- 8—A real estate investment trust
- 9—An entity registered at all times during the tax year under the Investment Company Act of 1940
- 10—A common trust fund operated by a bank under section 584(a)
- 11—A financial institution
- 12—A middleman known in the investment community as a nominee or custodian
- 13—A trust exempt from tax under section 664 or described in section 4947

The following chart shows types of payments that may be exempt from backup withholding. The chart applies to the exempt payees listed above, 1 through 13.

IF the payment is for . . .	THEN the payment is exempt for . . .
Interest and dividend payments	All exempt payees except for 7
Broker transactions	Exempt payees 1 through 4 and 6 through 11 and all C corporations. S corporations must not enter an exempt payee code because they are exempt only for sales of noncovered securities acquired prior to 2012.
Barter exchange transactions and patronage dividends	Exempt payees 1 through 4
Payments over \$600 required to be reported and direct sales over \$5,000 ¹	Generally, exempt payees 1 through 5 ²
Payments made in settlement of payment card or third party network transactions	Exempt payees 1 through 4

¹ See Form 1099-MISC, Miscellaneous Income, and its instructions.

² However, the following payments made to a corporation and reportable on Form 1099-MISC are not exempt from backup withholding: medical and health care payments, attorneys' fees, gross proceeds paid to an attorney reportable under section 6045(f), and payments for services paid by a federal executive agency.

Exemption from FATCA reporting code. The following codes identify payees that are exempt from reporting under FATCA. These codes apply to persons submitting this form for accounts maintained outside of the United States by certain foreign financial institutions. Therefore, if you are only submitting this form for an account you hold in the United States, you may leave this field blank. Consult with the person requesting this form if you are uncertain if the financial institution is subject to these requirements. A requester may indicate that a code is not required by providing you with a Form W-9 with "Not Applicable" (or any similar indication) written or printed on the line for a FATCA exemption code.

A—An organization exempt from tax under section 501(a) or any individual retirement plan as defined in section 7701(a)(37)

B—The United States or any of its agencies or instrumentalities

C—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities

D—A corporation the stock of which is regularly traded on one or more established securities markets, as described in Regulations section 1.1472-1(c)(1)(i)

E—A corporation that is a member of the same expanded affiliated group as a corporation described in Regulations section 1.1472-1(c)(1)(i)

F—A dealer in securities, commodities, or derivative financial instruments (including notional principal contracts, futures, forwards, and options) that is registered as such under the laws of the United States or any state

G—A real estate investment trust

H—A regulated investment company as defined in section 851 or an entity registered at all times during the tax year under the Investment Company Act of 1940

I—A common trust fund as defined in section 584(a)

J—A bank as defined in section 581

K—A broker

L—A trust exempt from tax under section 664 or described in section 4947(a)(1)

M—A tax exempt trust under a section 403(b) plan or section 457(g) plan

Note. You may wish to consult with the financial institution requesting this form to determine whether the FATCA code and/or exempt payee code should be completed.

Line 5

Enter your address (number, street, and apartment or suite number). This is where the requester of this Form W-9 will mail your information returns.

Line 6

Enter your city, state, and ZIP code.

Part I. Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. If you are a resident alien and you do not have and are not eligible to get an SSN, your TIN is your IRS individual taxpayer identification number (ITIN). Enter it in the social security number box. If you do not have an ITIN, see *How to get a TIN* below.

If you are a sole proprietor and you have an EIN, you may enter either your SSN or EIN. However, the IRS prefers that you use your SSN.

If you are a single-member LLC that is disregarded as an entity separate from its owner (see *Limited Liability Company (LLC)* on this page), enter the owner's SSN (or EIN, if the owner has one). Do not enter the disregarded entity's EIN. If the LLC is classified as a corporation or partnership, enter the entity's EIN.

Note. See the chart on page 4 for further clarification of name and TIN combinations.

How to get a TIN. If you do not have a TIN, apply for one immediately. To apply for an SSN, get Form SS-5, Application for a Social Security Card, from your local SSA office or get this form online at www.ssa.gov. You may also get this form by calling 1-800-772-1213. Use Form W-7, Application for IRS Individual Taxpayer Identification Number, to apply for an ITIN, or Form SS-4, Application for Employer Identification Number, to apply for an EIN. You can apply for an EIN online by accessing the IRS website at www.irs.gov/businesses and clicking on Employer Identification Number (EIN) under Starting a Business. You can get Forms W-7 and SS-4 from the IRS by visiting IRS.gov or by calling 1-800-TAX-FORM (1-800-829-3676).

If you are asked to complete Form W-9 but do not have a TIN, apply for a TIN and write "Applied For" in the space for the TIN, sign and date the form, and give it to the requester. For interest and dividend payments, and certain payments made with respect to readily tradable instruments, generally you will have 60 days to get a TIN and give it to the requester before you are subject to backup withholding on payments. The 60-day rule does not apply to other types of payments. You will be subject to backup withholding on all such payments until you provide your TIN to the requester.

Note. Entering "Applied For" means that you have already applied for a TIN or that you intend to apply for one soon.

Caution: A disregarded U.S. entity that has a foreign owner must use the appropriate Form W-8.

Part II. Certification

To establish to the withholding agent that you are a U.S. person, or resident alien, sign Form W-9. You may be requested to sign by the withholding agent even if items 1, 4, or 5 below indicate otherwise.

For a joint account, only the person whose TIN is shown in Part I should sign (when required). In the case of a disregarded entity, the person identified on line 1 must sign. Exempt payees, see *Exempt payee code* earlier.

Signature requirements. Complete the certification as indicated in items 1 through 5 below.

1. Interest, dividend, and barter exchange accounts opened before 1984 and broker accounts considered active during 1983. You must give your correct TIN, but you do not have to sign the certification.

2. Interest, dividend, broker, and barter exchange accounts opened after 1983 and broker accounts considered inactive during 1983. You must sign the certification or backup withholding will apply. If you are subject to backup withholding and you are merely providing your correct TIN to the requester, you must cross out item 2 in the certification before signing the form.

3. Real estate transactions. You must sign the certification. You may cross out item 2 of the certification.

4. Other payments. You must give your correct TIN, but you do not have to sign the certification unless you have been notified that you have previously given an incorrect TIN. "Other payments" include payments made in the course of the requester's trade or business for rents, royalties, goods (other than bills for merchandise), medical and health care services (including payments to corporations), payments to a nonemployee for services, payments made in settlement of payment card and third party network transactions, payments to certain fishing boat crew members and fishermen, and gross proceeds paid to attorneys (including payments to corporations).

5. Mortgage interest paid by you, acquisition or abandonment of secured property, cancellation of debt, qualified tuition program payments (under section 529), IRA, Coverdell ESA, Archer MSA or HSA contributions or distributions, and pension distributions. You must give your correct TIN, but you do not have to sign the certification.

What Name and Number To Give the Requester

For this type of account:	Give name and SSN of:
1. Individual	The individual
2. Two or more individuals (joint account)	The actual owner of the account or, if combined funds, the first individual on the account ¹
3. Custodian account of a minor (Uniform Gift to Minors Act)	The minor ²
4. a. The usual revocable savings trust (grantor is also trustee) b. So-called trust account that is not a legal or valid trust under state law	The grantor-trustee ¹ The actual owner ¹
5. Sole proprietorship or disregarded entity owned by an individual	The owner ³
6. Grantor trust filing under Optional Form 1099 Filing Method 1 (see Regulations section 1.671-4(b)(2)(i) (A))	The grantor ⁴
For this type of account:	Give name and EIN of:
7. Disregarded entity not owned by an individual	The owner
8. A valid trust, estate, or pension trust	Legal entity ⁴
9. Corporation or LLC electing corporate status on Form 8832 or Form 2553	The corporation
10. Association, club, religious, charitable, educational, or other tax-exempt organization	The organization
11. Partnership or multi-member LLC	The partnership
12. A broker or registered nominee	The broker or nominee
13. Account with the Department of Agriculture in the name of a public entity (such as a state or local government, school district, or prison) that receives agricultural program payments	The public entity
14. Grantor trust filing under the Form 1041 Filing Method or the Optional Form 1099 Filing Method 2 (see Regulations section 1.671-4(b)(2)(i) (B))	The trust

¹ List first and circle the name of the person whose number you furnish. If only one person on a joint account has an SSN, that person's number must be furnished.

² Circle the minor's name and furnish the minor's SSN.

³ You must show your individual name and you may also enter your business or DBA name on the "Business name/disregarded entity" name line. You may use either your SSN or EIN (if you have one), but the IRS encourages you to use your SSN.

⁴ List first and circle the name of the trust, estate, or pension trust. (Do not furnish the TIN of the personal representative or trustee unless the legal entity itself is not designated in the account title.) Also see *Special rules for partnerships* on page 2.

***Note.** Grantor also must provide a Form W-9 to trustee of trust.

Note. If no name is circled when more than one name is listed, the number will be considered to be that of the first name listed.

Secure Your Tax Records from Identity Theft

Identity theft occurs when someone uses your personal information such as your name, SSN, or other identifying information, without your permission, to commit fraud or other crimes. An identity thief may use your SSN to get a job or may file a tax return using your SSN to receive a refund.

To reduce your risk:

- Protect your SSN,
- Ensure your employer is protecting your SSN, and
- Be careful when choosing a tax preparer.

If your tax records are affected by identity theft and you receive a notice from the IRS, respond right away to the name and phone number printed on the IRS notice or letter.

If your tax records are not currently affected by identity theft but you think you are at risk due to a lost or stolen purse or wallet, questionable credit card activity or credit report, contact the IRS Identity Theft Hotline at 1-800-908-4490 or submit Form 14039.

For more information, see Publication 4535, Identity Theft Prevention and Victim Assistance.

Victims of identity theft who are experiencing economic harm or a system problem, or are seeking help in resolving tax problems that have not been resolved through normal channels, may be eligible for Taxpayer Advocate Service (TAS) assistance. You can reach TAS by calling the TAS toll-free case intake line at 1-877-777-4778 or TTY/TDD 1-800-829-4059.

Protect yourself from suspicious emails or phishing schemes. Phishing is the creation and use of email and websites designed to mimic legitimate business emails and websites. The most common act is sending an email to a user falsely claiming to be an established legitimate enterprise in an attempt to scam the user into surrendering private information that will be used for identity theft.

The IRS does not initiate contacts with taxpayers via emails. Also, the IRS does not request personal detailed information through email or ask taxpayers for the PIN numbers, passwords, or similar secret access information for their credit card, bank, or other financial accounts.

If you receive an unsolicited email claiming to be from the IRS, forward this message to phishing@irs.gov. You may also report misuse of the IRS name, logo, or other IRS property to the Treasury Inspector General for Tax Administration (TIGTA) at 1-800-366-4484. You can forward suspicious emails to the Federal Trade Commission at: spam@uce.gov or contact them at www.ftc.gov/idtheft or 1-877-IDTHEFT (1-877-438-4338).

Visit IRS.gov to learn more about identity theft and how to reduce your risk.

Privacy Act Notice

Section 6109 of the Internal Revenue Code requires you to provide your correct TIN to persons (including federal agencies) who are required to file information returns with the IRS to report interest, dividends, or certain other income paid to you; mortgage interest you paid; the acquisition or abandonment of secured property; the cancellation of debt; or contributions you made to an IRA, Archer MSA, or HSA. The person collecting this form uses the information on the form to file information returns with the IRS, reporting the above information. Routine uses of this information include giving it to the Department of Justice for civil and criminal litigation and to cities, states, the District of Columbia, and U.S. commonwealths and possessions for use in administering their laws. The information also may be disclosed to other countries under a treaty, to federal and state agencies to enforce civil and criminal laws, or to federal law enforcement and intelligence agencies to combat terrorism. You must provide your TIN whether or not you are required to file a tax return. Under section 3406, payers must generally withhold a percentage of taxable interest, dividend, and certain other payments to a payee who does not give a TIN to the payer. Certain penalties may also apply for providing false or fraudulent information.

SECTION D: SPECIAL PROVISIONS & SPECIFICATIONS
FOR
HIGHWAY 278 STREETSCAPE PROJECT

8/2017

**DEPARTMENT OF COMMERCE
GRANTS ADMINISTRATION
COMMUNITY DEVELOPMENT BLOCK GRANT PROGRAM**



CONTRACT SPECIAL PROVISIONS

The following CDBG Contract Special Provisions should be used with all construction contracts, including housing rehabilitation, as applicable, and professional service contracts, where CDBG funds are being used in whole or in part.

CONTRACT SPECIAL PROVISIONS

1. **Definitions:** For purposes of this Contract, the following terms shall have the meanings set forth below:
- (a) “Assistance” means the CDBG grant funds provided, or to be provided, to the Grantee by the State, pursuant to the Grant Award Agreement.
 - (b) “CDBG” means Community Development Block Grant.
 - (c) “Contract” means the contractual agreement between the Owner and the Contractor to which these Contract Special Provisions have been incorporated and made a part thereof.
 - (d) “Contractor” means the contractor whose services are retained pursuant to the Contract.
 - (e) “Grantee” means the unit of local government designated as the recipient of the Assistance in the Grant Award and signing the acceptance provision of the Grant Award.
 - (f) “HUD” means U.S. Department of Housing and Urban Development, which is the federal agency that awards and has authority over CDBG funding to the State.
 - (g) “Owner” means the Grantee or Subrecipient, as applicable.
 - (h) “Project” means the project for which the services of the Contractor have been retained pursuant to the Contract which are funded, in whole or in part, with CDBG funds.
 - (i) “State” means the State of South Carolina, or that agency, agency division, or Office of State government which has been delegated the responsibility for administering the CDBG program for the State of South Carolina, as appropriate.
 - (j) “Subrecipient” means the agent of the unit of local government as designated by an agreement.
 - (k) “Labor Surplus Area” means a civil jurisdiction that has an unemployment rate at least 20% above the average unemployment rate for all states, the District of Columbia, and Puerto Rico during the previous two calendar years. The Department of Labor issues the labor surplus area list on a fiscal year basis.

2. **Prime Contractor Responsibilities:** The Contractor is required to assume sole responsibility for the complete effort and enforcement of laws and regulations under this Contract. The Owner will consider the Contractor to be the sole point of contact with regard to contractual matters. All contractors, including subcontractors must be registered in SAM and eligible to receive federal contracts.
3. **Federal and State Laws:** The Contractor agrees to comply with all CDBG requirements as well as other federal and state laws, regulations, or Executive Orders. The State reserves the right to add or delete terms and conditions of this Contract as may be required by revisions and additions or changes in the requirements, regulations, and laws governing the CDBG Program.
4. **Procurement and Contracting:** In accordance with 2 CFR Part 200, the cost plus a percentage of cost and percentage of construction cost methods of contracting shall not be used. This provision shall supersede any conflicting provision in an executed contract document or agreement funded in whole or in part with CDBG funds.
5. **Ownership:** Ownership of all real or personal property, acquired in whole or in part with CDBG funds for use on this Project, shall be vested in the Grantee, unless otherwise authorized by the State. When the Grantee determines that the property is no longer required for the purposes of this Project, the Grantee must notify the State and obtain approval for disposition of the property in accordance with applicable guidelines.
6. **Copyright:** Except as otherwise provided in the terms and conditions of this Contract, the Contractor paid through this Contract is free to copyright any books, publications or other copyrightable materials developed in the course of the Project and under this Contract. However, HUD and the State reserve a royalty-free, non-exclusive and irrevocable license to reproduce, publish or otherwise use and to authorize others to use, for Federal government and State purposes:
 - (a) the copyright in any work developed under this Contract; and
 - (b) any rights of copyright to which a subcontractor purchases ownership with grant support.

The Federal government's rights and the State's rights identified above must be conveyed to the publisher and the language of the publisher's release form must insure the preservation of these rights.
6. **Reporting Requirements:** The Contractor agrees to complete and submit all reports, in such form and according to such schedule, as may be required by the State or HUD. Further, the Contractor agrees to require any subcontractors to submit reports that may be required and to incorporate such language in its agreements. Failure to meet deadlines with the required information could result in sanctions.
7. **Access to Records:** All records with respect to all matters covered by this Contract shall be made available at any time for audit and inspection by HUD, the State or the Grantee or their representatives upon their request.
8. **Maintenance of Records:** Records for non-expendable property purchased totally or partially with Federal funds must be retained for five years after final close-out of the grant. All other pertinent contract records including financial records, supporting documents and

statistical records shall be retained for a minimum of five years after the final close-out report. However, if any litigation, claim, or audit is started before the expiration of the five year period, then records must be retained for five years after the litigation, claim or audit is resolved.

9. **Confidential Information:** Any reports, information, data, etc., given to, prepared by, or assembled by the Contractor under this Contract, which the Grantee or the State requests to be kept confidential, shall not be made available to any individual or organization by the Contractor without prior written approval of the Grantee or the State, as applicable.
10. **Reporting of Fraudulent Activity:** If at any time during the term of this Contract anyone has reason to believe by whatever means that, under this or any other program administered by the State, a recipient of funds has improperly or fraudulently applied for or received benefits, monies or services pursuant to this Contract or any other contract, such information shall be reported immediately to the appropriate authorities.
11. **Political Activity:** None of the funds, materials, property or services provided directly or indirectly under this Contract shall be used for any partisan political activity, or to further the election or defeat of any candidate for public office or otherwise in violation of the provisions of Section 8-13-765 of the Code of Laws of South Carolina, 1976, as amended.
12. **Conflicts of Interest and Ethical Standards, South Carolina Consolidated Procurement Code:** The following provisions regarding “conflicts of interest” apply to the use and expenditure of CDBG funds by the Grantee and its subrecipients, including the Contractor.

In the procurement of supplies, equipment, construction and services, the more restrictive conflict of interest provisions of the State of South Carolina Ethics, Government Accountability and Campaign Reform Act of 1991 or of the Contractor shall apply.

In cases not governed by the above, such as the acquisition and disposition of real property and the provision of CDBG assistance to individuals, businesses and other private entities, the following provisions shall apply.

Except for eligible administrative or personnel costs, the general rule is that no person who is an employee, agent, consultant, officer, or elected or appointed official of the State or a unit of general local government or any designated public agencies or subrecipient which are receiving CDBG funds who exercise or have exercised any function or responsibilities with respect to CDBG activities assisted herein or are in a position to participate in a decision making process or gain inside information with regard to such activities, may obtain a financial interest or benefit from the activity, or have an interest in any contract, subcontract or agreement with respect thereto, or the proceeds thereunder either for themselves or those with whom they have family or business ties during their tenure or for one year thereafter. Exceptions may be granted by the State on a case by case basis as requested upon full disclosure in writing.

Should any governmental entity, contractor, subcontractor, employee or official know or perceive any breach of ethical standards or conflict of interest under the CDBG grant awarded to the Grantee or any other CDBG grant, they shall immediately notify in writing the Department of Commerce, Grants Administration, 1201 Main Street, Suite 1600, Columbia, South Carolina, 29201. If the State finds any circumstances that may give rise to

a breach of ethical standards or conflict of interest, under any grant, they shall notify the participating governmental entity and the State Ethics Commission as appropriate. The State may undertake any administrative remedies it deems appropriate, where there is a breach of ethical standards or conflict of interest under the regulations governing the CDBG Program and the State policies.

- 13. Applicable Law:** In addition to the applicable Federal laws and regulations, this Contract is also made under and shall be construed in accordance with the laws of the State. By execution of this Contract, the Contractor agrees to submit to the jurisdiction of the State for all matters arising or to arise hereunder, including but not limited to performance of said Contract and payment of all licenses and taxes of whatever kind or nature applicable hereto.
- 14. Limitation of Liability:** The Contractor will not assert in any legal action by claim or defense, or take the position in any administrative or legal procedures that he is an agent or employee of the Owner. This provision is not applicable to contracts for CDBG administration services where the Contractor is a Council of Government. The State shall not be liable for failure on the part of the Grantee or any other party to perform all work in accordance with all applicable laws and regulations. The Grantee agrees to defend, indemnify, and hold harmless the State from and against all claims, demands, judgments, damages, actions, causes of actions, injuries, administrative orders, consent agreement and orders, liabilities, penalties, costs, and expenses of any kind whatsoever, including, without limitation, claims arising out of loss of life, injury to persons, property, or business or damage to natural resources in connection with the activities of the Grantee and any other third parties in a contractual relationship with the Grantee, or a subsidiary, whether or not occasioned wholly or in part by any condition, accident, or event caused by any act or omission of the State as a result of the Assistance.
- 15. Legal Services:** No attorney-at-law shall be engaged through the use of any funds provided under this Contract in any legal action or proceeding against the State, the Grantee, any local public body or any political subdivision.
- 16. Contract:** If any provision in this Contract shall be held to be invalid or unenforceable, the remaining portions shall remain in effect. In the event such invalid or unenforceable provision is considered an essential element of this Contract, the parties shall promptly negotiate a replacement provision, which addresses the intent of such provision.
- 17. Amendments:** Any changes to this Contract affecting the scope of work of the Project must be approved, in writing, by the Owner and the Contractor and shall be incorporated in writing into this Contract. Any amendments of the original contract must have written approval by the State prior to execution.
- 18. Termination for Convenience:** This Contract may be terminated for convenience in accordance with 2 CFR Part 200.
- 19. Sanctions:** If the Contractor fails or refuses to comply with the provisions set forth herein, the State or Owner may take any or all of the following actions: cancel, terminate or suspend in whole or in any part the contract, or refrain from extending any further funds to the Contractor until such time as the Contractor is in full compliance.
- 20. Subcontracting:** If any part of the work covered by this Contract is to be subcontracted, the Contractor shall identify the subcontracting organization and the contractual arrangements

made therewith to the Owner and to the State. All subcontracts must be approved by the Owner and the State to insure they are not debarred or suspended by the Federal or State governments and to insure the Owner and the State understand the arrangements.

- 21. Subcontracting with Small and Minority Firms, Women's Business Enterprise and Labor Surplus Areas:** It is national policy to award a fair share of contracts to disadvantaged business enterprises (DBEs), small business enterprises (SBEs), minority business enterprises (MBEs) and women's business enterprises (WBEs). Accordingly, affirmative steps must be taken to assure that DBEs, SBEs, MBEs and WBEs are utilized when possible as sources of supplies, equipment, construction and services. Affirmative steps shall include the following:

- (a) Including qualified DBEs, SBEs, MBEs and WBEs on solicitation lists;
- (b) Assuring that DBEs, SBEs, MBEs and WBEs are solicited whenever they are potential sources;
- (c) Whenever economically feasible, dividing total requirements into smaller tasks or quantities so as to permit maximum participation by DBEs, SBEs, MBEs and WBEs;
- (d) Where the requirement permits, establishing delivery schedules which will encourage participation by DBEs, SBEs, MBEs and WBEs;
- (e) Using the services and assistance of the Small Business Administration, Minority Business Development Agency, the State Office of Small and Minority Business Assistance, the U.S. Department of Commerce and the Community Services Administration as required; and
- (f) Requiring the subcontractor, if any, to take the affirmative actions outlined in (1) – (5) above.

- 22. Debarment Certification:** The Contractor must comply with Executive Orders 12549 and 12689 regarding Federal debarment and suspension regulations prior to entering into a financial agreement for any transaction as outlined below.

- (a) Any procurement contract for goods and services, regardless of type, expected to equal or exceed the Federal procurement small purchase threshold (which is \$100,000 and is cumulative amount from all federal funding sources).
- (b) Any procurement contract for goods and services, regardless of amount, under which the Contractor will have a critical influence on or substantive control over the transaction.

In addition, no contract may be awarded to any contractors who are ineligible to receive contracts under any applicable regulations of the State.

- 23. South Carolina Illegal Immigration Reform Act:** The Owner and the Contractor are required to comply with the South Carolina Illegal Immigration Reform Act (signed June 4, 2008) requiring verification of lawful presence in the United States of any alien eighteen years of age or older who has applied for state or local public benefits, as defined in 8 U.S.C. Section 1621, or for federal public benefits, as defined in U.S.C. Section 1611.

- 24. Equal Employment Opportunity:** The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the State.

In carrying out the Project, the Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor must take affirmative action to insure that applicants for employment are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to, the following: 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. The Contractor shall post in conspicuous places, available to employees and applicants for employment, notices to be provided by the State setting forth the provisions of this non-discrimination clause. The Contractor shall state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin. The Contractor will, in all solicitations or advertisements for employees by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin. The Contractor shall incorporate the foregoing requirements of this paragraph in all of its subcontracts for the Project unless exempted by rules, regulations, or orders of the State issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor.

The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided by the State advising the said labor union or workers' representatives of the Contractor's commitment under this Section and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by the rules, regulations, and orders of the State, or pursuant thereto, and will permit access to its books, records, and accounts by HUD and the State for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

In the event of the Contractor's noncompliance with the non-discrimination clauses of this Contract or with any of such rules, regulations, or orders, this Contract may be canceled, terminated or suspended in whole or in part and the Contractor may be declared ineligible for further State government contracts or federally assisted construction contract procedures authorized in Executive Order 11246 of September 24, 1965, or by rules, regulations, or orders of the State, or as otherwise provided by law.

25. **Age Discrimination:** In accordance with 45 CFR, Parts 90 and 91, the Contractor agrees there shall be no bias or age discrimination as to benefits and participation under this Contract.
26. **Section 109 of the Housing and Community Development Act of 1974:** No person in the United States shall on the grounds of race, color, national origin or sex be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity funded in whole or in part with funds made available under the CDBG program of the State.
27. **Section 504 of the Rehabilitation Act of 1973, as amended:** The Contractor agrees that no otherwise qualified individual with disabilities shall, solely by reason of his disability, be

denied the benefits, or be subjected to discrimination including discrimination in employment, any program or activity that receives the benefits from the Assistance.

- 28. Section 3, Compliance and Provision of Training, Employment and Business Opportunities:** The work to be performed under this Contract is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, (12 USC § 1701u). The purpose of Section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by Section 3 shall, to the greatest extent feasible be directed to low and very low-income persons, particularly persons who are recipients of HUD assistance for housing.

The parties to this said Contract agree to comply with HUD's regulations in 24 CFR Part 135, which implement Section 3. As evidenced by their execution of this Contract, the parties to this Contract certify that they are under no contractual or other impediment that would prevent them from complying with the 24 CFR Part 135 regulations.

The contractor agrees to send to each labor organization or representative of workers with which the Contractor has a collective bargaining agreement or other understanding, if any, a notice advising the organization or workers' representative of the contractor's commitments under this Section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. The notice shall describe the Section 3 preference, shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions; the qualifications for each; and the name and location of person(s) taking applications for each of the positions; and the anticipated date the work shall begin. The Contractor agrees to include this Section 3 clause in every subcontract subject to compliance with regulations in 24 CFR Part 135, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this Section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR Part 135. The Contractor will not subcontract with any subcontractor where the Contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR Part 135.

The Contractor will certify that any vacant employment positions including training positions, that are filled (1) after the Contractor is selected but before this Contract has been executed, and (2) with persons other than those to whom the regulations of 24 CFR Part 135 require employment opportunities to be directed, were not filled to circumvent the Contractor's obligations under 24 CFR Part 135.

The Contractor agrees to submit such reports as required to document compliance with 24 CFR Part 135. Noncompliance with the regulations in 24 CFR Part 135 may result in sanctions, termination of this Contract for default, and debarment or suspension from future HUD assisted contracts.

- 29. Lead-Based Paint:** The construction or rehabilitation of residential structures with any portion of the Assistance is subject to the HUD Lead-Based Paint regulations found at 24 CFR Part 35. Any grants or loans made by the Grantee for the rehabilitation of residential structures with any portion of the Assistance shall be made subject to the provisions for the elimination of lead-based paint hazards under subpart B of said regulations, and the Grantee shall be responsible for the inspections and certifications required under Section 35.14(f) thereof.

30. Compliance with Air and Water Acts: (Applicable to construction contracts and related subcontracts exceeding \$100,000) This Contract is subject to the requirements of the Clean Air Act, as amended, 42 USC § 7401 et seq., the Federal Water Pollution Control Act (Clean Water Act), as amended, 33 USC § 1251 et seq., and the regulations of the Environmental Protection Agency with respect to 40 CFR Part 15, as amended from time to time, and the South Carolina Stormwater Management and Sediment Reduction Act. In particular, the following are required:

- (a) A stipulation by the Contractor or subcontractor that any facility to be utilized in the performance of any nonexempt contract or subcontract is not listed on the List of Violating Facilities, issued by the Environmental Protection Agency (EPA) pursuant to 40 CFR § 15.20.
- (b) Agreement by the Contractor to comply with all the requirements of Section 114 of the Clean Air Act, as amended (42 USC § 7414) and Section 308 of the Federal Water Pollution Control Act, as amended (33 USC § 1318) relating to inspection, monitoring, entry, reports and information, as well as all other requirements specified in said Sections 114 and 308, and all regulations and guidelines issued thereunder.
- (c) A stipulation that as a condition of award of contract prompt notice will be given of any notification received from the Director, Office of Federal Activities, EPA, indicating that a facility utilized or to be utilized for the contract under consideration is to be listed on the EPA list of Violating Facilities.
- (d) Agreement by the Contractor that the Contractor will include or cause to be included the criteria and requirements in these subparagraphs (1) through (4), in every nonexempt subcontract and requiring that the Contractor will take such action as the State may direct as a means of enforcing such provisions.

In no event shall any amount of the Assistance be utilized with respect to a facility which has given rise to a conviction under section 113(c)(1) of the Clean Air Act or Section 309(c) of the Federal Water Pollution Control Act.

31. Federal Labor Standards Provisions: *(Applicable to construction contracts in excess of \$2,000 or residential rehabilitation contracts involving more than eight units)*

The Project or program to which the construction work covered by this Contract pertains is being assisted by the United States of America and the Federal Labor Standards Provisions as set forth on Attachment 1 are included in this Contract pursuant to the provisions applicable to such Federal assistance. These provisions must be complied with or sanctions will be instituted.

Attachment 1

U.S. Department of Housing and Urban Development, Office of Labor Relations form HUD-4010 (06/2009) ref. Handbook 1344.1

A. 1. (i) Minimum Wages. All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often 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 thereto and made a part thereof, 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 29 CFR 5.5 (a)(1)(iv); 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 of the time actually work 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 an wage rates conformed under 29 CFR 5.5(a)(1)(ii) 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.

(ii) (a) Any class of laborers or mechanics 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. HUD shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

- (1)** The work to be performed by the classification requested is not performed by a classification in the wage determination; and
- (2)** The classification is utilized in the area by the construction industry; and
- (3)** The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(b) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee 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 HUD or its designee to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so

advise HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

(c) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB Control Number 1214-0140.)

(d) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(ii)(b) or (c) of this paragraph, 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.

(iii) 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.

(iv) 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. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

2. Withholding. HUD or its designee 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 Federal-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, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension or any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the contractor, disburse such amounts withheld for an on account of the contractor or subcontractor to the respective employees to whom they are due. The Comptroller General shall make such disbursements in the case of direct Davis-Bacon Act contracts.

3. (i) Payrolls and basic records. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work 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 of 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 and trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs. (Approved by the Office of Management and Budget under OMB Control Numbers 1215-0140 and 1215-0017.)

(ii) (a) the contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee. 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). This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal Stock Number 029-005-00014-1), U.S. Government Printing Office, Washington, DC 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. (Approved by the Office of Management and Budget Under OMB Control Number 1215-0129.)

(b) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays for or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be maintained under 29 CFR 5.5 (a)(3)(i) and that such information is correct and complete;

(2) That each laborer or mechanic (including each 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 29 CFR Part 3;

(3) 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.

(c) 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 subparagraph A.3.(ii)(b).

(d) 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.

(iii) The contractor or subcontractor shall make the records required under subparagraph A.3.(i) available for inspection, copying, or transcription by authorized representatives of HUD or its designee 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, HUD or its designee may, after written notice to the contractor, sponsor, applicant or owner, 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.

(i) **Apprentices.** Apprentices will be permitted to work at less than the predetermined rate for the work they perform when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment Training Administration, Office of Apprenticeship Training, Employer and Training Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his 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 in any craft classification shall not be greater than the ratio permitted to the contractor as to his 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 state 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 ration 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

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for 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 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.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under 29 CFR Part 5 shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

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 will insert in any subcontracts the clauses contained in subparagraphs 1 through 11 of this paragraph A and such other clauses as HUD or its designee may by appropriate instructions require, and a copy of the applicable prevailing wage decision, and also a clause requiring the subcontractors to include these clauses 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 this paragraph.

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 if its subcontractors) and HUD or its designee, the U.S. Department of Labor, or the employees or their representatives.

10. (i) Certification of Eligibility. 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) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(ii) 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) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001. Additionally, U.S. Criminal Code, Section 1 01 0, Title 18, U.S.C., "Federal Housing Administration transactions", provided in part: "Whoever, for the purpose of . . . influencing in any way the action of such Administration..... makes, utters or publishes any statement knowing the same to be false..... shall be fined not more than \$5,000 or imprisoned not more than two years, or both."

11. Complaints, Proceedings, or Testimony by Employees. No laborer or mechanic to whom the wage, salary, or other labor standards provisions of this Contract are applicable shall be discharged or in any other manner discriminated against by the Contractor or any subcontractor because such employee has filed any complaint or instituted or caused to be instituted any proceeding or has testified or is about to testify in any proceeding under or relating to the labor standards applicable under this Contract to his employer.

B. Contract Work Hours and Safety Standards Act. The provisions of this paragraph B are applicable only where the amount of the prime contract exceeds \$100,000. 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 laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of 40 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 40 hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in subparagraph (1) of this paragraph, the contractor and any subcontractor responsible therefore 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 violations of the clause set forth in subparagraph (1) of this paragraph, 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 40 hours without payment of the overtime wages required by the clause set forth in sub paragraph (1) of this paragraph.

(3) Withholding for unpaid wages and liquidated damages. HUD or its designee 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 contract, 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 subparagraph (2) of this paragraph.

(4) **Subcontracts.** The contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraph (1) through (4) of this paragraph 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 subparagraphs (1) through (4) of this paragraph.

C. Health and Safety. The provisions of this paragraph C are applicable only where the amount of the prime contract exceeds \$100,000.

(1) No laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to this health and safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation.

(2) The Contractor shall comply with all regulations issued by the Secretary of Labor pursuant to Title 29 Part 1926 and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act, 40 USC 3701 et. seq.

(3) The Contractor shall include the provisions of this paragraph in every subcontract so that such provisions will be binding on each subcontractor. The Contractor shall take such action with respect to any subcontract as the Secretary of Housing and Urban Development or the Secretary of Labor shall direct as a means of enforcing such provisions.

SPECIAL PROVISIONS

PROJECT NUMBER
4-CE-15-008

COUNTY
HAMPTON

Except as may otherwise be specified on the plans or in the special provisions, all materials and workmanship within the South Carolina Department of Transportation right-of-way shall conform to the SCDOT Standard Specifications for Highway Construction (Latest Edition), the latest Traffic Signal Special Provisions and Specifications for Traffic Signal Installation, and SCDOT Standard Drawings for Road Construction in effect at the time of letting.

ERRATA TO STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION:

Refer to SCDOT Supplemental Specification dated **January 1, 2018** as described in **Section E**.

DEFINITION AND TERMS:

Delete Paragraph 101.3.27, (the) Engineer, of the 2007 Version of the Standard Specifications for Highway Construction in its entirety and replace with the following:

*The Town of Varnville, acting directly or through his duly authorized representative, such representative acting within the scope of particular assigned duties or authority. On this Project the firm of **Dennis Corporation** shall function as the Engineer's duly authorized representative with authority as described in Section 105, "CONTROL OF WORK", of the Standard Specifications for Highway Construction, latest Edition.*

The project Owner is the Town of Varnville. In the specifications where the terms "SCDOT" or "Department" or other like terms are used to describe the facility Owner, it shall be interpreted as meaning the Town of Varnville, as appropriate.

Add "Notice-to-Proceed" to Section 101 as follows:

Notice-to-Proceed. A written notice to the Contractor fixing the date on which the Contract Time will commence to run and on which the Contractor may start to perform obligations under the Contract Documents.

SUBSTANTIAL COMPLETION OF WORK:

Section 101.3.76 is hereby replaced with the following:

101.3.76 Substantial Completion of Work

Substantial Completion of Work is the point in the project when work has been constructed to the typical section in the Plans over the entire length of the project including tie-ins, all pay items have been installed in reasonable conformance with the plans and specifications over the entire length of the project and all lanes of traffic are open to the public in their final configuration with the final applications of thermoplastic and raised pavement markers with the only remaining work to be performed being punch list items.

STANDARD DRAWINGS:

The Bidders are hereby advised that this project shall be constructed using the Current Standard Drawings with all updates effective at the time of the letting. The Standard Drawings are available for download at http://www.scdot.org/doing/sd_Disclaimer.aspx. All drawings that are updated are labeled with their effective letting date in red.

The Standard Drawings may be available for purchase through the SCDOT Engineering Publications Sales Center. The Engineering Publication Sales Center is located in Room 122 (College Street Entrance) of the SCDOT Headquarters Building, 955 Park Street, Columbia, South Carolina.

All references in the plans, standard specifications, supplemental specifications, supplemental technical specifications or special provisions to drawings under the previous numbering system are hereby updated to the new drawing numbers. Refer to sheets 000-205-01 through 000-205-07 to find new drawing numbers when looking for references to older drawing numbers. "Old sheet numbers" are also visible on the website when using the full set of drawings "current" search and are sortable by clicking the header over the appropriate column on the results page. Be aware that some older drawings now span over multiple pages due to detailing changes.

STANDARD DRAWINGS ERRATA:

The Bidders are hereby advised that the following note changes apply to the published Standard Drawings.

On Sheet **000-205-05**, add the following information under the columns below:

OLD DRAWING NAME

NEW DRAWING NAME

720-905-01 to 720-905-05

720-901-01 to 720-993-32

On sheet **605-005-05 (ver 1-1-2013)**, replace entire text of General Note #4 with the following text:

4. The square footage of sign panels attached to 21/2" x 21/2" 12 gauge sign support secured to a 3" x 3" 7 gauge breakaway anchor shall not exceed 20 square feet.

On Sheet **720-305-00 (ver May 2008)**, delete the entire note directly above main detail:

If sidewalk exists, the driveway opening should...

On sheet **720-405-00 (ver May 2009)** Detail 2 replace dimension 2' 6" maximum with:

2' 6" minimum

On sheet **720-901-01 (ver Feb 2015)** replace not 5.04 with:

5.04 When a mid-block crossing is required, consider mid-block staggered crossing (720-955-41) to encourage eye contact between the pedestrian and the oncoming traffic. Always angle the stagger so that the pedestrian travels through the refuge facing the oncoming traffic.

On Sheet **722-305-00 (ver May 2010)** Detail 4 replace note "French Drain see note 21" with:

French Drain see note 4.5.

On sheet **722-305-00 (ver May 2010)** table 722-305A, 4th column, change the following:

Delete (SF)

Replace text "up to 36" with "up to 3'X3"

Replace text "larger than 36" with "larger than 3'X3"

On sheet **804-105-00 (ver May 2008)** Title Block replace text "Riprap (Bridge End)" with:

Riprap (Bridge End)

On sheet **805-325-00 (ver Jan 2011)** detail 2 replace text "rectangular washers (FWR03) See 805-005-00 with:

"rectangular washers (FWR03) See 805-090-00"

On sheet **805-325-00 (ver Jan 2011)** change text of note 5 to the following:

5. For project specific requirements such as additional offset blocks, extra length posts, and post attachment details, see Project Plans. Include all costs of project specific requirements in the Guardrail Thrie-Beam Bridge Connector pay item.

On sheet **805-330-00 (ver Jan 2011)** detail 2 replace text "rectangular washers (FWR03) See 805-005-00" with:

"rectangular washers (FWR03) See 805-090-00"

On sheet **805-330-00 (ver Jan 2011)** change text of note 4 to the following:

4. For project specific requirements such as additional offset blocks, extra length posts, and post attachment details, see Project Plans. Include all costs of project specific requirements in the Guardrail Thrie-Beam Bridge Connector pay item.

On sheet **805-510-00 (ver Jan 2011)** detail 3 replace guardrail base plate note with the following:

See standard drawings 805-655-xx for guardrail base plate options.

On sheet **805-655-M1 (ver Jan 2011)** replace note 30.4 with the following:

30.4 Install adhesive anchors to a depth sufficient to develop a minimum factored (reduced) ultimate tensile capacity of 21 kips per anchor bolt. Increase minimum embedment shown in detail 4 as required by adhesive manufacturer's recommendations for the existing material properties, anchor bolt pattern, edge conditions, and any other design reduction.

On sheet **815-002-00 (ver Jan 2013)** Type B, D1, & D2 Inlet Structure Filters, revise as follows:

Replace all references of #5 stone with #5 or #57 stone.

Payment for either #5 or #57 stone will be made under the pay item **Aggregate No. 5 for Erosion Control (6" Uniform)**

PROPOSAL ITEMS AND QUANTITIES:

A list of bid items and quantities is **Section F**.

ELECTRONIC BIDDING:

Section 102.5 is deleted in its entirety. Electronic bids will not be accepted for this project. Refer to RFB and General Conditions for bidding instructions.

PROPOSAL GUARANTY:

Section 102.9 is deleted in its entirety. Refer to the RFB and General Conditions for proposal guaranty/bid bond requirements.

AWARD OF CONTRACT:

Section 103.2 of the Standard Specifications is amended to allow ninety (90) days for the award of a contract after the opening of proposals.

EXECUTION OF THE CONTRACT:

Section 103.6 is hereby replaced with the following:

Section 103.6 Execution of the Contract

Prior to execution of the contract, and upon notification by the Owner or his designee, the successful bidder shall submit all Required Contract Forms to the Engineer, including Performance Bonds, Payment Bonds, and Certificates of Insurance, for review by South Carolina Department of Commerce (SCDOC). All parties shall execute the attached Form of Agreement at the Preconstruction Conference to be scheduled following approval by SCDOC. No Contract will be considered effective until it has been fully executed by all parties thereto.

INSURANCE REQUIREMENTS:

In addition to the requirements as set forth in Section 103.8 of the Standard Specifications (Edition of 2007), the Contractor shall purchase and maintain, in a company or companies acceptable to the Owner, general liability and automobile liability insurance written on an occurrence basis, with minimum limits as shown below or as required by law, whichever is greater. **The Contractor shall include the Owner and Dennis Corporation as Additional Insureds.** The authorized insurance company shall provide a Waiver of Subrogation in all policies maintained by the insured for the performance of the Contract.

GENERAL LIABILITY	LIMIT
General Aggregate	\$1,000,000.00
Products – Comp/Ops Aggregate	\$500,000.00
Personal & Advertising Injury	\$500,000.00
Each Occurrence	\$500,000.00
Fire Damage (any one fire)	\$25,000.00
Medical Expense (any one person)	\$10,000.00
AUTOMOBILE LIABILITY (Any Auto)	
Combined Single Limit	\$500,000.00

The Contractor shall also purchase and maintain in a company or companies acceptable to the Owner, Worker's Compensation and Employer's Liability Insurance with minimum limits as shown below or as required by law, whichever is greater:

<u>WORKER'S COMPENSATION and EMPLOYER'S LIABILITY (statutory)</u>	<u>LIMIT</u>
(Each Accident)	\$100,000.00
(Disease-Policy Limit)	\$500,000.00
(Disease-Each Employee)	\$100,000.00

Certificates of Insurance acceptable to the Owner shall be filed not less than 10 days after notification of award.

The Certificate of Insurance shall not be changed to the extent that limits are decreased by endorsement, canceled or non-renewed without thirty (30) days prior written notice to the Owner. The Contractor shall provide and maintain the coverage as required by Section 103.08 and these additional requirements. Failure to provide and maintain the required coverage will be grounds to declare the Contractor in default of the Contract.

The criteria which an Insurance Company or Companies are deemed satisfactory by the Owner shall include, but not be limited to the following:

- a) The above required insurance coverage shall be written by a Company or Companies licensed in the areas of required coverage by the Insurance Commissioner of the South Carolina Department of Insurance, and
- b) The Insurance Company or Companies shall be assigned a rating of "A-" or better by A. M. Best Company on its most recent Best's Insurance Report, and
- c) The Owner considers the "ACORD Certificate of Insurance" as an acceptable form of certificate.

BONDS AND INSURANCE PAYMENT:

Bonds and Insurance consists of all Bonds and Insurance required of the contractor. A maximum allowable amount of 2% of the total contract amount will be paid on the first pay estimate after work begins. If there is a remaining amount of the lump sum price for Bonds and Insurance after payments are made according to the limit above, then the remaining amount will be paid on the final estimate.

PROJECT LIMITS AND SCOPE OF WORK:

The Town of Varnville, due to budget considerations, reserves the right to adjust the amount of work to be performed on this project. Items of work may be added or deleted only at the discretion of the Town. The Contractor shall, by signing this request for bids, agree to adjust, as indicated by the Town, the quantities and corresponding pay items to be performed, at the times and locations determined to be beneficial to the Town.

MAINTENANCE OF TRAFFIC:

In addition to the Contractor maintaining traffic throughout the length of this project as required by the Specifications, it will also be necessary that the Contractor, prior to beginning any work, submit to the Engineer for approval his plan for constructing this project.

CONSTRUCTION QUALITY CONTROL AND ASSURANCE TESTING:

The Owner shall provide construction quality control and quality assurance testing for this project, except for MANUFACTURERS MATERIALS CERTIFICATIONS AND CERTIFIED TEST REPORTS as required by the provision included below.

CONSTRUCTION STAKES, LINES AND GRADES:

Construction stakes, lines and grades shall be provided by contractor.

SOUTH CAROLINA MINING ACT:

See Attached Supplemental Specification Dated **March 20, 2003** as described in **Section E**.

QUALIFIED PRODUCT LISTINGS:

All references to "Approval Sheet" or "Approval Policy" are to be replaced with "Qualified Products Listings (QPL)" and "Qualified Products Policies (QPP)" respectively. This change includes all references in the SCDOT Standard Drawings, SCDOT Standard Specifications, SCDOT Supplemental Specifications, SCDOT Special Provisions, SCDOT Supplemental Technical Specifications, SCDOT Internet and Intranet websites, and all other documents produced by SCDOT.

MANUFACTURERS MATERIALS CERTIFICATIONS AND CERTIFIED TEST REPORTS:

The contractor shall supply the Engineer with all required materials certifications and manufacturers test reports for items to be permanently incorporated into the project, prior to their use. The Town must approve these certifications and reports before payment can be made to the contractor for these items.

DBE PARTICIPATION:

The Bidder is encouraged to use DBE subcontractors on this project. All DBE participation shall be reported to the project engineer before substantial completion.

COORDINATION OF UTILITY RELOCATION WORK WITH HIGHWAY CONSTRUCTION:

As it is not economically feasible to complete the rearrangement of all utility conflicts in advance of the highway construction, ***it shall be the responsibility of the contractor to inspect the site for potential utility conflicts and coordinate utility relocations during construction.***

It is the responsibility of the Contractor to call Palmetto Utility Protection Service (1-888-721-7877 or 811) and the non-PUPS member utilities three (3) days prior to work so that existing utilities can be properly marked.

CRANE SAFETY:

Refer to SCDOT Supplemental Specification dated **August 1, 2013** as described in **Section E**.

REQUIRED MEDIA NOTIFICATION FOR CONSTRUCTION PROJECTS:

Contractors are encouraged to co-operate with the news media since all projects are constructed with public funds. Because the scope of this project will cause disruption of normal traffic flow, the Contractor is required to notify the public, in a timely manner, of disruptive activities such as lane closures.

The Contractor is required to utilize area media to accomplish public notification of traffic disruptions.

The Contractor is required to deal directly with the news media and all reasonable efforts should be made to co-operate with the media. However, the safety, security and construction schedule on site should not be disrupted in order to accomplish this. The Contractor may coordinate these activities with and receive guidance from the Engineer.

CERTIFICATION AND COMPLIANCE CONCERNING ILLEGAL ALIENS:

By submission of this bid, the bidder as the prime contractor does hereby agree:

- a. to certify its compliance with the requirements of Chapter 14 of Title 8 of the S.C. Code of Laws regarding Unauthorized Aliens and Public Employment;
- b. to provide the engineer with any documents required to establish such compliance upon request; and
- c. to register and participate and require agreement from subcontractors and sub-subcontractors to register and participate in the federal work authorization program to verify the employment authorization of all new employees, or to employ only workers who supply the documents required pursuant to SC Code 8-14-20(B)(2).

IRAN DIVESTMENT ACT:

By submission of this bid the bidder as the prime contractor does hereby certify their compliance to the following:

1. **CERTIFICATION:** (a) The Iran Divestment Act List is a list published pursuant to Section 11-57-310 that identifies persons engaged in investment activities in Iran. Currently, the list is available at the following URL: <http://procurement.sc.gov/PS/PS-iran-divestment.phtm> (.) Section 11-57-310 requires the government to provide a person ninety days (90) written notice before he is included on the list. The following representation, which is required by Section 11-57-330(A), is a material inducement for the SCDOT to award a contract to you. (b) By signing your Offer, you certify that, as of the date you sign, you are not on the then-current version of the Iran Divestment Act List. © You must notify the SCDOT immediately if, at any time before posting of a final statement of award, you are added to the Iran Divestment Act List.
2. **ONGOING OBLIGATIONS:** (a) You must notify SCDOT immediately if, at any time during the contract term, you are added to the Iran Divestment Act List. (b) Consistent with Section 11-57-330(B), you shall not contract with any person to perform a part of the Work, if, at the time you enter into the subcontract, that person is on the then-current version of the Iran Divestment Act List.

3. **OPTION TO RENEW RESTRICTION:** Contractor acknowledges that, unless excused by Section 11-57-320, if the contractor is on the then-current Iran Divestment Act List as of the date of any contract renewal, the renewal will be void ab initio.

TEMPORARY SUSPENSION OF THE RESURFACING WORK:

In addition to complying with Subsection 108.7 of the Standard Specifications, the Contractor must abide by the following:

Once work on a road commences, the Contractor must not suspend work on the road without written permission from the Engineer. In the event the Contractor suspends work without such approval, additional liquidated damages in the amount of **\$500.00** per calendar day will be assessed for the unauthorized suspended work period.

PAVING OPERATIONS:

The asphalt overlay shall be applied in two separate and distinct operations, each operation representing about one-half of the roadway width and traffic shall be maintained continuously. Unless otherwise directed by the Engineer, paving operations shall be scheduled such that the length of the longitudinal joint exposed to traffic shall not extend beyond the length of pavement placed in one normal days operation (or 3 miles, whichever is greater) before dropping back to bring the adjacent lane forward.

CONTRACT TIME AND DETERMINATION AND EXTENSION OF CONTRACT TIME:

Completion Date for this project is **within 140 Days of NTP**.

Section 108.6 of the Standard Specifications is amended to include the following **immediately after paragraph No. 5:**

An increase in contract time may be considered if, for reasons beyond the contractor's control, including weather, the amount of time originally anticipated by the Town is not available to the contractor for the prosecution of the work. The actual number of days (based on project records) which the Engineer determines to have been satisfactory for performance of the work will be compared to the number of days which the Town originally used to determine the specified completion date. The completion date may be extended by such an amount as the conditions justify.

CONSTRUCTION SCHEDULES:

Refer to SCDOT Supplemental Specification dated **November 4, 2013** as described in **Section E**.

This project is a **Level 1 Project**.

FAILURE TO COMPLETE THE WORK ON TIME:

Delete Section 108.9 in its entirety and replace with the following:

Owner and Contractor recognize that time is of the essence and that the Owner will suffer financial loss if the work is not substantially complete in accordance with the time(s) specified herein. They also recognize the delays, expenses and difficulties involved in proving in a legal or arbitration preceding the actual loss suffered by the Owner if the work is not completed on time.

Accordingly, instead of requiring such proof, the Owner and the Contractor agree that as liquidated damages for delay (but not as a penalty) the Contractor shall pay the Owner the amounts stipulated below:

LIQUIDATED DAMAGES SCHEDULE

<u>Phase</u>	<u>NTP Date</u>	<u>End Date</u>	<u>Liquidated Damages</u>
All	*TBD	140 Days	\$500.00 PER DAY
*To be determined at Preconstruction Conference.			

RETAINAGE:

If the Contractor's progress is judged to be delinquent or portions of the work are defective, the Town reserves the right to withhold retainage. The total amount retained will be sufficient to cover anticipated liquidated damages and the cost to correct defective work.

PROMPT PAYMENT CLAUSE:

Refer to SCDOT Supplemental Specification dated **July 1, 2017** as described in **Section E**.

FUEL ADJUSTMENT INDEX:

There will be no adjustments for this contract.

ROADWAY TYPICAL SECTION:

Each roadway or section of roadway shall have a corresponding ROADWAY TYPICAL SECTION that the final roadway surface shall be graded and surfaced to meet. The Typical Section contains profile and cross slope criteria that shall be met for the entire length of each roadway or roadway section. Contractor shall grade the existing roadway to generally improve vertical curves and to create uniform roadway profiles and alignments. Roadway profiles shall be graded to maintain drainage and to minimize dips or steepness (minimum of 0.5% or as directed by Engineer). Slope and profile shall be subject to approval by Engineer prior to cement stabilization. All work associated with achieving the ROADWAY TYPICAL SECTION shall be included in the unit price work for CEMENT STABILIZED EARTH BASE COURSE -6"UNIFORM and ROADWAY GRADING.

ASPHALT BINDER ADJUSTMENT INDEX:

There will be no adjustments for this contract.

DRESSING OF SHOULDERS:

Prior to the placement of asphalt mixtures on existing roadways, the contractor will be required to remove all vegetation adjacent to the edge of pavement which impedes the placement of the asphalt mixture to the specified width. The contractor shall also remove and dispose of all excess asphalt which is disturbed during minor grading for widening or during removal of debris or grass from existing surface during preparation of surface for new lift. After the asphalt mixture has been placed, the contractor shall blade the disturbed material to the extent that the shoulder is left in a neat and presentable condition. All excess material shall be removed from the project. No direct payment shall be made for this work; all costs are to be included in the price of other items of work.

CONTINGENT MAINTENANCE STONE:

Maintenance Stone used on this project shall conform to the gradation requirements of Section 305, or to the gradation specified for Aggregate No. CR-14 in the Standard Specifications.

RATE OF APPLICATION:

Portland cement shall be uniformly applied and mixed over the entire length of each roadway at a rate established per roadway, as determined by project manager or field engineer. The pounds per square yard specified are set up as an average rate of application. The Engineer may direct variations wherever conditions warrant.

LIQUID CURING COMPOUNDS:

Refer to SCDOT Supplemental Specification dated January 1, 2018 as described in **Section E**.

SHOP PLANS & WORKING DRAWINGS FOR STRUCTURES:

Refer to SCDOT Supplemental Specification dated January 1, 2017 as described in **Section E**.

ASPHALT BINDER AND ADDITIVES:

Refer to SCDOT Supplemental Specification dated March 1, 2016 as described in **Section E**.

REINFORCING STEEL:

Refer to SCDOT Supplemental Specification dated August 3, 2015 as described in **Section E**.

CONCRETE ENTRAINED AIR AND SLUMP PROPERTIES:

Refer to SCDOT Supplemental Specification dated February 1, 2015 as described in **Section E**.

EROSION CONTROL MEASURES:

Refer to SCDOT Supplemental Specification dated January 1, 2018 as described in **Section E**.

TEMPORARY PAVEMENT MARKINGS FAST DRY, HIGH BUILD DURABILITY WATERBORNE PAINT:

Refer to SCDOT Supplemental Specification dated August 1, 2014 as described in **Section E**.

CLASS 5000 STRUCTURAL CONCRETE:

Refer to SCDOT Supplemental Specification dated August 1, 2014 as described in **Section E**.

PORTLAND CEMENT & PORTLAND CEMENT CONCRETE:

Refer to SCDOT Supplemental Specification dated May 5, 2014 as described in **Section E**.

WORK ZONE TRAFFIC CONTROL REQUIREMENTS FOR CONTRACTORS/SUBCONTRACTORS:

Refer to SCDOT Supplemental Specification dated September 1, 2013 as described in **Section E**.

NCHRP 350 APPROVED PRODUCTS LIST:

Refer to SCDOT Supplemental Specification dated August 12, 2013 as described in **Section E**.

TRAILER MOUNTED AUTOMATED FLAGGER ASSISTANCE DEVICE SYSTEM (AFAD):

Refer to SCDOT Supplemental Specification dated September 1, 2012 as described in **Section E**.

PERMANENT PAVEMENT MARKINGS:

Refer to SCDOT Supplemental Specification dated December 2, 2011 as described in **Section E**.

EROSION CONTROL:

Refer to SCDOT Supplemental Specification dated July 1, 2011 as described in **Section E**.

CEMENT MODIFIED RECYCLED BASE:

Refer to SCDOT Supplemental Specification dated December 1, 2010 as described in **Section E**.

CONCRETE BATCHING AND MIXING:

Refer to SCDOT Supplemental Specification dated April 5, 2010 as described in **Section E**.

SUBSECTION 401.4.17 TRANSPORTATION AND DELIVERY OF MIXES:

Refer to SCDOT Supplemental Specification dated July 1, 2010 as described in **Section E**.

CEMENT MODIFIED RECYCLED BASE:

Refer to SCDOT Supplemental Specification dated July 6, 2009 as described in **Section E**.

CSXT SPECIAL PROVISIONS:

Refer to SCDOT Supplemental Specification dated April 11, 2007 as described in **Section E**.

BASES AND SUBBASES QUALITY CONTROL/QUALITY ASSURANCE:

Refer to SCDOT Supplemental Specification dated June 1, 2001 as described in **Section E**.

TRAFFIC CONTROL:

The Contractor shall execute the item of Traffic Control as required by the Standard Specifications, the plans, the Standard Drawings For Road Construction, these special provisions, all supplemental specifications, the MUTCD, and the Engineer. This is an amendment to the Standard Specifications to require the following:

GENERAL REGULATIONS -

These special provisions shall have priority to the plans and comply with the requirements of the MUTCD and the standard specifications. Revisions to the traffic control plan through modifications of the special provisions and the plans shall require approval by the Town. **Final approval of any revisions to the traffic control plan shall be pending upon review.**

Install and utilize changeable message signs in all lane closures installed on high volume high-speed multilane roadways. Use of changeable message signs in lane closures installed on low volume low speed multilane roadways is optional unless otherwise directed by the plans and the Engineer. Install and use a changeable message sign within a lane closure

set-up as directed by the *Standard Drawings For Road Construction*. When a lane closures is not present for any time to exceed 24 hours, remove the changeable message sign from the roadway. Place the sign in a predetermined area on the project site, as approved by the Engineer, where the sign is not visible to passing motorists. The preprogrammed messages utilized shall be in accordance with the *Standard Drawings For Road Construction* when used as part of the traffic control set-up for lane closures. Only those messages pertinent to the requirements of the traffic control situation and the traffic conditions are permitted for display on a changeable message sign at all times. At no time will the messages displayed on a changeable message sign duplicate the legends on the permanent construction signs.

During operation of changeable message signs, place the changeable message sign on the shoulder of the roadway no closer than 6 feet between the sign and the near edge of the adjacent travel lane. When the sign location is within 30' of the near edge of a travel lane open to traffic, supplement the sign location with no less than 5 portable plastic drums placed between the sign and the adjacent travel lane for delineation of the sign location. Install and maintain the drums no closer than 3 feet from the near edge of the adjacent travel lane. This requirement for delineation of the sign location shall apply during all times the sign location is within 30' of the near edge of a travel lane open to traffic, including times of operation and non-operation. Oversized cones are prohibited as a substitute for the portable plastic drums during this application.

All signs mounted on portable sign supports shall have a minimum mounting height of 5' from the ground to the bottom of the sign. All signs mounted on ground mounted u-channel posts shall have a minimum mounting height of 7' from the ground to the bottom of the sign.

Temporary "Exit" signs (M1025-00) shall be located within each temporary gore during lane closures on multilane roadways. Mount these signs a minimum of 7' from the pavement surface to the bottom of the sign in accordance with the requirements of the MUTCD.

When covering signs with opaque materials, the Department prohibits attaching a covering material to the face of the sign with tape or a similar product or any method that will leave a residue on the retro-reflective sheeting. Residue from tape or similar products, as well as many methods utilized to remove such residue, damages the effective reflectivity of the sign. Therefore, contact of tape or a similar product with the retro-reflective sheeting will require replacement of the sign. Cost for replacement of a sign damaged by improper covering methods will be considered incidental to providing and maintaining the sign; no additional payment will be made.

Signs not illustrated on the typical traffic control standard drawings designated for permanent construction signs shall be considered temporary and shall be included in the lump sum price bid item for "Traffic Control" unless otherwise specified.

Install and maintain any necessary detour signing as specified by the typical traffic control standard drawings designated for detour signing, Part VI of the MUTCD, these Special Provisions, and the Engineer. The lump sum price bid item for "Traffic Control" includes payment for installation and maintenance of the detour signing.

The Contractor shall maintain the travel patterns as directed by the traffic control plans and shall execute construction schedules expeditiously. The Contractor shall provide the Engineer with no less than a two-week prior notification of changes in traffic patterns.

No Nighttime work shall be permitted for this project.

Upon completion of the final riding surface on each road, the Contractor will be allowed up to 3 working days to begin eliminating shoulder drop-offs greater than 2" and continue the work until these drop-offs are eliminated.

During paving operations, the Department requires lane closures at all times where grade elevation differences and drop-offs greater than 2" exist adjacent to or between the travel lanes of a roadway opened to traffic, unless otherwise specified by these special provisions. Maintain lane closure restrictions at all times unless otherwise directed by these special provisions.

During surface planing and milling operations, the department requires lane closures at all times where grade elevation differences and drop-offs greater than 1" exist, adjacent to or between the travel lanes of a roadway open to traffic, unless otherwise specified by these special provisions. If the grade elevation difference exceeds 1", mill the adjacent travel lanes or pave the milled travel lanes as necessary to eliminate these grade elevation differences before opening the travel lanes to traffic at these locations. Maintain lane closure restrictions at all times unless otherwise directed by these special provisions.

During the paving operations, the length of roadway with an acceptable grade elevation difference less than or equal to 2" shall not exceed 2 miles.

During the surface planing operations, the length of roadway with an acceptable grade elevation difference less than or equal to 1" shall not exceed 2 miles.

LANE CLOSURE RESTRICTIONS -

The Contractor shall install all lane closures as directed by the Standard Specifications For Highway Construction (Edition of 2007), the Standard Drawings For Road Construction, these special provisions, the MUTCD, and the Engineer. The Contractor shall close the travel lanes of two-lane two-way roadways by installing flagging operations. The Contractor shall close the travel lanes of multilane roadways as directed by the typical traffic control standard drawings designated for lane closures on primary routes.

The Department prohibits lane closures on primary routes during any time of the day that traffic volumes exceed 800 vehicles per hour per direction. The Department reserves the right to suspend a lane closure if any resulting traffic backups are deemed excessive by the Engineer. Maintain all lane closure restrictions as directed by the plans, these special provisions, and the Engineer.

The Department reserves the right to restrict the installation of lane closures on high volume primary routes when the presence of a lane closure will seriously hinder normal traffic flow during extended holiday periods. An extended holiday period is hereby defined as those days preceding and following the holiday that experience significant increases in the volume of traffic due to the holiday as determined by the Department. Also, the Department reserves the right to increase an extended holiday period if excessive traffic disruptions occur during those days prior to and after the established extended holiday period. Extended holiday periods include but are not limited to the week of Thanksgiving, the weeks before and after Christmas, and the weeks before and after the 4th of July. The Contractor should submit inquiries to the Engineer regarding specific days of an extended holiday period no less than two weeks prior to entering into an extended holiday period. The Contractor should make these inquiries annually due to the progressive nature of the calendar.

Flagging operations are considered to be lane closures for two-lane two-way operations and shall be subject to all restrictions for lane closures as specified by this contract.

Lane closures, including flagging operations, are restricted to maximum distances of 2 miles. Install all lane closures according to the typical traffic control standard drawings. On occasions when daytime lane closures must be extended into the nighttime hours, substitute the nighttime lane closure standards for the daytime lane closure standards.

The Department reserves the right to suspend a lane closure if any resulting traffic backups are deemed excessive by the Engineer. Maintain all lane closure restrictions as directed by the Standard Specifications, these special provisions, and the Engineer.

TYPICAL TRAFFIC CONTROL STANDARD DRAWINGS -

Typical traffic control standard drawings of the "Standard Drawings for Road Construction" for this project shall be as shown below or as required:

Install the permanent construction signs as shown on the typical traffic control standard drawing, "Construction Signing Permanent Primary Routes 605-010-02", or as directed by Engineer. A list of roadways for the placement of the signs can be obtained from the Engineer.

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SECTION E: SUPPLEMENTAL SPECIFICATIONS

SUPPLEMENTAL SPECIFICATIONS

Included herein are specific Supplemental Specifications provided by the South Carolina Department of Transportation (SCDOT). It is the Contractor's responsibility to construct the project in accordance to the current Supplemental Specifications released by SCDOT at the time Bids for this project were opened.

Below are listed SCDOT Supplemental Specifications that pertain specifically to the project which are included in this section. Additional Supplemental Specifications, not included but which may be required for the Project, are on file with SCDOT and are available on the SCDOT website: http://www.scdot.org/doing/road_SupSpec.aspx

THE LIST OF THE SUPPLEMENTAL SPECIFICATIONS PROVIDED IS AS FOLLOWS:

1. (01-01-18) Errata to Standard Specifications for Highway Construction
2. (01-01-18) Liquid Curing Compounds
3. (07-01-17) Prompt Payment Clause
4. (01-01-17) Shop Plans & Working Drawings for Structures
5. (03-01-16) Asphalt Binder and Additives
6. (08-03-15) Reinforcing Steel
7. (02-01-15) Concrete Entrained Air and Slump Properties
8. (01-01-18) Erosion Control Measures
9. (08-01-14) Temporary Pavement Markings Fast Dry, High Build Durability Waterborne Paint
10. (08-01-14) Class 5000 Structural Concrete
11. (05-05-14) Portland Cement & Portland Cement Concrete
12. (11-04-13) Construction Schedules
13. (03-20-03) South Carolina Mining Act
14. (08-01-13) Crane Safety
15. (11-04-13) Construction Schedules
16. (09-01-13) Work Zone Traffic Control Requirements for Contractors/Subcontractors
17. (08-12-13) NCHRP 350 Approved Products List
18. (09-01-12) Trailer Mounted Automated Flagger Assistance Device System (AFAD)
19. (12-02-11) Permanent Pavement Markings
20. (07-01-11) Erosion Control
21. (12-01-10) Cement Modified Recycled Base
22. (04-05-10) Concrete Batching and Mixing
23. (07-01-10) Subsection 401.4.17 Transportation and Delivery of Mixes
24. (07-06-09) Cement Modified Recycled Base
25. (01-01-18) Errata to Standard Specifications for Highway Construction
26. (04-11-07) CSXT Special Provisions
27. (06-01-01) Bases and Subbases Quality Control/Quality Assurance

THE LIST OF THE SUPPLEMENTAL TECHNICAL SPECIFICATIONS PROVIDED IS AS FOLLOWS:

1. SC-M-306 (01/18) Cement Modified Recycled Base
2. SC-M-400 (01/18) Asphalt Mixture Quality Acceptance
3. SC-M-401 (06/07) Mixing Plants for Hot Mix Asphalt
4. SC-M-402 (01/18) Materials Properties for Asphalt Mixtures
5. SC-M-403 (04/16) Rideability for Asphalt Mixtures
6. SC-M-675 (01/18) Traffic Signals
7. SC-M-810-4 (07/17) Seeding
8. SC-M-815-2 (03/08) Silt Fence Systems
9. SC-M-815-8 (07/17) Inlet Structure Filters

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SCDOT TRAFFIC SIGNAL SPECIFICATIONS

Supplemental Technical Specification for General Provisions SCDOT Designation: SC-M-675

1.1 Turn Key Project

- Unless noted otherwise on the plans or in the Special Provisions this is a “turn-key” project, with the contractor furnishing and installing all equipment, complete and operational to the satisfaction of the Engineer. The Contractor shall install the traffic signal(s) to provide a complete modern and operational installation.
- The PLANS are schematic in nature, showing what is generally expected at each intersection. The Contractor must devise/refine the final details, working within the Specifications, the Standard Drawings, and with the Engineer.
- Deviations from the Plans must be approved by the Engineer.
- After the completion of the project, the Contractor shall furnish to the District Traffic Engineer, three (3) "red-lined" sets of "as-built" plans detailing deviations from the plans and showing the exact locations and sizes of all conduits, poles, pedestals, splice boxes, detectors, and the routing and destination of all wires leaving the control cabinets.

1.2 Temporary Items / Temporary Adjustments

If Plans or Engineer indicates temporary items or adjustments are necessary, the contractor shall perform as indicated below:

- Provide new equipment that is to be removed after the signal work is complete,
- Relocate existing signs or equipment, as necessary, to approved locations,
- Shift existing signs or equipment slightly for work zone setups.
- Any new equipment will be paid using the appropriate furnish and install pay item based on the quantity installed. The items installed become the property of SCDOT. If Engineer indicates temporary items are to be removed at the end of the contract, Contractor shall deliver these items to the appropriate signal shop. Remove and Salvage of temporary items shall be included in Remove and Salvage pay item in accordance with **688.1 Removal, Salvage and Disposal**.
- Relocated items will be paid using the appropriate install pay items based on the quantity installed.
- Shifting signal heads and/or signs along the existing span wire or mast arm shall be incidental to the work required for continuity of operations.
- Use fully reliable, fully functional temporary equipment of with no visible defects or damage..
- Install temporary signals in accordance with SCDOT specifications.
- Relocated or adjusted signal equipment are considered "temporary", unless specified otherwise on the Plans. The Contractor shall plan and stage the work so that the result is a traffic signal installation conforming to the plans and using all NEW equipment.
- Signal heads shall be shifted side-to-side to be over traffic lanes as the traffic lanes are opened or closed to traffic.
- The location of temporary and final signal poles will be approved by the Engineer. The Contractor shall furnish the temporary and final wood poles as necessary for Continuity of Operation. Provide back guys for wood poles, sufficient to keep the pole vertical.
- Contractor may re-use minor equipment in temporary adjusted configurations, but not in the final configuration. This includes steel cable, electrical cable, conduit, pedestrian buttons and signs, and splice boxes not utilized in the new signalization. The Contractor shall furnish sufficient steel cable and electrical cable to provide Continuity of Operation.
- Contractor shall coordinate and cooperate with any utility owning joint use poles in order to maintain signal continuity.
- Transfer highway signs on existing steel cable (span wires) to the adjusted spans, and place in the same physical alignment. (Ground mounted signs are covered in Section 107.11 of the STANDARD SPECIFICATIONS.)
- The Contractor shall install temporary electric service(s) as necessary to operate the signal(s). Coordinate with the local power company.

1.3 Transfer of Operations (Continuity of Operations) from existing to temporary or from temporary to final)

- Provide Full Continuity of Operation; Transfer operation to the new or temporary controller, simultaneously turning off the old controller.
- The Maintenance of Traffic (as provided in the Traffic Control Plan), and the SAFETY OF TRAFFIC is of prime importance. Continuous Operation of traffic signals enhances safety. Contractor shall NOT arbitrarily turn off signals for convenience. Construct the adjusted, temporary or new signal and smoothly transfer operation to that signal. When allowed by the Engineer to briefly turn off a signal, provide complete intersection control using a flagger and/or Police traffic direction.
- Existing traffic signals shall REMAIN IN OPERATION until the new/modified installation has been satisfactorily tested, and placed in operation. Accomplish the testing without hazard to the traveling public and while the signal heads are suitably BAGGED WITH BURLAP or alternative approved by the Engineer.
- Cover all signal heads in place, but not in use, with BURLAP or alternative approved by the Engineer.. Adjustments in the existing equipment made necessary by the new installation are incidental to the signal construction.
- Upon approval from the Engineer, switch the new signal heads into service during that controller phase being displayed by the existing equipment; turn off the existing equipment simultaneously. After the new signal equipment has been made operational, immediately turn off the existing signal heads, and remove.
- The Contractor shall completely coordinate work between sub-contractors, and shall carefully stage the project to minimize the impact to traffic.

1.4 Operations during Construction

- The Contractor shall be responsible for the operations of all existing and newly installed signals from the notice to proceed of the project until final acceptance of the project.
- There is no separate pay item for operations during construction; Operations is considered incidental to the construction process.
- Fixed time operation of signals is unacceptable. Maintain detection for the life of the project. Install and operate the temporary actuation devices; transfer operation to the temporary devices prior to demolition of the existing loop detector systems.
- If detection is damaged and cannot be immediately repaired or temporary lane configurations are required, Contractor shall provide temporary equipment to provide operational detection during the life of the construction project, using video detection or other approved detection method.
- It is not permissible to adopt "uncoordinated" operation of adjacent signals; if damage to the existing interconnection cable has been broken, Contractor shall repair it immediately. If the installation of a new signal within or adjacent to an existing signal system occurs, provide interconnection to the new signal as soon as it is operational. Ensure appropriate communications is available to communicate with the signal system.
- The Engineer will provide temporary controller time settings for changing traffic conditions during construction. These temporary time settings may occur throughout the project life; Contractor shall implement these timings as directed by the Engineer; this work is incidental to the contract.
- Plan the work to cause minimum interference with any existing signal operation.
- The Contractor shall not change the phasing or other operation of a signalized intersection without the approval of the Engineer.
- Ensure the signal controller has the correct settings on the time clocks to local legal time, where needed.

1.5 Maintenance / Repairs

- The Contractor shall be responsible for the daily maintenance and repairs and emergency repairs for all existing, temporary and any newly installed signals in the project from the notice to proceed until final acceptance of the project. The Contractor is responsible and liable for proper and safe operation of each signal. The Contractor shall perform EMERGENCY REPAIRS AND SERVICES as required, to ensure continuity of operation of listed traffic signals and associated equipment. This shall include replacement of malfunctioning LED modules.
- Contractor and Engineer shall perform a walk thru of all signals to determine if any repairs are needed prior to the contractor assuming maintenance responsibility. After the contractor assumes maintenance responsibility, the contractor also assumes financial responsibility for repairs until final acceptance.
- The Contractor shall retain ownership of the materials and equipment provided in the project until Final Acceptance (see Final Inspection & Final Acceptance) has been made by the Engineer, when it then becomes SCDOT property.
- There is no separate pay item for maintenance during construction; maintenance is simply part of the construction process and is considered incidental to the work.
- The Contractor shall provide at least one (1) qualified LOCAL signal technician, subject to on-call at all times, to provide emergency services as required to assure continuous and efficient operation of signal installations and systems. This shall include non-business hours, weekends, and holidays. The Technician shall be fully qualified to trouble-shoot, service, repair and/or replace traffic controllers and components, both electro-

mechanical and solid-state. At the PRE-CONSTRUCTION CONFERENCE, the Contractor shall furnish the RCE with a LIST OF THE SIGNAL TECHNICIANS who will be responsible for performing the emergency service, and the LOCAL PHONE NUMBER(S) of the Contractor's agent(s) (answering service, etc.), who will receive emergency calls during and after the Contractor's normal business hours.

- The Contractor shall be ON-SITE of the malfunctioning signal for emergency service within the maximum time listed in the following schedule-

i. <u>Weekdays or Saturday</u>	<u>Maximum Time</u>
1. 6 AM to 6 PM	1 hour
2. 6 PM to 6 AM	4 hours

ii. <u>Sundays or Holidays</u>	
1. Day or Night	4 hours

- Once the Contractor has started repair work/emergency service the Contractor shall restore a malfunctioning signal to normal phase operations uninterrupted.
- The Contractor shall maintain a LOG of all trouble calls received, the response time, and the corrective action taken. The records and logs shall be available to Department personnel for review during normal working hours. All records and logs shall be turned over to the Department at FINAL ACCEPTANCE.
- In the event the Contractor fails to perform in accordance with requirements and schedules of this Specification, the Department reserves the right, without notice to the Contractor, to engage a Third Party to perform the maintenance and emergency service necessary to assure continuous traffic signal operation. Further, all expenses incurred by the Department in implementing this option, shall be deducted from the payment due the Contractor. In addition the Contractor shall pay liquidated damages to SCDOT in the amount of **FIFTEEN HUNDRED (\$1500) DOLLARS FOR EACH OCCASION, FOR EACH DAY (UNTIL CORRECTED).**

1.6 Utility Coordination

- The Contractor, prior to the beginning of any construction activity, shall coordinate as necessary with the Utility Company to provide power and any necessary attachment agreements as well as ensuring all utilities are identified and avoided during construction.

1.7 Contract Schedule

- Unless noted otherwise in the *Special Provisions*, the **Contractor** shall furnish the Engineer with a **WEEKLY SCHEDULE** for the **TRAFFIC SIGNAL CONSTRUCTION** work, each Friday, for the week to come, listing the location and date of each intended activity. This will permit scheduling signal inspection personnel. Deviation from this schedule may cause the Department to delay Inspection and Payments.
- Any work performed without notification of the proper parties in the Department, will be treated as unauthorized work (see Section 105.11 of the Standard Specifications), and could result in nonpayment to the Contractor for that work.

1.8 Permits, Codes, Licenses, & Abilities

- Perform all work in a safe and workmanlike manner, to meet the highest industry standards, in accordance with the requirements of the latest editions of the National Electrical Code (NEC), the National Electrical Safety Code (NESC), the Illuminating Engineering Society (IES), the American National Standards Institute (ANSI), the National Electrical Manufacturer's Association (NEMA), and the regulations and standards of the local power company.
- The prime contractor or subcontractor responsible for the performance of the work must be licensed by the SC Licensing Board For Contractors and possess a Journeyman Card issued by the South Carolina Municipal Association or as required by the city in which work occurs at the time work is performed.
- Further, at least one 'ON-SITE' field supervisor shall have LEVEL II or higher, Traffic Signal Certification by the International Municipal Signal Association (IMSA). Photo copies of the license and certificate (for both above) shall be submitted before work commences. The Contractor shall retain employee(s) holding the above certificate for the duration of the project; and the employee(s) shall be present DAILY and at the FINAL INSPECTION.
- The Contractor shall employ persons capable of programming traffic signal controllers of the type used by this project. The Contractor shall possess both a desktop and a portable (laptop) computer, and be capable of using them to upload and download signal operating parameters.

1.9 Integration

- Integration will be performed by SCDOT or local government signal maintenance staff; contractor shall coordinate with SCDOT to determine project schedule and time frame for integration. Contractor shall not expect SCDOT or local government signal maintenance staff to provide integration without 2 weeks' notice and mutually agreed upon schedule of completion, including time frame for cabinets/controllers/conflict monitors to be provided at the signal shop; if signal maintainers have any issues with equipment provided,

they will contact contractor to inform them to replace said equipment within reasonable time frame and to meet project schedules.

1.10 Equipment

- SCDOT Supplied Equipment - The Department will not furnish signal equipment, unless noted otherwise in the Special Provisions or on the Plans.
- Contractor Supplied Equipment - The Contractor shall furnish all **new** equipment (submittal of invoices required), including incidental items; used, refurbished equipment or any equipment with less than 80% of the warranty remaining at installation will not be accepted.
- Compatibility
 - a. If additional equipment is required during the life of this contract due to a Change Order or Extra Work, Contractor shall purchase equipment from the same manufacturer as the original item, to ensure compatibility.
 - b. When installing equipment such as signal heads or pedestrian equipment, where some existing equipment is being retained, the contractor shall provide the same type of equipment, as is remaining, for visual compatibility.
- The Contractor shall submit for approval a list of equipment including make, model number, manufacturer serial numbers, warranty information, purchase invoice, and purchase date. Documentation must be submitted for the furnish items required for this contract. At the time of such submission, the Contractor shall provide a copy of the Transmittal Letter, to SCDOT.
- the Contractor shall submit for approval, catalog descriptions and documentation--THREE (3) COPIES--for each class of signal equipment and materials furnished by the Contractor. They are to be submitted a minimum of TWO WEEKS PRIOR TO INSTALLATION to the RCEFOR APPROVAL. At the time of such submission, the Contractor shall provide a copy of the Transmittal Letter, to the RCE..
- Equipment substitutions in the life of the contract are only allowed if the contractor can show a valid hardship in remaining with the originally submitted equipment. A valid hardship may include non-availability of type of equipment due to unforeseen delivery or material shortages (contractor ordering equipment late does not apply), vendor going out of business. SCDOT may allow equipment substitutions if product is determined by SCDOT to be of better quality than originally submitted or if contractor is replacing non-QPL items with QPL or SCDOT Equipment Contract items, or if equipment is experimental in nature and SCDOT wants to test said equipment.
- SCDOT will not pay for furnish and/or installation costs of any materials installed without prior approval and acceptance.
Contractor shall provide letter from the manufacturer of the cabinet and from the manufacturer of the controller indicating the equipment provided is the SCDOT QPL qualified equipment; Contractor shall ensure all warranties, serial numbers, documentation, and receipts are provided with cabinet assembly and controller delivery.

1.11 Inspection

- Quality Acceptance and Inspection is the responsibility of SCDOT. SCDOT will designate those individuals responsible for inspection. For signals located within a local government with which SCDOT has a signal maintenance agreement, the inspection personnel may include local government personnel.
- The Contractor is advised that in any dispute between the Contractor and the Manufacturer, concerning the operation/maintainability/reparability of any piece of equipment, THE DECISION OF THE DEPARTMENT SHALL BE FINAL.
- SCDOT's designated inspector will provide a punch list of outstanding items to be addressed prior to Final Inspection.

1.12 Final Inspection & Final Acceptance

- The contractor shall not request a final inspection until the punch list items are complete.
- The Contractor shall request the Final Inspection a minimum of one week prior to the desired day of inspection. Confirmation to the Resident Construction Engineer shall be provided forty-eight (48) hours prior to Final Inspection, that the project is on schedule and ready for inspection.
- **Burn In** Upon completion of the Final Inspection and correction of any deficiencies, the work will be subject to a **sixty (60) day operational test (burn in), during which the contractor remains responsible for any maintenance or repairs of any deficiencies.** If during this period, a problem arises a **NEW sixty (60) day test** period shall begin. Prior to Final Acceptance, if the materials or equipment are damaged or are in disrepair, the Contractor shall be responsible for repair or replacement.
- **Final Acceptance:** Final Acceptance occurs after 60 days of trouble-free operation (Burn In). At Final Acceptance, contractor will officially transfer all equipment, including warranties to SCDOT. SCDOT will become responsible for signal operations and maintenance upon Final Acceptance of the entire project. .

1.13 Mobilization

- Section 103.10, 103.11 of the STANDARD SPECIFICATIONS is amended as indicated below:
- For traffic signal projects, payment for 1031000 (LS) Mobilization includes all the signals and signal related work in the contract.
- For traffic signal projects, payment for 1031010 (EA) Mobilization will be paid per traffic signal (Each) or per ¼ mile for fiber installation (Each).
- These prices shall include demobilization.

1031000	MOBILIZATION	LS
1031010	MOBILIZATION	EA

- For traffic signal projects, payment for Mobilization of Material pay item addresses payment for moving large items furnished by SCDOT, such as concrete poles, requiring special equipment such as boom trucks, to the project site from a location designated by SCDOT.

9610021	MOBILIZATION OF MATERIAL PER WORK ORDER, 1-100 MILES FROM LOCATION TO WORKSITE	EA
9610022	MOBILIZATION OF MATERIAL PER WORK ORDER, 101-250 MILES FROM LOCATION TO WORKSITE	EA
9610023	MOBILIZATION OF MATERIAL PER WORK ORDER, 250+ MILES FROM LOCATION TO WORKSITE	EA

1.14 Payment for Materials on Hand

Section 109.7 of the STANDARD SPECIFICATIONS is amended to include the following paragraphs.

When permitted by the Engineer, partial payment will be made for major traffic signal items that are being furnished by the Contractor. Certain items such as wooden poles, and other very heavy units not readily movable or vandalized, may be stored in un-secured locations either ON- or OFF-SITE. Other items such as signal heads, detector amplifiers, controllers, cabinets, and certain other major items may be stored in a secured/protected location either ON- or OFF-SITE. The equipment shall be labeled stating SCDOT, and the Project Name. Other requirements of Paragraph 109.8 remain applicable. Payment shall be in accordance with the following criteria: The Contractor may be paid at FIFTY (50%) PERCENT of the contract unit price of item, not to exceed the paid invoice amount.

1. Only items measured by 'EACH' shall be eligible.
2. Only items with a unit price exceeding \$1500 shall be eligible.

1.15 Maintenance of Traffic (Traffic Control)

- The Contractor shall execute the item of Traffic Control as required by the Standard Specifications, the plans, the Standard Drawings For Road Construction, these supplemental specifications, the MUTCD, and the Engineer.

Supplemental Technical Specification for Electrical Conduit

SCDOT Designation: 675.1

1.1 Description

This work shall consist of furnishing and installing Electrical Conduit and fittings of the types and sizes specified herein, at locations shown on the Plans, or as established by the ENGINEER in accordance with these Specifications.

1.2 Materials

- Use rigid, heavy-wall, galvanized steel conduit, meeting the requirements of Federal Specification WW-C-581, and American Standards Association Specifications USAS C-80.1-1966.
- Use sunlight resistant PVC (Polyvinyl chloride) Conduit SCHEDULE 80, meeting the requirements of National Electrical Manufacturing Association (NEMA) Specification TC-2 and Underwriter Laboratory (UL) standards UL-514; and/or ASTM D-1784. Fittings shall meet NEMA TC-3 and UL-514.
- Use SCHEDULE 80 HDPE (High Density Polyethylene) Rolled Conduit.
- Use Flexible Weather-Tight Steel Conduit consisting of flexible single strip, helically wound, interlocking galvanized steel. Ensure the steel conduit is made liquid-tight using an extruded polyvinyl chloride jacket and that it meets the requirements of UL-360.
- Use fittings that are made of the same material and quality as the conduit run, including conduit bodies, 90° bends, weatherheads, elbows, nipples, couplings, and other hardware.
- Use Conduit Junction Boxes that are non-metallic PVC molded junction box with a weather tight screw-down cover, of nominal size 6"W x 6"L x 4"D.
- Use threaded Grounding Bushings made of malleable iron, galvanized steel, or brass; and shall have an insulating plastic insert, and lay-in lugs to hold No. 6 AWG copper wire.
- Use a Pulling Line made of Polypropylene Rope, having a minimum tensile strength of 240 pounds.
- Use Underground Warning Tape that is Heavy duty B-720 polyethylene, 0.89 mm (3.5 mils) thick, by 76 mm (3 in) wide, with APWA color RED, for electric lines.
- Use minimum 14 Ga. Tracer Wire

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Electrical Conduit.
- Install conduit as Riser, or Underground.
- Install Underground Conduit as Trenched, Bored and Jack or Directional Bored in accordance with the plans and Standard Drawings.
- Concrete used for patching pavement shall be DOT STANDARD SPECIFICATION CLASS X according to Sections 701, 702, 703, and 704.
- Bituminous Concrete for patching pavement shall be DOT STANDARD SPECIFICATIONS, Section 400 and 403.
- All materials will be subject to inspection for condition by the ENGINEER, just prior to incorporation into the work.
- Use standard bends, elbows, or by bending the steel conduit to make changes in direction of conduit. Steel conduit, if bent, shall have a uniform radius which will fit the location, with a minimum radius of six (6) times the internal diameter of the pipe. Sharp kinks in the conduit or the substitution of unlike materials will not be permitted.
- Use standard manufactured conduit bodies, condulets, weatherheads, elbows, nipples, tees, reducers, bends, couplings, unions, etc., of the same materials and treatment as the straight conduit, as required throughout the conduit line. Tightly connect all fittings to the conduit. Use a SOLVENT-WELD CEMENT for fitting connections with PVC conduit. Where steel conduit mates PVC, use an adapter coupling and waterproof seal.

1.3.2 Riser

- Use nipples to eliminate cutting and threading where short lengths of conduit are required. Where it is necessary to cut and thread steel conduit, no exposed threads will be permitted. All conduit fittings shall be free from burrs and rough places; and all cut conduits shall be reamed before fittings and cables are installed. All conduit runs ending in a junction box, hand box, or other approved junction point, shall be provided with a bushing to protect the cable from abrasion. Cap future use conduit.

- Attach conduit risers to wood poles; or where specified, to the outside of steel poles. Use stainless steel bands for steel poles. Use conduit clamps/straps and galvanized screws on wood poles. Attachment shall be in accordance with the plans or Standard Drawings. Furnish each Riser with a weatherhead, which shall not be measured.

1.3.3 Trenched

- Unless shown otherwise, place conduits at a minimum depth of 18 inches below surface grade, and slope at a minimum rate of 6 inches per 100 feet of length, to a splice box/junction box hole or drain. Clean and swab all conduit runs before installing cables. Use DUCT-SEAL in poles, cabinets, and buildings to seal the opening.
- Where conduit passes under a curb, cut an 'X' in the curb, over the conduit. Where there is no curb, drive a stake in the ground at the end of the conduit to mark its location. Cut an 'X' to indicate the side the conduit enters, where conduit is placed in a signal pole foundation for future use.
- Restore all cuts, trenches, and openings to the original condition. Replace grass surfaces with pre-grown, cut turf (sod), in existing lawns. Rake, seed and fertilize other dirt areas. Replace any damaged trees and shrubs.

Trenching (Non-Paved Surface)

- Excavate the trenches to such depth as necessary to provide 18 inches minimum cover over the conduit. Cinders, broken concrete, or other hard abrasive materials will not be permitted in the back-filling. Clear the trench of such materials before placing the conduit. No conduit shall be placed prior to inspection by the ENGINEER. Compact the back-fill and restore the surface.

Trenching (In Paved Surface)

- Cleanly saw cut trenches across driveways or streets about 6 inches wide. Place the conduit and compact the back-fill. Provide and install the patch of like material and thickness as was removed. NO additional payment shall be made for the bituminous or concrete patching material, unless a pay item has been established for such.

Bored and Jack (Pushing)

- If pay item is provided, place steel conduit under existing roadways, driveways, sidewalks or other paved surfaces by Bore and Jack method. Such conduit shall be placed by jacking, boring, pushing, or other means approved by the ENGINEER, without cutting or removing pavement.

Trenchless (Directional Bored)

- If pay item is provided, place Schedule 80 PVC or Schedule 80 HDPE conduit under existing roadways, driveways, sidewalks or other paved surfaces by directional bore method. Conduit shall be buried at a minimum of 36 inches. Payment will not be made for damaged or crumpled conduit. An acceptable alternative material can be **SCHEDULE 80 HDPE CONDUIT (TRENCHLESS)**.

Placed Before Pouring

- Install PVC conduit w/ Flexible Weather Tight conduit firmly attached to the bottom reinforcement bar mat or to the bottom wire mat, using plastic tie-wraps every 2 feet, at locations where conduit is placed before concrete placement in a bridge deck. At expansion joints, use 4 feet (typical) of Flexible Weather Tight steel conduit to accommodate movement. Install to NEC standards for concrete structural installations and usage, including any recommended lubricants and sleeves. Plug all conduit ends to prevent concrete penetration. When used on a bridge, provide a splice-box(es) near the center line, and terminate the conduit in hand-boxes at each end.

Open Cuts in Roadway

- Open cuts are typically not allowed, and every effort to bore under roadways and driveways shall be attempted. If utility conflicts require open cuts for installation of conduit, and where approved by the Engineer, conduit may be placed in an open cut and open cuts shall be repaired in accordance with the SCDOT Utility Accommodations Policy.

1.4 Measurement

- Electrical Conduit will be measured by LINEAR FEET, for the type, size, and method of installation specified, along the center line of the conduit from end to end, including trenched, risers, and bored-and-jacked.
- Conduit bends, conduit bodies, (condulets), 90° bends, elbows, conduit junction boxes for detector loops, miscellaneous fittings, couplings, weatherheads, adapters, bushings, locknuts, and other items shall be incidental to conduit installation and shall NOT be measured.
- Unless otherwise specified, trenching, back-filling, and patching will NOT be measured for payment.

- If more than one conduit is installed within a directional bore, payment will be made for the directional bore from box to box. The additional runs of conduit will be paid per LF of additional conduit (pay item 675027Z) from box to box.
- F&I Encased Conduit work includes all equipment, manpower and materials to furnish and install conduit in an open cut paved area within a travel way; this work is paid by linear feet (LF):

1.5 Payment

For conduit either Trenched or Riser:

6750005	FURNISH & INSTALL 1.0" GALVANIZED RIGID CONDUIT	LF
6750015	FURNISH & INSTALL 2.0" GALVANIZED RIGID CONDUIT	LF
6750025	FURNISH & INSTALL 3.0" GALVANIZED RIGID CONDUIT	LF
6750181	FURNISH & INSTALL 1.0" ALUMINUM CONDUIT	LF

For bored and jacked:

6750078	FURNISH & INSTALL 1.0" GALVANIZED RIGID CONDUIT (BORED AND JACKED)	LF
6750085	FURNISH & INSTALL 2.0" GALVANIZED RIGID CONDUIT (BORED AND JACKED)	LF
6750090	FURNISH & INSTALL 3.0" GALVANIZED RIGID CONDUIT (BORED AND JACKED)	LF

For high accuracy directional boring:

675027S	FURNISH & INSTALL 2.0" SCHEDULE 80 PVC CONDUIT (DIRECTIONAL BORED)	LF
675027V	FURNISH & INSTALL 3.0" SCHEDULE 80 PVC CONDUIT(DIRECTIONAL BORED)	LF
675027Y	FURNISH & INSTALL 4.0" SCHEDULE 80 PVC CONDUIT(DIRECTIONAL BORED)	LF
675027Z	FURNISH ADDITIONAL CONDUIT WITHIN DIRECTIONAL BORE	LF
6760050	FURNISH & INSTALL 1" SCHEDULE 80 HDPE CONDUIT (TRENCHLESS)	LF
6760060	FURNISH & INSTALL 2" SCHEDULE 80 HDPE CONDUIT (TRENCHLESS)	LF
6760070	FURNISH & INSTALL 3" SCHEDULE 80 HDPE CONDUIT (TRENCHLESS)	LF
6760080	FURNISH & INSTALL 4" SCHEDULE 80 HDPE CONDUIT (TRENCHLESS)	LF

For flexibility:

6750175	FURNISH & INSTALL 1.0" FLEXIBLE GALVANIZED STEEL CONDUIT - WEATHER TIGHT	LF
6750179	FURNISH & INSTALL 2.0" FLEXIBLE GALVANIZED STEEL CONDUIT - WEATHER TIGHT	LF
675017D	FURNISH & INSTALL 3.0" FLEXIBLE GALVANIZED STEEL CONDUIT - WEATHER TIGHT	LF

Open Cut:

6750262	FURNISH & INSTALL ENCASED CONDUIT (2-2" PVC, SCHEDULE 40)	LF
6750263	FURNISH & INSTALL ENCASED CONDUIT (3-2" PVC, SCHEDULE 40)	LF

Supplemental Technical Specification for Electrical Cable

SCDOT Designation: 677.1

1.1 Description

This work shall consist of furnishing and installing traffic signal, loop lead-in, pedestrian signal, and pedestrian push button Electrical Cable of the size and type shown on the Plans or detailed in the Standard Drawings.

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Electrical Cable.

1.3.2 Field Wiring

- Install SPLICE-FREE cable runs. Make all connections at terminal blocks, or in the controller cabinet.
- Install all field wiring in accordance with applicable Electrical Codes--National, State, and Local. Where required, arranging for PERMITS and/or electrical INSPECTION is the responsibility of the Contractor.
- Provide at least 3 feet of cable slack at each splice box, strain pole base, and cabinet. Neatly coil and bind the slack with a nylon tie.
- At the cabinet end, label each cable, using nylon cable markers, and indelible pen, indicating the Phase and/or Approach (NB, EB, etc.).
- Cabinet connections shall correspond to the COLOR-CODE shown on the Standard Drawing 675-110-00 TYPICAL WIRE & CABLE USAGE sheet; (green wire to green signal circuit, etc.).
- Replace the entire length of cables damaged during installation, without further cost to the Department.
- All electrical cable installed in conduit shall be drawn in place, free from electrical and mechanical injury. When a lubricating agent is needed, use a wire pulling compound compatible with the cable insulation.
- Install in conduit any vertical cable runs mounted on the outside of poles as shown on the plans or in the Standard Drawings.
- Use weather service heads wherever electrical cable directly enters a strain pole or a vertical conduit run.
- Provide drip loops of at least 8 inches at all overhead entrance points such as signal heads, strain poles, or weather heads.
- If any splices in homerun cables are detected, all work will cease by the contractor in that district until new wire is pulled to replace the spliced joint.

1.3.3 Traffic Signal Wiring

- Install each cable run with the number of conductors indicated in the Standard Drawing 675-110-00 Typical Wire and Cable Usage. These include the provision of spare conductors. The substitution of additional cables to attain the required number of conductors shall not be permitted.
- Run a separate cable for each phase or approach in accordance with Standard Drawing 675-110-00 Typical Wire and Cable Usage.
- The list below is a guide to general usage--

Signal: Jumpers	4 pair (8 conductor) BLACK
Signal: To Each Approach	4 pair (8 conductor) BLACK

Loop lead-in Wiring

- Install each cable run with the number of conductors indicated in the Standard Drawing 675-110-00 Typical Wire and Cable Usage. These include the provision of spare conductors. The substitution of additional cables to attain the required number of conductors shall not be permitted.
- Run a separate cable to each corner of the intersection in accordance with Standard Drawing 675-110-00 Typical Wire and Cable Usage.
- The list below is a guide to general usage--

Loop: To Each Corner	4 pair (8 conductor) GRAY
Loop Lead-in	2 pair (4 conductor) GRAY

1.3.4 Pedestrian Signal Head Wiring

- Install each cable run with the number of conductors indicated in the Standard Drawing 675-110-00 Typical Wire and Cable Usage. These include the provision of spare conductors. The substitution of additional cables to attain the required number of conductors shall not be permitted.
- Run a separate cable for each phase or approach in accordance with Standard Drawing 675-110-00 Typical Wire and Cable Usage.
- The list below is a guide to general usage--

Pedestrian Signal	2 pair (4 conductor) BLACK
Pedestrian Push Button	2 pair (4 conductor) GRAY
Loop Lead-in	2 pair (4 conductor) GRAY

1.3.5 Push Button Wiring

- Install each cable run with the number of conductors in accordance with Standard Drawing 675-110-00 Typical Wire and Cable Usage. These include the provision of spare conductors. The substitution of additional cables to attain the required number of conductors shall not be permitted.
- A separate cable should be run for each phase or approach in accordance with Standard Drawing 675-110-00 Typical Wire and Cable Usage.
- The list below is a guide to general usage--

Pedestrian Push Button	2 pair (4 conductor) GRAY
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1.3.6 Electrical Conduit

All conduit and elbows shall be installed as described in the appropriate Specification.
See 675.1 ELECTRICAL CONDUIT.
See 688.7 CONTROLLERS AND 332/336 CABINETS.
See 688.5 STEEL STRAIN POLE AND FOUNDATION.

1.4 Measurement

- With the exception of the electrical service cable, electrical cable lengths of the size and numbers of conductors specified, shall be measured by LINEAR FEET as actually furnished and installed, completely in place and accepted, with each size cable being a separate pay item.

1.5 Payment

6770388	FURNISH & INSTALL NO. 14 COPPER WIRE, 4 CONDUCTOR - BLACK	LF
6770389	FURNISH & INSTALL NO. 14 COPPER WIRE, 4 CONDUCTOR - GRAY	LF
6770393	FURNISH & INSTALL NO. 14 COPPER WIRE, 8 CONDUCTOR - BLACK	LF
6770394	FURNISH & INSTALL NO. 14 COPPER WIRE, 8 CONDUCTOR - GRAY	LF

Supplemental Technical Specification for Fiber Optic Cable SCDOT Designation: 677.3

1.1 Description

This work shall consist of furnishing and installing single-mode fiber optic (SMFO) cable in conduit and risers or overhead lashed to new messenger cable.

1.2 Materials

Acceptable single-mode fiber optic (SMFO) cable shall meet all requirements stated in RUS-90 and shall be an accepted product of the United States Department of Agriculture Rural Utility Service as meeting the requirements of RUS-PE-90. The cable shall be new, unused, and of current design and manufacture. More information concerning these industry standards can be found on the SCDOT website, 677.3 *Fiber Optic Cable Industry Standards*, http://www.scdot.org/doing/publications_Traffic.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Fiber Optic Cable.
- The CONTRACTOR shall furnish all materials and attachment hardware and installation guides necessary to install the fiber optic cable in accordance with Standard Drawing 675-125-00 Interconnect. Install fiber optic cable where, and in the manner indicated on the Plans, or as needed to maintain communications in an existing fiber network, in accordance with the standard drawings.
- The CONTRACTOR shall order cable in reel lengths that are of sufficient length to require no intermediate splicing of the cable.
- Prior to installation, the CONTRACTOR SHALL PROVIDE certified TEST RESULTS from the manufacturer showing the cable furnished has been tested and meets Industry Standards, 677.3 Fiber Optic Cable.
- The CONTRACTOR shall take every precaution to ensure the fiber optic cable is not damaged during storage and installation. Do not step on the fiber optic cable or run over the fiber optic cable by any vehicle or equipment. Do not pull the fiber optic cable along the ground or over or around obstructions.
- Ensure the fiber optic cable is packaged on wooden reels. These reels shall not contain imperfections such as broken flanges or nails that may cause damage to the cable as it is unreeled.
- Each cable reel shall have a durable weatherproof label that shows the actual length of cable on the reel.
- The CONTRACTOR shall coordinate his overhead and underground construction activities on a continuing basis with each of the utility agencies which have facilities in the immediate vicinity.

1.3.2 Bends and Tensioning

- During installation, the CONTRACTOR shall provide cable blocks at least every 50 feet to guide the cable and reduce pulling tension. All pulling equipment and hardware that will contact the cable during installation must maintain the minimum bend radius of the fiber optic cable as listed in Table 1. Corner blocks, appropriately sized to ensure that the minimum bending radius of the cable is maintained, shall be provided whenever fiber optic cable must be pulled around a corner.

Table 1 Fiber Optic Minimum Bend Radius Chart

Nominal Cable Diameter		Minimum Bend Radius (No Tension) Installed		Minimum Bend Radius (Under Tension)	
Millimeters	Inches	Centimeters	Inches	Centimeters	Inches
6.0 – 10.0	(1/4 – 3/8)	10.0	(4.0)	15.0	(6.0)
10.1 – 15.0	(4/10 – 6/10)	15.0	(6.0)	22.5	(9.0)
15.1 – 20.0	(10/16 – 8/10)	20.0	(8.0)	25.0	(10.0)
20.1 – 23.0	(13/16 – 9/10)	23.0	(9.0)	25.0	(10.0)
23.1 – 25.0	(15/16 – 1.0)	25.0	(10.0)	30.0	(12.0)

- Fiber optic cable shall not be pulled through any intermediate junction box, manhole, pull box, pole

base or any other opening in the conduit unless specifically required by the ENGINEER in specific facilities. The necessary length of cable to be installed shall be pulled from one junction box, manhole, pull box, pole base, or cabinet to the immediate next downstream manhole, box, pole base, or cabinet. The remaining length of cable to be installed in the next conduit shall be carefully stored in a manner that is not hazardous to pedestrian or vehicular traffic yet ensures that no damage to the cable shall occur. The cable shall be stored in a manner that shall allow that length of cable to be safely pulled into the next conduit. The ENGINEER shall approve the storing methods to be used.

- Cable reel lagging shall remain on the cable reels until they arrive at the pulling site. If the lagging has been removed, the CONTRACTOR shall securely fasten the cable ends to avoid damage during transit.
- If the cable must be unreeled during installation, use the "figure-eight" configuration to prevent kinking or twisting of the fiber optic cable. The preferred size of the "figure-eight" is 15 feet with each loop about eight (8) feet in diameter. The fiber optic cable shall not be coiled in a continuous direction except for lengths of 100 feet or less.
- The CONTRACTOR shall not increase the tension on the messenger cable to which the fiber optic cable has already been lashed.
- At the completion of a day's installation, the CONTRACTOR shall protect the cable from moisture by placing a cable cap and/or several wraps of tape on the tip of the cable.
- The CONTRACTOR shall record the cable meter marks at every other pole location and at the fiber splice points on a set of as-built plans. Two (2) copies of the plans showing the meter marks shall be provided to the ENGINEER. The meter marks are most easily obtained while forming drip loops.
- The CONTRACTOR shall route the fiber optic cable on the inside of messenger intersections at dead ends and crossovers.

1.3.3 Aerial Installation

- Where the plans call for aerial installation, the CONTRACTOR shall furnish new messenger cable (see 682.3 Steel Cable) and shall lash the fiber optic cable to the new messenger.
- Install aerial cable either manually or by using the moving reel method. If the CONTRACTOR proposes to use the moving reel method, the CONTRACTOR shall submit to the ENGINEER the cable manufacturer's recommended procedures for this installation technique at least seven (7) days prior to beginning the installation of the fiber optic cable.
- Maintain the required clearances between the fiber optic cable and the utility features as follows unless otherwise noted on the PLANS:
 - 4 inches minimum vertical clearance and 12 inches minimum total (diagonal) separation to the telephone and/or cable vision facilities.
 - 40 inches minimum vertical clearance to all electrical transformers.
 - 40 inches minimum vertical clearance to all electric lines (including street light circuits).
- Where called for on the PLANS or as directed by the ENGINEER, furnish fiberglass extension arms and utilize to install the new fiber optic cable. Provide MIF PH6-2 fiberglass extension arms or approved equal.
- Where called for on the PLANS, the CONTRACTOR shall install down guys, sidewalk guys, and aerial guys in accordance with 682.2 Back Guy and as shown in the standard drawings.
- The CONTRACTOR shall use a Kellems® (or approved equal) grip wire mesh pulling grip and swivel to prevent damage to the cable during cable pulls.
- The CONTRACTOR shall provide drip loops for the fiber optic cable at all utility poles to which the fiber optic cable is attached. The drip loops must be of the "smooth-curve" type and shall be at least of the recommended dimensions for a drip loop in the typical details. Form drip loops by hand or by using an expansion loop-forming tool. Support the cable with straps and spacers in the absence of lashing wire support and to hold the cable bundles together. Install the strap and spacer no closer than 4 inches to the first bend in the drip loop.
- Where called for on the PLANS, the CONTRACTOR shall install backlashes in the Fiber Optic cable as necessary. The CONTRACTOR shall utilize 16 inch Fiber Optic Strand Storage Bracket (Multilink model number 2116-SSPTB or approved equivalent) which are also known as "Fiber Optic Sno Shoes". All hardware necessary for the installation of the backlash including the "Fiber Optic Sno Shoes", and lashing of the additional cable shall be incidental to the cost of Furnishing and Installing the Fiber Optic cable.
- The straps and spacers used for drip loops and other fiber optic cable handling purposes shall be hand-tight only. The strap and spacer must be loose enough to allow longitudinal travel by the cable, but tight enough to prevent the strap and spacer from moving on the messenger cable.
- Over lash the fiber optic cable to the messenger cable (See 682.3 Steel Cable - 1/4" galvanized steel cable). Use aluminum wrapping tape spaced at intervals not exceeding 380 mm or with 1.5

mm (minimum) diameter galvanized steel spiral cable wrap for lashing. Wrapping tape, if used shall be 1.3 mm x 7.6 mm. Use at least 4 turns. Accomplish the lashing in the manner that results in the wire and the cable appearing to be an integral part of the support cable. Install fiber optic cable without loose lashing, twisting or weaving along the messenger.

- The CONTRACTOR shall terminate the lashing wire with a lashing wire clamp as the cable run is lashed up, span-by-span. Terminate the lashing wires as follows:
 - 1) Place a cable spacer between the fiber optic cable and the messenger.
 - 2) Locate lashing wire clamp 2 inches from strap and spacer. Pull enough lashing wire out of lasher to terminate into the lashing wire clamp.
 - 3) Wrap the lashing wire 3 times around only the messenger between the lashing wire clamp and the planned location of the first wrap around both the strand and fiber optic cable.
 - 4) Secure the lashing wire as shown in the typical details.

1.3.4 Underground Installation

- Where shown on the PLANS, install the fiber optic cable in new underground conduit and risers.
- Seven (7) days prior to the installation of fiber optic cable in conduit is performed, the CONTRACTOR shall provide the ENGINEER with 4 copies of the cable manufacturer's recommended and maximum pulling tensions and a list of the cable manufacturer's approved pulling lubricants. Only use those lubricants in the quantity recommended by the fiber optic cable manufacturer.
- When installing the cable in underground conduit, the maximum allowable pulling tension for the cable installation by the CONTRACTOR shall not exceed 70 percent of the manufacturer's maximum pulling tension. If the cable is pulled by mechanical means, use a dynamometer (clutch device) approved by the ENGINEER to ensure that a maximum allowable pulling tension is not exceeded at any time during installation.
- Fiber optic cable shall not be pulled over edges or corners, over or around obstructions or through unnecessary curves or bends. Use approved cable guides, feeders, shoes and bushings to prevent damage to the cable during installation.
- Use sealing bushings rather than weather heads on all risers containing fiber optic cable. The sealing bushings shall conform to the typical detail shown.
- Ensure conduit bends and cabinet entrance fittings used by the fiber optic cable network are designed to accommodate the bending radius limitations of the fiber optic cable used.

1.3.5 Splice

Splice the fiber optic cable only at those points shown in the PLANS. The designated splices proposed for installation in each controller cabinet consist of one of the following:

- Fibers Interconnect Centers – This splice in the cabinet shall be installed in accordance with 677.4 Fiber Interconnect Center
- The CONTRACTOR shall pull an adequate amount of fiber optic cable into the controller cabinet to perform splicing and to provide approximately 50 feet of slack cable (approximately 25 feet from the entering and 25 feet from the exiting cable). After the fiber optic cable has been spliced, the cable shall be neatly coiled (with tie-wraps placed on the cable) and placed on top of the fiber interconnect center or on the bottom of the cabinet. The cable shall be readily accessible to enable maintenance personnel to perform splicing of the cable in a vehicle located near the controller cabinet.
- Factory Terminated Patch Panel – This aerial splice and plug into cabinet shall be installed in accordance with 677.6 Factory Terminated Patch Panel
- Fiber optic cable runs shall be continuous between allowable splice points. The CONTRACTOR shall carefully determine the length of fiber optic cable necessary to reach from termination point to termination point. Splicing of fiber optic cable in conduit, pole bases, manholes, or pull boxes shall not be permitted.

1.3.6 Utilities

- Relocation of overhead utilities will be made by others and is not a part of this Contract.
- Where fiber optic cable is to be installed on overhead poles, the CONTRACTOR shall exercise care in temporary placement of installation equipment to provide safety to the public and to prevent damage to existing facilities. Should the CONTRACTOR cause damage to any existing cables and/or equipment, the CONTRACTOR shall immediately notify the ENGINEER and the affected owner and the CONTRACTOR shall repair or have the repair made at no additional cost.

1.3.7 Grounding and Bonding

- All metal conduits shall be grounded.
- All conduit, terminal cabinets, anchor bolts and reinforcing bar cages shall be made mechanically and electrically secure to form a continuous system and shall be effectively grounded. Use #6 AWG bare stranded copper wires for the grounding or bonding conductor.

- Bonding of metallic conduit in pull boxes and other installations, where the conduit is not coupled, shall be coupled with metallic conduit ground bushings having smoothly rounded molded insulated inserts and bonding jumpers.
- The CONTRACTOR shall furnish and install all grounding facilities.

1.3.8 Fiber Optic Cable Tests

- Continuity - Prior to the installation of any fiber optic cable, the CONTRACTOR shall test the continuity of each fiber using an Optical Time Domain Reflectometer (OTDR). The test shall be conducted while the fiber is still on the reel and the test results shall be provided to the ENGINEER.
- Contractor shall provide documentation indicating that all optic fibers have been proof tested by the fiber manufacturer at a minimum load of 50 kpsi.
- Contractor to provide documentation that all optical fibers have been 100% attenuation tested by the manufacturer. The attenuation of each fiber shall be provided with each cable reel.
- Splice Loss - After the installation of the fiber optic cable, the CONTRACTOR shall test the dB loss for every splice of the fiber optic cable in accordance with procedures established in the OTDR operator's manual. The testing may be done in conjunction with the splicing of the cable. Any splice that has a splice loss >0.09 dB shall be re-spliced.
- The CONTRACTOR shall provide hardcopy test results to the ENGINEER that identify the location of the splice (Intersection name, splice tray #), the fiber (by buffer tube and fiber color), and the splice loss in dB.
- Connector/End Splice Testing - The CONTRACTOR shall test each connector/end splice loss in one (1) direction using an OTDR in accordance with procedures established in the OTDR operator's manual. The average mated connector/end splice loss shall be <0.5 dB. Individual mated connector pair/end loss shall be <0.7 dB. Any connector/end splice with a loss greater than 0.7 dB shall be replaced, by the CONTRACTOR. Any replacement connectors/ends shall also be tested.
- End-to-End Attenuation Testing - The CONTRACTOR shall perform end-to-end testing of each fiber between each place point at 1310 nm and 1550 nm in one (1) direction in accordance with EIA/TIA 526-7.
- The CONTRACTOR shall provide hardcopy test results to the ENGINEER that identify the two (2) ends of the test site, the fiber tested, the wavelength tested, the reference power output, and the system attenuation in dB.
- The CONTRACTOR shall provide OTDR Signature traces of all fibers between all intersections for system documentation and restoration purposes.

1.4 Measurement

- Fiber optic cable, of the type and size specified will be measured by linear feet of cable actually furnished and installed, completely in place and accepted, using an "OTDR" (optical time-domain reflectometer). Such payment shall be full compensation for furnishing all material, labor, hardware, equipment and incidentals necessary for furnishing and installing communications cable and completing the work as specified.
- Note that electrical conduit, splice boxes, splice cabinets, and steel span wire are listed elsewhere as separate pay items.

1.5 Payment

6770470	FURNISH & INSTALL 12 STRAND FIBER OPTIC CABLE – SINGLE MODE	LF
677046D	FURNISH & INSTALL SELF SUPPORTING 12 STRAND FIBER OPTIC CABLE - SINGLE MODE	LF

Supplemental Technical Specification for Fiber Interconnect Centers SCDOT Designation: 677.4

1.1 Description

This work shall consist of furnishing and installing a Fiber Interconnect Center, including splicing the fiber optic cable and all necessary material to accomplish this work in accordance with this specification and standard drawings.

1.2 Materials

- The Fiber Interconnect Center shall include ST adapter panel, strain relief hardware, be rack mountable, have the capacity for 4 Fusion Splice Trays and termination/connection capacity for 24 fibers in 4 modules. The Center shall be a Systimax 600G2-1U-UP-SD or approved equivalent.
- The interconnect center shall be equipped with 2 fiber optic modular connector panels with 24 factory-installed interconnection sleeves. The modular interconnection panels shall be clearly labeled (transmit/receive). The interconnection sleeves shall be types ST compatible, with ceramic insert, and composite housing for single-mode fiber optic cable. These shall be Systimax MODG2-6ST-SM-PT-A and MODG2-6ST-SM-PT-B or approved equivalent.
- Each interconnect center shall be furnished with 3 Fusion Splice Trays. The trays shall be capable of accepting 12 fusion and 6 mechanical splices. The tray shall be a Systimax RS-2AF-16SS or approved equivalent.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Fiber Interconnect Center.
- Multiple splices may be required to connect all incoming fibers to traffic signal network.

1.3.2 Cabinet

- Install the Fiber Interconnect Center in the controller cabinet. Place the Fiber Interconnect Center in the cabinet such that the slack fiber optic cable stored on top of the fiber interconnect center (in accordance with 677.3 Fiber Optic Cable) can be easily removed (along with the fiber interconnect center) from the cabinet and taken to a maintenance vehicle for splicing.
- Provide all necessary materials and hardware including furnishing and installing splice trays, interconnection sleeves, jumpers, and connectors needed for connecting the fiber optic cable to the signal communications network.

1.3.3 Splicing Methods

- Use the fusion-splice technique to perform all splicing, which induces less than 0.3 dB attenuation, unless noted otherwise in the special provisions. Recoat bare fibers with a protective RTV gel or similar substance prior to application of the sleeve or housing to protect the fiber from scoring, dirt, or microbending. Package each spliced fiber in a heat shrink protective sleeve or housing. Perform all splices in accordance with the cable manufacturer's and the splice manufacturer's recommendations. During splicing, the CONTRACTOR shall maintain the continuity of the buffer tube and fiber color.
- Provide incoming fibers with 5 feet of coiled slack and splice to a pigtail of the same type fiber. Pigtails shall have a minimum length of 5 feet and shall have a factory-installed ST compatible connector. The pigtails shall have an attenuation of less than 0.3 dB. The ST connector shall mate with the connector panels installed in the fiber interconnect center.
- Protect unused optical fibers with sealed end caps.
- The CONTRACTOR shall record the meter marks on the cable sheath at each splice point. Provide these marks to the Engineer as part of the as-built system plans at the completion of the project.

1.3.4 Jumpers

- The CONTRACTOR shall furnish and install 2 single-mode fiber optic cable assemblies with connectors factory-installed on each end (jumpers). These assemblies will be used to connect the fiber optic modem to the connector panel. These jumpers will not be paid for directly but shall be considered incidental to the item Furnish and Install Fiber Optic Modem.

1.3.5 Future Applications

- The fiber optic communications network shall accommodate future applications. As shown in the standard drawings, fusion splice all six fibers in one buffer tube of the entering cable through to the six fibers in one of the buffer tubes leaving the cabinet. Maintain the continuity of the buffer tube and fiber color. Splice these fibers in a separate splice tray. The cable entering and exiting the cabinet will contain another buffer tube that contains six fibers. Fusion-splice three of the incoming and three of the outgoing fibers to pigtail assemblies with factory-installed type ST compatible connectors. Place these six splices in a second splice tray. Fusion-splice the remaining three incoming and three outgoing fibers to pigtail assemblies with factory-installed type ST compatible connectors and placed in a third tray. Connect all pigtail assemblies c to the connector panels installed in the Fiber Interconnect Center. Clearly label the Transmit and Receive designations of each fiber pair on the front of the connector panel. Test each fiber termination/connection for attenuation.

1.3.6 Fiber Optic Cable Tests

- Continuity - Prior to the installation of any fiber optic cable, the CONTRACTOR shall test the continuity of each fiber using an Optical Time Domain Reflectometer (OTDR). Conduct the test while the fiber is still on the reel and provide the test results to the ENGINEER.
- Splice Loss - After the installation of the fiber optic cable, the CONTRACTOR shall test the dB loss for every splice of the fiber optic cable in accordance with procedures established in the OTDR operator's manual. The testing may be done in conjunction with the splicing of the cable. Any splice that has a splice loss >0.09 dB shall be re-spliced.
- The CONTRACTOR shall provide hardcopy test results to the ENGINEER that identify the location of the splice (Intersection name, splice tray #), the fiber (by buffer tube and fiber color), and the splice loss in dB.
- Connector/End Splice Testing - The CONTRACTOR shall test each connector/end splice loss in one (1) direction using an OTDR in accordance with procedures established in the OTDR operator's manual. The average mated connector/end splice loss shall be <0.5 dB. Individual mated connector pair/end loss shall be <0.7 dB. Replace any connector/end splice with a loss greater than 0.7 dB. Test any replacement connectors/ends.
- End-to-End Attenuation Testing - The CONTRACTOR shall perform end-to-end testing of each fiber between each place point at 1310 nm and 1550 nm in one (1) direction in accordance with EIA/TIA 526-7.
- The CONTRACTOR shall provide hardcopy test results to the ENGINEER that identify the two (2) ends of the test site, the fiber tested, the wavelength tested, the reference power output, and the system attenuation in dB.
- The CONTRACTOR shall provide OTDR Signature traces of all fibers between all intersections for system documentation and restoration purposes.

1.4 Measurement

- This item shall include the labor, equipment, and materials necessary to furnish and install the fiber optic interconnect centers in accordance with the PLANS and Standard Drawings. This item shall be measured by the number of each installed, which shall be full compensation for furnishing and installing the fiber interconnect centers into the signal controller cabinets and making the necessary connections. The fusion splicing of the cable, furnishing and installing the splice trays, pigtail assemblies, connector panels and interconnection sleeves shall be considered incidental to this item and will not be paid directly.
- Pay item 6770486 may be used to pay for additional fiber splices required if more than one fiber trunk is to be interconnected at signal. This pay item includes all necessary items needed to provide this interconnection.

1.5 Payment

6770476	FURNISH & INSTALL FIBER OPTIC INTERCONNECT CENTER	EA
6888092	INSTALL FIBER OPTIC INTERCONNECT CENTER	EA
6770486	FIBER OPTIC REPAIR SPLICE OH/UG	EA

Supplemental Technical Specification for Factory Terminated Patch Panel

SCDOT Designation: 677.6

1.1 Description

This work shall consist of furnishing and installing a Factory Terminated Patch Panel, including splicing the fiber optic cable and all necessary material to accomplish this work in accordance with this specification and standard drawings.

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Factory Terminated Patch Panel.
- The Contractor shall furnish the ENGINEER with any warranties on materials that are provided by the Manufacturer or Vendor as normal trade practice.
- Multiple splices may be required to connect all incoming fibers to traffic signal network.

1.3.2 Cabinet

- The factory terminated patch panel shall be installed by the CONTRACTOR between the controller cabinet and the overhead fiber optic cable run. The factory terminated patch panel shall be located in the cabinet such that the slack fiber optic cable is safely stored (in accordance with 677.3 Fiber Optic Cable).
- Provide all necessary materials and hardware including furnishing and installing interconnection sleeves, jumpers, and connectors needed for connecting the fiber optic cable to the signal communications network.

1.3.3 Splicing Methods

- When using a preterminated, molded patch panel unit that serves as the drop cable and fiber interconnect center (patch panel/fusion splice containment) the free end shall be spliced to the trunk fiber optic cable in an approved aerial enclosure according to the splice plan. The overhead splice and enclosure and all necessary materials and hardware is incidental and should be included in pay item.
- Use the fusion- splice technique to perform all splicing, which induces less than 0.3 dB attenuation, unless noted otherwise in the special provisions. Recoat bare fibers with a protective RTV gel or similar substance prior to application of the sleeve or housing to protect the fiber from scoring, dirt, or microbending. Package each spliced fiber in a heat shrink protective sleeve or housing. Perform all splices in accordance with the cable manufacturer's and the splice manufacturer's recommendations. During splicing, the CONTRACTOR shall maintain the continuity of the buffer tube and fiber color.
- Protect unused optical fibers with sealed end caps.
- *The CONTRACTOR shall record the meter marks on the cable sheath at each splice point.* Provide these marks to the Engineer as part of the as-built system plans at the completion of the project.

1.3.4 Jumpers

- The CONTRACTOR shall furnish and install 2 single-mode fiber optic cable assemblies with connectors factory-installed on each end (jumpers). These assemblies will be used to connect the fiber optic modem to the Factory terminated patch panel. These jumpers will not be paid for directly but shall be considered incidental to the item Furnish and Install Factory terminated patch panel.

1.3.5 Future Applications

- Splice all fiber strands and connect to accommodate future applications.

1.3.6 Fiber Optic Cable Tests

- Continuity - Prior to the installation of any fiber optic cable, the CONTRACTOR shall test the continuity of each fiber using an Optical Time Domain Reflectometer (OTDR). Conduct the test while the fiber is still on the reel and provide the test results to the ENGINEER.
- Splice Loss - After the installation of the fiber optic cable, the CONTRACTOR shall test the dB loss for every splice of the fiber optic cable in accordance with procedures established in the OTDR operator's manual. The testing may be done in conjunction with the splicing of the cable. Any splice that has a splice loss >0.09 dB shall be re-spliced.
- The CONTRACTOR shall provide hardcopy test results to the ENGINEER that identify the location of the splice (Intersection name, splice tray #), the fiber (by buffer tube and fiber color), and the splice loss in dB.
- Connector/End Splice Testing - The CONTRACTOR shall test each connector/end splice loss in one (1) direction using an OTDR in accordance with procedures established in the OTDR operator's manual. The average mated connector/end splice loss shall be <0.5 dB. Individual mated connector pair/end loss shall be <0.7 dB. Replace any connector/end splice with a loss greater than 0.7 dB. Test any replacement connectors/ends.
- End-to-End Attenuation Testing - The CONTRACTOR shall perform end-to-end testing of each fiber between each place point at 1310 nm and 1550 nm in one (1) direction in accordance with EIA/TIA 526-7.
- The CONTRACTOR shall provide hardcopy test results to the ENGINEER that identify the two (2) ends of the test site, the fiber tested, the wavelength tested, the reference power output, and the system attenuation in dB.
- The CONTRACTOR shall provide OTDR Signature traces of all fibers between all intersections for system documentation and restoration purposes.

1.4 Measurement

- The bid for the Factory terminated patch panel shall include the cost of furnishing and installing the Factory terminated patch panel into the signal controller cabinets, splicing into fiber trunk overhead and making all the necessary connections.
- The fusion splicing of the cable, pigtail assemblies, connector panels and interconnection sleeves shall be considered incidental to this item and will not be paid directly.
- This item shall include the labor, equipment, and materials necessary to install the Factory terminated patch panel in accordance with the PLANS and Project Special Provisions. This item shall be measured by the number of each installed.
- Pay item 6770486 may be used to pay for additional fiber splices required if more than one fiber trunk is to be interconnected at signal. This pay item includes all necessary items needed to provide this interconnection.

1.5 Payment

6888082	FURNISH & INSTALL FACTORY TERMINATED PATCH PANEL	EA
6888093	INSTALL FACTORY TERMINATED PATCH PANEL	EA
6770486	FIBER OPTIC REPAIR SPLICE OH/UG	EA

Supplemental Technical Specification for Wireless Network Communications Link SCDOT Designation: 677.7

1.1 Description

This work shall consist of installing a Wireless Network Communications Link with all necessary hardware in accordance with the plans and standard drawings to provide a data link between field devices (i.e. Traffic Signal Controllers).

1.2 Materials

Wireless Communications Equipment provided by others (generally SCDOT). Cable shall be as follows or equal:

Superior Essex	Cabling	CAT 5e Ethernet cable
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1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Wireless Network Communications Link.
- The Contractor shall furnish the ENGINEER with any warranties on materials provided by the Manufacturer or Vendor as normal trade practice.
- A Wireless Network Communications Link is used to network two Traffic Signal Cabinets together. Each link consists of Master ODU (Out Door Unit, *Antenna*) connected to a data switch within one of the signal cabinets and a Slave ODU connected to a data switch within the other signal cabinet. Each ODU is aligned to face the opposing ODU. The cable length between the ODU and its associated data switch may not exceed 300 feet.
- Wireless Network Communications Link components at each of the linked traffic signal cabinets includes an ODU, a LPU (Lightning Protection Unit), power supply mounting hardware, and CAT 5e cabling. The ODU is pole mounted per manufacturer's specifications. The LPU and power supply are mounted within the traffic signal cabinet. CAT 5e cable is installed between the ODU and LPU.

1.3.2 Site Survey

- **Perform a radio path Site Survey test before installing any equipment.** For the applicable frequency spectrum of the radios being deployed, perform a spectrum analysis to ensure no competing equipment in the area. Ensure the radio path site survey test is performed using the supplied brand of radio equipment to be deployed. Typically, if the ODUs can be mounted with clear line of sight between them, this is sufficient to ensure proper operation. If this is not possible, it may be determined that a repeater station is necessary to complete the intended link. Provide the test results to the ENGINEER for review and approval. Submit copies of the test results and colored copies of the frequency spectrum scan along with an electronic copy of this information. The ENGINEER will approve final locations of the ODUs and any necessary repeater stations.

1.3.3 Antenna

- Install each ODU in such a manner that avoids conflicts with other utilities (separation distances in accordance with the guidelines of the NESC) and as specified in the ODU manufacturer's recommendations. Secure the ODU mounting hardware to the pole and route the CAT 5E cable such that no strain is placed on the RJ-45 connectors. Align each antenna/radio to be perpendicular to the ground (using bubble level) and to face the opposing radio

1.3.4 Cable

- Install Cat 5E cable between the ODU and the LPU. Terminate each end with compatible RJ-45 connector. Perform end-to-end continuity test and 1 GigaBit/sec transmission tests using Ethernet Twisted Pair test gear. Provide test results to ENGINEER.
- Lightning Protection Unit (LPU)- Install LPU in Signals cabinet per manufacturer's instructions. Connect CAT 5e cable to LPU

1.4 Measurement

- Pay Item 677048B INSTALL WIRELESS NETWORK COMMUNICATIONS LINK BETWEEN TWO TRAFFIC SIGNALS is measured as EACH unit. This pay item includes furnishing mounting hardware and cable for ODU, installing ODU and cable, installing cabinet equipment, and adjusting ODU as needed for optimum communications for both ends of the link (Master ODU at one signal and Slave ODU at the other signal. Actual ODUs and associated equipment provided by others (generally SCDOT).

1.5 Payment

677048B	INSTALL WIRELESS NETWORK COMMUNICATIONS LINK BETWEEN TWO SIGNALS	EA
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Supplemental Technical Specification for Detector Loop

SCDOT Designation: 678.1

1.1 Description

This work shall consist of furnishing and installing a Detector Loop within and alongside the roadway, at the locations shown on the Plans, and in accordance with Standard Drawing 675-120-00. A Detector Loop installation shall consist of: installing the required conduit runs; making the pavement saw cut; placing the required number of turns of loop wire in the saw cut; creating a twisted pigtail; splicing the pigtail to the shielded, twisted pair lead-in cable; connecting the lead-in cable to the back-panel terminals at the controller cabinet; verifying proper detection of traffic; and sealing the saw cut. Several items used to create a complete detector installation are specified elsewhere. They are: FURNISH AND INSTALL ELECTRICAL CONDUIT; and FURNISH AND INSTALL SPLICE BOXES/ JUNCTION BOXES. The "junction point" referred to in the specifications below, is defined to be a splice box, or a conduit junction box as specified on the Plans.

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.2 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Detector Loop.
- The LOCATION and SIZE of each loop shall conform to the Plans and to the Standard Drawings.
- The front of each loop shall typically located 12 to 36 inches in front of the Stop Line, however, the final location will be determined by the ENGINEER based on field conditions.
- Center loops in the traffic lane in accordance with the Standard Drawings and as shown on the Plans.
- Stage loop installation so that each entire loop installation (from saw cut to sealing) is completed within the same working day with minimum blockage of traffic.
- Cut all presence loops, left turn lanes and side streets, in a quadrupole design, in accordance with the standard drawings.
- Provide a 5-year workmanship warranty for the loops following Final Acceptance. The CONTRACTOR will return to repair or replace any loops rising up or pulling from the pavement or not functioning within warranty period at no additional cost.

1.3.2 Saw Cuts

- Prior to cutting, mark the intended saw cut using paint or chalk on the pavement and obtain approval from the ENGINEER.
- The Contractor shall slot the roadway using a diamond or abrasive rotary power-saw with a blade approximately 3/8 INCH IN WIDTH.
- Use a power-driven walk-along model saw, not a hand-tool.
- The MINIMUM DEPTH of each Saw cut shall be:
 - 2 INCHES DEEP in CONCRETE; and
 - 2-1/2 INCHES DEEP in BITUMINOUS pavement; and
 - 3 INCHES DEEP for any Quadrupole loop or loop with 4 turns.
- Cut the corners diagonally to prevent sharp edges in accordance with the standard drawings. Extend the saw cuts to provide full-depth.
- Wash out and blow dry saw cuts to ensure the cut is free from dust, grit, oil and moisture before the placement of wire. Use compressed air to blow dry.
- If the Engineer gives written approval, the curb and gutter may be saw cut. If saw cutting of curb and gutter is not permitted, drill a 1 1/2-inch hole under the curb at a 45 degree angle.
- Avoid pavement seams or cracks. However, when it is necessary to traverse a crack, drill a 2-inch diameter hole at least 3 inches deep, and provide slack in the loop wire to allow for expansion and contraction.

1.3.3 Loop Wire

- Install each loop wire in a continuous and splice-free manner.

- Do not install provide any wire with cuts, breaks, or nicks in the insulation. The Engineer will not accept damaged loop wire.
- Wire all loops in one direction, counter-clockwise only.
- Each loop shall have the number of turns shown below, or as indicated on the Plans.
 - 6' x 6', 6' x 10' – 4 turns
 - 6' x 15', 6' x 20', 6' x 30', 10' x 20', 10' x 30' – 3 turns
 - 6' x 40', 6' x 50', 10' x 40' – 2 turns
 - Quadrupole loops shall have twice the turns in the middle cut, and be wired in a figure eight pattern, counter-clockwise only
- Form each Detector Loop by installing one continuous length of single conductor (loop) wire in a separate saw cut, from the nearest approved "junction point", around the loop the specified number of turns, then back to the "junction point".
- Place the wire in the cut so that there are no kinks or curls, and no straining or stretching of the insulation around the corner of the slot, or at the junction.
- Press the wire to the bottom of the saw cut slot, using a roller or a blunt-stick (similar to a paint stirrer), to seat the loop wire at the bottom of the slot or channel. Do not use a screwdriver or similar sharp tool as this may damage the loop wire insulation.
- After placing the wire in the slot, recheck it for slack, raised portions, and tightness.
- Use 1 INCH LENGTHS of 1/2 inch closed-cell foam-plastic (BACKER-ROD) at 2 foot spacings, to hold the wire at the bottom of the slot. DO NOT use backer-rod around the entire perimeter!
- Form the "pigtail" by twisting together the two ends of the loop wire from the corner of the loop to the "junction point"; Twist the two ends with a pitch of 15 TURNS PER YARD;
- Enclose the loop wire pigtail in conduit from the roadway edge to the "junction point".
- TEST each loop BEFORE SEALING, to ensure inductance is in the range of 50 to 2500 micro-Henrys. Ensure the insulation resistance measured to earth ground is greater than 100 megohms at 500 volts DC. Provide MEGGER TEST and INDUCTANCE TEST before and after sealing, and provide a written record of the test to the ENGINEER on company letterhead.

1.3.3 **Lead-In Cable**

- Install the lead-in cable in a continuous run, splice-free, and free from cuts or nicks in the insulation.
- At the specified "junction point", splice the twisted "pigtail" from the loop wire to the shielded, (twisted-pair) lead-in cable that runs from the "junction point" to the controller cabinet (terminal).
- Provide an electrically permanent and waterproof seal at the "junction point" splice. Remove 1-1/2 inches of insulation from each wire. Use either a crimped-on or twisted and soldered splice. No wire nuts are allowed. Waterproof seal the entire splice using a method described below:
 - a. Normal Splice – Splice each individual pair (pair of twisted loop wires meeting pair of loop lead-in wires), by using either a crimp-on or a soldered joint. Seal the junctions in a low-voltage, waterproof splice kit. Install the splice kit per the manufacturer's instructions.
 - b. Underwater Splice - Where required on the Plans, install an underwater splice kit according to the manufacturer's instructions.
- The ENGINEER must be present to witness the splicing. Any splices made without the presence of the ENGINEER are unacceptable, and shall be re-spliced.
- Leave sufficient slack in both the lead-in cable and the loop wire, to allow movement of 3 feet from the front of the "junction point". Neatly coil and nylon-tie the slack after completion of the splice.
- In the controller cabinet, label the lead-in cable on an insulated, preprinted-sleeve, slipped over the wire before attachment of a spade-lug connector. Crimp on a spade-lug connector onto each loop lead-in wire.
- In the controller cabinet, do not connect the ground (drain) wire from each lead-in cable; instead, cut it off at the cable sheath, and leave it floating.
- Run the lead-in cable in conduit (in accordance with 675.1 Electrical Conduit) from the "junction point" to the nearest signal pole, or directly to the cabinet if in the same quadrant.
- Run the lead in cable inside a conduit (riser) or metal pole, across span wires, and then down inside a conduit (riser) or metal pole, to the cabinet.
- Install one of the following for the conduit for lead-in cable required to be installed under sidewalks and curbs
 - Rigid Galvanized Steel Conduit
 - SCHEDULE 80 PVC Conduit
 - SCHEDULE 80 HDPE Rolled Conduit
 - Flexible Weather-Tight Steel Conduit

1.3.4 Sealant

- Use QPL approved Loop Sealant in all loops unless specified by the ENGINEER.
- Mix and apply Loop Sealant according to the manufacturer's directions.
- Do not pour Loop Sealant into saw cuts during precipitation of any kind, or at temperatures below 10° C (50° F).
- Completely fill the saw cut and drilled holes with Loop Sealant; do not allow bubbles below the surface; do not over fill the cut, ensuring only a minimum spillover along the joint. Use Duct-Seal to prevent sealant from flowing into conduit ends.
- When the sealant hardens, ensure there is neither a bulge nor depression, but rather a smooth road surface. Ensure the sealant is not over-poured, preventing bulges or bumps higher than the surrounding surface of the roadway. Wipe the area smooth with a squeegee.
- Ensure the sealant has hardened before allowing traffic to move over the area.

1.4 Measurement

- Detector loops shall be measured by LINEAR FEET of: loop wire, lead-in cable, and saw cut as actually placed, including sealant, electrical connections, testing, and incidental hardware. Note that conduit and splice boxes are measured elsewhere as separate items.

1.5 Payment

Loop Wire:

6770413	FURNISH & INSTALL NO. 14 COPPER WIRE, 1-CONDUCTOR FOR LOOP WIRE	LF
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Loop Lead-in cable:

See 677.1 Electrical Cable

6770389	FURNISH & INSTALL NO. 14 COPPER WIRE, 4 CONDUCTOR - GRAY	LF
6770394	FURNISH & INSTALL NO. 14 COPPER WIRE, 8 CONDUCTOR - GRAY	LF

Saw Cut:

6780495	SAWCUT FOR LOOP DETECTOR	LF
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Supplemental Technical Specification for Wireless Vehicle Detection System

SCDOT Designation: 678.2

1.1 Description

This work shall consist of furnishing a Wireless Vehicle Detection System to detect vehicles on a roadway by using battery-powered magnetometer-type SENSORS that communicate their detection data by RADIO RECEIVER &/OR REPEATERS to a CABINET INTERFACE before the data is relayed to a local traffic controller and, optionally, a central software system or a data server, or interface to such, as may be desired.

1.2 Materials

1.2.1 Overview

- 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. The SENSORS shall be located as specified by the intersection plans, with each SENSOR'S supporting CABINET INTERFACE or REPEATER installed as necessary to provide communications. Each SENSOR in an installation shall be capable of being individually configured with its own sensitivity level. A single SENSOR shall be capable of being configured with a sensitivity level that approximates the detection zone of a standard 6' x 6' inductive loop. 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. As an option as directed by the plans, up to two SENSORS properly configured shall be capable of detecting motorcycles in a standard traffic lane and bicycles in a designated bicycle lane. A CABINET INTERFACE shall support the relay of SENSOR detection data through several interfaces as required by the application.
- Communications between a SENSOR and RADIO RECEIVER can be direct, via a single REPEATER, or via two REPEATERS operating in tandem. Communications between the SENSORS and the RADIO RECEIVER or REPEATER and between the REPEATER and RADIO RECEIVER or another REPEATER shall be via radio. Detection data shall be relayed from each CABINET INTERFACE to a local traffic controller for real-time vehicle presence detection using contact closure signals or serial communication interface.
- As an option, data shall be capable of being relayed from each CABINET INTERFACE to a central software system or central server over standard IP (Internet Protocol) networks. An option to provide data via a web page interface may be required.

1.2.2 Radio Link

The radio links between each SENSOR and RADIO RECEIVER or REPEATER and between each REPEATER and RADIO RECEIVER or each REPEATER and REPEATER shall conform to the following requirements.

- 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.).
- The center frequencies, bandwidths, and transmit power levels of the radio links shall allow operation in an unlicensed frequency band.
- Frequency channels shall be employed by the SENSORS, CABINET INTERFACE, and REPEATERS to avoid interference with other devices operating in the unlicensed band.
- Either user-configurable frequency assignments or frequency hopping technology shall be provided. If frequency channels are user-configurable, at least 16 frequency channels shall be supported. If spread-spectrum/frequency hopping technology is provided ensure technology can address potentially interfering radio transmissions in the unlicensed band.
- 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.

1.2.3 Components

The Wireless Vehicle Detection System shall consist of one or more of the following:

- **SENSORS** - installed in-pavement in each traffic lane.
- **RADIO RECEIVER** - mounted on the side of the roadway.
- **CABINET INTERFACE**- CABINET INTERFACE located in traffic signal cabinet will provide SENSOR information processing and support the interface between a RADIO RECEIVER and a standard traffic controller using contact closure signals or standard serial communication interface such as NEMA TS2 Port 1.
- **EXTENSION MODULE** - to provide additional detector outputs to a traffic controller.
- **REPEATER** - Wireless REPEATERS mounted on the side of the roadway, serving to extend the radio range of a RADIO RECEIVER.
- EPOXY, CAT5 / ETHERNET CABLE, ELECTRIC CABLE, SOFTWARE (Incidentals)

1.2.4 SENSOR

- 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). The SENSOR shall sample the earth's magnetic field at a rate of 128 Hz. The SENSOR shall communicate time-stamped ON and OFF vehicle detection events. Each SENSOR shall automatically recalibrate in the event of a detector lock. Each SENSOR shall communicate by radio to a nearby RADIO RECEIVER or REPEATER RADIO. Each SENSOR shall transmit its detection data within 150 ms of a detected event. Each SENSOR shall automatically re-transmit a detected event if no acknowledgement is received from the access point. Each SENSOR may stop retransmission after 8 attempts. Each SENSOR shall transmit a unique identifying code. Each SENSOR shall respond within 100 seconds when the access point is powered on and transmitting. When no RADIO RECEIVER or REPEATER is present or powered on and transmitting, the SENSORS are not required to detect vehicles.
- All SENSOR components shall be contained within a single housing. The SENSOR housing shall conform to NEMA Type 6P and IEC IP68 standard. The SENSOR components shall be fully encapsulated within the housing to prevent moisture from degrading the components. The SENSOR housing shall be capable of being installed in a 4 to 4.5 inch diameter hole with a minimum 2.25 inches. A SENSOR shall operate at temperatures from -37°F / -38.3°C to +176°F / +80°C. 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.

1.2.5 RADIO RECEIVER (AT INTERSECTION)

- A RADIO RECEIVER shall support at least 48 SENSORS with a 0.125 second latency. A RADIO RECEIVER shall meet the temperature and humidity requirements of section 2.1.5 of NEMA Standard TS2-2003. All RADIO RECEIVER components (not including antennas) shall be contained within a single housing. The RADIO RECEIVER housing shall conform to NEMA Type 4X and IEC IP67 standards. A RADIO RECEIVER shall be no larger than 12"H x 8"W x 7"D.
- The RADIO RECEIVER shall communicate to the CABINET INTERFACE utilizing a standard CAT5e or higher Ethernet cable. The RADIO RECEIVER shall have a weatherproof Ethernet connector on the bottom. The Ethernet connector shall be shipped with a cover firmly attached to provide protection from the elements prior to cable connection. The weatherproof connector shall not require any specialized tools for installation.
- A means shall be provided for surge suppression and isolation between the radio receiver and the cabinet interface for a wired connection. Electrical isolation of 1000V or greater and transient / surge protection shall be provided for the interface between the Cabinet Interface and Radio Receiver. This may be provided integral to the devices or as a separate unit, or combination thereof.

1.2.6 CABINET INTERFACE

- Detection data shall be communicated to a standard roadside traffic controller via a CABINET INTERFACE capable of being installed in a standard 170 cabinet. Type 170, Type 2070 and ATC controller types shall be supported. As an option, detection data shall be communicated over TCP/IP via an integrated 10Base-T Ethernet interface or a NEMA TS2-2003 Port 1 serial interface. The CABINET INTERFACE shall be capable of simultaneously communicating detection data via the contact closure interface and other interfaces.
- Each CABINET INTERFACE shall be capable of communicating with at least 2 RADIO RECEIVERS. EXTENSION MODULES shall provide additional contact closures (user configurable from 1 to 4 outputs

each). The CABINET INTERFACE shall provide all the higher level processing and interface functions of the system. Each CABINET INTERFACE shall provide detector data as contact closure signals to the traffic controller or via a serial communications interface. A CABINET INTERFACE shall connect to standard 170/2070 input files or NEMA detector racks. One or more EXTENTION MODULEs shall provide up to 64 channels of detection data from a single CABINET INTERFACE's supported SENSORS, where each channel comprises an optically isolated contact closure relay and, if configured for TS2 operation, an additional output meeting TS2 requirements, to indicate the channel status. Each CABINET INTERFACE and EXTENTION MODULE shall be configurable. A CCI card shall provide contact closure signals in either presence or pulse mode. A CCI card shall provide up to 31 seconds of delay timing. A CCI card shall provide up to 7.5 seconds of extension (carryover) timing. The CCI and EXTENTION MODULE front panel shall provide status LEDs to monitor Detection channel status, and Faults. The CCI and EXTENTION MODULE front panel shall be either software or via front panel switches configurable to provide Presence or pulse mode, Delay timing and Extension timing.

- A CABINET INTERFACE or EXTENTION MODULE shall be powered by the input file/detector rack backplane via an 11- 26 VDC input. Power Consumption for a CABINET INTERFACE (without optional cellular interfaces) shall be under 5 watts. An EXTENTION MODULE shall be surge protected to GR-1089 standards. A CABINET INTERFACE and EXTENTION MODULE shall meet the requirements of NEMA TS2-2003, section 2.1.5 Temperature and Humidity, and section 2.1.7 Transients, Input-Output Terminals.

1.2.7 EXTENTION MODULE

- An EXTENTION MODULE shall be available to allow additional detector outputs to be interfaced to the traffic controller. When interfacing through the detector card rack, the extension module shall allow up to four detector outputs to be interfaced to detector card slot(s).

1.2.8 REPEATER

- A REPEATER radio communicating directly to a CABINET INTERFACE shall support at least 10 SENSORS. A REPEATER communicating to a CABINET INTERFACE via an intermediate REPEATER (i.e., tandem operation) shall support at least 6 SENSORS. A REPEATER shall be battery-powered, solar powered or a combination of the two. The REPEATER battery shall be field replaceable. A REPEATER shall meet the requirements of NEMA TS2-2003, section 2.1.5 Temperature and Humidity. All REPEATER components shall be contained within a single housing.

1.2.9 Epoxy

- The epoxy shall be a two part poly-urea based joint sealant. It shall have self-leveling characteristics. The surface the epoxy will be bonding to shall be free of debris, moisture and anything else which might interfere with the bonding process. The epoxy shall be approved by the manufacturer of the detection system. Epoxy is an incidental item to be included in installation of SENSORS.

1.2.10 Software

- Each SENSOR, access point contact closure, RADIO RECEIVER and REPEATER shall be capable of accepting software and firmware upgrades. The Wireless Battery-Powered Magnetometer Vehicle Detection System shall provide software operating on conventional notebook/portable PCs or utilize a standard web browser program to support configuration of a SENSOR, to support configuration of an access point, to support configuration of a REPEATER, to store and retrieve detection data.

1.2.11 Certification

- The Contractor SHALL FURNISH, the design details and drawings prior to installation in sufficient detail for complete evaluation and comparison with these Specifications.

1.2.12 Warranty

- Performance shall be warranted for a period of **60 months** of the date of purchase and shall include repair or replacement of any component of the Wireless Vehicle Detection System. Failure due to workmanship, materials, and manufacturing defects shall be warranted for repair or replacement of the first 60 months of the date of purchase. The vendor shall replace any failed components within 30 calendar days of notification.
- During the warranty period, technical support shall be available from the supplier via telephone within 2 business days of the time a call is made by a user, where this support shall be provided by factory-authorized personnel or factory-authorized installers.
- During the warranty period, standard updates to the software shall be available from the supplier without charge.

1.3 Construction

- Install wireless detection system in accordance with manufacturer's instructions.
- Install wireless detectors using coring and fill hole with epoxy to obtain flush mounted installation
- Install overhead receivers/ repeaters to ensure proper communications with detectors
- Coordinate with manufacturer or their representative to ensure proper system installation

1.4 Measurement

Pay Item 677049A includes furnishing and installing all necessary hardware, software, mounting hardware, equipment and components required to obtain detection zones complying with this specification and as shown on the plans or listed in the special provisions. Such payment shall be full compensation for installing all equipment, labor, and incidentals necessary to complete the work as specified. The other pay items listed below are specifically for furnishing and installing that item, and include any necessary mounting hardware, cable and other incidental items necessary for installation of that item.

1.5 Payment

677049A	FURNISH & INSTALL WIRELESS DETECTION SYSTEM PER SIGNAL	EA
6770494	F&I FLUSH MOUNTED WIRELESS SENSOR	EA
6770496	RADIO RECEIVER AT INTERSECTION W/ ANTENNA/MOUNTING KIT	EA
6770497	CABINET INTERFACE / SYSTEM CONTROLLER	EA
6770498	EXTENTION MODULE (FOR ADDITIONAL DETECTOR OUTPUTS)	EA
6770495	REPEATERS W/ ANTENNA/MOUNTING KIT	EA
6770501	FURNISH & INSTALL EPOXY TUBES	EA
6770505	FURNISH EPOXY APPLICATOR	EA

Supplemental Technical Specification for Electric Service

SCDOT Designation: 680.1

1.1 Description

This work shall consist of furnishing and installing an Electric Service to provide electric power to traffic signals, at locations shown on the Plans, and in accordance with the Standard Drawings and Power Company procedures.

1.2 Materials

- All materials shall be NEC compliant.
- Meter, Meter Box (Pan type), Hub Access.
- Power Connection – Single-phase, 120/240 Volt, 3-Wire, 60-Hertz alternating current supply.
- Cable - 3-Wire (W, BL, RD), THHN/THWN, No.6 AWG
- Disconnect Switch - NEMA Standard Type 3R, weatherproof, Circuit Breaker Type, with a tab for pad-locking the cover closed, 3-Wire Design (2-circuit), with solid neutral. The panel shall be completely enclosed; there shall be no gaps in the panel with the door shut.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Electric Service.
- Perform all work in accordance with the Plans, the Standard Drawings and the REQUIREMENTS OF THE LOCAL POWER COMPANY. All work shall be in accordance with the National Electric Code (NEC), and applicable local Codes.
- Coordinate with the ENGINEER and the Power Company Representative as necessary to arrange the schedule for power connection.
- The Engineer will provide contact information for the Power Company.
- Make all necessary arrangements with the Power Company to insure having the needed power available at the TIME OF SIGNAL TURN-ON. Immediately report any difficulties in securing the service of the Power Company to the Engineer.
- Coordinate with the Engineer and the Power Company to determine the exact location of the electric service. The Electric Service is generally located as indicated below:
 - a) Overhead service drop to controller pole;
 - b) Overhead service drop to service pole, then underground to controller cabinet (isolated);
 - c) Underground Power Company feed, to service on the back of controller cabinet.
- The CONTRACTOR shall obtain all ELECTRIC PERMITS required; and shall arrange for INSPECTION at completion.
- Use 1-inch diameter SCHEDULE 80 PVC Conduit and Fittings or Rigid Metallic Conduit for the Electric Service; install it to extend from the point of Power Company attachment, through the meter and disconnect assembly, to the controller cabinet, in accordance with 675.1 ELECTRICAL CONDUIT.
- Install a weather head to the above conduit for overhead service connections. Install a strain Clevis, to create a 1 foot minimum drip loop.
- Use rustproof hardware; use stainless steel or galvanized steel parts; use STAINLESS STEEL BANDS for attachment to steel poles.
- Space the bands a maximum of 3 feet and at the top and bottom of the pole.
- When specifically required by the Utility Company or on wood poles, substitute Conduit Clamps/strap, fastened with galvanized screws, for the bands.

1.3.2 Meter

- Provide a Meter for the electric service, unless otherwise directed by the Engineer. Provide the necessary hardware accordingly.
- The CONTRACTOR shall furnish and install the METER BOX (PAN), and the HUB.
- Provide power connection that is a SINGLE-PHASE, 120/240 VOLT, 3-WIRE, 60-Hertz alternating current supply.

Disconnect Switch

- Provide disconnect switch that is NEMA STANDARD TYPE 3R, weatherproof. It shall be CIRCUIT BREAKER TYPE, and have a tab for pad-locking the cover closed. It shall be of 3-WIRE DESIGN (2-circuit), with solid neutral.
- The CONTRACTOR shall twist a No. 6 AWG wire through the padlock tab, to prevent unauthorized entry and until SCDOT installs a padlock.

1.3.3 Electric Service

- Provide electrical service with components having the ratings stated in the following table, to provide a maximum of future flexibility and a minimum of voltage-drop to the lamps:

ITEM		USAGE	
		<i>Flashing Beacons</i>	<i>Traffic Signal</i>
Disconnect Breaker			
	Box Rating (for uniformity):	60 AMP	60 AMP
	Circuit Breaker (one side):	20 AMP	50 AMP
Cable			
	3-Wire (W, BL, RD), THHN/THWN	No.6 AWG	No.6 AWG
Conduit			
	Schedule 80 PVC (Wood Poles)	1 inch	1 inch
	Rigid metallic (galvanized or aluminum) for steel or concrete poles	1 inch	1 inch

- Install Electrical Service Cable (Type THHN/THWN, sized per above table, 3-WIRE, (White, Black, red) 600 Volt, Copper only, stranded, with cable lugs) from the point of Power Company attachment to the Meter. From the meter to the cabinet install white, (black or red) and green. Install Electrical Service Cable in separate conduit from all other Electric Cable that connects to signal heads, pedestrian head or detection. At no place shall the service cable be in the same conduit as signal cables or loop lead-ins.

1.3.4 Ground System

- Ensure the resistivity of the electrical system EARTH GROUND shall be 15 OHMS OR LESS, as measured with an appropriate instrument which was calibrated not more than 60 days prior to the date of performing such tests.
- Ensure the poles, ground rods, ground wires, span wires, etc. forming the traffic signal, form a "GROUNDING ELECTRODE SYSTEM" as defined by Article 250 of the NATIONAL ELECTRIC CODE.
- Provide a 16 mm by 5/8 inch by 8 feet (minimum) ground rod, copper-clad, with brass or bronze ground rod clamp. EXOTHERMICALLY WELD the service ground rod; Connect all other ground rods with clamps.
- Provide grounding wire for the service that is No. 6 AWG, Bare, solid or stranded copper wire Exothermically Welded. (Note that this is in addition to the solid grounding wire running down each wooden pole.)

1.4 Measurement

- Complete Electrical Service shall be measured by EACH service installed in place, as shown on the Plans. It shall include all necessary conduit (trenched and/or riser), cable, conduit fittings, hardware, ground rod, banding, clamps, lugs, and all other materials and equipment specified or directed by the ENGINEER or Power Company. (Usually, there shall be no additional measurement of electrical cable used; there shall be no additional measurement of conduit used.) When an "Isolated electric service" is required by the Plans, an item and quantity will have been provided for wooden pole, as required.

1.5 Payment

6800499	FURNISH & INSTALL ELECTRICAL SERVICE FOR TRAFFIC SIGNAL	EA
6800500	MODIFY EXISTING ELECTRICAL SERVICE FOR TRAFFIC SIGNAL	EA

Supplemental Technical Specification for Splice Box / Junction Box

SCDOT Designation: 680.2

1.1 Description

This work shall consist of furnishing and installing a Splice Box or Junction Box at the locations shown on the Plans in accordance with these specifications and Standard Drawings 675-130-01, 675-130-03.

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Electrical Conduit.
- Provide a Splice Box including a Box and Cover, installed over aggregate, in accordance with the Standard Drawings.
- Install the Splice Box for use as a signal cable electrical enclosure.
- Install the Junction Box, where indicated on plans, for use as a loop detector "junction point". Unless shown mounted on a pole, install the junction box in the dirt, at the depth of the conduit run, and covered with earth.

1.3.2 Splice Box

- Construct the Splice Box in accordance with the Standard Drawings, at locations shown on the Plans.
- Construct the Splice Box such that when the Box and Cover are in place, they are flush with the adjacent pavement, ground, or sidewalk, as shown in the Standard Drawings.
- Place patching Concrete around any Box installed in pavement.
- Place boxes at least 1 foot behind the curb-line or edge of roadway or as shown on the plans.

1.3.3 Placed Before Pouring.

- Where shown on the Plans, place Custom Splice Boxes in roadways or structures, prior to pouring the concrete. Typical usage would be in a bridge deck. Firmly attach the incoming conduit to the bottom reinforcement bar mat, or to the bottom wire-mat, using plastic tie-wraps every 2 feet. CAUTION: COMPLETELY PLUGG/BLOCK/SEAL THE BOTTOM OF THE SPLICE BOX AND THE CONDUIT ENDS TO PREVENT CONCRETE PENETRATION. When used on a bridge, install the Splice Boxes near the center line, and terminate the conduit in Splice Boxes at each end.

1.3.4 Conduit

- Install conduit (in accordance with 675.1 ELECTRICAL CONDUIT) to enter the Box at the bottom and to extend at least 2 inches beyond the inside wall.
- Install conduit to enter from the direction of the run unless otherwise permitted by the ENGINEER.
- Ensure all metallic conduit ends within the Box have grounding bushings with plastic inserts; and ensure they are bonded using #6 AWG bare copper ground wire. Provide end bushings to prevent chaffing in plastic conduits.
- After placing the electrical cable, pack the completed conduit ends with "duct-seal" or other equivalent material to prevent water from entering the conduit. Insert steel wool at conduit ends to prevent rodent/pest intrusion. Cap spare conduit.

1.4 Measurement

- Furnishing and installing Splice Boxes will be measured by EACH Box placed complete, including Box, Cover, aggregate, patching concrete, ground wire, ground bushings, sealing, and all miscellaneous hardware and incidentals required.
- Furnishing and installing Junction Boxes will be measured incidental to the conduit to which it is used with.

1.5 Payment

6800518	FURNISH & INSTALL 13"X24"X18"D.ELEC.FLUSH UNDGRD.ENCLOSURE-(STR.POLY.CONC.) HD	EA
680052C	FURNISH & INSTALL 17"X30"X24"D.ELEC.FLUSH UNDGRD.ENCLOSURE-(STR.POLY.CONC.) HD	EA
6800508	FURNISH & INSTALL 12"X12"X12"D.ELEC.FLUSH UNDGRD.ENCLOSURE-(STR.POLY.CONC.) HD	EA
6888100	INSTALL ELECTRICAL FLUSH UNDERGROUND ENCLOSURE	EA

Supplemental Technical Specification for **Wood Pole / Back Guy Assembly**

SCDOT Designation: 682.1

1.1 Description

This work shall consist of furnishing and installing CCA treated Wood Poles and Back-Guy cable assemblies, of the types and sizes shown on the Plans, in accordance with these Specifications, and in close conformity with the lines shown on the Plans and in accordance with the Standard Drawings, 675-115-01, 675-115-02. Each wood pole installation shall include all related overhead and underground hardware, and back guy assemblies as provided elsewhere.

1.2 Materials

Furnish a wood pole meeting the following requirements:

- Southern Yellow Pine that is cut, stored, seasoned, and manufactured in accordance with specification ANSI 05, 1-19-79.
- Prohibited defects include:
 - Red heart
 - Shakes in the tops of poles
 - Short crooks
 - Double-sweep
 - Splits or through-checks
 - Nails or spikes
 - Excessive knots
 - Scars deeper than 1 inch or longer than 3 feet
 - Excessive butt-swell
 - More than one twist per pole length
 - Sweep in two planes
- All poles shall be straight to the extent that a line drawn from the center of the butt end, to the center of the tip end shall lie within the middle two-thirds of the body of the pole at all points.
- Poles shall also be free from short crooks, in which the surface deviation from straightness in any 5 feet of length exceeds 1.5 inches at any location, as determined by a straight edge.
- Each pole shall be prepared and pressure-treated in accordance with American Wood Preservers Association (AWPA) Standards C1, C3, C4, and M1. Treatment shall be "SALT TREATED", CCA-CHROMATED COPPER ARSENATE, and shall conform to AWPA Standard P5. The retention of the treatment shall be tested in accordance with AWPA Standard M2. The minimum penetration shall be 3 inches, or 90 percent of the sap-wood. The retention shall be at least 0.60 POUNDS PER CUBIC FOOT, as determined by AWPA Standards.
- Provide Class II pole in the length specified in pay item.
- Each pole shall have a "brand" 12 feet above the butt-end, showing the Manufacturer, Plant-location with month and year of treatment, "Southern Pine CCA", and the Pole Class and Length. A Metal Tag showing Pole Length and Class shall be fixed to the butt-end; and the Length and Class shall be stamped on the top-end.
- Each pole shall have the "Brand Mark" of an inspection-company that has been approved by the Department.

Furnish Back-Guy Assembly as follows:

- From the top-down, a Back-Guy Assembly shall consist of: eye-type thru-bolt, guy-hook, strandvise (or 3-bolt clamp), jumper-bonding clamp, the steel cable (3/8-inch guy-cable stranded), another strandvise (or 3-bolt clamp), and a Screw-type guy anchor.
- All parts shall be as shown on the Installation Details or the Standards. All hardware shall be hot-dip galvanized in accordance with ASTM Standard A-153 to ensure rust proof.
- Acceptable parts are:

- a) Guy Anchors - One piece screw type guy-anchors, shall conform to EEI-TD-2, 1 inch diameter, 8- FEET LONG, thimble eye type. (Joslyn No. J-6550-WCA or approved equal)
- b) Guy Guards shall conform to REA Item "AT" yellow plastic (PVC) sunlight resistant, 8 feet long.
- c) Spool Insulators shall conform to REA Item "CM".
- d) Insulators shall conform to REA Item "W".
- e) Machine Bolts shall conform to REA Item "C".
- f) `J' hooks - Reliable No. 5552 (or approved equal).
- g) Guy and Messenger Cable Dead Ends - Reliable Universal Strandwise (or approved equal)
- h) Thimbleye Bolts shall conform to EEI-TD-4.
- i) Thimble Nuts shall conform to EEI-TDJ-5.
- j) Washers shall conform to EEI-TDJ-10.
- k) Angle Thimbleye shall conform to REA Item 5.
- l) Cable- 3/8 INCH DIAMETER CABLE (682.3 STEEL CABLE)
- m) Cable Clamps: 3-bolt clamps shall conform to EEI-TDJ-23, (4 inch and 6 inch sizes)
- n) Clevises shall conform to EEI-TD-20.
- o) Side-walk Bridge-over shall be a stress supporting spreader-type, bolting to the wood pole.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Wood Poles and/or Back-Guy Assemblies.

1.3.2 Utility Poles

- Install poles used for joint-use UTILITIES, in accordance with all local codes, and with the requirements of the Utility Company. Provide Cross Arms if required by the Utility Company.

1.3.3 Location

- Install the pole in the general location shown on the Plans.
- Coordinate with the Engineer to stake the field location of the pole, considering the property lines, underground utilities, and overhead clearances (including the guy anchor assembly).
- Engineer will approve staked locations, however contractor is responsible for locating utilities.
- If utility conflicts are discovered, relocate pole in coordination with the Engineer's approval.
- The pole location may have to be moved based on unmarked utilities.

1.3.4 Hole

- Drill a 6-foot DEEP hole, unless indicated otherwise in standard drawings.
- The diameter of the hole shall be larger than the pole by approximately 4 inches all around.
- Ensure the hole is a uniform diameter, and cleanly augured.

1.3.5 Installation

- Install poles to be vertical; if poles are corner signal poles, RAKE the pole away from the strain, 2 to 4 inches per 10 feet length.
- Install back guy assembly in line with the strain of each span wire.
- After installing, back-fill the hole with clean earth or sand (no rocks or debris), placed in 1 foot layers; moisten and compact each layer.
- Remove excess earth from the site; A 2-inch mound around the pole base is acceptable.

1.3.6 Sidewalk

- When installing the pole in a sidewalk, cleanly cut out the sidewalk 6 inches larger than the pole on all sides.
- Install conduit runs in the cut.
- Install as indicated in 1.3.5 Installation, leaving 4 inches for concrete placement.
- Install expansion joint material around the pole and tack in place, after installation of the pole and back filling the hole.
- Pour concrete around the pole to a depth of 4 inches; neatly troweled level. This work is incidental to pole installation.

1.3.7 Grounding

- Ground each pole in accordance with the Standard Drawings.
- Install a No. 6 AWG, SOLID, bare-copper ground wire (ASTM B2) to run the entire length of wooden poles, and extend 6 inches above the top end.
- Securely attach and bond the ground wire to the pole while it is lying on the ground.

- Ensure the ground wire extends 6 inches above the top end with a 2-foot coil (slack) at the top end, and extends down to the bottom with another 2-foot coil on the bottom end.
- Attach the ground wire (and the coils) using galvanized 1-1/2 inch wire staples, on (2 foot) centers above 14 feet, and on 1 foot centers below 14 feet. (The spacing change will be at 8 feet above grade.)
- Provide Ground Rods that are copper-clad, conforming to EEI-TDJ-30, having a minimum size of 5/8 inch by 8 feet in length.
- Use a ground rod clamp that is heavy-duty bronze or brass.
- Provide a GROUND ROD on one wood pole at each intersection, typically on the pole having the electrical service from the Power Company.
- Drive the ground rod vertically into the earth, until it extends about 2 inches above local grade.
- Use a separate No. 6 AWG bare, STRANDED/SOLID copper wire to bond the electrical service and the overhead cable (and pole ground wire) system to the ground rod, using a grounding clamp.

1.3.8 Back- Guy Assembly

- Back Guy each wood pole used to support signal span wires.
- Install Back-Guy Assemblies on wood poles used to support messenger cables especially at turns, and as directed by the ENGINEER.
- Install sufficient numbers of back-guy assemblies to ensure the stability of wood pole installations. This may include:
 - Double-guying
 - Extra-large anchors
 - Re-guying Utility Company poles.
- Install a Back-Guy Assembly:
 - a) Where shown on the plans;
 - b) In conjunction with installation of Steel Cable as span wire;
 - c) In conjunction with the installation of a wooden pole;
 - d) Where required by the Utility Company to "dress" pole to which signal equipment is attached; or,
 - e) At corner/turning wood poles that are used for messenger cable runs.
- A separate pay item is provided for Back Guy installation
- Inform the ENGINEER when additional back guy assemblies are required.
- Ensure the number and size of Back-Guy assemblies is fully sufficient to anchor every wood signal pole, corner messenger cable pole, and Utility Company pole (where required).
- Stage the installation of the wood pole, Back-Guy Assembly, and the span wire, for the safety of the motorist, pedestrian, and signal construction worker.
- Stretch, adjust, and then RE-ADJUST the span wire and Back-Guy Assembly to produce the specified amount of span wire sag, the proper signal head road-clearance, and still create a nearly vertical wood pole.
- Ensure the Back-Guy Assembly is sufficiently strong to handle the pull of all span wires, considering the earth/soil type into which the ground anchor is buried. Provide EXTRA LARGE ANCHORS and/or MULTIPLE-ANCHOR ASSEMBLIES if needed. Use special anchors for solid rock.
- Where a pedestrian sidewalk is adjacent to a wood pole, furnish a sidewalk "bridge-over" assembly.
- Ensure the compass angle of the Back-Guy is reasonably IN LINE with the strain of the overhead cable: that is, in line with each span wire. For corner signal wood poles, install two (2) Back-Guys, installed at right angles to each other. Using a single diagonal Back-Guy is generally unacceptable, unless approved by the ENGINEER.
- Install the Back-Guy (wherever possible) to provide as a minimum: rise=2 / run=1 (i.e. 2/1). For example, if the Back-Guy is attached at 26 feet, the anchor should be at a minimum of 13 feet from the pole. This corresponds to an angle with the earth of about 60 degrees.
- Perform all work within the public Right of Way, and take particular to assure that the Back-Guy does not extend into private property.
- Install the Back-Guy where it will not interfere with traffic, giving particular attention to private driveways. Where damage is likely (e.g. edge of driveway) install a STEEL GUY GUARD to protect the cable. When shown on the Plans, place a CONCRETE TIRE/WHEEL STOP (curb) at the base of the Back-Guy, anchored/pinned with 2 feet pieces of reinforcement bar.
- Do not splice the steel cable used in the Back-Guy assembly.

1.3.9 Inspection

- The ENGINEER will inspect each installation of wood pole, span wire, signal heads, and Back-Guy, for proper clearance, dress, and tension. At the direction of the ENGINEER, the CONTRACTOR shall re-install or replace improper installations, without further compensation.

1.3.10 Acceptance

- Acceptance of each wood pole shall include checking for the pressure-treatment inspection company Brand Mark, plus visual inspection by the ENGINEER.
- The visual inspection shall be made of the pole, overhead cables, grounding, and back guy assembly.
- The complete installation shall be structurally sound, and the final pole placement shall be vertical, or raked as specified.
- Contractor shall replace any poles NOT meeting this inspection, without further cost to the project.

1.4 Measurement

- Furnishing and installing wood poles, will be measured by EACH, of the Size specified, erected in place as shown on the Plans, including grounding, and all miscellaneous hardware and related work activity as required.
- Furnishing and installing Back-Guy Assemblies, will be measured by EACH, erected in place in accordance with the Specifications and as shown on the Plans, including all miscellaneous hardware as required.
- Additional Back-Guy Assemblies that are installed for reason of situations or conditions that arise during construction, will be paid, and shall be measured by EACH.

1.5 Payment

Wood Pole

6825020	FURNISH & INSTALL 35' WOOD POLE - CLASS II - CCA TREATED(0.60)	EA
6825021	FURNISH & INSTALL 40' WOOD POLE - CLASS II - CCA TREATED(0.60)	EA
6825023	FURNISH & INSTALL 50' WOOD POLE - CLASS II - CCA TREATED(0.60)	EA
6825025	FURNISH & INSTALL 60' WOOD POLE - CLASS II - CCA TREATED(0.60)	EA

Back-Guy Assembly

6825045	FURNISH & INSTALL 3/8" BACK GUY FOR WOOD POLE	EA
6825046	FURNISH & INSTALL 3/8" SIDEWALK GUY	EA
6825047	FURNISH & INSTALL 3/8" AERIAL GUY	EA

Supplemental Technical Specification for Steel Cable

SCDOT Designation: 682.3

1.1 Description

This work shall consist of furnishing and installing splice-free lengths of Steel Cable with cable supports, for mounting signal heads, signs, interconnect runs at locations shown on the Plans and in accordance with the Standard Drawings.

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Steel Cable.

1.3.2 Span Wire

- Install all Span Wire as shown on the plans and in accordance with the Standard Drawings. Note that different methods and materials are required for Wood Poles and Steel Poles.
- Before erecting the Span Wire, the Contractor shall determine the length of cable required to span the distance indicated on the Plans. Allow sufficient additional length to compensate for sag, pole connections, and adjustments, to make the whole assembly consistent with the plans and the Standard Drawings. NO MID-SPAN SPLICES SHALL BE PERMITTED.
- Set the Span Wire so that the height of the installed signal heads, including all hardware, shall conform to the clearances shown on the Standard Drawings.
- Do not permanently "tied-off" the Span Wire until all signal heads, signs, and cables are in place.
- Do not erect any Span Wire which lays on, or is likely to rub a Utility Company's cable. Protect any Span Wire erected within 6 inches of any other cable, wire, or structure with plastic wire-guards.
- When required by the Utility Company, or by the applicable electrical Code, install strain-type fiberglass insulators.
- **Cables from STEEL POLES**
 - a) Steel Poles are essentially electrical conductors.
 - b) Use a Roller Type Pole Clamp attached at the proper height.
 - c) Secure the free-end of the cable with a 6 inch galvanized steel clamp, with 5/8 inch galvanized bolts. Place the clamp approximately 1 foot from the pole. Cable-grips are not permitted.
 - d) Cover the ends of the cable with "servisleaves" to prevent unraveling.
 - e) The SAG shall be 3%, TO 5%, fully loaded.
- **Cables from WOODEN POLES**
 - a) Wooden poles are essentially electrical insulators, and thus require extensive GROUNDING and BONDING procedures, in accordance with the Standard Drawings.
 - b) The SAG shall be typically 5%, fully loaded.
 - c) The height of attachment shall be sufficient to provide the required road-clearance, including sag.
 - d) Shall be installed in accordance with the requirements of the Utility Company.
 - e) May require the installation of a back guy assembly as required in 682.1 WOOD POLE/BACK GUY ASSEMBLY.
 - f) Shall be electrically bonded.

1.3.3 Messenger Wire

- Where Messenger Wire is attached to traffic signal poles, install it in the same manner as specified for span wire, but with relatively little sag.
- Where Messenger Wire is attached to utility poles, install it in accordance with the UTILITY COMPANY'S SPECIFICATIONS.

1.3.4 Tether Wire

- Where Steel Cable is specified to tether signal heads and/or traffic signs, install it in accordance with the Standard Drawings. Galvanized S-hooks should be used at the pole ends to permit "break-away" action.

1.3.5 Cable Supports

- Use Cable Supports to support electrical cables from span wire and messenger wire. Place Cable Supports at 10 INCH INTERVALS.
- When Aluminum Tie-Wraps are used, install by wrapping 3-full turns TIGHTLY around the bundle formed by the steel cable and all electrical cables then cutting off from the tape coil.

1.4 Measurement

- Measure Steel Cable of the SIZE specified by the LINEAR FEET of material as actually placed, which shall include cable supports, clamps, insulators, and all other miscellaneous hardware and fittings. (or other sizes as shown on the plans), and such payment shall be full compensation for furnishing and placing the cable, support rings, clamps, S-hooks, turnbuckles, and other incidentals required to complete the work as specified.

1.5 Payment

6825092	FURNISH AND INSTALL 3/8" GALVANIZED STEEL CABLE (Span Wire)	LF
6825090	FURNISH AND INSTALL 1/4" GALVANIZED STEEL CABLE (Messenger Wire)	LF

Supplemental Technical Specification for Pedestrian Pole and Base

SCDOT Designation: 682.4

1.1 Description

This work shall consist of furnishing and installing a Pedestrian Pedestal Pole and Base in accordance with these Specifications and the Standard Drawings (675-105-02, 675-105-03).

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Pedestrian Pole and Base.
- Install Pedestrian Pedestal Poles where shown on the Plans and as needed to accommodate pedestrian movements.
- Mount Pedestrian Pedestal Poles so that no portion of the assembly (including the pedestrian head) is closer than 24" inches to the face of the curb.
- Powder-coating may be required if pay item is provided or if specified in the special provisions or on the signal plans. Perform the powder-coating over the aluminum poles at the factory or during the manufacturing process.

1.3.2 Installation

- Construct the foundation to the dimensions shown on Standard Drawings.
- Capp two 1- inch conduit elbows at both ends and secured in place in the excavation before pouring any concrete. The size and number of elbows shall be that necessary to mate with the incoming runs.
- Ensure all conduit elbows shall extend beyond the side of the finished foundation by approximately twelve inches, in the direction of, and at a depth matching the incoming conduit.
- Set 4 Anchor Bolts using pre-formed templates (wood or metal), to provide a "bolt-circle" in accordance with the Dimension Chart, or with recommendations of the base manufacturer. Leave the templates in place for two days (48 hours) or until the forms are removed.
- Mix, place and test concrete in accordance with applicable portions of SCDOT STANDARD SPECIFICATIONS Sections 701, 702, 703, and 704.
- Fasten the pedestrian pole base to the concrete foundation using appropriate hardware.
- Erect and tightly screw the aluminum pole into the base.
- Tighten the setscrew to prevent counter rotation of the aluminum pole.

1.4 Measurement

- Furnishing and installing pay items include pedestrian pedestal pole, base, and foundation installation by EACH including all required incidental hardware and work to install.

1.5 Payment

6825480	FURNISH & INSTALL 4' BREAK-AWAY ALUMINUM PEDESTAL POLE AND BASE	EA
6825482	FURNISH & INSTALL 8' BREAK-AWAY ALUMINUM PEDESTAL POLE AND BASE	EA
6825484	FURNISH AND INSTALL 10' BREAK-AWAY ALUMINUM PEDESTAL POLE AND BASE	EA

Powder-coating Option:

6888192	POWDERCOATING OPTION FOR 4' ALUMINUM PEDESTAL POLE	EA
6888193	POWDERCOATING OPTION FOR 8' ALUMINUM PEDESTAL POLE	EA
6888194	POWDERCOATING OPTION FOR 10' ALUMINUM PEDESTAL POLE	EA

Foundation Only:

Only for use where pedestrian pole and base is provided by others.

6825486	INSTALL CONCRETE FOUNDATION FOR ALUMINUM PEDESTAL POLE	EA
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Supplemental Technical Specification for Signal Heads

SCDOT Designation: 686.1

1.1 Description

This work shall consist of furnishing and installing Signal Heads, LED Modules or Backplates of the types, sizes, and mounting specified, in accordance with these Specifications, the plans and in accordance with the Standard Drawings (675-105-01, 675-105-02).

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Signal Heads.
- The Contractor shall furnish the ENGINEER with any warranties on materials provided by the Manufacturer or Vendor as normal trade practice, including a minimum 5-year warranty for the LED modules.
- In addition, the Contractor shall provide a EIGHTEEN (18) MONTHS workmanship warranty following the FINAL ACCEPTANCE. If any signal head fails by reason of defective material or workmanship, including cracking, falling, peeling or fading, the Contractor shall furnish and install replacement signal heads at no expense to the Department.
- Signal LED modules shall have the incandescent look. Pixelated LED modules shall be supplied as replacement modules only as directed by the ENGINEER.
- The red section in the five section head shall be powder coated.
- Provide fully assembled Signal Heads with LED Modules and the appropriate mounting hardware
- Install Signal Heads where shown on the plans and positioned in accordance with the Standard Drawings.
- Ensure the top section of all vehicle signal heads mounted on the same pole or pedestal is within 6 inches of being the same height unless otherwise specified.
- Install all multi-section/ combination signal heads with their top sections at the same elevation as other signal heads.

1.3.2 Wiring

- Connect electrical cable to the terminals in each signal head to provide the proper display indication.
- Do not externally splice the cable.
- Run electrical cable in accordance with the Standard Drawings.

1.3.3 Mounting

- Provide mounting hardware that is from one manufacturer. The DEPARTMENT will not accept mix-matched mounting assembly parts.
- Tighten mounting assembly to manufacturer standards prior to installing.
- If overhead adjustments are required for aiming, contractor shall field tighten using spanner wrench; Contractor shall ensure that signal heads are securely mounted on span wire or mast arms.
- Mount all traffic signal heads as shown on the plans and in accordance with the Standard Drawings.
- Aim signal faces to ensure good visibility, and to the satisfaction of the ENGINEER.

1.3.4 Signal Backplate

- Fasten Signal Backplates using appropriate hardware recommended by the signal head manufacturer.
- Provide a Signal Backplate that matches signal head without cutting, bending, or breaking. Drilling holes to match screw patterns is acceptable.
- Provide a Signal Backplate in accordance with Standard Drawing.

1.4 Measurement

- The pay items for furnish and install Signal Heads will be measured using the EACH unit and includes furnishing and installing Signal Heads with LED modules as specified on the plans and including ALL mounting hardware, internal electrical connections and ALL required incidental hardware.

1.5 Payment

6865710	FURNISH & INSTALL 12" – 5 SECTION SIGNAL HEAD	EA
6865720	FURNISH & INSTALL 12" – 4 SECTION SIGNAL HEAD	EA
6865723	FURNISH & INSTALL 12" – 3 SECTION SIGNAL HEAD	EA
6865834	FURNISH & INSTALL BACKPLATE W/ RETROREFL.BORDERS FOR TRAFFIC SIGNAL	EA

Supplemental Technical Specification for Pedestrian Signal Head

SCDOT Designation: 686.3

1.1 Description

This work shall consist of furnishing and installing Pedestrian Signal Heads, Pedestrian LED Modules of the types, sizes, and mounting specified, in accordance with these Specifications, the plans and in accordance with the Standard Drawings. (675-105-02, 675-105-03, 675-110-00).

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Pedestrian Signal Heads.
- The Contractor shall furnish the ENGINEER with any warranties on materials provided by the Manufacturer or Vendor as normal trade practice, including a minimum 5-year warranty for the LED modules.
- In addition, the Contractor shall provide a EIGHTEEN (18) MONTHS workmanship warranty following the FINAL ACCEPTANCE. If any pedestrian signal head fails by reason of defective material or workmanship, including cracking, falling, peeling or fading, the Contractor shall furnish and install replacement pedestrian signal heads at no expense to the Department.
- Pedestrian Signal LED modules shall have the incandescent look. Supply pixelated LED modules as replacement modules only as directed by the ENGINEER.
- The pedestrian head and the mounting hardware are stated as one item.
- Install pedestrian signal heads where shown on the Plans or as needed to accommodate pedestrian movements.
- If multiple Pedestrian Signal Heads are required on the same pole or pedestal, mount within 6 INCHES of being the same height unless otherwise specified on the Plans.
- Mount Pedestrian Signal Heads so that no portion of the assembly is closer than 24 INCHES to the face of the curb.
- Mount Pedestrian Signal Heads to provide a clearance of 9 to 10 feet from the surface grade.

1.3.2 Wiring

- Connect electrical cable to the terminals in each Pedestrian Signal Head to provide the proper display indication when energized by the signal controller.
- Do not externally splice the cable.
- Run electrical cable in accordance with the Standard Drawings.

1.3.3 Mounting

- Use non-corrosive material in all hardware.
- Use FEDERAL YELLOW painted brackets, arms, and other hardware, unless noted otherwise in the plans or special provisions.
- Mount all pedestrian signal heads as shown on the Plans and Standard Drawings.
- See Standard Drawings for mounting information on Clamshell Mount, Side of Pole Mount, Single Post Top Mount, and Dual Post Top Mount.

1.4 Measurement

- The pay items for furnish and install Pedestrian Signal Heads will be measured using the EACH unit and includes furnishing and installing Pedestrian Signal Heads with LED modules as specified on the plans and including ALL mounting hardware, internal electrical connections and ALL required incidental hardware.
- There are separate pay items for furnishing and installing Pedestrian LED modules in existing pedestrian signal heads using the EACH unit.

1.5 Payment

6865782	FURNISH & INSTALL PEDESTRIAN SIGNAL HEAD	EA
6865783	FURNISH & INSTALL COUNTDOWN PEDESTRIAN SIGNAL HEAD	EA

Supplemental Technical Specification for Pedestrian Push Button Station Assembly with Sign

SCDOT Designation: 686.4

1.1 Description

This work shall consist of furnishing and installing a PEDESTRIAN PUSH BUTTON STATION ASSEMBLY AND PUSH BUTTON SIGN, of the types, sizes, and mountings specified in accordance with these Specifications, at locations shown on the Plans and in accordance with the Standard Drawings.

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Pedestrian Push Button Assembly.
- The Contractor shall furnish the ENGINEER with any warranties on materials that are provided by the Manufacturer or Vendor as normal trade practice.
- Install Push Button Station Assemblies where shown on the Plans, or as necessary to accommodate pedestrian movements.

1.3.2 Installation

- Install Push Button Station Assemblies on poles in a height of 3-1/2 to 4 feet ABOVE GRADE.
- Orient and wire the Push Button Station Assembly in such a manner to clearly indicate to the pedestrian, the crosswalk with which it is associated.
- Attach Push Button Station Assemblies to poles using 1 inch stainless steel bands or galvanized screwed directly to pole.
- If dual push button station assemblies are required, a single dual mounting bracket shall be used to allow for two push button station assemblies to be mounted with the buttons positioned below the sign.
- Firmly secure the finished assembly to the pole.
- Connect each Push Button Station Assembly with the appropriate electrical cable, and wire to actuate the proper phase of the controller. The necessary cable is specified as a separate item, in accordance with 677.1 ELECTRICAL CABLE.
- Do not splice the cable.
On metal poles, bring the cable for the push buttons through the rear of the assembly directly into the pole or controller cabinet. On wooden poles, use electrical conduit to bring the cable to the assembly.

1.3.3 Push Button Signs

- Install each push button sign on the station assembly to reflect the proper intention of the pedestrian movement.

1.4 Measurement

- The pay items for furnish and install Push Button Station Assembly with Sign will be measured using the EACH unit and includes furnishing and installing the Push Button, Push Button Assembly and Sign as specified on the plans and including ALL mounting hardware, internal electrical connections and ALL required incidental hardware.

1.5 Payment

6865793	FURNISH & INSTALL PEDESTRIAN PUSH BUTTON MICROSWITCH TYPE STATION ASSEMBLY (9"x12") AND SIGN (R-10-3E)	EA
6865794	FURNISH & INSTALL PEDESTRIAN PUSH BUTTON MICROSWITCH TYPE STATION ASSEMBLY (9"x15") AND SIGN (R-10-3E)	EA
6865795	FURNISH & INSTALL PEDESTRIAN PUSH BUTTON MICROSWITCH TYPE	EA
6865796	FURNISH & INSTALL PEDESTRIAN PUSH BUTTON SOLID STATE WITH LIGHT AND TONE STATION ASSEMBLY (9"x12") AND SIGN (R-10-3E)	EA
6865797	FURNISH & INSTALL PEDESTRIAN PUSH BUTTON SOLID STATE WITH LIGHT AND TONE STATION ASSEMBLY (9"x15") AND SIGN (R-10-3E)	EA
6865798	FURNISH & INSTALL PEDESTRIAN PUSH BUTTON SOLID STATE WITH LIGHT AND TONE	EA

Supplemental Technical Specification for LED Blankout Sign

SCDOT Designation: 686.5

1.1 Description

This work shall consist of furnishing and installing a LED Blankout Sign of Clam-Shell configuration, with Sun Visor and designated mounting hardware. of the types, sizes, and mounting specified, in accordance with these Specifications, the plans and in accordance with the Standard Drawings.

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to LED Blankout Sign.
- The Contractor shall furnish the ENGINEER with any warranties on materials that are provided by the Manufacturer or Vendor as normal trade practice.
- The Blankout Sign and the mounting hardware are stated as one item.
- Install the Blankout Signs where shown on the Plans, positioned according to the Standard Drawings.
- Hang Blankout Sign to ensure good visibility, to the satisfaction of the Engineer.

1.3.2 Wiring

- Connect electrical cable to the terminals in each Blankout sign to provide the proper display indication.
- Do not externally splice the cable.
- Run electrical cable in accordance with the Standard Drawings.
- Electrical cable shall be splice-free lengths of, NO. 14 COPPER WIRE, 4 CONDUCTOR, BLACK, see 677.1 Electric Cable

1.3.3 Mounting

- Use hardware that is non-corrosive material, or chemically compatible with the item being used.
- Use adjustable signal brackets to rigidly mount Blankout Signs.
- Use brackets and suspensions that are painted Federal YELLOW unless directed otherwise by the Engineer (Except mast arm mounts).
- Mount all Blankout Signs as shown on the Standards Drawings.

1.4 Measurement

- The pay items for furnish and install Blankout Signs will be measured using the EACH unit and includes furnishing and installing Blankout Sign housing, with appropriate LED module as specified on the plans and including ALL mounting hardware, internal electrical connections and ALL required incidental hardware.
- There are separate pay items for furnishing and installing Blankout LED modules in existing Blankout sign housing using the EACH unit and includes weather tight neoprene gasket and any other hardware or material necessary to complete installation.

1.5 Payment

6865820	FURNISH & INSTALL NO RIGHT/LEFT TURN SYMBOLIC LED BLANKOUT SIGN W/ SPAN WIRE MOUNTING	EA
6865821	FURNISH & INSTALL NO RIGHT/LEFT TURN SYMBOLIC LED MODULE	EA

Supplemental Technical Specification for Removal Salvage and Disposal of Equipment and Materials SCDOT Designation: 688.1

1.1 Description

This work consists of the removal and salvage or removal and disposal of equipment, materials or refuse that are not designated or permitted to remain. Contractor will dispose of these items in a manner that complies with all state and federal regulations governing disposal.

1.2 Materials

n/a

1.3 Construction

1.3.2 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Removal, Salvage and Disposal of Equipment and Materials.
- Carefully remove the items to be salvaged from the job site and return to the Department. The Contractor shall deliver, and obtain a RECEIPT for, the salvaged equipment, from the SCDOT District Signal Shop or the Local Government Signal Shops to which it was delivered. These receipts shall be presented to the Engineer.
- Remove equipment or material to be Disposed and properly dispose at an APPROVED LAND FILL (or material reclamation yard). Any materials designated as HAZARDOUS WASTE shall be disposed in compliance with the SC Department of Health and Environmental Control (DHEC) regulations.
- Any equipment or material to be Disposed shall not be re-sold by contractor as anything other than scrap material.
- Fill every hole caused by removing old equipment on THE SAME DAY. Back-fill, compact, and reseed/sod, in compliance with the Standard Specifications. Cleanly side-trim holes in PAVEMENT then bring to grade and finish with the same paving material as the adjacent pavement. Completely replace sidewalk "squares" (complete square), using forms and expansion material.
- Underground conduit and detector loops not utilized, shall be abandoned in place.
- FINAL ACCEPTANCE and Final Payment will be withheld, until the Contractor has completely demobilized, and until the Contractor presents the proper RECEIPTS indicating the salvaged equipment has been delivered..

1.3.3 Items that are Removed and Disposed of:

1.3.2.1 Concrete foundations

- Remove the foundations of ground-mounted cabinets completely. Remove the foundations of signal support poles to a minimum depth of 18 inches below surface grade, unless noted differently on the plans or in the special provisions.

1.3.2.2 Damaged Equipment

- Remove and Dispose of any signal equipment/material that is deemed by the Engineer to be damaged beyond salvaging.

1.3.2.3 Miscellaneous Equipment

- Remove minor equipment from the site and dispose. This includes steel cable, electrical cable, conduit, concrete pads, back guys and pullboxes / handboxes not utilized in the new signalization.

1.3.2.4 Wood Poles

- Remove Wood Poles that are not utilized in the new signalization and are not required by other utilities

1.3.4 Items that are Removed and Salvaged

1.3.3.1 Cabinet Assembly

- Prior to removal, clearly tag each cabinet, controller, conflict monitor, and any other major cabinet equipment item with the intersection name from which it is being removed. (*Fiber interconnect center, video detection cabinet equipment, Ethernet switch, fiber modem, radio cabinet equipment*)
- Record serial numbers for each cabinet, controller, and conflict monitor serial numbers and transmit to the Department

1.3.2.2 Signal Heads

- Prior to removal, clearly tag each signal head with the intersection name from which it is being removed.
- Carefully dismount signal heads keeping as much of the mounting hardware intact as possible.
- During the removal and delivery, take special care to prevent damage to the lenses and visors.

1.3.2.3 Pedestrian Equipment

- Prior to removal, clearly tag each pedestrian head, pedestrian pole and pedestrian button assembly with the intersection name from which it is being removed.
- Carefully dismount pedestrian heads and button assemblies keeping as much of the mounting hardware intact as possible.
- Ensure removal of pedestal pole includes related hardware (nuts, base).
- During the removal and delivery, take special care to prevent damage to the lenses and visors.

1.3.2.4 Metal Poles

- Prior to removal, clearly tag each steel strain pole with the intersection name from which it is being removed.
- Ensure removal of strain poles includes their related hardware (pole caps, bolt covers, hand hole covers, nuts, transformer bases, etc.).
- Bag related hardware and attach to steel strain pole and pedestrian pole to ensure materials remain together.

1.3.2.5 Splice Boxes

- Prior to removal, clearly tag each splice box with the intersection name from which it is being removed.

1.3.2.6 Signs

- Remove and salvage highway signs on existing span wires after the replacement signs have been installed.

1.4 Measurement

The pay item remove, salvage and disposal shall be paid as a lump sum per contract or as per each, which relates to remove, salvage, disposal items per signal. The lump sum pay item includes all signals named in the contract. The each pay item relates to each signal. Costs relating to transportation, disposal, pavement, pole foundation removal 18" below grade and grading repairs are incidental and are to be included in either pay item.

The cost for removing foundations for steel strain poles is provided as each, which is per pole foundation which is all removals needed per steel strain pole foundation removal. The related costs of transportation, disposal, concrete, pavement repair, etc., are incidental and shall be included in the bid price of Removal, Salvage, and Disposal.

1.5 Payment

6885990	REMOVAL, SALVAGE,& DISP.OF EXISTING TRAF. SIGNAL EQUIPMENT	LS
6885991	REMOVAL, SALVAGE,& DISP.OF EXISTING TRAF. SIGNAL EQUIPMENT	EA
	REMOVE FOUNDATION OF STEEL STRAIN POLE COMPLETELY	EA

Supplemental Technical Specification for Video Detection System

SCDOT Designation: 688.3

1.1 Description

This work consists of furnishing and installing video detection systems with all necessary hardware and software in accordance with the plans and Standard Drawings.

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Video Detection System.
- The Contractor shall furnish the ENGINEER with any warranties on materials that are provided by the Manufacturer or Vendor as normal trade practice.
- Arrange and conduct site surveys with SCDOT personnel to determine proper camera sensor unit selection and placement.
- Provide SCDOT at least 3 working days notice before conducting site surveys.
- Upon completion of the site surveys, provide SCDOT with revised plans reflecting the findings of the site survey.
- As determined during the site survey, install sensor junction boxes with nominal 6 x 10 x 6 inches dimensions at each sensor location. Provide terminal blocks and tie points for power cable
- Place into operation loop emulator detection systems. Configure loop emulator detection systems to achieve required detection in designated zones. Have a certified manufacturer's representative on site to supervise and assist with installation, set up, and testing of the system.
- Perform modifications to camera sensor unit for gain, sensitivity, and iris limits necessary to complete the installation.
- Do not install camera sensor units on signal poles unless approved by the ENGINEER
- Install a power cable appropriately sized to meet the power requirements of the sensors. At a minimum, provide three conductor 120 VAC field power cable.
- Install the necessary cables from each sensor to the signal controller cabinet along signal cabling routes.
- Install surge protection where coaxial video cables and other cables are required between the camera sensor and other components located in the controller cabinet. Terminate all cable conductors.
- Relocate camera sensor units and reconfigure detection zones as necessary according to the plans for construction phases.

1.4 Measurement

- Furnishing and Install Video Detection System shall be measured as EACH unit and shall include one camera, the cabinet equipment, and all mounting hardware and necessary cable to connect camera to cabinet equipment.
- Furnish and Install Add'l Camera with Hardware & Lead In shall be measured as EACH unit and includes furnishing and installing 1 camera and all mounting hardware and necessary cables to connect to cabinet equipment.

1.5 Payment

6886039	FURNISH & INSTALL VIDEO DETECTION CAMERA MOUNTING HARDWARE	EA
6886040	FURNISH & INSTALL VIDEO DETECTION SYSTEM W/HARDWARE & LEAD-IN	EA
6886041	INSTALL VIDEO DETECTION SYSTEM	EA
6886042	FURNISH & INSTALL VIDEO DETECTION CAMERA W/ HARDWARE & LEAD-IN	EA

Supplemental Technical Specification for Steel Strain Pole and Foundation

SCDOT Designation: 688.5

1.1 Description

This work shall consist of furnishing and installing Steel Strain Poles for traffic signal supports at the locations shown on the Plans and in accordance with the Standard Drawings, with anchor bolts and all miscellaneous hardware. This work shall also consist of installing a foundation for the steel strain pole in accordance with the Standard Drawings.

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Steel Strain Pole.
- The Contractor shall furnish the ENGINEER with any warranties on materials that are provided by the Manufacturer or Vendor as normal trade practice.
- Repair galvanized surfaces (poles) which have been scratched or abraded so that bare metal is exposed, by applying 2 coats of 90% (minimum) Zinc-rich, cold-galvanizing compound; to the satisfaction of the ENGINEER.

1.3.2 Location

- Install the pole in the general location shown on the Plans.
- Coordinate with the Engineer to stake the field location of the pole, considering the property lines, underground utilities, and overhead clearances.
- ENGINEER will approve staked locations, however contractor is responsible for locating utilities.
- If utility conflicts are discovered, relocate pole in coordination with the Engineer's approval.
- The pole location may have to be moved based on unmarked utilities.

1.3.3 Foundation

- Drill a hole, as indicated in the Standard Drawings.
- The hole shall be augured (earth-auger), and the concrete poured in UN-disturbed earth.
- Ensure the hole is a uniform diameter, and cleanly augured.
- If foundation cannot be constructed to meet Standard Drawings, provide an alternative foundation design signed and sealed by a SC PE.
- It may be necessary to use a jack-hammer in BED-ROCK; it may be necessary to use a heavy walled CAISSON to line the hole and to pump it dry in high water table areas or areas where springs are encountered. These materials, tools and additional labor are incidental to the project.
- Where shown on the Plans, or as determined by the location of underground utilities, it may be necessary to excavate a hole BY HAND. NO additional payment shall be made UNLESS an item has been established in the BID or Proposal for UNCLASSIFIED EXCAVATION (hand excavation of hole) - CUBIC YARDS.
- Construct the foundation as shown in Standard Drawing 675-115-02 including the rebar cage and conduit.
- Mix, place, pour and test the concrete in accordance with SCDOT Standard Specifications, Sections 701, 702, 703, and 704.
- Provide CLASS 5000 for the foundation. Place the concrete in one continuous pour with vibration.
- Set the Anchor Bolts using pre-formed templates (wood or metal), to provide a "bolt-circle" in accordance with the Standard Drawings or with recommendations of the pole Manufacturer. Leave the templates in place for 2 days (48 hours).
- Cap conduit elbows at both ends, and secure in place in the excavated hole before pouring any concrete.
- Each foundation shall have a minimum of 1-3", 3-2" and 2-1" conduits placed in accordance with the Standard Drawings. Provide additional conduits if shown on the plans. These conduits are incidental to the work.

- Terminate all conduit provided in foundation in a 13"X24"X18"splice box; the splice box shall be installed in accordance with 680.2 Splice Boxes / Junction Boxes. The splice box shall be paid separately.
- Ensure all conduit elbows extend beyond the side of the finished foundation by a minimum of 12 inches, in the direction of, and at a depth matching the incoming conduit. Where a conduit elbow is placed for future use, scribe an "X" in the foundation to indicate the side where such conduit enters. Ensure the conduit protrudes a minimum of 6 inches above the top of the finished concrete foundation.

1.3.4 Grounding

- Furnish and install ground rods and grounding wire with each foundation.
- Configure the ground rod with the foundation, as shown on the Standard Drawings.
- Use grounding clamps of brass or bronze to secure the grounding wire to the ground rod.
- Use a continuous ground wire to bond all metal parts together--pole ground stud; pedestal pole nut; pole-mounted controller cabinet ground; metal conduits; etc.

1.3.5 Installation

- Do not place the steel pole on the foundation for a minimum of 2 days (48 hours after individual pour)
- Do not place strain on the steel pole for a minimum of 7 days (168 hours after individual pour) or as otherwise directed by the ENGINEER.
- Rake each pole away from the line of span wire pull, by adjusting the nuts on the Anchor Bolts.
- When final load is applied, ensure there is a 6 inch (plus or minus one inch) rake at the top of the pole, opposing the direction of the stress.
- Restore the site to prime condition after the pole installation, back filling the area surrounding the pole with topsoil, raking it level and seeding. If the area is sloped, then use landscape turf.

1.3.6 Sidewalk/Island Installation

- When installing the pole in a sidewalk, cleanly cut out the entire "square" of the sidewalk and install the foundation as indicated above.
- Replace the sidewalk using expansion joint material to separate different "pours" and old/new concrete. This work is incidental, unless an item has been established for CONCRETE PATCH or for SIDEWALK.
- In concrete islands, saw-cut out a square opening 4 feet x 4 feet for the pole base and repair as stated above.
- When installed in SIDEWALKS or CONCRETE ISLANDS, contour the entire area and hand-finish to produce a neat visual line. Sharp edges or pedestrian hazards shall not be allowed.

1.3.7 Acceptance

- Acceptance of each pole shall include foundation strength testing plus visual inspection by the ENGINEER.
- The visual inspection shall be made of the pole, overhead cables, and grounding.
- The complete installation shall be structurally sound, and the final pole placement shall be vertical, or raked as specified.
- Contractor shall replace any poles NOT meeting this inspection, without further cost to the project.

1.4 Measurement

- Furnishing and installing 13" Diameter Steel Strain Poles and Foundations, will be measured by EACH, of the size(s) specified, and erected in place as shown on the plans. This shall include foundation, anchor bolts, nut covers, pole cap, reinforcing steel, ground rod, ground wire, and all miscellaneous hardware as required.
- Installing Concrete Foundation for Steel Strain Pole, will be measured by each, shall include reinforcing steel, ground rod, ground wire, and all miscellaneous hardware as required.

1.5 Payment

682505A	FURNISH & INSTALL 26' STEEL STRAIN POLE AND FOUNDATION	EA
6825050	FURNISH & INSTALL 26' STEEL STRAIN POLE (POWDER COATED) AND FOUNDATION	EA
6825056	FURNISH & INSTALL 26' STEEL STRAIN POLE (POWDER COATED OVER GALVANIZED) & FOUNDATION	EA
682505B	FURNISH & INSTALL 28' STEEL STRAIN POLE AND FOUNDATION	EA
6825051	FURNISH & INSTALL 28' STEEL STRAIN POLE (POWDER COATED) AND FOUNDATION	EA
6825057	FURNISH & INSTALL 28' STEEL STRAIN POLE (POWDER COATED OVER GALVANIZED) AND FOUNDATION	EA
682505D	FURNISH & INSTALL 32' STEEL STRAIN POLE AND FOUNDATION	EA
6825052	FURNISH & INSTALL 32' STEEL STRAIN POLE (POWDER COATED) AND FOUNDATION	EA
6825058	FURNISH & INSTALL 32' STEEL STRAIN POLE (POWDER COATED OVER GALVANIZED) AND FOUNDATION	EA

Supplemental Technical Specification for Concrete Strain Pole

SCDOT Designation: 688.6

1.1 Description

This work shall consist of furnishing and installing pre-stressed Concrete Strain Poles for traffic signal supports at the locations shown on the Plans and in accordance with the Standard Drawings, with all miscellaneous hardware. These poles shall be of the type intended for direct embedding, with the hole back filled with concrete.

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Concrete Strain Pole.
- The Contractor shall furnish the ENGINEER with any warranties on materials that are provided by the Manufacturer or Vendor as normal trade practice.
- Patch any concrete surfaces which have been chipped, chunked or damaged to the satisfaction of the ENGINEER with a commercial grade vinyl or epoxy based on concrete patching compound, according to manufacturer's instructions.
- CAUTION – Concrete poles are very heavy, quite long and are difficult to handle. Perform transportation, site handling and erection with acceptable equipment and methods and by qualified personnel. The Contractor is cautioned to have cranes, pole trailers and sufficient manpower to perform this work with total safety to the crew and to the motoring public. The Contractor shall review the manufacturer's shop drawings to identify proper pick-up points for lifting.

1.3.2 Location

- Install the pole in the general location shown on the Plans.
- Coordinate with the Engineer to stake the field location of the pole, considering the property lines, underground utilities, and overhead clearances.
- ENGINEER will approve staked locations, however contractor is responsible for locating utilities.
- If utility conflicts are discovered, relocate pole in coordination with the Engineer's approval.
- The pole location may have to be moved based on unmarked utilities.

1.3.3 Hole

- Augur the hole in undisturbed earth of the diameter and to the depth (at least) listed in the standard drawings or as recommended by the manufacturer (whichever is larger). Construct the embedding foundation as shown in Standard Drawing 675-115-02.
- Measure the depth and diameter of the hole with a tape measure to ensure it meets the required dimensions.
- If hole dimensions and backfill foundation cannot be constructed to meet Standard Drawings, provide an alternative foundation design signed and sealed by a SC PE.
- It may be necessary to use a jack-hammer in BED-ROCK; it may be necessary to use a heavy walled CAISSON to line the hole and to pump it dry in high water table areas or areas where springs are encountered. In Wet-lands or loose-sand, it may also be necessary to auger a larger hole. These materials, tools and additional labor are incidental to the project.
- Where shown on the Plans, or as determined by the location of underground utilities, it may be necessary to excavate a hole BY HAND. NO additional payment shall be made UNLESS an item has been established in the BID or Proposal for UNCLASSIFIED EXCAVATION (hand excavation of hole) - CUBIC YARDS.
- In bed-rock, a hole shall be jack-hammered out and be of sufficient depth to hold the design embedded length and a diameter to provide 3 inch clearance all around the concrete pole.

1.3.4 Grounding

- Furnish and install ground rods and grounding wire with each concrete pole.
- Drive the ground rod adjacent to the poured concrete embedding as shown on the Standard Drawing.
- Use grounding clamps of brass or bronze to secure the grounding wire to the ground rod.

- Use a continuous ground wire to bond all metal parts together--pole ground stud; pedestal pole nut; pole-mounted controller cabinet ground; metal conduits; etc.

1.3.5 Installation

- Place the concrete pole in the hole.
- Lift the pole into place, using a sling. A single point lift shall NEVER be used and such misuse could result in the ENGINEER rejecting that pole.
- Next, to lower the pole into the hole, insert a bar into the chocker hole (1/3 down the pole)(to prevent the strap from slipping) and use a single strap to raise one end of the pole vertically and jostle the butt end into the hole.
- Lower the pole into the hole and hold vertically by the crane.
- Using a pry bar through the "CANT" hole, rotate the pole so that all holes are at the proper compass orientation angle with the street and incoming conduit runs.
- Rake each pole slightly away (leaned away) from the direction of the span wire pull. For a concrete pole this will typically mean that the back side of the pole is vertically plumb.
- Backfill the hole back with concrete while supporting the concrete pole vertically with a pole or boom truck until the poured embedding concrete begins to set. This will typically be 15 to 20 minutes.
- Mix, place, pour and test the concrete in accordance with SCDOT Standard Specifications, Sections 701, 702, 703, and 704.
- Provide CLASS 3000 for the foundation; Place the concrete in one continuous pour.
- Plug/cover the underground cable entrance hole and any conduit openings to prevent concrete intrusion.
- After installation, the Contractor shall plug or cap all unused openings and couplings on the concrete pole using a threaded plug or a cemented PVC cap.
- Cap at both ends and secure in place any conduit elbows in the excavation before pouring any concrete.
- Each foundation shall have a minimum of 1-3", 3-2" and 2-1" conduits placed in accordance with the Standard Drawings. Provide additional conduits if shown on the plans. These conduits are incidental to the work.
- Terminate all conduit provided in foundation in a 13"X24"X18"splice box; the splice box shall be installed in accordance with 680.2 Splice Boxes / Junction Boxes. The splice box shall be paid separately.
- Ensure all conduit elbows shall extend beyond the side of the finished foundation by a minimum of 12 inches in the direction of and at a depth matching the incoming conduit.
- Do not place stress (steel cables) on the pole until the poured embedding concrete has hardened (typically 72 hours).
- Restore the site to prime condition after the pole installation, back filling the area surrounding the pole with topsoil, raking it level and seeding. If the area is sloped, then use landscape turf.

1.3.6 Sidewalk/Island Installation

- When installing the pole in a sidewalk, cleanly cut out the entire "square" of the sidewalk and install the concrete pole embedded in poured concrete; back fill with tamped dirt to 4 inches below the ground line foundation as indicated above.
- Replace the sidewalk using expansion joint material to separate different "pours" and old/new concrete. This work is incidental, unless an item has been established for CONCRETE PATCH or for SIDEWALK.
- In concrete islands, saw-cut out a square opening 4 feet x 4 feet for the pole base and repair as stated above.
- When installed in SIDEWALKS or CONCRETE ISLANDS, contour the entire area and hand-finish to produce a neat visual line. Sharp edges or pedestrian hazards shall not be allowed.

1.3.7 Acceptance

- Acceptance of each pole shall include foundation strength testing plus visual inspection by the ENGINEER.
- The visual inspection shall be made of the pole, overhead cables, and grounding.
- The complete installation shall be structurally sound, and the final pole placement shall be vertical, or raked as specified.
- Contractor shall replace any poles NOT meeting this inspection, without further cost to the project.

1.4 Measurement

- Furnishing and installing concrete strain poles will be measured by EACH of the length specified. This shall include pole cap and all miscellaneous hardware as required.
- Conduit elbows shall be considered to be incidental to the installation of the concrete pole.

1.5 Payment

6825061	FURNISH & INSTALL 35' CONCRETE STRAIN POLE	EA
6825062	FURNISH & INSTALL 40' CONCRETE STRAIN POLE	EA
6825064	FURNISH & INSTALL 45' CONCRETE STRAIN POLE	EA

Supplemental Technical Specification for Controller and Cabinet Assembly

SCDOT Designation: 688.7

1.1 Description

This work shall consist of furnishing and installing Cabinet Assembly, Cabinet Foundation and Controller in accordance with these Specifications, at the locations shown on the Plans, and in accordance with the Standard Drawings. This item shall include all electrical accessories and other items specified.

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Controller and Cabinet Assembly.
- The Contractor shall furnish the ENGINEER with any warranties on materials that are provided by the Manufacturer or Vendor as normal trade practice or to match warranty on existing state contract items.

1.3.2 Concrete Foundation

- Construct the foundation to the dimensions shown on the Standard Drawing 675-130-02.
- Set bolt pattern in accordance with the recommendations of the Cabinet Manufacturer.
- Set templates for setting anchor bolts and leave in place until the forms are removed.
- Concrete lag bolts drilled into pad are allowed.
- Mix, place and test concrete in accordance with applicable portions of SCDOT STANDARD SPECIFICATIONS Sections 701, 702, 703, and 704. Provide CLASS 3000 concrete.
- Set base mounted cabinets on a bead of silicone caulk.

1.3.3 Ground Rod and Ground Wire

- Furnish and install a ground rod and ground wire with each Cabinet.
- Place the 5/8 INCH by 8 feet (minimum) Copper-clad ground rods near the cabinet's concrete foundation, external to the cabinet pad in a splice box. If additional ground rods are required, place nearby and EXOTHERMICALLY WELD together.
- Place a 1-INCH PVC conduit and elbow in foundation prior to pouring as shown in the Standard Drawing.
- Run ground wires (No. 6 AWG bare, stranded copper wire) continuously from the ground rod to the Controller Cabinet (chassis ground on the AC ground bar) through this conduit; and run ground wires continuously from the ground rod to the foundation anchor bolts, to the conduit bends, etc.
- EXOTHERMICALLY WELD ground wires TO THE GROUND ROD.
- Use grounding bushings on metal conduit.
- For Cabinets mounted on strain poles, connect the grounding stud on the pole.
- The entire ground rod shall be driven below the grade or place in a junction box.

1.3.4 Conduit Elbows

- Do not encase the conduit entering the cabinet in concrete. (See Standard Drawings)
- Set Conduit Elbows in the footing excavation before the concrete is poured.
- The size and number of elbows shall be that necessary to mate with the incoming runs and in accordance with the plans and the Standard Drawings. Run conduit in accordance with Standard Drawing 675-130-02 from pole to splice box and from pole to cabinet where the steel pole is adjacent to a base mounted cabinet.
- Conduit shall extend beyond the side of the finished foundation by a minimum of 12 inches, in the direction of, and at a depth matching the incoming conduit.
- The conduit shall extend beyond the top of the finished foundation into the pole or Cabinet, in accordance with Standard Drawings.
- Cover and protect the open-ends and threads on the conduit bends during construction activities.

1.3.5 *Electrical Wiring*

- Install all required equipment in the Cabinet, and neatly wire with tied or wrapped harnesses. Force-fitted or mutually interfering equipment is not acceptable.
- Label cable harnesses and terminals legibly.
- Terminate all bare wires in a "spade-lug" prior to connection to a terminal strip. 'Crimp-on' the "spade-lug" using a ratchet-type crimping tool.
- Tie wires not facilitating equipment movement to the back or side-panel.
- Install and position equipment for easy access.
- Ensure opening and closing the Cabinet door shall not chaff the wiring.
- Ensure the field (lamp) wiring shall have 3 feet of slack cable in each cabinet.
- Coil the slack and tie neatly in the bottom of the Cabinet.
- Separate signal cables from detector lead-in cables as much as possible, to reduce interference.

1.4 **Measurement**

- Local Controller and Cabinet furnished and/or installed will be measured by EACH TYPE Controller and Cabinet (mounting specified); and erected in place as shown on the Plans including miscellaneous electronics, load switches, wiring, electrical connection, ground rod, ground wire, and all related hardware. This includes a concrete cabinet foundation, anchor bolts and all necessary hardware.
- Furnishing and/or Installing a Concrete Cabinet Foundation will be measured by EACH and will include anchor bolts and all necessary hardware.

1.5 **Payment**

6845510	FURNISH AND INSTALL CONTROLLER AND 336 CABINET ASSEMBLY - POLE MOUNTED	EA
6845511	FURNISH AND INSTALL CONTROLLER AND 332/336 CABINET ASSEMBLY - BASE MOUNTED	EA
6888220	INSTALL CONTROLLER AND 336 CABINET - POLE MOUNTED	EA
6888225	INSTALL CONTROLLER AND 332/336 CABINET - BASE MOUNTED-INCLUDING FOUNDATION	EA
6888226	INSTALL CONTROLLER AND 332/336 CABINET ASSEMBLY-BASE MOUNTED CABINET ON EXISTING FOUNDATION	EA
6845520	FURNISH AND INSTALL 2070 CONTROLLER UNIT IN EXISTING CABINET	EA
6845614	INSTALL 2070 CONTROLLER UNIT &/OR CONFLICT MONITOR IN EXISTING CABINET	EA
6887951	FURNISH AND INSTALL CONCRETE CABINET FOUNDATION	EA

Supplemental Technical Specification for Flasher Cabinet Assembly

SCDOT Designation: 688.8

1.1 Description

This work shall consist of furnishing and installing Splice/Flasher Cabinet as indicated on the plans and in accordance with these Specifications and the Standard Drawings.

1.2 Materials

Acceptable materials for Flasher Cabinet Assembly includes an aluminum flasher box, complete with mounting brackets, police lock and key, minimum dimensions of 14" x 14" x 11". Flasher Cabinet Assembly shall have terminal lugs included. Flasher Cabinet Assembly shall be Pre-wired for Time Switch and include a back panel pre-wired for

- 8 position terminal block
- 10 amp circuit breaker
- SPA-100T lightning surge protector
- Toggle switch for a variety of operation times
- 30 amp isolation relay
- NEMA flasher.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Flasher Cabinet.
- The Contractor shall furnish the ENGINEER with any warranties on materials that are provided by the Manufacturer or Vendor as normal trade practice or to match warranty on existing state contract items.
- Provide all components or hardware made of corrosion-resistant material, or be of the same materials as the item being installed.
- Provide a cabinet designed for pole or pedestal-pole mounting. It shall be furnished with all related corrosion resistant hardware, including top and bottom mounting brackets, or pole-hub. Straps used shall be stainless steel.
- Install a Flasher Cabinet Assembly to operate overhead or shoulder mounted flashers that are powered with electricity.

1.3.2 Mounting/ Foundation

Mount the Cabinet as shown in the Standards Drawings.

1.3.3 Grounding

- GROUNDING AND SURGE/LIGHTNING PROTECTION SHALL BE PROVIDED in every Flasher Cabinet Assembly (unless specifically forbidden by the Manufacturer).
- The Protector shall be Telephone Company grade, and be conformable with the Terminal Block
- Ground the cable shield.
- Run a No. 6 AWG bare stranded copper Ground Wire continuously from the Cabinet to the ground rod at the pole base. Where design requires, drive a new ground rod; and install a ground wire from the Cabinet to the ground rod.

1.3.1 Electrical Wiring

- Connect electrical cables to the terminals in accordance with the signal equipment Manufacturer recommendations.

1.4 Measurement

- Furnishing and/or Installing Flasher Cabinet Assembly, shall be measured by EACH housing, erected and placed as shown on the Plans, including miscellaneous electronics, electrical connections, etc. NOTE: The furnishing, installation, and payment of the conduit, poles, electrical service, and other major items are specified elsewhere.

1.5 Payment

6845655	FURNISH & INSTALL FLASHER CABINET ASSEMBLY	EA
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Supplemental Technical Specification for Solar Powered Flasher Assembly

SCDOT Designation: 688.9

1.1 Description

This work shall consist of installing and/or furnishing a Solar Powered Flasher Assembly and performing all related wiring necessary, in accordance with these Specifications and the Standard Drawings.

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Solar Powered Flasher Assembly.
- The Contractor shall furnish the ENGINEER with any warranties on materials provided by the Manufacturer or Vendor as normal trade practice, including a minimum 5-year warranty for the LED modules.
- The types of Solar Flasher Assembly is listed below:
 - 24/7 Single Solar 24 Hour Flashing Beacon
 - 24/7 Single Compact Solar 24 Hour Flashing Beacon
 - Dual 24 Hour Solar Powered Flashing Beacon
 - Dual Solar Powered School Flashing Beacon
 - Dual Compact Solar School Zone Flasher

1.3.2 Installation

- Install the entire assembly, including solar engine, signal housing and LED modules with all necessary hardware for mounting to one of the following pole types:
 - Pedestrian Pole
 - Side-of-pole arm
- If the sign is larger than 36 inches, install the assembly using two poles.
- Install Pedestrian Pole in accordance with 682.4 Pedestrian Pole and Base and the Standard Drawings.
- The entire assembly shall mount at one point. Separate mounting for the signal head or any other component shall not be required.

1.4 Measurement

Furnishing and Installing a Solar Powered Flasher Assembly, shall be measured by EACH, erected and placed as shown on the Plans, which shall include all electrical connections and all required incidental hardware and all necessary bases and foundations for poles.

Separate pay items for Pedestrian Poles are in accordance with 682.4 Pedestrian Pole and Base.

1.5 Payment

6865700	FURNISH & INSTALL SOLAR POWERED FLASHER ASSEMBLY - SINGLE BEACON	EA
6865701	FURNISH & INSTALL SOLAR POWERED FLASHER ASSEMBLY - DUAL BEACON	EA
6865702	FURNISH & INSTALL SOLAR POWERED FLASHER ASSEMBLY	EA

Supplemental Technical Specification for Steel Pole with Mast-Arm

SCDOT Designation: 690.1

1.1 Description

This work shall consist of designing (foundations, lengths of arms, size of support arms), furnishing and installing Steel Traffic Signal Poles with Mast-Arm(s). Concrete footings with reinforcing steel, anchor bolts, ground rods, conduit elbows, and miscellaneous hardware shall be designed and installed with each pole as required. **Steel mast-arm poles, its components, adapter plates and foundations shall be stamped and sealed by a licensed South Carolina Professional Engineer.**

1.2 Materials

Material Specifications are located at

http://www.scdot.org/doing/technicalPDFs/publicationsManuals/trafficEngineering/TrafficSignal_MaterialSpecs.pdf.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Mast Arms.
- The CONTRACTOR shall furnish the Engineer with all warranties on equipment and material offered by the Manufacturer as normal trade practice.
- Repair poles, which have been scratched or abraded so that bare metal is exposed, to the satisfaction of the Engineer. Repair holes drilled in poles or Mast-Arms
- Use hardware or components made of a non-corrosive material, or be of the same material as the item being installed.
- Install signal head using rigid signal head mount brackets. The bracket shall consist of a top- and bottom-arm, an extruded aluminum vertical tube, a vertical tube clamp, and a mast-arm clamp, with all hardware. The Bracket shall be COMPLETELY RUST PROOF, and shall be fully adjustable in all dimensions and angles.
- *Where required by the Plans, install signs using a rust proof mounting bracket.*
- *Powdercoating Color and type will be specified on the plans or in the Special Provisions.*
- *Decorative options will be specified on the plans or in the Special Provisions.*
- *Luminaires generally require a taller pole, per Standard Drawing or as noted in Special Provisions or Signal Plans.*
- *Luminaire to be furnished and/or installed must be provided by the same manufacturer as the mast arm, unless noted otherwise. Luminaire design and/or color should match mast arm design and/or color unless noted otherwise in Special Provisions or on Plans.*
- Luminaires are metered separately from traffic signal, unless noted otherwise on the plans or in the special provisions.

1.3.2 Location

- Install the pole in the general location shown on the Plans.
- Coordinate with the Engineer to stake the field location of the pole, considering the property lines, underground utilities, and overhead clearances.
- ENGINEER will approve staked locations, however contractor is responsible for locating utilities.
- If utility conflicts are discovered, relocate pole in coordination with the Engineer's approval.
- The pole location may have to be moved based on unmarked utilities.
- The design of the mast arm is based on the location, length and soil type. Contractor shall not order mast arm poles until final pole location is determined free of utilities and is approved by the Engineer.
- Provide soil boring at each signal location to the satisfaction of the Engineer of Record designing the mast arm assembly and foundation. A minimum of one soil boring per signal to a 15' depth is required.

1.3.3 Foundation

- Contractor to provide foundation design (see 1.3.9), including depth and diameter of foundation, reinforcing cage design, strength of concrete;
- Drill a hole, as indicated in the foundation design.
- The hole shall be augured (earth-auger), and the concrete poured in UN-disturbed earth.
- Ensure the hole is a uniform diameter, and cleanly augured.
- The foundation shall be constructed with a circular reinforcing cage (**either tied together, or tack welded**) installed, in accordance with foundation design.

- Steel reinforcement shall conform to the requirements of DOT STANDARD SPECIFICATIONS, Section 703.2.1. The bars shall be of the size and type shown on the foundation design.
- The finished square surface above ground shall be as shown on the Standard Drawings.
- It may be necessary to use a jack-hammer in BED-ROCK; it may be necessary to use a heavy walled CAISSON to line the hole and to pump it dry in high water table areas or areas where springs are encountered. These materials, tools and additional labor are incidental to the project.
- Where shown on the Plans, or as determined by the location of underground utilities, it may be necessary to excavate a hole BY HAND. NO additional payment shall be made UNLESS an item has been established in the BID or Proposal for UNCLASSIFIED EXCAVATION (hand excavation of hole) - CUBIC YARDS.
- Mix, place, pour and test the concrete in accordance with SCDOT Standard Specifications, Sections 701, 702, 703, and 704.
- Use design concrete strength, minimum of CLASS 5000 for the foundation. Place the concrete in one continuous pour with vibration.
- Set the Anchor Bolts using pre-formed templates (wood or metal), to provide a "bolt-circle" in accordance with the Standard Drawings or with recommendations of the pole Manufacturer. Leave the templates in place for 2 days (48 hours).
- Capp conduit elbows at both ends, and secure in place in the excavated hole before pouring any concrete.
- Each foundation shall have a minimum of 1-3", 3-2" and 2-1" conduits placed in accordance with the Standard Drawings. Provide additional conduits if shown on the plans. These conduits are incidental to the work.
- Terminate all conduit provided in foundation in a 13"X24"X18"splice box; the splice box shall be installed in accordance with 680.2 Splice Boxes / Junction Boxes. The splice box shall be paid separately.
- Ensure all conduit elbows extend beyond the side of the finished foundation by a minimum of 12 inches, in the direction of, and at a depth matching the incoming conduit. Where a conduit elbow is placed for future use, scribe an "X" in the foundation to indicate the side where such conduit enters. Ensure the conduit protrudes a minimum of 6 inches above the top of the finished concrete foundation.

1.3.4 **Grounding**

- Furnish and install ground rods and grounding wire with each foundation.
- Configure the ground rod with the foundation, as shown on the Standard Drawings.
- Use grounding clamps of brass or bronze to secure the grounding wire to the ground rod.
- Use a continuous ground wire to bond all metal parts together--pole ground stud; pedestal pole nut; pole-mounted controller cabinet ground; metal conduits; etc.

1.3.5 **Anchor Bolts**

- Provide hooked anchor bolts at least 90 inches long with each steel pole with mast arms.
- Thread and hot dip galvanize the top 12 inches of the anchor bolt.
- Provide two hot dipped galvanized nuts and two washers per anchor bolt.

1.3.6 **Adapter Plate**

- Provide adapter plate with each mast arm that has a different anchor bolt pattern from SCDOT's standard steel pole pattern.
- **Note: Adapter plate(s), bolts, nuts, and washers not required if steel pole with mast arm is designed to be supported by current SCDOT signal foundation (concrete foundation with (4) 2" dia. anchor bolts on a 18-inch dia. bolt circle), and the design meets the design criteria requirements of this specification.**
- With each steel pole with mast arms, provide a 2" thick, hot dipped galvanized steel adapter to allow a pole with a 19" square base plate and 18" dia. bolt circle to be installed. Plate shall be pre-drilled with (4) 2 3/8" dia. bolt holes on the 18" dia. bolt circle. A 10" dia. minimum hole shall be provided in the center of the adapter plate.
- Provide (4) hot dipped galvanized 2" x 10" hex head cap screws, (12) nuts, and (8) washers in a **BURLAP** bag for each adapter plate. Bolts and nuts shall be of sufficient strength to support a 32-foot tall steel pole with steel strain wire supporting signal heads and signs for the intersection in case the steel pole with mast arms is damaged and has to be removed and replaced.
- Adapter plate(s), bolt, and nut selection and design shall be stamped and sealed by a licensed South Carolina Professional Engineer.
- Provide a **BURLAP** bag containing the adapter plate nuts, bolts, and washers inside each steel pole with mast arms.

- Place the adapter plate, if required, between the leveling nuts and the steel pole with mast arms base.

1.3.7 Installation

- Do not place the mast arm pole on the foundation for a minimum of 2 days (48 hours after individual pour)
- Do not place a load on the mast arm poles for a minimum of 7 days (168 hours after individual pour) or as otherwise directed by the ENGINEER.
- Each Pole shall be raked away from the line of the Mast-Arm pull, by adjusting the nuts on the anchor bolts.
- When final load is applied, there shall be an essentially vertical appearance as determined by the Engineer.
- Provide 22' minimum vertical clearance between the bottom of the overhead traffic signal mast arm and the pavement and shoulders, unless otherwise shown on the plans.
- Restore the site to prime condition after the pole installation, back filling the area surrounding the pole with topsoil, raking it level and seeding. If the area is sloped, then use landscape turf.

1.3.8 Sidewalk/Island Installation

- When installing the pole in a sidewalk, cleanly cut out the entire "square" of the sidewalk and install the foundation as indicated above.
- Replace the sidewalk using expansion joint material to separate different "pours" and old/new concrete. This work is incidental, unless an item has been established for CONCRETE PATCH or for SIDEWALK.
- In concrete islands, saw-cut out a square opening 4 feet x 4 feet for the pole base and repair as stated above.
- When installed in SIDEWALKS or CONCRETE ISLANDS, contour the entire area and hand-finish to produce a neat visual line. Sharp edges or pedestrian hazards shall not be allowed.

1.3.9 Acceptance

- Acceptance of each pole shall include foundation strength testing plus visual inspection by the ENGINEER.
- The visual inspection shall be made of the pole, overhead cables, and grounding.
- The complete installation shall be structurally sound, and the final pole placement shall be vertical, or raked as specified.
- Contractor shall replace any poles NOT meeting this inspection, without further cost to the project.

1.3.10 Design Criteria

1.3.10.1 AASHTO Standards

- Ensure the Mast-Arm traffic signal Pole is designed to meet the requirements of the "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals"; American Association of State Highway And Transportation Officials (AASHTO), latest edition.
 - Design all components of the Mast-Arm Pole assemblies to include and to address the following:
 - Mast Arm Length
 - Soil type
 - Design Life – minimum 25-year mean recurrence interval
 - Basic wind speed in accordance with AASHTO Wind Speed map (latest edition)
 - Ice loading
 - Fatigue category II (2)
 - Natural wind gust pressure loads
 - Truck-induced gust pressure loads
 - Mast arm loading as follows in 1.10.2.

1.3.10.2 Minimum Loading Assumptions

- For design, minimum loading assume there is a 4-section polycarbonate, rigidly mounted signal head with backplate centered per lane including auxiliary lanes, an 24" x 8' illuminated street name sign on each arm, and additional 24" x 36" signs adjacent to each signal head. See plans to determine if additional loading is required. Design mast arms for the most stringent loading.

1.3.10.3 Design And Drawings

- The CONTRACTOR SHALL FURNISH pole design details, calculations, and shop-drawings in sufficient detail for complete evaluation and comparison with these Specifications.
- Any exceptions to these Specifications must be stated in writing.
- The design, calculations, and shop drawings shall be stamped and sealed by a licensed South Carolina Professional Engineer.

- The CONTRACTOR SHALL FURNISH a concrete foundation design details and calculations adequate for local soil type and steel pole with mast arm loading.
- Mast arm loading shall be the greater of the Minimum Loading Assumptions or the loading shown on the Plans.
- The design and calculations shall be stamped and sealed by a licensed South Carolina Professional Engineer.
- **Provide CATALOG CUTS ARE REQUIRED FOR REVIEW AND APPROVAL PRIOR TO FABRICATION.**

1.3.10.4 Miscellaneous Items

Steel pole with mast arms design drawing shall include the following:

- 4" x 6" minimum reinforced handhole,
- 1/2" coarse thread grounding stud located on interior of pole handhole,
- strain relief j-hook at top of pole, rain cap,
- holes in steel poles and mast arms for wiring to be routed to traffic signals,
- holes for wiring to be protected with full circumference grommets,
- nut covers to be provided to cover anchor bolt nuts,
- tapered poles and mast arms shall taper uniformly along their length
- additional requirements as shown on the signal plans for the intersections

1.4 Measurement

The following pay items will be measured by Each (EA) erected in place as shown on the plans:

- Design shall include all necessary services to completely design mast arm installation, including necessary geotechnical work, utility research, foundation design, mast arm upright and arm structural design and determining length of mast arms.
- Furnish includes delivery costs and all necessary components necessary to provide and install a fully functional mast arm, including all hardware Adapter Plates (if applicable), Anchor Bolts, Nut Covers, Pole Cap, reinforcing steel, ground rod, ground wire, and all miscellaneous hardware as required.
- Install pay items including foundation include all materials and work necessary to completely install mast arm structure, including rebar, concrete, conduit, and forms.
- Install pay item without foundation includes all work necessary to install mast arm on existing foundation.
- Powdercoating pay items include providing a color option for mast arms, either over the base mast arm material or over the galvanized mast arm material
- Decorative option per mast arm includes providing decorative features such as ornamental pole bases (skirts), fluted options, banner arms or curved options, in accordance with the special provisions or plans.
- Luminaire option for mast arm includes the additional cost for a taller pole (27'), if luminaire is to be mounted above the signal heads.
- Furnish and install mounting assembly pay items include installing the mounting hardware for signs and for signal heads on the mast arm, including all necessary hardware.
- Furnish and install Luminaire includes all necessary materials, equipment and labor for full operational luminaire assembly, including electrical cable, conduit and meter pan if metered separately from traffic signal.
- Pay items for mast arms designating the height and length of the mast arms will only be used when the Engineer has designed full mast arm plans; payment and will be paid for at the contract unit price Each (EA), and include all materials, hardware, manpower and equipment to fully install a functional mast arm assembly.

The following pay item will be measured by cubic yard (CY):

- Install Foundation for Mast Arm includes all materials and work necessary to completely install mast arm foundation, including rebar, concrete, conduit, and forms.

1.5 Payment

6888179	DESIGN, FURNISH & INSTALL STEEL POLE WITH MAST ARM INCLUDING FOUNDATION	EA
6888172	DESIGN, FURNISH & INSTALL STEEL POLE WITH MAST ARM WITHOUT FOUNDATION	EA
6888177	DESIGN, FURNISH & INSTALL STEEL POLE WITH TWIN MAST ARMS INCLUDING FOUNDATION	EA
6888178	DESIGN, FURNISH & INSTALL STEEL POLE WITH TWIN MAST ARMS WITHOUT FOUNDATION	EA
6888166	POWDERCOATING PER MAST ARM OVER BASE	EA

6888167	POWDERCOATING PER MAST ARM OVER GALVANIZED	EA
6888168	DECORATIVE OPTION PER MAST ARM	EA
6888169	LUMINAIRE OPTION FOR MAST ARM - TO ACCOUNT FOR TALLER POLE	EA
6513020	FURNISH & INSTALL MOUNTING ASSEMBLY FOR FLAT SHEET SIGN ERCTD ON MAST ARM	EA
6865831	FURNISH & INSTALL VEHICLE TRAFFIC SIGNAL HEAD MOUNTING ASSEMBLY FOR MAST ARM	EA
6888164	FURNISH & INSTALL DUAL LUMINAIRE INCLUDING LUMINAIRE ARMS AND ALL ASSOCIATED HARDWARE	EA
6888165	FURNISH & INSTALL SINGLE LUMINAIRE INCLUDING LUMINAIRE ARMS AND ALL ASSOCIATED HARDWARE	EA
6888174	INSTALL FOUNDATION FOR MAST ARM INCLUDING CONCRETE AND REBAR	CY
	FURNISH & INSTALL ___' STEEL POLE WITH ___' MAST ARM INCLUDING FOUNDATION	EA
	FURNISH & INSTALL ___' STEEL POLE WITH TWIN MAST ARMS (___'X___')AT ___ DEG. INCLUDING FOUNDATION	EA

SCDOT TRAFFIC SIGNALS

MATERIAL SPECIFICATIONS

Revised
5/16/2016

MATERIAL SPECIFICATION REVISIONS

NOTE: SCDOT has made note of revisions since the last set of specifications, however, it is the responsibility of the contractor/vendor to read the specifications and verify materials meet requirements. Do not rely solely on this revision sheet for specification changes.

Date	Specification	Description	Details of Revision
5/16/2016	M688.7	CONTROLLER AND CABINET ASSEMBLY	Various revisions
5/16/2016	M686.4	PEDESTRIAN PUSH BUTTON STATION ASSEMBLY WITH SIGN	Revised dual mount bracket requirement
3/1/2016	M686.1		Revised requirements for removable door
3/1/2016	M688.7		Replaced with 4/15/2013 spec until revision is complete – QPL items match this spec
3/1/2016	M677.4		Removed Furnish Fiber Interconnect Center specification
3/1/2016	M677.3		Revised Fiber Optic Cable specifications to be Industry Standards
2/1/2016	M688.6		Various minor revisions
2/1/2016	M688.5		Various minor revisions
9/14/2015	M688.3		Clarified processing unit type and added Network Services Policy
7/1/2015	M688.7		Revised required conflict monitor and accommodates operation of 18 phase
7/1/2015	M688.6		Various revisions
7/1/2015	M688.5		Revised hole requirements
6/23/2015	M682.4		Added information about powdercoating
12/15/2014	M686.3		Removed pay item information. See supplemental specifications.
12/15/2014	M686.1		Removed pay item information. See supplemental specifications.
7/31/2014	M686.1		Revised hanger and signal head specifications
6/11/2014	M686.1		Revised to include Non-Pixelated LED specification, revised backplate specifications
5/19/2014	M677.1		Updated specifications
12/2/2013	M686.2		Added Non-Pixelated LED specification
7/22/2013	M686.3		Revised module lens requirements
6/1/2013	M686.3		Revised modules types, to comply with latest ITE specification, revised terminal strip material, fade resistant for 5 years, identifiers on equipment and packaging, warranty
4/15/2013	M682.4		Revised Class 3000 Concrete
4/15/2013	M688.5		Revised Class 5000 Concrete
4/15/2013	M688.6		Revised Class 3000 Concrete
4/15/2013	M688.7		Revised Class 3000 Concrete
3/6/2013	M686.4		New State Contract, Added Pay Items

Traffic Signals Material Specifications 5/16/2016

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		Revision Date
M677.1	FURNISH ELECTRICAL CABLE	5/19/2014
M677.3	INDUSTRY STANDARDS FOR FIBER OPTIC CABLE	3/1/2016
M677.6	FURNISH FACTORY TERMINATED PATCH PANEL	10/1/2012
M678.1	FURNISH WIRE, SEALANT, AND/OR MATERIALS FOR DETECTOR LOOP	10/1/2012
M680.2	FURNISH SPLICE BOX/JUNCTION BOX	10/1/2012
M682.3	FURNISH STEEL CABLE	10/1/2012
M682.4	FURNISH PEDESTRIAN POLE AND BASE	4/15/2013
M686.1	FURNISH VEHICLE SIGNAL HEADS AND BACKPLATES	3/1/2016
M686.3	FURNISH PEDESTRIAN SIGNAL HEADS	12/15/2014
M686.4	FURNISH PEDESTRIAN PUSH BUTTON STATION ASSEMBLY WITH SIGN	5/16/2016
M686.5	FURNISH SYMBOLIC LED BLANKOUT SIGN	10/1/2012
M688.3	FURNISH VIDEO DETECTION SYSTEM	9/14/2015
M688.5	FURNISH STEEL STRAIN POLE AND FOUNDATION	2/1/2016
M688.6	FURNISH CONCRETE STRAIN POLE	2/1/2016
M688.7	FURNISH CONTROLLER AND CABINET ASSEMBLY	5/16/2016
M688.9	FURNISH SOLAR POWERED FLASHER ASSEMBLY	10/1/2012

M677.1 ELECTRICAL CABLE

1.1 Description

This specification describes requirements for furnishing traffic signal, loop lead-in, pedestrian signal, and pedestrian push button Electrical Cable.

1.2 Materials

1.2.1 Black Cable

1.2.1.1 Traffic Signal Head Black 8 Conductor Wiring

BLACK - Unless specified elsewhere, the traffic signal cable shall be (8 conductor). The conductor shall be #14 AWG, 19 strands, bare copper. The conductor insulation shall be high density polyethylene and shall be both ultraviolet and weather resistant. The wall thickness for the single conductor shall be 0.025" minimum point thickness with a .124" nominal diameter. The Cabling overall lay shall be 6" with a left hand lay. 1 (60) Non-Hydroscopic Polypropylene filler material shall be utilized to produce a circular cross section. The conductor cable assembly shall be wrapped with a 0.001 inch clear Mylar tape material applied helically with a minimum 25% overlap. The overall cable assembly shall be provided with a black high density polyethylene jacket which is both ultraviolet and weather resistant. The wall thickness shall be 0.042 inch minimum point thickness. The cable shall have a nominal cabling diameter of .393" and a nominal jacket diameter of .487" and shall have a ripcord for easy jacket removal. The outer cable jacket shall have sequential foot marks. Traffic signal cable shall be manufactured in accordance with the requirements of Underwriters' Laboratories, SCDOT, IMSA 20-1, ROHS, Federal specifications, and the National Electric Code.

The traffic signal cable must also meet or exceed specifications in the chart below.

Conductor Insulation

		<i>External Jacket</i>	
<i>Conductor Colors</i>	<i>Insulation Color</i>	<i>Size, AWG</i>	
White, Yellow Red, Green White w/Black Band, Yellow w/Black Band Red w/Black Band, Green w/Black Band	Black	#14	

1.2.1.2 Pedestrian Signal Head Black 4 conductor Wiring

BLACK - Unless specified elsewhere, the traffic signal cable shall be (4 conductor). The conductor shall be #14 AWG, 19 strands, bare copper. The conductor insulation shall be high density polyethylene and shall be both ultraviolet and weather resistant. The wall thickness for the single conductor shall be 0.025" minimum point thickness with a .124" nominal diameter. The Cabling overall lay shall be 4.50" left hand lay. 4 (60) Non-Hydroscopic Polypropylene filler material shall be utilized to produce a circular cross section. The conductor cable assembly shall be wrapped with a 0.001 inch clear Mylar tape material applied helically with a minimum 25% overlap. The overall cable assembly shall be provided with a black high density polyethylene jacket which is both ultraviolet and weather resistant. The wall thickness shall be 0.045 inch minimum point thickness. The cable shall have a nominal cabling diameter of .296" and a nominal jacket diameter of .373" and shall have a ripcord for easy jacket removal. The outer cable jacket shall have sequential foot marks. Traffic signal cable shall be manufactured in

accordance with the requirements of Underwriters' Laboratories, SCDOT, IMSA 20-1, ROHS, Federal specifications, and the National Electric Code.

The traffic signal cable must also meet or exceed specifications in the chart below

Conductor Insulation

Conductor Colors	External Jacket	
	<u>Insulation Color</u>	<u>Size, AWG</u>
White, Yellow, Red, Green	Black	#14

1.2.2 Gray Cable

1.2.2.1 Loop lead-in Gray 4 Pair Wiring

GRAY - Unless specified elsewhere, the loop lead-in cable shall be four individually shielded pairs (8 conductor). Each pair shall be individually twisted (two turns per foot minimum). The conductor shall be #14 AWG, 19 strands, bare copper. The conductor insulation shall be high density polyethylene and shall be both ultraviolet and weather resistant. The nominal insulation thickness shall be 0.025". The nominal insulation diameter shall be .134". Each pair shall be wrapped with a 0.001 inch aluminum mylar foiled shield with a minimum 25% overlap. Aluminum is to be located on the outside. 4 (60) non-hydroscopic polypropylene filler material shall be utilized to produce a circular cross section. The cabling overall lay shall be a 5.50" left hand lay. The drain wire shall be #16 AWG, 19 strands, tinned copper. The conductor cable assembly shall be wrapped with a 0.001 inch clear Mylar binder applied helically with a minimum 25% overlap. The overall cable assembly shall be provided with a high density polyethylene jacket which is both ultraviolet and weather resistant. Nominal Jacket diameter shall be 0.525" and shall have a ripcord for easy jacket removal. Nominal Cabling Diameter shall be .445". The nominal jacket thickness shall be 0.042". The outer cable jacket shall have sequential foot marks. Traffic signal cable shall be manufactured in accordance with the requirements of SCDOT, IMSA 50-2, ROHS, and the National Electric Code.

The twisted pair loop lead-in cable must also meet or exceed specifications in the chart below.

Conductor Insulation

Pair Color	External Jacket	
	<u>Insulation Color</u>	<u>Size, AWG</u>
White-Yellow Red-Green White w/Black Band-Yellow w/Black Band Red w/Black Band-Green w/Black Band	Gray	#14

1.2.2.2 Pedestrian Push Button Gray 2 Pair Wiring

GRAY - Unless specified elsewhere, the loop lead-in cable shall be two individually shielded pairs (4 conductor). Each pair shall be individually twisted (two turns per foot minimum). The conductor shall be #14 AWG, 19 strands, bare copper. The conductor insulation shall be high density polyethylene and shall be both ultraviolet and weather resistant. The nominal insulation thickness shall be 0.025". The nominal insulation diameter shall be .124". Each pair shall be wrapped with a 0.001 inch aluminum mylar foiled shield with a minimum 25% overlap. Aluminum is to be located on the outside. 3 (60) non-hydroscopic polypropylene filler material shall be utilized to produce a circular cross section. The cabling overall lay shall be a 4.00" left hand lay. The drain wire shall be #16 AWG, 19 strands, tinned copper. The conductor cable assembly shall be wrapped with a 0.001 inch clear Mylar binder applied helically with a minimum 25% overlap. The overall cable assembly shall be provided with a high density polyethylene jacket which is both ultraviolet and weather resistant. Nominal Jacket diameter shall be

0.40" and shall have a ripcord for easy jacket removal. Nominal Cabling Diameter shall be .335". The nominal jacket thickness shall be 0.035". The outer cable jacket shall have sequential foot marks. Traffic signal cable shall be manufactured in accordance with the requirements of SCDOT, IMSA 50-2, ROHS, and the National Electric Code.

The twisted pair loop lead-in cable must also meet or exceed specifications in the chart below.

Conductor Insulation		External Jacket
Pair Color	Insulation Color	Size, AWG
White-Yellow Red-Green	Gray	#14

1.2.3 Certification

CATALOG CUTS ARE REQUIRED

1.2.4 Warranty

The Vendor shall furnish SCDOT with any warranties on equipment and materials that are provided by the Manufacturer or Vendor as normal trade practice.

1.2.5 Labeling and Delivery

Unless otherwise stated, the cable shall be supplied in minimum reels of 1,000 feet, for splice-free installation.

The Manufacturer shall be required to mark each cable and cable reel to facilitate easy identification of the various sizes when stored in stockpiles.

1.3 Measurement

Electrical Cable, of the size and numbers of conductors specified, shall be measured by LINEAR FEET and furnished in 1000' reels.

1.4 Payment

Furnishing Electrical Cable, measured as provided above, will be paid at the contract unit price bid for:

FURNISH NO. 14 COPPER WIRE, 4 CONDUCTOR - BLACK	1000' REEL
FURNISH NO. 14 COPPER WIRE, 2 PAIR CONDUCTOR - GRAY	1000' REEL
FURNISH NO. 14 COPPER WIRE, 8 CONDUCTOR - BLACK	1000' REEL
FURNISH NO. 14 COPPER WIRE, 4 PAIR CONDUCTOR - GRAY	1000' REEL

677.3 FIBER OPTIC CABLE

1.1.1 Industry Standard

- The optical fiber **cable plant** consists of optical fiber cables, connectors, mounting panels, jumper cables, and other passive components, but it does not include active components.
- TIA-526-7 (OFSTP-7)-2002+A1:2008, *Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant*. This standard specifies singlemode optical loss measurement methods between two passively connected points using an optical source and power meter. An Optical Loss Test Set uses a light source to inject light in the fiber and a measurement device to measure the light out- this measures the attenuation (optical loss).
- Singlemode fiber (OS1, OS2) shall not have more than 0.5 dB attenuation (signal loss) per kilometer. That is measured with an Optical Loss Test Set.
- No more than 20% light loss will be accepted. Singlemode fiber (OS1, OS2, OSP) shall not have more than 0.5 dB attenuation (signal loss) per kilometer. That is measured with an Optical Loss Test Set.
- An OTDR is a good tool to “see” the overall “health” of the installed fiber OR to locate breaks, estimate connector and splice loss, identify macrobends (bends visible to the eye but hidden in the cable jacket) and microbends (a microbend could be caused if the fiber coating squeezes a fiber as it contracts at very low temperatures, ran over by a vehicle, or if it is stressed during installation). Both bends can result in increased attenuation that can degrade system performance and minimize optical throughput. Fusion or mechanical splices shall not have a loss of more than 0.3 dB. Mechanical splices are not SCDOT standard splice methodology. SCDOT allows Singlemode connector mating (patch cord to fiber interconnect center coupler) a max loss of 0.75 dB when planning and testing. The same loss is allowed from the patch cord to the Ethernet switch. Essentially signal loss of 0.75 dB is expected and allowed each time two factory connectors are mated. FYI- factory terminated patch cords have an average loss of 0.3 dB for factory-polished singlemode pigtails suitable for splicing.
- This standard includes an encircled flux launch condition metric (i.e. launch cable which allows the OTDR to settle down and analyze the true reflections of the installed cable, splices, and connectors) for measuring cable plant. Additionally, this standard includes the description of using an optical time domain reflectometer (OTDR) for total attenuation measurement and measurements of individual component loss.
- Outside Plant Cable OSP installation- The standard calls for water-blocked cables (cables suitable for outside plant use) with a minimum pulling tension of 600 pounds.
- Minimum bend radius is 20 times the cable diameter under max rated pulling tension and 10 times unloaded (unloaded means slack storing and permanently installed).
- ANSI/TIA/EIA-598-C-2005, *Optical Fiber Cable Color Coding*. This standard specifies the recommended identification for individual fibers, fiber units, and groups of fiber units
- within a cable structure (jacket).

1.1.2 Cable

- The cable shall meet all requirements stated in RUS-90 as well as those stated within this document. The cable shall be an accepted product of the United States Department of Agriculture Rural Utility Service as meeting the requirements of RUS-PE-90. The cable shall be new, unused, and of current design and manufacture.
- The single-mode fiber used in the cable shall conform to the following specifications:

Typical Core Diameter:	8.3 μm
Cladding Diameter:	125.0 + 1.0 μm by fiber end measurement
Core-to-Cladding Offset:	< 1.0 μm
Cladding Non-Circularity:	< 2.0% (Defined as: $[1 - (\text{min. cladding dia.} / \text{max. cladding dia.})] \times 100$)
Coating Diameter:	250 + 15 μm
Attenuation Uniformity:	No point discontinuity greater than 0.1 dB at either 1300 nm or 1550 μm .
- The change in attenuation at extreme operational temperatures for single-mode fibers shall not be greater than 0.40 dB/km at 1550 nm and 0.5 at 1310 nm, with 80% of the measured values no greater than 0.10 dB/km at 1550 nm.
- The maximum dispersion shall + 3.3 ps/(nm • km) for 1285 nm through 1330 and shall be < 18 ps/(nm • km) at 1550 nm.

1.1.3 Fiber Characteristics

- All fibers in the cable shall be usable fibers and meet required industry standards.
- All optical fibers shall be sufficiently free of surface imperfections and inclusions to meet the optical, mechanical, and environmental requirements to this specification.

- Each optical fiber shall consist of a doped silica core surrounded by a concentric silica cladding.
- The coating shall be a dual-layered, UV cured acrylate applied by the fiber manufacturer. The coating shall be capable of being mechanically or chemically striped without damaging the fiber.

1.1.4 Cable Size and Configuration

- The core or buffer tubes containing the fibers and the interstices between the buffer tubes, fillers, and strength members in the core structure are filled with a suitable material to exclude water. Fibers may be assembled in either loose tube fiber bundles or tight buffered configurations. Both construction types must pass all the requirements of current industry standards such as ICEA S-87-640, Telcordia GR-20-CORE and RUS PE-90.
- Each loose tube configuration shall contain twelve (12) fibers. The fibers shall not adhere to the inside of the buffer tube.
- Each fiber and loose tube buffer shall be distinguishable from each other by means of color coding according to ANSI/TIA/EIA-598-C-2005, *Optical Fiber Cable Color Coding* as referenced below. Tight buffered fibers shall adhere to the same color coding standards.

1. Blue
2. Orange
3. Green
4. Brown
5. Slate
6. White
7. Red
8. Black
9. Yellow
10. Violet
11. Rose
12. Aqua

- Optical cable designs not specifically addressed by this section may be allowed if accepted by SCDOT. Justification for acceptance of a modified design must be provided to substantiate product utility and long term stability and endurance.

M677.6 FACTORY TERMINATED PATCH PANEL**1.1 Description**

This specification describes requirements for furnishing a Factory Terminated Patch Panel. Included in this item is the splicing of the fiber optic cable; installing interconnection sleeves, jumpers, connectors and other hardware that may be needed for connecting the fiber optic cable to the signal system electronic devices.

1.2 Materials**1.2.1 *Factory Terminated Patch Panel***

The interconnect center shall be a factory terminated patch panel, including strain relief hardware and have termination/connection capacity for 12 fibers and a 200' tail.

1.2.2 *Certification***CATALOG CUTS ARE REQUIRED****1.2.3 *Warranty***

The Vendor shall furnish SCDOT with any warranties on equipment and materials that are provided by the Manufacturer or Vendor as normal trade practice.

1.3 Measurement

Furnishing a Factory Terminated Patch Panel will be measured by EACH.

1.4 Payment

The Factory Terminated Patch Panel, as measured above, will be paid for at the contract unit price bid for:

FURNISH FACTORY TERMINATED PATCH PANEL	EA
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M678.1 FURNISH WIRE, SEALANT, AND/OR MATERIALS FOR DETECTOR LOOP**1.1 Description**

This specification describes requirements for furnishing Wire, Sealant, and/or Materials for a Detector Loop.

1.2 Materials**1.2.1 Loop Wire**

Loop wire shall be splice-free lengths of: No. 14 AWG, 19 Strands, single-conductor bare copper wire. The conductor insulation (BLACK or GRAY) shall be high density polyethylene and shall be both ultraviolet and weather resistant. The wall thickness shall be 0.030 inch minimum point thickness. Cable shall be manufacturer in accordance with the requirements of Underwriters Laboratories, Federal specifications, and the National Electric Code.

1.2.2 Sealant

The loop sealant used to fill the saw cuts and other gaps, shall be of a type intended for traffic loop embedding. The cured sealant shall be semi-flexible, and be capable of adhering securely to concrete, asphalt, wood, metal, etc. It shall be unaffected by freeze-thaw cycling, salts, gasoline, oil, sewerage and corrosive chemicals. It shall be proportioned and mixed per the manufacturer's specifications. Acceptable sealants are listed on the SCDOT QPL.

1.2.3 Waterproofing Splice Materials

The splice at the "junction point" shall be made waterproof using the materials listed below:

- a) Cable Splice Kit - Commercially available, Low-Voltage, water-proof Splice-kit; to be Plymouth "PLYFLEX"; or 3M "SCOTCH-LOK", Unipak #3570, Resin 400, (or approved equal). To be installed per manufacturer's instructions.
- b) Heat Shrink tubes
- c) Gel Caps
- d) Vinyl plastic electrical tape (use where required)-Cold and weather resistant, 19 mm (3/4 inch) wide, 1.8 mm (7 mil) thickness, (Scotch 33+ or approved equal). Shall use liquid electrical coating (where required) - Fast-drying sealant compatible with vinyl tape, brush-applied (3M, Scotchkote or approved equal).

1.2.4 Underwater Splicing Kit

Where shown on the Plans, in very wet areas an Underwater Splice Kit may be required at the "junction point". This splicing kit shall consist of a two-piece mold-body, with pourable resin sealing compound, funnels, and end sealing strips (3M, Scotchcast 82-A1 or approved equal).

1.2.5 Wire Crimps

The PREFERRED splicing method at the "junction point", shall use a commercial/industrial grade, copper-alloy CRIMP-ON, with one end closed, of a size proper for the gauge of wires to be spliced, and

the number of conductors. It shall be installed with butt splice using a T & B type crimping tool or similar tool, intended for the purpose (NOT regular pliers). (Note: wire-nuts are not acceptable.)

1.2.6 Solder

The alternate method of splicing at the "junction point" is to use SOLDER, which shall be electronic-grade, rosin-core, 60 lead/40 tin. Acid-core solder is not acceptable, nor are acid-type soldering pastes.

1.2.7 Certification

The Vendor shall provide details for the loop sealant, loop wire, and lead-in wire proposed.

CATALOG CUTS ARE REQUIRED

SAMPLE REQUIRED

1.2.8 Warranty

The Vendor shall furnish SCDOT with any warranties on equipment and materials that are provided by the Manufacturer or Vendor as normal trade practice.

1.3 Measurement

Wire for Detector Loops, of the size and numbers of conductors specified, shall be measured by LINEAR FEET and furnished in 5000' reels.

1.4 Payment

Furnishing Wire for Detector Loops, measured as provided above, will be paid at the contract unit price bid for:

	FURNISH NO. 14 COPPER WIRE, 1-CONDUCTOR FOR LOOP WIRE	5000' REEL
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M678.1 FURNISH WIRE, SEALANT, AND/OR MATERIALS FOR DETECTOR LOOP**1.1 Description**

This specification describes requirements for furnishing Wire, Sealant, and/or Materials for a Detector Loop.

1.2 Materials**1.2.1 Loop Wire**

Loop wire shall be splice-free lengths of: No. 14 AWG, 19 Strands, single-conductor bare copper wire. The conductor insulation (BLACK or GRAY) shall be high density polyethylene and shall be both ultraviolet and weather resistant. The wall thickness shall be 0.030 inch minimum point thickness. Cable shall be manufacturer in accordance with the requirements of Underwriters Laboratories, Federal specifications, and the National Electric Code.

1.2.2 Sealant

The loop sealant used to fill the saw cuts and other gaps, shall be of a type intended for traffic loop embedding. The cured sealant shall be semi-flexible, and be capable of adhering securely to concrete, asphalt, wood, metal, etc. It shall be unaffected by freeze-thaw cycling, salts, gasoline, oil, sewerage and corrosive chemicals. It shall be proportioned and mixed per the manufacturer's specifications. Acceptable sealants are listed on the SCDOT QPL.

1.2.3 Waterproofing Splice Materials

The splice at the "junction point" shall be made waterproof using the materials listed below:

- a) Cable Splice Kit - Commercially available, Low-Voltage, water-proof Splice-kit; to be Plymouth "PLYFLEX"; or 3M "SCOTCH-LOK", Unipak #3570, Resin 400, (or approved equal). To be installed per manufacturer's instructions.
- b) Heat Shrink tubes
- c) Gel Caps
- d) Vinyl plastic electrical tape (use where required)-Cold and weather resistant, 19 mm (3/4 inch) wide, 1.8 mm (7 mil) thickness, (Scotch 33+ or approved equal). Shall use liquid electrical coating (where required) - Fast-drying sealant compatible with vinyl tape, brush-applied (3M, Scotchkote or approved equal).

1.2.4 Underwater Splicing Kit

Where shown on the Plans, in very wet areas an Underwater Splice Kit may be required at the "junction point". This splicing kit shall consist of a two-piece mold-body, with pourable resin sealing compound, funnels, and end sealing strips (3M, Scotchcast 82-A1 or approved equal).

1.2.5 Wire Crimps

The PREFERRED splicing method at the "junction point", shall use a commercial/industrial grade, copper-alloy CRIMP-ON, with one end closed, of a size proper for the gauge of wires to be spliced, and

the number of conductors. It shall be installed with butt splice using a T & B type crimping tool or similar tool, intended for the purpose (NOT regular pliers). (Note: wire-nuts are not acceptable.)

1.2.6 Solder

The alternate method of splicing at the "junction point" is to use SOLDER, which shall be electronic-grade, rosin-core, 60 lead/40 tin. Acid-core solder is not acceptable, nor are acid-type soldering pastes.

1.2.7 Certification

The Vendor shall provide details for the loop sealant, loop wire, and lead-in wire proposed.

CATALOG CUTS ARE REQUIRED

SAMPLE REQUIRED

1.2.8 Warranty

The Vendor shall furnish SCDOT with any warranties on equipment and materials that are provided by the Manufacturer or Vendor as normal trade practice.

1.3 Measurement

Wire for Detector Loops, of the size and numbers of conductors specified, shall be measured by LINEAR FEET and furnished in 5000' reels.

1.4 Payment

Furnishing Wire for Detector Loops, measured as provided above, will be paid at the contract unit price bid for:

	FURNISH NO. 14 COPPER WIRE, 1-CONDUCTOR FOR LOOP WIRE	5000' REEL
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M680.2 SPLICE BOX / JUNCTION BOX

1.1 Description

This specification describes requirements for furnishing a Splice Box and/or Junction Box. The Splice Box shall consist of a Box and Cover, installed over aggregate. The Splice Box is intended for use as a signal cable electrical enclosure. The Junction Box is intended for use as a loop detector "junction point".

1.2 Materials

1.2.1 Box and Cover

The Splice Box shall consist of a Base having an open top (the Box), with a separate removable Cover. They shall be made from a lightweight, blended modern material, using fiberglass reinforcement, and shall be NON-CONCRETE / NON-STEEL. They shall be GRAY IN COLOR. Covers shall have the LEGEND "TRAFFIC SIGNAL". They shall use HEX-HEAD stainless steel bolts. The PHYSICAL FEATURES AND THE NOMINAL SIZE AND DIMENSIONS for the Box and Cover, are shown on the Standards or the Design Details, and are listed below.

	<u>WIDTH</u>	<u>LENGTH</u>	<u>DEPTH</u>
SPLICE BOX:	13 inch	24 inch	18 inch
HAND BOX:	17 inch	30 inch	24 inch
MINI SPLICE BOX:	12 inch	12 inch	12 inch

1.2.2 Design Load

Boxes shall be designed to meet or exceed the loading requirements for a Tier 15 application per the Society of Cable Engineers (SCTE) ANSI/SCTE 77-2007 "Specification for Underground Enclosure Integrity, Table – Test Loads".

Thus, boxes shall be designed and tested for the following test loads: Cover- vertical load 22,500 pounds distributed over a 10 inch x 10 inch area. Box - vertical load 22,500 pounds distributed over a 5 inch x 10 inch. Box- lateral load of 1200 pounds per square foot . The cover deflection shall be less than 0.5 inch; and the box deflection less than 0.25 in/ft of length.

1.2.3 Western Underground Committee (WUC)

Using the above specified loads, the Splice Box shall meet or exceed the WUC "Recommended Guide No. 3.6, Non-Concrete Enclosures". Structural Requirements shall include: testing for Vertical Load on Cover; Vertical Load on Box; Lateral Load on Box. Further they shall meet WUC recommendations for: Accelerated Service per ASTM D-756; Chemical Resistance per ASTM D-543; Simulated Sunlight Resistance per ASTM G-53; plus Water Absorption; and Flammability. Covers shall be skid-resistant, with a minimum coefficient of friction of 0.50.

1.2.4 Certification

CATALOG CUTS ARE REQUIRED

1.2.5 Warranty

The Vendor shall furnish SCDOT with any warranties on equipment and materials that are provided by the Manufacturer or Vendor as normal trade practice.

1.3 Measurement

Furnishing a Splice Box will be measured by EACH Box including Box and Cover.

Furnishing a Junction Box will be measured incidental to the conduit to which it is used with.

1.4 Payment

Furnishing Splice Box and/or Junction Box, accepted and measured as provided above, will be paid for at the contract unit price bid for:

FURNISH 13"X24"X18"D.ELEC.FLUSH UNDGRD.ENCLOSURE-(STR.POLY.CONC.)HD	EA
FURNISH 17"X30"X24"D.ELEC.FLUSH UNDGRD.ENCLOSURE-(STR.POLY.CONC.)HD	EA
FURNISH 12"X12"X12"D.ELEC.FLUSH UNDGRD.ENCLOSURE-(STR.POLY.CONC.)HD	EA

M682.3 STEEL CABLE**1.1 Description**

This specification describes requirements for furnishing splice-free lengths of Steel Cable with cable supports, for mounting signal heads, signs, interconnect runs, and installing back guys.

1.2 Materials**1.2.1 Fabrication**

Steel Cable shall be fabricated of 7 steel wires, Class A double galvanized in accordance with ASTM A-475, and twisted into a single concentric strand to conform with the following schedule:

Diameter (inches)	Strand Size (AWG)	Tensile Strength (pounds)
1/4	14	3,150
3/8	11	6,950
7/16	9.5	9,350
1/2	8	12,000

Usage

Span Wire - All Steel Cable used as span wire shall be 3/8 inch in diameter, unless otherwise noted on the Plans.

Messenger Wire - All Steel Cable used as messenger shall be 1/4 inch in diameter, unless otherwise noted on the Plans.

Tether Wire - All Steel Cable used as tether wire shall be 1/4 inch in diameter, unless otherwise noted on the Plans.

Back Guy - All Steel Cable used for back guying shall be 3/8 inch in diameter, unless noted otherwise on the Plans.

Cable Supports

Aluminum Tie-wrap - Shall be Flat Aluminum Armor Tape, 0.05 inch Thick X 0.30 inch Wide, typically furnished in 10 pound coils.

Where specifically required, Support Rings (also called "cable rings", "messenger rings") shall be galvanized in accordance with ASTM A-153, and the design approved by the ENGINEER, and shall be 2 to 3 inches in diameter (to contain the Electrical Cables), and sized to specifically match the Steel Cable.

Miscellaneous Hardware

All hardware and fittings shall be of the type shown on the Standards or the Construction and Installations Details.

All hardware and fittings shall be made of galvanized steel or non-corrosive metal. The tensile strength of all hardware shall be equal-to or greater-than the Steel Cable installed.

All thimble-eye and oval eye-bolts used to connect the automatic compression dead-end clamps to wooden poles, shall be 3/4 inch diameter. S-hooks shall be the same diameter as the cable. Fiberglass insulators shall be fabricated from epoxy-resin impregnated fiberglass strands, and have a tensile strength 50% greater than the Steel Cable.

Certification

The Vendor shall provide a Certification from the Manufacturer that the Steel Cable has been tested to meet or exceed the required tensile strength.

Warranty

The Vendor shall furnish SCDOT with any warranties on equipment and materials that are provided by the Manufacturer or Vendor as normal trade practice.

1.3 Measurement

Steel Cable of the SIZE specified shall be measured by the LINEAR FEET and furnished in 1000' reels.

1.4 Payment

Accepted quantities of Steel Cable, measured as stated above will be paid for at the contract unit price bid for:

FURNISH 3/8" GALVANIZED STEEL CABLE	1000' REEL
FURNISH 1/4" GALVANIZED STEEL CABLE	1000' REEL

M682.4 PEDESTRIAN POLE AND BASE**1.1 Description**

This specification describes requirements for furnishing a Pedestrian Pedestal Pole and Base.

1.2 Materials**1.2.1 Aluminum Base**

Pedestrian bases shall be constructed of aluminum. The neck of the base shall be threaded to accommodate a 4 inch diameter aluminum pole. The neck will also house a set screw that prevents counter rotation.

1.2.2 Anchor Bolts

Four (4) Anchor Bolts shall be supplied with each base. Each Anchor Bolt shall be threaded at the top, and shall have an L-bend at the bottom. A total of eight nuts and eight flat washers shall be supplied. Nuts shall be ASTM 563 Grade A.

1.2.3 Aluminum Pole

Aluminum pedestrian pole shall be 4 inches in diameter and 4 feet, 8 feet and/or 10 feet in length. It shall be constructed of polished aluminum and threaded on one end.

1.2.4 Concrete

The Concrete provided shall be CLASS 3000, and shall be mixed, poured, and finished in accordance with SC DOT STANDARD SPECIFICATIONS, Section 701, 702, 703, and 704.

1.2.5 Powdercoating

Color to be specified in special provisions or on signal plan. Powdercoating over aluminum shall be done at the factory or during the manufacturing process.

1.2.6 Warranty

The Vendor shall furnish SCDOT with any warranties on equipment and materials that are provided by the Manufacturer or Vendor as normal trade practice.

1.3 Measurement

Furnishing a Pedestrian Pedestal Pole and Base will be measured by EACH including all required incidental hardware.

1.4 Payment

Furnishing a Pedestrian Pole and Base measured as provided above, will be paid for at the contract unit price for:

	FURNISH 4' BREAK-AWAY ALUMINUM PEDESTAL POLE AND BASE	EA
	FURNISH 8' BREAK-AWAY ALUMINUM PEDESTAL POLE AND BASE	EA
	FURNISH 10' BREAK-AWAY ALUMINUM PEDESTAL POLE AND BASE	EA

M686.1 VEHICLE SIGNAL HEADS AND BACKPLATES**1.1 Materials****1.1.1 Signal Heads**

All Signal Heads shall conform to the ITE July 2005 "VTCSH". Specifications of the ITE (Light Emitting Diode (LED) Vehicular Traffic Signal Modules (hereafter referred to as ITE July 2005 "VTCSH".) published by the INSTITUTE OF TRANSPORTATION ENGINEERS (ITE), "Standard for Adjustable Face Vehicular Traffic Control Signal Heads" (latest Revision). All sections of each head shall be furnished by the SAME MANUFACTURER. The only exception is where the top section must be aluminum. Polycarbonate Vehicle Signal Heads of the size, type, and arrangement specified, are to be furnished by the Manufacturer or Vendor, together with ALL the necessary hardware for make-up and mounting. The basic material requirements are listed below:

1.1.1.1 Housing

The COLOR shall be Federal YELLOW (13538).

Each Signal Head housing shall consist of an assembly of separate interchangeable sections, each holding an individual optical unit, and stainless steel parts between the signal heads. THE TOP SECTION OF EACH 3-SECTION HEAD SHALL HAVE AN ALUMINUM REINFORCING / BEARING PLATE INSIDE AS WELL AS ON THE OUTSIDE OF THE HEAD. The Aluminum reinforcing / bearing plate SHALL HAVE TWO STAINLESS ¼" retaining BOLTS WITH LOCK WASHER AND NUT AND shall provide for a watertight seal to prevent water from entering the housing. THE BOLTS SHALL PROTRUDE COMPLETELY THRU BOTH PLATES AND THE TOP OF THE HEAD. The TOP SECTION OF THE FIVE-SECTION CLUSTER, AND OF THE FOUR-SECTION IN-LINE, SHALL BE POWDER COATED ALUMINUM. The Aluminum section shall be Federal Yellow (13538) and shall be fade resistant for a minimum of five years. The rest of those configurations shall be POLYCARBONATE and it shall also be fade resistant for five years. Heads with noticeable premature Fading shall be subject for replacement covered under the warranty.

The material of the Housing, Door, and Visor shall be engineering-grade structural, ultraviolet-stabilized PURE POLYCARBONATE resin. Other plastics are NOT acceptable. All edges shall be milled to a uniform round edge and free of all sharp edges.

1.1.1.2 Polycarbonate

The Department is aware of the design characteristics of this material--particularly the fact that as fillers are added for strength, the material becomes more brittle. We also recognize that signal manufacturers have optimized their designs around a specific formulation. Therefore the VENDOR shall provide complete particulars about the polycarbonate type number proposed for the Signal head. Further the VENDOR shall submit strength and wind tunnel test results (See Paragraph 1.2.5 Certification)

1.1.1.3 Door

The COLOR shall be Federal YELLOW (13538).

The door latches shall consist of stainless steel latch eye-bolts, wing-nut, and washer; all retained to keep them from falling to the street.

The hinges shall be reinforced protrusions (mortise and tenon) from the door. The hinges shall be attached to the head with Stainless steel roll pins or reinforced polycarbonate pins that are made as part of the head.

1.1.1.4 Visor

The Visor COLOR shall be Federal YELLOW (13538) outside, and dull BLACK (37038) inside.

The Visor CLASSIFICATION shall be TUNNEL (slot at bottom), unless otherwise specified.

The Visor shall be twist-on, attached to the housing with four stainless steel SCREWS, through the twist-on tabs on the visor.

1.1.1.5 Wiring

Wiring and Electrical shall be in accordance with ITE Standards. Color Coded wiring shall be factory connected to a barrier type TERMINAL BLOCK in the LOWER PORTION OF THE RED SECTION of each Signal Head. In the five-section cluster, the TERMINAL BLOCK shall be located in the (TOP) SECTION.

The TERMINAL BLOCK shall be double sided barrier type with two screws per barrier section; and shall make connections to the lamp wires using fast-on SPRING-LOADED SPADE LUGS and screws, (i.e. provisions should be made so that spade lugs or screws can be used on the same terminal block.) ONE PER SCREW. More than one neutral is allowed per terminal. The neutral designated terminal shall have triple stack connections supplied. The number of barrier sections in the TERMINAL BLOCK for the three and four section head, shall be 6-position, 12-terminal. For the five section head, it shall be 8-position, 16-terminal. The screws in the terminal block shall be no less than 8mm in length.

1.1.1.6 Mounting Assemblies

All mounting hardware shall be furnished.

Span Wire Mounting

Hardware for Span-Wire shall be finished Powder Coated Federal YELLOW (13538)

For Span-Wire mounting, the HANGER shall be cast ALUMINUM, and shall contain two stainless steel J-Hooks with stainless steel pin, properly sized BOWTIE cotter pin, lock washers and nuts, and have seven notches to position the hanging signal. A double weatherhead entrance shall be used. The weatherhead entrance BUSHING shall have a 1 1/2 inch hole for wire entry. THE NIPPLE USED SHALL BE OF THE SAME BRAND AS THE GOOSENECK AND SHALL HAVE AT LEAST TWO INCHES OF THREAD. THE THREAD PATTERN SHALL BE VIBRATION RESISTANT SEMI COURSE THREAD. THE NIPPLE SHALL BE TORQUED TO PROPER MANUFACTURER SPECIFICATIONS. THE SET SCREW SHALL BE INSTALLED WITH BLUE LOCTITE AND TIGHTNED SO THAT NIPPLE WILL NOT TURN. THE NIPPLE SHALL ALSO HOLD THE INTERNAL BEARING PLATE IN PLACE. The entrance diameter shall be maintained throughout the weatherhead, without restriction or reducing the hole diameter, into the signal head. No Tri-Stud hangers allowed. No special tools shall be required to tighten or adjust signal heads. Hangers with mismatched threads that will not tighten will be rejected. Span wire hangers shall not require disassembly to install on span wire.

For Span-Wire mounting, for MULTI-WAY heads, there shall be included a "SWIVEL BALANCE ADJUSTER" for proper vertical alignment.

For 5-SECTION CLUSTER signal assemblies, ONE Span-Wire Hanger shall be furnished, attached to the top signal section. The configuration shall be FHWA MUTCD TYPE 'S', known as the "dog-house head". At the bottom of the top signal section, a cast-aluminum bracket shall connect with the

arrow side, and with the ball indication side. This bracket shall have a removable, threaded "knockout" plug at each 90-degree turn, to facilitate wiring.

A 2 inch wide ribbed, cast aluminum BOTTOM BRACKET (No. 10 018 or equiv.), having holes 17 inches on-center, shall be used to unify the assembly. (The two sides of the cluster shall be not more than 8 inches apart.)

For 4-SECTION "T" ASSEMBLY, ONE Span-Wire Hanger shall be furnished, together with two cast aluminum brackets. The two red sections shall be not more than 8 inches apart. Tri-studs will not be accepted.

Mast Arm Mounting

Unless otherwise shown on the plans, rigid signal head mounting brackets shall be used. The bracket shall consist of a top- and bottom-arm, an extruded aluminum vertical tube, a vertical tube clamp, and a mast-arm clamp, with all hardware. The Bracket shall be COMPLETELY RUST PROOF, and shall be fully adjustable in all dimensions and angles.

1.1.1.7 Balance Adjuster

When needed, a Balance adjuster shall be aluminum with a 3/4" WEH. It shall be furnished Powder Coated Federal Yellow (13538) and shall have stainless steel bushing, stainless steel hardware, and a stainless steel eye. This item, as part of the furnish contract, shall not come attached to the signal head assemblies.

1.1.2 LED Modules

Provide modules that consist of an assembly that utilizes LEDs as the light source in lieu of an incandescent lamp for use in traffic signal sections. Use LEDs that are AlInGaP technology for red and yellow indications and InGaN for green indications. Install the ultra-bright type LEDs that are rated for 100,000 hours of continuous operation from -40°C to +74°C. Design modules to have a minimum useful life of 60 months, and to meet all parameters of this specification during this period of useful life.

Ensure, unless otherwise stated in these specifications, that each module meets or exceeds the requirements of the Interim Purchase Specification of the ITE July 2005 "VTCSH". (Light Emitting Diode (LED) Vehicular Traffic Signal Modules (hereafter referred to as ITE July 2005 "VTCSH". Arrow displays shall meet or exceed the electrical and environmental operating requirements of ITE July 2007 "VTCSH" of the ITE specifications.

Each LED module supplied shall be as a set from the same manufacturer.

Lamp socket 'Screw-in' type products shall not be allowed for vehicle traffic signals.

Inline fuses shall not be used in the wire from the head to the terminal end. This wire shall not have any splice points

1.1.2.1 Electrical

Provide modules that have maximum power consumption equal to or below the requirements of Table 1. Design the modules to operate from a 60 ± 3 HZ AC line voltage ranging from 80 volts to 135 volts. Ensure that fluctuations of line voltage have no visible effect on the luminous intensity of the indications. Design the module to have a normal operating voltage of 120 VAC, and measure all parameters at this voltage.

Certify that the module has a power factor of 0.90 or greater, and that THD (current and voltage) induced into an AC power line by the module does not exceed 20 percent for modules with power ratings

above 15W, and 40 percent for modules with power ratings of 15W or less. Design the modules onboard circuitry to include voltage surge protection to withstand high repetition noise transients as stated in Section 2.1.6 of NEMA Standard TS-2, 1992. Ensure all wiring meets the requirements of Section 13.02 of the ITE Publication: Equipment and Material Standards, ITE July 2005 "VTCSH". Provide spade terminals appropriate to the lead wires and sized for a #10 screw connection to the existing terminal block in a standard signal head.

Ensure that the module is compatible with signal load switches and conflict monitors. Design the module to provide sufficient current draw to ensure proper load switch operation while the voltage is varied from a regulated 80Vrms to 135 Vrms. Design off-state for green and yellow modules to be 30Vrms or greater, and on-state to be 40Vrms or greater. Also for green and yellow modules, design the voltage decay to 10 Vrms or less to be 100 milliseconds or less. Ensure that the control circuitry prevents current flow through the LEDs in the off state to avoid a false indication.

Design all modules to meet existing SCDOT monitor specifications for the following type of signal monitors: 170 controller/cabinet Type 210, 2010, 2010ECL and 2010ECLIP conflict monitors (including red monitoring and so-called plus features such as dual indication detection and short yellow time detection).

Ensure that the modules and associated onboard circuitry meet Class A emission limits referred to in Federal Communications Commission (FCC) Title 47, Subpart B, Section 15 regulations concerning the emission of electronic noise.

1.1.2.2 Photometric and Chromaticity Requirements

The maintained minimum luminous intensity values for the modules are shown in ITE July 2005 "VTCSH" specifications. Test all ball modules for luminous intensity at 25°C to meet 115% of values in table 2. Design and certify the modules to meet or exceed the maintained minimum luminous intensity values throughout the warranty period based on normal use in a traffic signal operation over the operating temperature range. Test the Red and Green modules for maintained luminous intensity at 74°C using ITE July 2005 "VTCSH" specifications. Use LEDs that conform to the chromaticity requirements of ITE July 2005 "VTCSH" specifications throughout the warranty period over the operating temperature range. Make chromaticity coordinate compliance measurements at 25°C.

1.1.2.3 Physical and Mechanical Requirements

Design the modules as retrofit replacements for installation into standard incandescent traffic sections that do not contain the incandescent lens, reflector assembly, lamp socket and lens gasket. Ensure that installation does not require special tools or physical modification for the existing fixture other than the removal of the incandescent lens, reflector assembly, lamp socket, and lens gasket.

1.1.2.4 Environmental Requirements

Provide modules that are rated for use in the operating temperature range of -40°C (-40°F) to +74°C (+165°F). Ensure that the modules (except yellow) meet all specifications throughout this range. Fabricate the module to protect the onboard circuitry against dust and moisture intrusion per the requirements of NEMA Standard 250-1991 for Type 4 enclosures to protect all internal components.

1.1.2.5 Module Construction

Design the module to be a single, self-contained device with the circuit board and power supply for the module inside and integral to the unit.

Design the assembly and manufacturing process for the module to ensure all internal components are adequately supported to withstand mechanical shock and vibration from high winds and

other sources. Wire the individual LEDs such that a catastrophic loss or the failure of one LED will result in the loss of not more than 20 percent of the signal module light output. LEDs shall be soldered to the circuit board.

1.1.2.6 Materials

Fabricate the lens and signal module from material that conforms to ASTM specifications. Enclosures containing either the power supply or electronic components of the module shall be made of UL94VO flame retardant materials. The lens of the signal module is excluded from this requirement.

1.1.2.7 Module Identification

Permanently mark each module with the manufacturer's name, model number, serial number, date of manufacture, and lot number if applicable. Identifiers shall be clearly understood. A Barcode shall also be incorporated into the label with all identifiers.

Permanently mark the following operating characteristics on the back of the module: rated voltage and rated power in Watts and Volt-Ampere.

If a specific mounting orientation is required, provide permanent markings consisting of an up arrow, or the word "UP" or "TOP" for correct indexing and orientation within the signal housing.

1.1.2.8 Lens

Provide a lens that is integral to the unit with a smooth outer surface and UV stabilized to withstand ultraviolet exposure for a minimum period of 60 months without exhibiting evidence of deterioration. Coat the front of a polycarbonate lens to make it more abrasion resistant. Seal the lens to the module to prevent moisture and dust from entering the module.

Tint the red and yellow lens to match the wavelength (chromaticity) of the LED. Provide a green lens that is either colorless or tinted to match the wavelength (chromaticity) of the LED.

1.1.2.9 12 Inch Arrow

The following specification requirements apply to the 12 inch (300 mm) arrow module only, which is the only size arrow allowed. All general specifications apply unless specifically superseded in this paragraph. Ensure that the arrow module meets specifications stated in ITE 2007 (VTCSH) for arrow indications. Design arrow displays to be LEDs to meet ITE 2007 (VTCSH) specifications. Determine the luminous intensity using the CALTRANS 606 method or similar procedure. <http://itvendors.dot.ca.gov/hq/esc/ctms/ctmsindex600.html>

1.1.2.10 Testing

Provide test results for ball modules from an independent testing laboratory showing wattage and compliance with ITE 2007 (VTCSH) arrow specifications.. Ensure that the LED signal modules tested are typical, average production units.

Burn In

Energize the sample module(s) (a sample of one module minimum) for a minimum of 24 hours, at 100 percent on-time duty cycle, at a temperature of +74°C (+165°F) before performing any qualification testing. Any failure of the module, which renders the unit non-compliant with the specification after burn-in, shall be cause for rejection. All specifications will be measured including, but not limited to:

Photometric (Rated Initial Luminous Intensity)

Measure at +25°C. Measure luminous intensity for red and green modules upon the completion of a 30 minute 100 percent on-time duty cycle at the rated voltage. Measure luminous intensity for yellow modules immediately upon energizing at the rated voltage.

Chromaticity (Color)

Measure at +25°C. Measure chromaticity for red and green modules upon the completion of a 30 minute 100 percent on-time duty cycle at the rated voltage. Measure chromaticity for yellow modules immediately upon energizing at the rated voltage.

Electrical

Measure all specified parameters for quality comparison of production quality assurance on production modules. (rated power, etc.)

Equipment Compatibility

In addition to the test of modules for compatibility with controllers, conflict monitors, and load switches, perform the following test, and certify the results. Connect each signal module to the output of a standard load switch connected to a variable AC voltage supply (95 to 135 VAC). With the load switch "off," vary the AC voltage from 95 Vrms to 135 Vrms, and measure the drop across the module. Readings greater than 15 Vrms are unacceptable.

1.1.2.11 Photometric Maintenance

Provide testing at an independent laboratory for a designated module to be tested for maintained luminous intensity at 25°C once each year during the five-year warranty period.

Notes:

Design signal modules to meet ITE requirements as a minimum throughout the warranty period.

Design signal modules to have a minimum initial intensity equal to 115% of Table 2 at 25°C.

Independent laboratory test reports are required to validate the initial intensity

1.1.3 *Signal Backplate*

A Signal Backplate constructed of thin strip of polycarbonate material that extends outward from and parallel to a signal face on all sides of a signal housing to provide a background for improved visibility of the signal locations shall be installed on all Signal Heads. Signal backplates shall be appropriate for the size and manufacturer of each signal head and be of monolithic construction. The backplate shall have a 2" retro reflective yellow border (Type XI (eleven) prismatic sheeting) applied, unless noted otherwise. See Standard Drawing for application.

1.1.4 *Certification***CATALOG CUTS ARE REQUIRED**

The Vendor shall provide written Certification from the Manufacturer that the latest ITE STANDARDS have been met.

The Vendor shall provide design details and drawings in sufficient detail for complete evaluation and comparison with these Specifications. Any exceptions to these Specifications must be stated in writing at that time.

The Vendor shall provide written specifications (product sheets) for the specific POLYCARBONATE (LEXAN TYPE NO.) formulation that is proposed. Bids shall provide the tests results for the IZOD IMPACT tests.

Housing Type No. _____ or See Attached Letter _____

The Vendor shall provide written TEST RESULTS DEMONSTRATING THE STRENGTH OF THE 3-SECTION SIGNAL HEAD. The test signal shall not have the SCDOT aluminum bearing plate installed. The tests should include static stress and wind tunnel setups.

Sample modules shall be provided for Department approval upon request. The sample modules submitted shall be representative of typical average production units. Samples will not be returned unless requested by the vendor.

The manufacturer of LED Modules shall have previously supplied indications to other states or cities and shall supply a list of these cities and/or states with the bid. The reference shall include name of city or state, contact person and model number of the LED display(s) previously supplied.

Sample modules shall be provided for Department approval upon request. The sample modules submitted shall be representative of typical average production units. Samples will not be returned unless requested by the vendor.

1.1.5 Warranty

The Vendor shall furnish SCDOT a **60 month** warranty from purchase date on equipment, materials, modules and lamps that are provided by the Manufacturer or Vendor as normal trade practice.

Replacement shall be provided within 30 days of receipt of failed equipment at no cost to the Department (including shipping costs). Faulty equipment shall be picked up from the seven signal shops by the vender.

M686.3 PEDESTRIAN SIGNAL HEADS

1.1 Materials

1.1.1 Pedestrian Head Housing

All signal heads shall conform to the specifications of the INSTITUTE OF TRANSPORTATION ENGINEERS (ITE), "Pedestrian Traffic Control Signal Indications" (latest Revision) August 4, 2010. All pedestrian signal heads shall be furnished by the same manufacturer and shall be new and current production models. Pedestrian signal heads of the size, type, and arrangement specified, are to be furnished, together with ALL the necessary hardware for make-up and mounting. For the purpose of this Specification, the basic material requirements are listed below:

1.1.1.1 General

All pedestrian signal heads shall use a SOLID display LED HAND/MAN module as a light source; a nominal message bearing surface of 16 inches; and SYMBOLIC MESSAGES; the Portland Orange UPRIGHT HAND for "Don't Walk", and Lunar White WALKING MAN for "Walk" OR a countdown display with a nominal message bearing surface of 16 inches with a SOLID SYMBOLIC MESSAGE Hand/Man overlay on the left and the countdown on the right. The Module and the Housing shall be two separate pieces.

1.1.1.2 Housing, Visor

The housing shall be a one piece ultra-stabilized, permanently colored, flame-retardant, PURE Polycarbonate resin. The materials and construction used shall comply with ITE specifications (latest Revision) August 4, 2010. A single housing shall contain the LED module. A weather tight neoprene gasket shall be provided. All Housing hardware shall be stainless steel or aluminum. The terminal strip shall be a minimum 4 position, double row, tinned over brass with zinc plated #10 steel screws. The DOOR shall swing down with two hidden hinges at the bottom, with removable locking pins. The DOOR shall be a corrosion resistant, powder coated, one-piece aluminum alloy die-casting, and pins.

A visor shall also be furnished and shall be securely fastened with stainless steel screws to the front of the signal housing, to shield the lens from the sun.

1.1.1.3 Finish

The finish colors shall be FEDERAL YELLOW (13538) for the door, housing, and exterior surfaces of the visor; and FLAT BLACK (37038) for the inside of the visor and for the part of the door within the visor.

1.1.1.4 Mounting

Pedestrian Heads must fit with brackets and related hardware described below for properly installing the pedestrian signal heads.

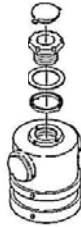
For *single post-top mount*:

A 1½" aluminum post top signal mounting shall be furnished. It shall consist of a slip fitter assembly for a one-way signal. It should be Pelco Product Part Number SE-3037 or equivalent with a FEDERAL YELLOW finish. See Diagram 1.

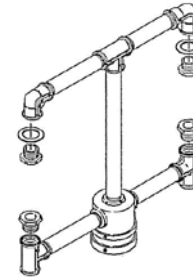
For *dual post-top mount*:

A 1½" aluminum post top signal mounting shall be furnished. It shall consist of a slip fitter for 1- and 2-way signal heads with a 4 inch slip-fitter bracket with a set screw, a lower mounting assembly, a support tube, and an upper mounting assembly. This mounting assembly should be Pelco Product Part Number SE-3257 or equivalent with a FEDERAL YELLOW (13538) finish. See Diagram 2.

**Diagram 1.
Single Post-
Top Mount**



**Diagram 2.
Dual Post-Top
Mount**

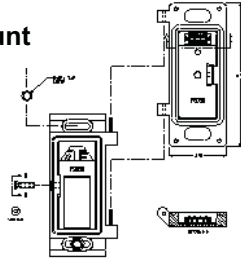


For **side-of-pole mount**:

A CLAMSHELL mount shall be furnished, compatible with a 4-1/2 inch and larger pole. The clamshell mount shall be compatible with either bolt mounting (to a wood pole), or band-on mounting to a steel pole. The side-mount shall make provisions for a hinge, and for wiring and terminal block. All hardware shall be tamper resistant. See Diagram 3.

A 1½" aluminum side-of-pole signal mounting shall be furnished. It shall consist of hub plates with conduit openings, and upper and lower arm assemblies for a 1-way signal. This mounting assembly should be Pelco Product Part Number SP-5523 or equivalent with a FEDERAL YELLOW (13538) finish. See the Diagram 4.

**Diagram 3.
Clamshell Mount**



**Diagram 4.
Side-of-pole Mount**



Locking devices equivalent to serrated washers shall be furnished with each type of mounting brackets, so that the pedestrian signal heads may be firmly and positively held in their required alignment.

1.1.2 Hand/Man LED Module and Hand/Man COUNTDOWN LED Module

Each LED module supplied shall be factory installed in the pedestrian signal head or shipped as a complete module with weather tight neoprene gasket to retrofit existing SCDOT polycarbonate pedestrian signal heads if applicable. Design the LED pedestrian signal module for installation into existing standard pedestrian signal head. All signal heads shall conform to the specifications of the INSTITUTE OF TRANSPORTATION ENGINEERS (ITE), "Pedestrian Traffic Control Signal Indications" (latest Revision) August 4, 2010

Identify each module with the manufacturer's name, model number, serial number, date of manufacture, and lot number if applicable per "The Equipment and Materials Standards" of the Institute of Transportation Engineers "Vehicular Traffic Control Signal Heads". The Identifiers shall be clearly understood with no need to decipher. A Barcode shall also be incorporated into the label with all identifiers.

The lens shall be a clear, non-glare, non-frosted polymeric lens with a matte finish. It shall be UV stabilized to withstand ultraviolet exposure for a minimum period of 60 months without exhibiting evidence

of deterioration. Coat the front surface of a polycarbonate lens to make it more abrasion resistant. Ensure that the lens has light transmission properties equal to or greater than 80%.

1.1.2.1 Optical

Comply with “The Equipment and Materials Standards” of the Institute of Transportation Engineers “Vehicular Traffic Control Signal Heads.

LED Hand/Man Module

Provide **16 inch displays** that have SOLID Symbolic Messages that meet the dimension requirements cited in Chapter 3, Table 1 Symbol Message for Class 3 displays (minimum 11 inches high and 7 inches in width each). Configure the pedestrian signal module with a sufficient number of LEDs to provide an average luminous intensity which meets the specifications of the ITE specifications (latest Revision) August 4, 2010. Ensure they meet this average luminous intensity throughout the warranty period over the operating temperature range. Wire the LEDs such that a catastrophic loss or failure of one or more LEDs will result in the loss of not more than five percent of the pedestrian signal module light output.

LED Hand/Man Countdown Module

Provide **16 inch displays** that have SOLID Symbolic Messages that meet the dimension requirements cited in Chapter 3, Table 1 *Symbol Message* for Class 3 displays. Ensure that the countdown number display is a minimum of 7 inches high by 6 inches wide. Configure the pedestrian signal module with a sufficient number of LEDs to provide an average luminous intensity which meets the specifications of the ITE specifications (latest Revision) August 4, 2010. Ensure they meet this average luminous intensity throughout the warranty period over the operating temperature range. Wire the LEDs such that a catastrophic loss or failure of one or more LEDs will result in the loss of not more than five percent of the pedestrian signal module light output.

Design the countdown display as a double row of LEDs, and ensure the countdown display blanks-out during the initial cycle while it records the countdown time. Ensure that the countdown display is operational only during the flashing don't walk, clearance interval. Blank out the countdown indication after it reaches zero until the beginning of the next flashing don't walk indication, and design the controlling circuitry to prevent the timer from being triggered during the solid hand indication.

Provide *certification* **with the bids** for evaluation that the pedestrian signal module complies with the ITE specifications (latest Revision) August 4, 2010. Provide **with the bids**, written independent testing laboratory results showing that the pedestrian signal modules meet or exceed the luminous intensity requirements of ITE specifications (latest Revision) August 4, 2010.

Portland Orange LEDs for the hand and countdown shall be of the latest AlInGaP technology or higher and Lunar White LEDs for the man shall be of the latest InGaN technology or higher. All modules shall be ETL certified and on the ETL certification program.

1.1.2.2 Electrical

Ensure that LED modules are compatible with signal load switches and conflict monitors meeting NEMA Standard TS 1 - 1989. Design the module to provide sufficient current draw to ensure proper load switch operation while the voltage is varied from a regulated 80Vrms to 135Vrms. Provide control circuitry to prevent current flow through the LEDs in the off state to avoid a false indication. Design all modules to meet existing SCDOT monitor specifications for the following types of signal monitors: 170 cabinet/controller compatible SCDOT specified Type 210, Type 2010, Type 2010ECL, and Type 2010ECL-ip conflict monitors (including red monitoring and so-called plus features such as dual indication detection and short yellow time detection).

Provide lead wires that are eighteen gauge (18AWG) minimum copper conductors with 105 degree Celsius insulation and also be anti-capillary. There shall be no more than three lead wires exiting the unit with no external splices. Lead wires shall be a minimum of 36 inches long with NEMA "Locking spade" terminals that are appropriate to the lead wires and sized for a #10 screw connection to the existing terminal block in the pedestrian signal head.

The LED's shall be soldered to the circuit board.

Ensure that the power consumption for the pedestrian signal modules is equal to or less than the following in watts, and that the modules have EPA Energy Star compliance ratings, if applicable to the shape, size and color.

TEMPERATURE	25°C	74°C
HAND	10	12
MAN	9	12
COUNTDOWN	9	12

1.1.3 Packaging

Each single pedestrian signal head, complete with visor and LED specified, completely assembled and designated mounting assembly, shall be packaged in a separate corrugated cardboard box. It shall be clearly labeled on the END of the box, in English, as to the type of mounting assembly contained therein. Manufacturer shall provide a packing list with the serial number(s), date(s) of manufacture, and lot number(s) if applicable.

Each style of retrofit module complete with weather tight neoprene gasket shall be packaged in a separate corrugated cardboard box. It shall be clearly labeled on the END of the box, in English.

1.1.4 Certification

Provide **with the bids**, written Certification from the intended Manufacturer, that ITE specifications (latest Revision) August 4, 2010 have been met for heads and modules.

The manufacturer shall have previously supplied indications to other states or cities and shall supply a list of these cities and/or states with the bid as references. The references shall include name of city or state, contact person, phone number, and model number of the LED display(s) previously supplied. Failure to submit references upon request shall be grounds for refection of the bid.

The Vendor SHALL FURNISH, the design details and drawings in sufficient detail for complete evaluation of the Proposal, and comparison with these Specifications. Any exceptions to these Specifications must be stated in writing at that time.

Sample modules shall be provided for Department approval upon request. The sample modules submitted shall be representative of typical average production units. **Samples will not be returned unless requested by the vendor.**

NOTE: CATALOG CUTS ARE REQUIRED AT BID OPENING.

1.1.5 Warranty

During the period of **60 months** following the date of Delivery, the Manufacturer or Vendor shall replace, at no expense to the Department (including shipping costs), any part of Polycarbonate Pedestrian Signal Head that fails by reason of defective material or workmanship. The Manufacturer or Vendor shall be responsible for pickup and delivery to the seven district signal shops and shall be within 150 miles of Columbia, South Carolina.

Performance shall be warranted for a period of **60 months** of the date of delivery and shall include repair or replacement of an LED pedestrian module that exhibits light output degradation which in the judgment of the department, cannot be easily seen at 150 feet in bright sunlight with the visor on the housing or that drops below the luminous intensity output requirements of sections 3.2 and 3.3 of this specification. Failure due to workmanship, materials, and manufacturing defects shall be warranted for repair or replacement of the first 60 months of the date of delivery. The vendor shall replace any failed modules within 30 calendar days of notification.

M686.4 PEDESTRIAN PUSH BUTTON STATION ASSEMBLY WITH SIGN**1.1 Description**

These items consists of furnishing AMERICAN DISABILITIES ACT APPROVED ALUMINUM PEDESTRIAN PUSH BUTTON STATION ASSEMBLIES AND PUSH BUTTON SIGNS of the types, sizes, and mounting specified, in accordance with these Specifications. All PUSH BUTTON STATION ASSEMBLIES AND PUSH BUTTON SIGNS shall be supplied with the appropriate mounting hardware.

1.2 Materials**1.2.1 Aluminum Push Button Station Assemblies**

Each aluminum push button station assembly shall conform to the specifications as set forth by the AMERICAN DISABILITIES ACT (ADA). Each aluminum push button station assembly shall be provided with an adjoining sign and must be able to accommodate to the size of the specified sign (either 9 x 12 inch or 9 x 15 inch).

1.2.2 Dual Mount Bracket

A single dual mounting bracket shall be provided to allow for two push button station assemblies to be mounted on one pole with the buttons positioned below the sign.

1.2.3 Push Buttons (with or without adjoining sign)

The long life switch shall be actuated by a 2 inch diameter chrome plated button and shall be included into a vandal resistant one-piece cast aluminum assembly and include a cable guide. Any exposed screws on the push button station assembly shall be stainless steel or other rust resistant material, and be tamper-proof. There shall be no sharp edges.

1.2.4 Finish

The finish color shall be FEDERAL YELLOW (13538) for the aluminum push button station assembly

The push button shall operate on a circuit not to exceed 24 Volts.

1.2.5 Push Button Signs

Each aluminum push button station assembly shall be provided with an adjoining sign.

The push button sign shall be aluminum with minimum thickness of 0.1 inch, with rounded corners, and have a black legend on white background. **The message shall be in accordance with the MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS (latest edition).**

The signs shall be 9 x 12 inch for:

R10-3 "PUSH BUTTON FOR GREEN LIGHT" when used without Pedestrian Signal Heads (see diagram below)

R10-3b "TO CROSS PUSH BUTTON (MAN WALK SYMBOL W/DEFINITIONS) ← → (arrow-left/right)" when used with hand/man Pedestrian Signal Heads The sign shall be reversible, such that one side displays the message with a left arrow and the other side displays the message with a right arrow (see diagram below).



R10-3



R10-3b

or should be 9 x 15 inch for:

R10-3e "TO CROSS PUSH BUTTON (COUNTDOWN)" when used with countdown Pedestrian Signal Heads The sign shall be reversible, such that one side displays the message with a left arrow and the other side displays the message with a right arrow (see diagram below).



R10-3e

1.2.6 Certification

CATALOG CUTS ARE REQUIRED

Provide written Certification from the intended Manufacturer, that ADA SPECIFICATIONS have been met for push buttons.

Provide design details and drawings sufficiently detailed. This is necessary for a complete evaluation of the Proposal, and comparison with these Specifications. Any exceptions to these Specifications must be stated in writing at that time.

Samples of each of the aluminum Pedestrian Push Button Station Assemblies and Signs shall be for Department approval upon request. The samples submitted shall be representative of typical average production units. **Samples will not be returned unless requested by the vendor.**

1.2.7 Warranty

During the period of **12 months** following the date of purchase, the Manufacturer or Vendor shall replace, at no expense to the Department (including shipping costs), any part of the Pedestrian Push Button Station Assembly, Sign or Bracket that fails by reason of defective material or workmanship.

1.3 Measurement

Furnishing a Pedestrian Push Button Station Assembly and Sign will be measured by EACH unit, including all dual mounting brackets and incidental hardware.

Furnishing a Sign will be measured by EACH unit.

1.4 Payment

Furnishing a Pedestrian Push Button Station Assembly and Sign, measured as provided above, will be paid for at the contract unit price bid for:

FURNISH PEDESTRIAN PUSH BUTTON MICROSWITCH TYPE STATION ASSEMBLY (9"x12") AND SIGN (R-10-3E)	EA
FURNISH PEDESTRIAN PUSH BUTTON MICROSWITCH TYPE STATION ASSEMBLY (9"x15") AND SIGN (R-10-3E)	EA
FURNISH PEDESTRIAN PUSH BUTTON MICROSWITCH TYPE	EA
FURNISH PEDESTRIAN PUSH BUTTON SOLID STATE WITH LIGHT AND TONE STATION ASSEMBLY (9"x12") AND SIGN (R-10-3E)	EA
FURNISH PEDESTRIAN PUSH BUTTON SOLID STATE WITH LIGHT AND TONE STATION ASSEMBLY (9"x15") AND SIGN (R-10-3E)	EA
FURNISH PEDESTRIAN PUSH BUTTON SOLID STATE WITH LIGHT AND TONE	EA
FURNISH DUAL MOUNTING BRACKET FOR (9 X 15 inch) SIGN	EA
FURNISH 20' SPUN ALUMINUM PEDESTRIAN POLE 4 1/2" DIAMETER	EA

For Signs:

FURNISH SIGN R10-3 (PUSH BUTTON FOR GREEN LIGHT)	EA
FURNISH SIGN R10-3b "TO CROSS PUSH (MAN/WALK SYMBOL WITH DEFINITIONS)" REVERSABLE FOR ARROWS IN BOTH DIRECTIONS	EA
FURNISH SIGN R10-3e "TO CROSS PUSH BUTTON (COUNTDOWN - ARROW)" REVERSABLE FOR ARROWS IN BOTH DIRECTIONS	EA

M686.5 SYMBOLIC LED BLANKOUT SIGN

1.1 Description

This specification describes requirements for furnishing Symbolic LED (Light Emitting Diode) No Right/Left Turn Blankout Sign, of Clam-Shell configuration, with Sun Visor and designated mounting hardware. The Blankout Sign and the mounting hardware are stated as one item.

1.2 Materials

1.2.1 Blankout Sign

All Blankout Signs shall be built to Institute of Transportation Engineers "Vehicular Traffic Control Signal Heads" (VTC SH) standards. All Blankout Sign housings shall be furnished by the same manufacturer and shall be new and current production models. The Blankout Sign shall be capable of displaying three distinct messages including blank message. The furnished Blankout Sign shall include all electrical and electronic hardware, structural materials, housings, and all the necessary hardware for make-up and mounting. The Blankout Sign, and its associated equipment, shall be capable of operating on a 24 hour a day, 7 day per week basis and shall conform to the physical and functional requirements of this Specification.

1.2.1.1 Symbol

All blankout signs shall use an illumination of International Symbol consisting of a red circle and slash and either a white right arrow or white left arrow. Symbols shall conform to MUTCD sign standards. When the display is not energized, the sign shall be effectively blank. The Symbol shall be illuminated by an assembly of high output lunar white and red LEDs.

1.2.1.2 Housing

The housing shall be constructed of Aluminum and shall be weatherproof. The outside dimensions shall not be less than 26 inches high by 26 inches wide and 4 inches deep. The housing shall not be less than 0.125 inch aluminum with all corners being welded their full length. All welds shall use the tungsten inert gas method. A fitting shall be installed on the bottom of the sign in the middle for tethering. The back shall be aluminum of not less than 0.063 inches thick. The door shall be extruded aluminum of not less than 0.125 inch thickness and shall be welded on two corners and screwed together on the other two corners to provide access for installation of a faceplate and polycarbonate lens. The aluminum door shall be attached to the housing utilizing stainless steel hinges. The door shall be held secure to a neoprene gasket by stainless steel, quarter turn link locks. All hardware shall be stainless steel and no tools shall be required for routine maintenance. A retaining rod shall be provided to secure the door in the open position.

1.2.1.3 Visor

A three sided aluminum visor of not less than 0.063 inch thickness and 7 inches deep shall also be furnished and shall be securely fastened with corrosion resistant screws to the aluminum door, to shield the lens from the sun.

1.2.1.5 Finish

The finish colors shall be FEDERAL YELLOW (13538) for the door, exterior and interior of the sign enclosure, and exterior surfaces of the visor. Apply the yellow by the dry powder method. Apply the yellow finish by electrostatic spray and heat cure. Ensure the thickness of the finish is a minimum of 2.5 mils thick. Do not apply paint to the latching hardware. Paint two coats of FLAT BLACK (37038) for the inside of the visor, and for the part of the door within the visor.

1.2.1.6 Mounting

All mounting hardware shall be furnished for Span-Wire mounting, as requested by the purchase order. Hardware for Span-Wire shall be finished FEDERAL YELLOW (13538).

For Span-Wire mounting, the HANGER shall be cast ALUMINUM, and shall contain two (2) stainless steel J-Hooks with stainless steel lock washers and nuts, and have seven (7) notches to position the hanging signal. A double weatherhead entrance shall be used. The weatherhead entrance BUSHING shall have a 1.5 inch hole for wire entry. That entrance diameter shall be maintained throughout the weatherhead, without restriction or reducing the hole diameter, into the sign. No special tools shall be required to tighten or adjust signs. Span wire hangers shall not require disassembly to install on span wire.

A fastener shall be installed in the bottom of the sign housing to provide for attachment to a tether cable of ¼ inch diameter.

1.2.2 *Symbolic LED Module*

Provide a symbolic display that is a PCB (Printed Circuit Board) matrix with a mat black solder mask with minimum thickness of 0.093 inches and a silk screened component identifier. Mount LEDs on front of the PCB matrix. Mount all other components on the back of the black matrix. Ensure that a person with 20/20 vision can read a fully intensified, legible message from 500 feet in front of the sign under any light conditions. Ensure the message is not legible when the sign is off, even if in direct sunlight.

Design and certify the LED Blankout Sign to operate over a temperature range of –40°F to 165°F with an operating voltage range of 105 to 130 volts and a power factor >95%. Ensure that all electronic components are standard industry items that are available from wholesale electronics distributors. Provide components that are “solid state” type. Do not use electro-mechanical components such as relays, transformers or solenoids.

Ensure compatibility and proper triggering and operation with load switches and conflict monitors in signal controllers currently used by the Department. Ensure the on-board circuitry meets FCC title 47, sub-part B, section 15 regulations on the emission of electronic noise. The presence of ambient radio signals, magnetic or electromagnetic interference, including those from power lines, roadway lights, transformers or motors, within 1 foot of any of the components of the Blankout Sign, shall not impair the performance of the Blankout Sign. The Blankout Sign shall not radiate any electrical or electromagnetic signals that could adversely affect any other electrical or electronic device.

1.2.2.1 LED Specifications

Use Red LEDs that are the latest Aluminum Indium Gallium Phosphide (AlInGaP) technology and White LEDs that are the latest Indium Gallium Nitride (InGaN) technology or better with a minimum luminous output requirement of 9,000 candelas per meter square when each discrete LED is driven at a current of 20 milliamperes. Install the ultra-bright type LEDs that are rated for 100,000 hours of elapsed time calendar hours use in an ambient temperatures, based on an average daily on-time usage factor of 11%, when driven at the specific forward current used for normal daylight LED Blankout Sign display

operation. Distribute the LEDs evenly. Ensure that the maximum distance, center to center, between consecutive LEDs is 0.5 inches, plus or minus 10%. Connect the individual LED light sources so that failure of a single LED will result in a loss of no more than 5 LEDs. Protect and seal the rear side of the PCB with a molded polymeric back cover. Mount the display PCB with back cover into the front door, which consist of an aluminum frame and face lens.

The LED driver electronics shall not be mounted on the same board as the LED displays. The driver boards shall be easily disconnected from the LED display modules. Removal of any display module shall not affect the operation of the remaining modules.

1.2.2.2 Lens

Provide a clear, non-glare, mat finish polycarbonate lens with a UV resistant surface treatment and super abrasion resistant properties. Ensure that the lens has light transmission properties equal to or greater than 80%. The module shall be completely sealed against moisture and dust intrusion.

1.2.2.3 Dimming

Provide a photocell and dimming circuitry to automatically reduce the light intensity of the display by 35% based on the ambient light to reduce long term degradation of the LEDs. Include a 30-second delay to prevent interference caused by extraneous light.

1.2.2.4 Labels

Identify each Symbolic LED Module with the manufacturer's name, model number, serial number, date of manufacture, and lot number if applicable.

1.2.3 **Packaging**

Each single Symbolic Blankout Sign, complete with visor, and LED Symbolic module capable of displaying either a right or left arrow, as specified, completely assembled with mounting assembly and tether fastener, shall be packaged in a separate corrugated cardboard box. The box shall be clearly labeled on the END of the box, in plain English, as to what's contained therein. All packages shall be identified with the Department PURCHASE ORDER NUMBER. Packing lists and EQUIPMENT LABELS shall be glued to every carton showing its contents.

Each Symbolic LED Module shall be packaged in a separate corrugated cardboard box. The box shall be clearly labeled on the END of the box, in plain English, as to what's contained therein. All packages shall be identified with the Department PURCHASE ORDER NUMBER. Packing lists and EQUIPMENT LABELS shall be glued to every carton showing its contents.

1.2.4 **Certification**

CATALOG CUTS ARE REQUIRED

Provide written Certification from the **Manufacturer or Vendor** that ITE Standards, MUTCD standards, and all the requirements of this specification have been met.

Samples shall be provided for Department approval if requested. The sample submitted shall be representative of typical average production units. Samples will not be returned unless requested by the vendor.

1.2.5 Warranty

During the period of **SIXTY (60) MONTHS** following the date of purchase, the Manufacturer or Vendor shall replace, at no expense to the Department (including shipping costs), any part of Symbolic LED Blankout Sign that fails by reason of defective material or workmanship.

Performance shall be warranted for a period of **SIXTY (60) MONTHS** of the date of purchase and shall include repair or replacement of a Symbolic LED NRT/NLT Module that exhibits light output degradation, which in the judgment of the department, cannot be easily seen at one hundred fifty feet (150') in bright sunlight with the visor on the housing or that drops below the luminous intensity output requirements of this specification. The vendor shall replace any failed modules within 30 calendar days of notification.

1.3 Measurement

Furnishing a No Right/Left Turn Symbolic LED Blankout Sign shall be measured by EACH with LED module installed, including ALL internal electrical and electronic hardware, structural materials, housings, and all the necessary hardware for proper mounting.

Furnishing a No Right/Left Turn Symbolic LED Module, measured by each, shall be complete with weather tight neoprene gasket for replacing defective existing modules if applicable.

1.4 Payment

Furnishing a No Right/Left Turn Symbolic LED Blankout Sign with LED module with span wire mount, measured as provided above, will be paid at the contract unit price bid for:

FURNISH NO RIGHT/LEFT TURN SYMBOLIC LED BLANKOUT SIGN W/ SPAN WIRE MOUNTING	EA
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Furnishing a Symbolic LED module, measured as provided above, will be paid at the contract unit price bid for:

FURNISH NO RIGHT/LEFT TURN SYMBOLIC LED MODULE	EA
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M688.3 VIDEO DETECTION SYSTEM

1.1 Description

This specification describes requirements for furnishing video detection system components with all necessary hardware and software and includes the Network Security Policy as part of this specification. A complete Video Detection System includes Camera, Camera Mounting Hardware, Camera Cable, CPU, Surge Arrestors, and Power Panel.

1.2 Materials

1.2.1 Video Imaging

Material and equipment furnished under this section must be pre-approved by SCDOT by the date of installation. Miscellaneous hardware such as cables and mounting hardware do not need to be pre-approved.

Ensure that software is licensed for use by SCDOT and by any other agency responsible for maintaining or operating system.

Design and furnish video detection systems that detect vehicles at signalized intersections by processing video images and providing detection outputs to the signal controller in real time (within 150 milliseconds of vehicle arrival).

Furnish all required camera sensor units, processor units, hardware and software packages, cabling, luminaire arms, harnesses, camera mounting assemblies, surge protection panels, grounding systems and all necessary hardware. Furnish systems that allow the display of detection zones superimposed on an image of the roadway on an SCDOT-furnished monitor or laptop computer screen. Ensure detection zones can be defined and data entered using a simple keyboard or mouse and monitor, or using a Windows® Xp (or newer) based laptop PC with software.

Provide design drawings showing design details and camera sensor unit locations for review and acceptance before installation. Provide mounting height and location requirements for camera sensor units on the design, based on site-survey. Design video detection systems with all necessary hardware. Indicate all necessary poles, spans, mast arms, luminaire arms, cables, camera mounting assemblies and hardware to achieve the required detection zones where SCDOT owned poles are not adequate to locate the camera sensor units. The vendor is responsible for the final design of video detection systems.

Review and acceptance of the designs by SCDOT does not relieve the vendor from the responsibility to provide fully functional systems and to ensure that the required detection zones can be provided.

Provide the ability to program each detection call with the following functions:

- Full Time Delay – Delay timer is active continuously,
- Normal Delay – Delay timer is inhibited when assigned phase is green (except when used with TS 2 and 170/2070L controllers),
- Extend – Call is extended for this amount of time after vehicle leaves detection area,

- Delay Call/Extend Call – This feature uses a combination of full time delay and extend time on the same detection call. Ensure operation is as follows: Vehicle calls are received after the delay timer times out. When a call is detected, it is held until the detection area is empty and the programmed extend time expires. If another vehicle enters the detection area before the extend timer times out, the call is held and the extend timer is reset. When the extend timer times out, the delay timer has to expire before another vehicle call can be received.

Provide the ability to program each detection zone as one of the following functions:

- Presence detector,
- Directional presence detector,
- Pulse detector,
- Directional pulse detector.

Ensure previously defined detector zones and configurations can be edited.

Provide systems that allow for the placement of at least 8 detection zones within the combined field of view of a single camera sensor unit.

Provide a minimum of 4 detection outputs per processing unit. If additional outputs are needed, provide all necessary hardware to allow for additional calls to be placed to the Controller via the input file.

Provide detection zones that can be overlapped. Ensure systems reliably detect vehicles when the horizontal distance from the camera sensor unit to the detection zone area is less than ten times the mounting height of the sensor. Ensure systems detect vehicles in multiple travel lanes.

Ensure systems can detect vehicle presence within 98 to 102 percent accuracy (up to 2 percent of the vehicles missed and up to 2 percent of false detection) for all weather and lighting conditions, in the absence of occlusion.

SCDOT may conduct field-testing to ensure the accuracy of completed video detection systems.

1.2.2 Video Detection System

Furnish video detection systems that receive and simultaneously process information from camera sensor units, and provides detector outputs to signal controllers.

Ensure systems provide the following:

- Operate in a typical roadside environment and meet the environmental specifications and are fully compatible with NEMA TS 1, NEMA TS 2, or Type 170/2070L controllers and cabinets,
- provide a “fail-safe” mode whereby failure of one or more of the camera sensor units will cause constant calls to be placed on the affected vehicle detection outputs to the signal controller,
- provide compensation for minor camera movement of up to 2 percent of the field of view at 400 feet without falsely detecting vehicles,
- process the video at a minimum rate of 30 frames per second,
- provide separate wired connectors inside the controller cabinet for viewing each camera,

Furnish camera sensor units that comply with the following:

- have an output signal conforming to EIA RS-170 standard,

- have a nominal output impedance of 75 ohms,
- be immune to bright light sources, or have built in circuitry or protective devices to prevent damage to the sensor when pointed directly at strong light sources,
- be housed in a light colored environmental enclosure that is water proof and dust tight, and that conforms to NEMA-4 specifications or better,
- simultaneously monitor at least five travel lanes when placed at the proper mounting location with a zoom lens,
- have a sunshield attached to the environmental enclosure to minimize solar heating,
- meet FCC class B requirements for electromagnetic interference emissions,
- have a heater attached to the viewing window of the environmental enclosure to prevent ice and condensation in cold weather,
- have the Video Processing unit in the cabinet.

Where coaxial video cables and other cables are required between the camera sensor and other components located in the controller cabinet, furnish surge protection in the controller cabinet.

Coaxial communications cable shall comply with the following, as recommended by the manufacturer:

- Belden 8281 or approved equivalent Number 20 AWG, solid bare copper conductor terminated with crimped-on BNC connectors (do not use BNC adapters) from the camera sensor to the signal controller cabinet.
- Belden 9259 or approved equivalent Number 22 AWG, stranded bare copper conductor terminated with crimped-on BNC connectors (do not use BNC adapters) from the camera sensor unit to the junction box, and within the signal controller cabinet.

Furnish power cable appropriately sized to meet the power requirements of the sensors. At a minimum, provide three conductor 120 VAC field power cable.

As determined during the site survey, furnish sensor junction boxes with nominal 6 x 10 x 6 inches dimensions at each sensor location. Provide terminal blocks and tie points for power cable.

1.2.1 Video Detection System Support

Furnish video detection systems with either a simple keyboard or a mouse with monitor and appropriate software, or with system software for use on SCDOT-owned laptop PCs. Ensure the system is Windows® 2000 compatible, or newer.

Provide Hardware and Windows® XP compatible (or newer) personal computer software, if needed, to provide remote video and video detection monitoring via standard telephone line.

Provide each individual system with all the necessary equipment to focus and zoom the camera lenses without the need to enter the camera enclosure.

Ensure systems allow the user to edit previously defined detector configurations. When a vehicle is within a detection zone, provide for a change in color or intensity of the detection zone perimeter or other appropriate display change on the monitor or laptop computer screen.

Provide cabling and interconnection hardware with 6-foot minimum length interconnection cable to interface with the system.

Provide all associated equipment manuals and documentation.

1.2.2 *Warranty*

The Vendor shall furnish SCDOT with any warranties on equipment and materials that are provided by the Manufacturer or Vendor as normal trade practice.

1.3 Measurement

Furnishing Video Detection System components shall be measured as EACH unit.

Furnishing Video Detection Camera Cable shall be measured by LINEAR FEET and furnished in 500' REELS or 1000' REELS.

Furnishing Video Detection System On Site Training shall be measured by DAY.

1.4 Payment

Furnishing Video Detection System components, Cable, and On Site Assistance, measured as provided above, will be paid for at the contract unit price for:

FURNISH VIDEO DETECTION CPU	EA
FURNISH VIDEO DETECTION CAMERA	EA
FURNISH VIDEO DETECTION CAMERA MOUNTING HARDWARE	EA
FURNISH VIDEO DETECTION CAMERA CABLE – 1000'	1000' REEL
FURNISH VIDEO DETECTION CAMERA CABLE – 500'	500' REEL
FURNISH MONITOR WITH VIDEO CABLE	EA
FURNISH VIDEO DETECTION ON SITE ASSISTANCE	DAY
FURNISH VIDEO DETECTION SURGE ARRESTORS	EA
FURNISH VIDEO DETECTION POWER PANEL WITH BREAKER	EA
FURNISH VIDEO DETECTION LENS ADJUSTMENT MODULE	EA

** Network Security Policy to follow on the next three pages:

Network Services Security Policy for network attached devices

This policy is subject to change at any time, as deemed necessary by Network Services and/or the ISO.

Last Update Status: *Updated August 27, 2015*

1. Overview

See Purpose.

2. Purpose

This document describes the required minimal security configuration for all networked devices connecting to a production network or used in a production capacity at or on behalf of South Carolina Department of Transportation (SCDOT).

3. Scope

All employees, contractors, consultants, temporary and other workers at SCDOT and its subsidiaries must adhere to this policy. All networked devices connected to SCDOT production networks are affected.

4. Policy

Every active network device must meet the following operational standards (if applicable):

1. No local user accounts are configured on the network device. Network devices must use TACACS+ /Radius/AD for all user authentication.
2. The super user password on the network device must be kept in a secure encrypted form. The network device must have the super user password set to the current production network device password from the device's support organization.
3. The following services or features must be disabled:
 - a. IP directed broadcasts
 - b. TCP small services
 - c. UDP small services
 - d. All source routing and switching
 - e. Any discovery protocols on Internet connected interfaces
 - f. Telnet, FTP, and HTTP services
 - g. Auto-configuration
4. The following services should be disabled unless a business justification is provided:
 - a. Cisco discovery protocol and other discovery protocols
 - b. Dynamic trunking
 - c. Scripting environments, such as the TCL shell
5. The following services must be configured:
 - a. Password-encryption
 - b. NTP configured to a corporate standard source
6. Any routing updates shall be done using secure routing updates.
7. Support for SNMPV3. Use corporate standardized SNMP community strings. Default strings, such as public or private must be removed. SNMP must be configured to use the most secure version of the protocol allowed for by the combination of the device and management systems.
8. Access control lists must be used to limit the source and type of traffic that can terminate on the device itself.

9. Access control lists for transiting the device are to be added as business needs arise.
10. The network device must be included in the corporate enterprise management system with a designated point of contact.
11. Each network device must have the following statement presented for all forms of login whether remote or local:

WARNING TO USERS

This computer system is the property of the South Carolina Department of Transportation (SCDOT) and may only be accessed by authorized users. Unauthorized access, use, misuse, or modification of this computer system or of the data contained herein or data in transit to/from this system constitutes a violation of Title 18, United States Code, Section 1030. SCDOT shall monitor system usage for unauthorized activities. You should have no expectation of privacy in your use of this network, including information stored locally on the hard drive or other media in use with this unit (e.g., floppy disks, USB drives, PDAs and other hand-held peripherals, CD-ROMs, etc.) Any or all activity of this system may be intercepted, monitored, recorded, copied, audited, or inspected by authorized SCDOT personnel. Improper use or criminal activity can lead to administrative disciplinary actions as well as civil and criminal penalties.

ANYONE USING THIS SYSTEM EXPRESSLY CONSENTS TO SUCH MONITORING. LOG OFF OR DISCONNECT IMMEDIATELY IF YOU DO NOT AGREE TO THE CONDITIONS STATED IN THIS WARNING

12. Telnet may never be used across any network to manage a router, unless there is a secure tunnel protecting the entire communication path. SSH version 2 is the preferred management protocol.
13. Any dynamic routing protocols (if any) must use authentication in routing updates sent to neighbors. Password hashing for the authentication string must be enabled when supported. Password will be provided by the SCDOT
14. The network device configuration standard will define the category of sensitive routing and switching devices, and require additional services or configuration on sensitive devices including:
 - a. IP access list accounting
 - b. Device logging
 - c. Incoming packets at the router sourced with invalid addresses, such as RFC1918 addresses, or those that could be used to spoof network traffic shall be dropped
 - d. Router console and modem access must be restricted by additional security controls

5. Policy Compliance**5.1 Compliance Measurement**

The InfoSec team will verify compliance to this policy through various methods, including but not limited to, periodic walk-thrus, video monitoring, business tool reports, internal and external audits, and feedback to the policy owner.

5.2 Exceptions

Any exception to the policy must be approved by the InfoSec team in advance.

5.3 Non-Compliance

An employee found to have violated this policy may be subject to disciplinary action, up to and including termination of employment.

6 Related Standards, Policies and Processes

None.

7 Definitions and Terms

None.

8 Revision History

Date of Change	Responsible	Summary of Change
August 1, 2015	NS Policy Team	Reviewed and accepted
August 27, 2015	NS Policy Team	Reviewed and accepted

M688.5 STEEL STRAIN POLE AND FOUNDATION

1.1 Description

This specification describes requirements for furnishing a Steel Strain Pole, of the sizes and colors specified. Anchor bolts and all miscellaneous hardware shall be supplied with each pole as required.

All anchor bolt nuts, caps, pole clamps, and miscellaneous pole hardware shall be **BAGGED IN BURLAP** for each pole during shipping. In addition, individual parts shall also be furnished as specified.

1.2 Materials

1.2.1 General

ALL STEEL STRAIN POLES PROVIDED FOR ANY INDIVIDUAL PROJECT SHALL BE FROM THE SAME MAUFACTURER.

Each Steel Strain Pole Assembly shall consist of:

1. A steel Shaft,
2. A steel Anchor Base,
3. Four steel Anchor Bolts with eight nuts,
4. A removable top plate which will bolt to the shaft with a 1/4" J-Bolt and attached to a 1/2" bar that is welded inside the shaft,
5. Four removable anchor bolt Covers,
6. Two adjustable heavy duty Pole Clamps, and
7. Miscellaneous hardware as specified.

1.2.2 Pole Materials

1.2.2.1 Shaft

The design of the shaft will be based on minimum mill certified 55,000 yield strength steel. One of the following steel must be used in the fabrication of the shaft: American Society for Testing and Materials (ASTM): A570-50, ASTM A572-50, ASTM A572-60, ASTM A607-50, ASTM A607-55, ASTM A607-60, ASTM A595-A or ASTM A595-B.

Only one (1) longitudinal weld, and no transverse welds, shall be permitted.

After being formed and welded, the Shaft shall then be longitudinally cold-rolled with sufficient pressure to flatten the weld. Break formed, (multi-sided) poles shall have a minimum of eight (8) sides and a guaranteed mill certified minimum yield of 55,000 Pounds per square inch (PSI).

The Shaft shall have a uniform taper in diameter from base to top of 0.14" per foot. The minimum base diameter and length shall be as specified in the Dimensions Chart.

A reinforced hand hole, complete with frame and cover with a minimum size of 4" x 6 1/2", shall be welded into the Shaft approximately 12" above the base plate at 0 degrees. The frame shall be tapped with a 1/2" - 13 Unified Thread Standard (UNC) for a grounding bolt. Stainless-steel hardware shall be supplied.

A J-hook wire support shall be welded inside near the top of the Shaft.

Round holes shall be provided in EVERY POLE as follows:

- 3" diameter hole, at 6" on-center below pole TOP; at 0 degrees (above hand hole).
- 3" diameter hole, at 6" on-center below pole TOP; at 270 degrees (orientate counter-clockwise).
- 3" diameter hole, at 15 ¼" on-center above pole BOTTOM; at 90 degrees (orientate counter-clockwise).
- 1" diameter hole, at 35" on-center above pole BOTTOM: at 90 degrees (orientate counter-clockwise).
- 1" diameter hole, at 35" on-center above pole BOTTOM: at 270 degrees (orientate counter-clockwise).

The two (2) 3" upper holes are for installing weatherheads w/nipple and the lower 3" hole is to permit the installation of a pole mounted Controller Cabinet. A 3" threaded, half-blind coupling shall be FACTORY WELDED, to the pole surface and protrude ¼" in each hole. The two (2) 1" diameter holes are for mounting the electrical service. These holes shall have a 1" threaded half-blind coupling FACTORY WELDED, to the pole surface and shall be flush mounted. The entire pole coupling shall then be hot dipped galvanized.

1.2.2.2 Anchor Base and Flange Plates

The Anchor Base and flange plates shall be made from ASTM A36 steel.

The Anchor Base shall be square (with rounded corners), and shall be of the size and thickness specified in the DIMENSIONS TABLE below.

The Anchor Base shall be provided with four (4) holes to accept Anchor Bolts. The size of the holes and the bolt circle shall be as specified in the DIMENSIONS TABLE below.

Tapped holes shall be provided for attaching removable Anchor Bolt covers, which shall be provided with stainless steel hex-head bolts.

The Anchor Base shall telescope the Shaft, and shall be secured to the Shaft by two fillet welds. One weld shall be on the inside of the base at the end of the Shaft, and the other shall be on the outside at the top of the base. The welded connection shall develop the full strength of the adjacent cross-section to resist bending action.

1.2.2.3 Anchor Bolts and Nuts

Anchor Bolts shall be steel rods of ASTM A-36 M-55, modified to have a minimum yield point of 55,000 PSI.

Four (4) Anchor Bolts shall be supplied with each pole. The Anchor Bolt size shall be specified in the Dimensions Chart.

Each Anchor Bolt shall be threaded at the top for 10", and shall have a 6" L-bend at the bottom, or a bearing plate as specified on larger pole sizes.

A total of eight (8) nuts and eight (8) flat washers shall be supplied and installed for each pole. Nuts shall be ASTM 563 Grade A. The two (2) nuts per bolt may be either:

- two (2) hex nuts (preferred), or
- one (1) hex nut and one square nut (acceptable).

Note: All other bolts shall be ASTM A325 or A307, (threaded per UNC series).

1.2.2.4 Pole Cap or Top Plate

Each pole shall be supplied with a Cap or top which shall be made from 7 GA. Galvanized steel or from cast aluminum, ASTM B-108; Alloy 356.OT6.

The Pole Cap shall be of a size greater than the pole top diameter and designed to prevent water from entering the top of the pole.

1.2.2.5 Bolt Cover

With each Pole there shall be supplied four (4) removable bolt covers capable of hiding the installed Anchor Bolts and the top nut. The covers shall have a clean-lined modern appearance. They shall attach to the pole with stainless-steel hex-head bolts. Acorn nuts are also acceptable.

1.2.2.6 Pole Clamp

With each Strain Pole there shall be supplied two (2) adjustable Span Wire Clamps. Each span wire clamp shall be constructed of 1/4" x 3" steel minimum, complete with two 7/8" x 4" stud bolts including two (2) lock washers and two (2) hex nuts per stud bolt. Each span wire clamp shall also include a clevis complete with a 7/8" x 3" bolt with one (1) lock washer and one (1) hex nut.

1.2.2.7 Pole Plugs

Plugs, either galvanized or stainless, shall be supplied for all holes in the steel pole. Plugs shall be installed in all un-used holes in the steel pole in a construction project.

1.2.2.8 Foundation Rebar Cage

See Standard Drawing, Poles, 675-115-02 for Foundation Cage details or separate drawing from Standard Drawing, Poles, 675-115-02 as part of this specification. <http://www.scdot.org/doing/technicalPDFs/standardDrawings/675-000-00.pdf>

1.2.3 **Dimensions**

Strain Poles shall be supplied on a per EACH basis, with dimensions in accordance with the following table:

DIMENSIONS TABLE

GALVANIZED STEEL SHAFT			GALVANIZED STEEL PLATE BASE			ANCHOR BOLTS			
Type	Diameter at Base	Length	Mfr's Standard Gauge	Plate Size	Plate Thickness	Bolt Circle	Bolt Hole Diameter	Diameter X Pole Total Length	Design Load @ Yield
13" X 26'	13"	26'	#3 gauge	19" square	2"	18"	2 3/8"	2"X90" (including L-bend)	5,200 lb.
13" X 28'	13"	28'	#3 gauge	19" square	2"	18"	2 3/8"	2"X90" (including L-bend)	5,200 lb.
13" X 32'	13"	32'	#3 gauge	19" square	2"	18"	2 3/8"	2"X90" (including L-bend)	5,800 lb.

1.2.4 **Other Materials**

All other hardware or components shall be made of a non-corrosive material, or be of the same material as the item being installed.

1.2.4.1 Concrete

The concrete used in the pole base, shall conform to the requirements of SCDOT STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, Section 701, 702, 703, and 704. The concrete shall be CLASS 5000, with "WATER-REDUCER ADMIXTURE", installed in ONE MONOLITHIC POUR, with VIBRATION.

1.2.4.2 Reinforcing Steel

Steel reinforcement shall conform to the requirements of DOT STANDARD SPECIFICATIONS, Section 703.2.1, which is amended to include the following:

"All references to AASHTO M 31 or ASTM A 615 are hereby deleted and replaced by ASTM A 706 with a single minimum yield strength level of 60,000 psi, designated as Grade 60."

The bars shall be of the size and type shown on the Design Details or in the Standards.

1.2.4.3 Conduit Elbow

Conduit Elbows shall be in accordance with FURNISH AND INSTALL ELECTRICAL CONDUIT. Conduit Elbows in pole bases shall be PVC, of the size and type shown on the Plans. As a minimum, THERE SHALL BE AT LEAST 1 CONDUIT ELBOW (2 INCH PVC ELBOW) IN EACH POLE BASE.

1.2.4.4 Ground Rod

Ground rods shall be 5/8 inch by 8 feet (minimum) Copper-Clad. A No. 6 AWG bare, stranded copper wire shall be used in the ground connection. EACH STRAIN POLE SHALL HAVE 1 GROUND ROD.

1.2.4.5 Pole Plugs

Plugs/Caps, either galvanized or stainless, shall be installed in all un-used holes in steel pole.

1.2.4.6 Miscellaneous

All other hardware or components shall be made of a non-corrosive material, or be of the same material as the item being installed.

1.2.5 **Galvanizing**

The following shall be hot-dipped galvanized to ASTM A-123:

Shaft, Anchor Base, nuts, and hand hole frame and cover, the top 12" of the Anchor Bolts, Pole Clamp, and all other steel or iron parts.

1.2.6 **Powder Coating Over Base (Optional)**

Powder Coating over base shall be an option. The finish color shall be specified at the time of ordering. The following shall be powder coated: Shaft, anchor base, nuts, hand hole frame and cover, the top 12" of the anchor bolts, pole clamp, and all other steel or iron parts.

1.2.7 **Powder Coating Over Galvanized (Optional)**

Powder Coating over galvanized shall be an option. The finish color shall be specified at the time of ordering. The following shall be powder coated after they have been hot-dipped galvanized: Shaft, anchor base, nuts, hand hole frame and cover, the top 12" of the anchor bolts, pole clamp, and all other steel or iron parts.

1.2.8 Pole Labeling

Every Pole shall be easily read and prominently labeled on the outside edge of the base plate. The method used shall be that the pole description is inscribed with "WELDING-BEAD", neatly hand-written, in 1-1/2" to 2" high letters. The legend used shall be one of the following:

13" X 26'
13" X 28'
13" X 32'

Note: Codes shall not be acceptable for pole size labeling. The welding bead shall be applied prior to galvanizing.

In addition to the welding bead identification every pole shall have a metal "Builders Plate" (name plate) with raised or stamped letters stating the manufacturer, the date of manufacture, lot number, the length and diameter of the pole and a ID number. The name plate shall be welded to the outside pole wall about 5' above the base at 0 degrees. Color Coding shall be included on each plate to facilitate ease of selection and identification.

1.2.9 Design and Drawings

The Vendor shall furnish pole design details and shop-drawings in sufficient detail for complete evaluation and comparison with these Specifications. Any exceptions to these Specifications must be stated in writing.

1.2.10 Quality Control, Testing, Certification

Where required, materials must be in full compliance with AASHTO and ASTM in effect on the date of advertisement.

Performance Testing - SCDOT reserves the right to receive on demand a test report from an independent laboratory certifying that the equipment furnished meets these specifications, at no costs to the Department. The bidder shall also provide a certification from the manufacturer that all strain poles shall have a guaranteed minimum yield strength, (mill certified), of 55,000 PSI.

Rejection - SCDOT reserves the right to reject an entire shipment of poles covered by this specification and project, if ten percent (10%) or more are found to be defective within a thirty (30 day period following receipt of materials.

1.2.11 Packaging

For Anchor Bolts – To preserve the threads, to help improve stock yard inventory procedures, and to enhance loading/unloading of the shipment, the Anchor Bolts (for either a pole shipment or as spares) shall be packaged and mounted on a pallet with four (4) anchor bolts across and four (4) levels high. Each layer should lay opposite so that the six inch bend protects the threaded end of the next level.

For Pole Hardware – To help improve stock yard inventory procedures, and to make outside storage possible, all anchor bolt hardware and all pole hardware for each pole shall be included in ONE (1) BURLAP BAG. No cardboard boxes shall be permitted. The bag shall contain the nuts, washers, pole cap, pole covers, pole clamps, pole plugs and all associated hardware. The bag shall be placed inside each steel pole.

If necessary, the bag shall be labeled by pole size if smaller clamps are needed for the 26' poles.

1.2.12 Delivery

SCDOT pickup from Vendor or Supply Depot is an option and will be specified at the time of the order.

Shipment for the poles shall be made via open-bed truck to facilitate unloading. Delivery shall be made to the SCDOT Supply Depot, 1418 Shop Road, Columbia, SC or one of seven District Signal Shops. Notice shall be given to the supervisor at the supply depot (803-737-6631) or the District Signal Shop at least two (2) working days in advance, as to the date of shipment, and expected delivery date to the supply depot. Vendor must have lay down yard and means to load poles on site in South Carolina for SCDOT pickup. Vendor to keep eight (8) 28' steel poles and eight (8) 32' steel poles with hardware in stock at all times for rapid use.

SCDOT District 1 Signal Shop

803-737-6974
1408 Shop Rd
Columbia, SC 29201

SCDOT District 3 Signal Shop

803-241-1117
13 Saluda Dam Rd
Greenville, SC 29611

SCDOT District 5 Signal Shop

803-661-4812
3018 East Palmetto St
Florence, SC 29506

SCDOT District 7 Signal Shop

803-395-7188
1768 Charleston Highway
Orangeburg, SC 29115

SCDOT District 2 Signal Shop

864-889-8030
510 W. Alexander Avenue
Greenwood, SC 29646

SCDOT District 4 Signal Shop

803-581-8551
1143 SCDOT Rd
Chester, SC 29706

SCDOT District 6 Signal Shop

843-740-1668
6355 Fain Blvd
N. Charleston, SC 29406

1.2.13 Manufacturer/Supplier

Poles must be manufactured within the United States at a facility solely owned by a company incorporated in the United States. Steel used shall comply with current Federal laws limiting foreign steel.

1.2.14 Warranty

The Manufacturer or Contractor shall warrant the poles and all associated hardware to be free from defects in material and workmanship for a period of two (2) years from date of shipment. Any defects within this period shall be repaired or replaced by the Contractor, at total cost to the Manufacturer or Contractor, including labor, parts and transportation.

1.3 Measurement

Furnishing Steel Strain Poles, will be measured by each, of the size(s) specified, anchor bolts, nut covers, pole cap, reinforcing steel, ground rod, ground wire, and all miscellaneous hardware as required.

1.4 Payment

Furnishing Steel Strain Poles, accepted, and measured as above, will be paid for at the contract unit price bid for:

FURNISH 13" X 26' STEEL STRAIN POLE	EA
FURNISH 13" X 26' STEEL STRAIN POLE (POWDER COATED OVER BASE)	EA
FURNISH 13" X 26' STEEL STRAIN POLE (POWDER COATED OVER GALVANIZED)	EA
FURNISH 13" X 28' STEEL STRAIN POLE	EA
FURNISH 13" X 28' STEEL STRAIN POLE (POWDER COATED OVER BASE)	EA

	FURNISH 13" X 28' STEEL STRAIN POLE (POWDER COATED OVER GALVANIZED)	EA
	FURNISH 13" X 32' STEEL STRAIN POLE	EA
	FURNISH 13" X 32' STEEL STRAIN POLE (POWDER COATED OVER BASE)	EA
	FURNISH 13" X 32' STEEL STRAIN POLE (POWDER COATED OVER GALVANIZED)	EA

M688.6 CONCRETE STRAIN POLE

1.1 Description

This specification describes requirements for furnishing pre-stressed Concrete Strain Poles, of the sizes specified. These poles shall be of the type intended for direct embedding, with the hole back filled with concrete.

The following covers the design and fabrication of pre-stressed concrete strain poles, to be used for supporting steel cable suspended traffic signals or supporting lane control signs.

1.2 Materials

1.2.1 General

ALL CONCRETE STRAIN POLES PROVIDED FOR ANY INDIVIDUAL PROJECT SHALL BE FROM THE SAME MANUFACTURER.

Each Concrete Strain Pole assembly shall consist of:

1. A round pre-stressed hollow concrete shaft,
2. A pole cap, and
3. Miscellaneous hardware as specified.

The poles shall meet or exceed the specifications stated in the latest publication of "American Association of State Highway and Transportation Officials" (AASHTO); "Standard Specifications For Structural Supports For Highway Signs, Luminaires And Traffic Signals" and in particular, "Pre-Stressed Concrete Design". Stress in concrete due to pre-stressing shall be within the limits stated in the AASHTO Standard. Loss of pre-stress shall be calculated using AASHTO methods. Further, the manufacturer shall provide documentation showing the permeability/water-absorption of their product. Other procedures shall be according to the American Concrete Institute (ACI).

Poles shall be designed and constructed so that all wiring and grounding facilities are concealed within the hollow poles. All hand holes, wire inlets/outlets, inserts for pole steps, through bolt holes and the ground wire shall be cast into the pole during the manufacturing process. **NO FACTORY NOR FIELD DRILLING SHALL BE ALLOWED AFTER THE POLES HAVE BEEN STRIPPED FROM THEIR MOLDS.**

Poles shall be designed in accordance with the following requirements, to provide the Mandatory Ultimate Ground Line Moment and with the cable attachment heights stated below. As given, the design shall assume:

OVERALL POLE LENGTH	EMBEDMENT (below ground line)
35 feet	8 feet
40 feet	10 feet
45 feet	11 feet

The *Defined Attachment Height* = Overall Pole Length – Embedment. The design shall assume a worst case strain (pull) of 22,200 Newtons (5000 pounds force) applied at the top of the pole (the design Defined Attachment Height).

Poles shall be designed using the South Carolina Department of Transportation (SCDOT) design method. A worst case application of AASHTO and ACI "Ultimate Strength Design" has been used. M is moment, T is torsion, U is ultimate.

The formula used: $(1.25 \cdot M / \phi M_u) + (1.25 \cdot T / \phi T_u)^2 \leq 1.0$. The contribution of torsion was neglected. A ϕ of 0.90 was used. Substituting gives $M_u > (1.25/.9) \cdot M$ or $M_u > 1.39 M$. We increased the 1.39 multiplier by 7 percent, to allow for torsion, fatigue and possible accidental vehicle damage.

Design Formula: $M_u > 1.5 M$

1.2.2 Pole Materials

1.2.2.1 Concrete

The concrete mix shall be designed to achieve a minimum twenty-eight (28) day compressive strength (f'c) of 58,650 kPa (8,500 psi) Pounds per square inch. Cement shall conform to the latest requirement of Type I or Type III Portland cement in accordance with ASTM C-150. The maximum size aggregate may be is 19 mm (Millimeter). (3/4 inch) or (¾") of the clear spacing between the main reinforcing steel and the surface of the pole. Any water reducers, retarders or accelerating admixture used shall conform to ASTM C-494. The water used shall be free from foreign materials in amounts harmful to concrete or embedded steel. The compressive strength at release of pre-stress (f'ci) shall be 31,050 kPa (4,500 psi).

1.2.2.2 Reinforcing Steel

NO deformed steel reinforcement (ASTM A-615) shall be used in the manufacturing process.

1.2.2.3 Pre-stressing Steel

Pre-stressing steel stranded rope cable, which shall conform to uncoated 12.7 mm (0.5 inch), 7 wire, stress relieved strand (including low relaxation) of 1,201,500 Newtons (270,000 pound strain) grade, ASTM A-416. The minimum number of strands shall be eight (8) strands.

1.2.2.4 Spiral Reinforcement

Steel wire spiral reinforcement shall conform to ASTM A-82 and shall be of minimum diameter 0.150". The pitch of the spiral reinforcement shall be on 2" centers for the first and last 3' of the pole, and 6.5" centers for the remaining portion of the pole. These requirements are more stringent than AASHTO.

1.2.2.5 Hardware

All structural steel shall conform to ASTM A-36 and be hot-dip galvanized per ASTM A-123. Hand hole frames and covers and all inserts shall be zinc alloy AC41A, ASTM B-240. All bolts, nuts, washers and other fasteners shall be stainless steel or be hot-dip galvanized per ASTM A-153.

1.2.3 Manufacturing

All manufacturing tolerances, details of reinforcement and finishes shall be in accordance with the latest specification for pre-stressed concrete poles, as published in the "Journal Of The Pre-Stressed Concrete Institute".

All poles shall be pre-stressed and be manufactured by the centrifugal spinning process using a mold. The purpose of this requirement is to insure a minimum twenty-eight (28) day compressive strength of 8,500 psi, and to provide the densest possible surface finish.

Forms shall be designed to provide a continuous outside taper of 0.180" per foot of length. Forms shall also provide a minimum of 1" of concrete cover over the pre-stressing strands.

Poles shall have a smooth, natural form finish, concrete soft gray in color (no dyes or stains).

Poles shall be round in cross section, with a hollow center and shall be of one piece construction.

All excess concrete shall be removed from inside of pole before delivery.

Poles shall not have any exposed steel at either top or the butt end. Steel strands, both top and butt end, shall be burned back a minimum of 0.75" and the resulting hole shall be completely sealed with epoxy.

Pole bottom ends shall be plugged with 12" of concrete at the butt end, which shall also have a 2" diameter drain hole through that plug.

1.2.4 Pole Features

Contact the Traffic Signal & Systems Engineer at (803) 737-1050 for: "Standard Drawing 675-115-02" for the height and compass orientation of pole features; and "Typical Concrete Pole Orientation" for intended usage.

– Standard Drawing 675-115-02. <http://www.scdot.org/doing/technicalPDFs/standardDrawings/675-000-00.pdf>.

Each pole shall include the features listed below.

1.2.4.1 Pole Cap

Each pole shall be supplied with a pole cap or top, which shall be made of plate aluminum. (Galvanized steel is NOT acceptable.)

1.2.4.2 Wire Support

A wire support consisting of a diametric reinforcing bar shall be cast inside the pole about 6" from the top. This bar can also be used to anchor the pole cap if necessary.

1.2.4.3 Upper Hand hole

A reinforced hand hole frame, complete with flush cover, with a minimum size of 3.5" x 8", shall be cast into pole approximately (1'-2") from the top of pole at 270°. (Orientate counter-clockwise)

1.2.4.4 Couplings

For weather head installation and entrance of the electrical cables, two (2) 2" I.D. conduit couplings shall be cast into the pole at 0° and 90° (orientate counter-clockwise) approximately (1'-2") from the top of pole and one (1) 2" I.D. conduit coupling (2'-10") from the top of the pole at 0°.

1.2.4.5 Through-Holes

Through-holes, for attaching steel span cable using appropriate through-bolt hardware, shall be at 0°, 90°, 180°, and 270°. The upper holes should be approximately (1'-10") from the top of pole and the lower holes should be approximately (2'-4") from the top of the pole. **NO PVC** (Polyvinyl chloride) is required in holes so that each level of span wire through bolt hardware can be used in multiple directions.

1.2.4.6 Grounding

A No. 4 AWG stranded copper ground wire shall be cast into each pole and be attached to the pre-stressed steel by bonding connectors. The embedded ground wire shall be terminated near the top of the pole and at a point near the bottom, approximately 9" below the ground line. Both terminations shall be made to a "copper tank ground" which provides a 0.5" tapped insert on the pole face for grounding attachment to spans wires at the top and to the driven ground rod at the base.

1.2.4.7 Pedestrian Features

For possible pedestrian signal head assembly, each pole shall have four (4) 1" holes for wiring the signals that will be banded onto the pole at a height 10' above the ground line at 0°, 90°, 180°, and 270°.

For possible pedestrian push buttons, each pole shall have four (4) 1" holes for wiring a push button that will be banded onto the pole at a height 3.5 feet above the ground line at 0°, 90°, 180°, and 270°.

1.2.4.8 Pole Labeling

Every pole shall have an embedded "Builders Plate" (name plate) of brass or aluminum with raised or stamped letters stating the manufacturer, the date of manufacture, lot number, the length and diameter of the pole and the ultimate ground line moment capacity. The name plate shall be cast into the outside pole wall about 5' above the ground line.

1.2.4.9 Rousting Holes

A 1.5" "CANT" hole, completely through the pole and lined with PVC conduit shall be cast into each pole at a height 4' above ground line. The purpose shall be to permit inserting a pry-bar to turn the pole for proper orientation with the intersection.

There shall also be a Pick-Up point hole at the defined distances from the top of the pole found on the "Concrete Pole Openings, Thru-Bolts & Couplings".

1.2.4.10 Lower Hand Hole

The compass location of the hand hole defines the zero (0) degree point. Each pole for traffic signal support shall have a reinforced hand hole frame, complete with flush cover, with a minimum size of 3.5" x 8.5", shall be cast into the pole approximately 1.5 feet above the ground line.

1.2.4.11 Pole Mounted Cabinet

For possible controller cabinet installation, (2) 3" I.D. conduit couplings shall be cast into the pole at 90° and 270° 1.5 feet from the ground line. **(Note: These couplings flank the lower hand hole)**

1.2.4.12 Underground Conduit Entrance

In each signal pole, there shall be cast in two (2) rectangular underground cable entrance openings (conduit entry hole) at 0° and 270° minimum size of 4" x 10", the top of which shall be located 1.5 feet below the ground line.

1.2.4.13 Pull Rope/Wire

The manufacturer shall furnish inside each pole a nylon or polypropylene rope or stainless steel wire so electrical wires may be pulled in installed pole. The rope or wire shall extend from the conduit opening near the base to the top of the pole.

Other Materials

Other materials shall meet the following requirements:

1.2.5.1 Concrete

The concrete used to embed the pole shall conform to the requirements of SCDOT STANDARD SPECIFICATIONS, Section 701, 702, 703, and 704. The concrete shall be Class 3000 and installed in ONE MONOLITHIC POUR, with VIBRATION.

1.2.5.2 Conduit Elbow

Conduit elbows shall be in accordance with furnish and install electrical conduit. Conduit elbows in pole bases shall be PVC of the size and type shown on the plans. If no other conduit is shown as a minimum, there shall be at least one (1) 2 inch PVC conduit elbow placed in each pole base.

1.2.5.3 Ground Rod

Ground rod(s) shall be 16 mm by 2.4 meters (5/8 inch by 8 feet) (minimum) copper clad. A No. 6 AWG bare stranded copper wire shall be used in the ground connection. **EACH STRAIN POLE SHALL HAVE AT LEAST ONE (1) GROUND ROD.**

1.2.5.4 Miscellaneous

All other hardware or components shall be made of a non-corrosive material or be of the same material as the item being installed.

1.2.5.5 Reinforcing Steel

Not usually needed for a concrete pole.

1.2.5 *Design and Drawings*

Prior to being approved for fabrication, the Contractor shall furnish from the manufacturer to the Engineer, complete stress computations, calculations, pole design details and design drawings in sufficient detail for complete evaluation and comparison with these Specifications. These submittals shall indicate the dimensions and shape of all individual structural and electrical features, their relative location on each pole and their relationship with each other. Drawings shall be made as close to scale as possible and with all details large enough to be self-explanatory. Any exceptions to these Specifications must be stated in writing. When computer programs have been used during the design process, the printouts of the programs or a copy thereof shall be provided to the engineer.

1.2.6 Certification

CATALOG CUTS ARE REQUIRED

The Vendor or Manufacturer shall provide documentation stating the permeability and/or water absorption of their concrete pole.

The Vendor shall provide a written certification from the intended manufacturer that all components of strain poles provided under this item have been designed and manufactured in complete accordance with these specifications and the approved design drawings, including the strength of the concrete. The certification letter shall be signed by an officer of the company.

Poles must be manufactured within the United States at a facility solely owned by a company incorporated in the United States. **The manufacturer must have a minimum of ten (10) years' experience in the design and production of centrifugally spun concrete poles shall have a full time registered professional engineer on staff.** Steel used shall comply with current Federal laws limiting foreign steel.

1.2.7 Quality Control, Testing, Certification

Where required, materials must be in full compliance with AASHTO and ASTM in effect on the date of advertisement.

By furnishing poles for SCDOT, the manufacturer implicitly grants the right of entry and inspection of the manufacturing facility to the Engineer (or designated representative) of SCDOT. If requested, each of the component materials involved in the production of these poles must be sampled, tested and approved by the SCDOT Materials Laboratory prior to the start of production. In addition the total production process, including curing, shall be subject to inspection and approval.

SCDOT, at the discretion of the Engineer, may direct that one (or more) randomly chosen poles shall be shipped directly to a testing facility other than the depot. This may be one of the SCDOT Materials Laboratories or an independent testing facility. There, the pole may be tested to destruction. This "test pole" shall be paid for at the contract unit price.

The Vendor shall furnish a Certification from the Manufacturer or Vendor, that the Steel Cable has been tested to meet or exceed the required tensile strength.

1.2.8 Delivery

SCDOT or Contractor pickup from Vendor or Supply Depot is an option and will be specified at the time of the order.

Shipment for the poles shall be made via open-bed truck to facilitate unloading. Delivery may be made to the SCDOT Supply Depot, 1418 Shop Road, Columbia, SC or any location specified in the state of South Carolina. Notice shall be given to the supervisor at the supply depot (803-737-6631) at least two working days in advance, as to the date of shipment, and expected delivery date to the supply depot. **Logistics for direct deliveries to locations other than the Supply Depot will be the responsibility of the vender.**

Concrete strain poles shall be delivered to a location specified at the time of ordering. Delivery time shall be no later than thirty (30) calendar days. Any material received that does not meet these specifications will be returned at the expense of the vendor or manufacturer.

1.2.9 Manufacturer/Supplier

Poles must be manufactured within the United States at a facility solely owned by a company incorporated in the United States. Steel used shall comply with current Federal laws limiting foreign steel.

1.2.10 Warranty

The Manufacturer or Vendor shall warrant the poles and all associated hardware to be free from defects in material and workmanship for a period of two (2) years from date of shipment. Any defects within this period shall be repaired or replaced by the Manufacturer or Vendor, at total cost to the Manufacturer or Vendor, including labor, parts and transportation.

1.3 Measurement

Furnishing Concrete Strain Poles will be measured by EACH of the length specified. This shall include pole cap and all miscellaneous hardware as required.

1.4 Payment

Furnishing Concrete Strain Poles accepted and measured as above, will be paid for at the contract unit price.

35' CONCRETE PRE-STRESSED POLE ASSEMBLY	EA
40' CONCRETE PRE-STRESSED POLE ASSEMBLY	EA
45' CONCRETE PRE-STRESSED POLE ASSEMBLY	EA
ALUMINUM POLE CAP	EA
HAND HOLE COVERS	EA

M688.7 CONTROLLER AND CABINET ASSEMBLY

Item	Description	Unit	Estimated Quantity
1	Controller Model 2070 Controller	Each	500
2	Cabinet Assembly (larger) Model 332A	Each	350
3	Cabinet Assembly (smaller) Model 336S	Each	100
4	Conflict Monitor Model 2018 ECL-ip	Each	250
5	Conflict Monitor Model 2010 ECL-ip	Each	250
6	Red Enable Board	Each	200
7	Load Switch Model 200 (SSS-87IO)	Each	2500
8	DC Isolator EDI Model 242	Each	350
9	Flash Transfer Relay Model 430	Each	350
10	Loop Detector Amplifier , LCD Enhanced/Intelligent	Each	500
11	Loop Detector Amplifier Model 222	Each	500
12	Surge Protection for Twisted-Pair Communications	Each	75
13	Flasher Load Switch Model 204	Each	110
14	Cabinet Power Supply Model 206L	Each	75
15	Power Strip	Each	150
16	#2 Lock and Key Set	Each	200
17	Aluminum Extender Base for Cabinet Assembly	Each	200
18	Low Voltage Protection	Each	100
19	2070-7A Card	Each	25
20	Conflict Monitor Tester ATSI Model 8000	Each	20
21	Suitcase Tester for 170 and 2070 controllers	Each	20
22	Cabinet Assembly Display Unit	Each	20
23	Evaluation of Equipment for Repair outside Warranty Period	Each	140
24	Repair Equipment outside Warranty Period	Hours	250
25	SCDOT Signal Cabinet Training	Each	15
26	Conflict Monitor Training	Each	15

EQUIPMENT SPECIFICATIONS

SCDOT's current equipment specifications are included. All equipment supplied under this contract shall meet or exceed these specifications. Include with your proposal detailed information on all products to be supplied. Identify any areas where products fail to meet these specifications as well as any features that exceed SCDOT's current specifications.

The following specifications state the minimum acceptable requirements, materials, and workmanship for traffic signal control equipment to be supplied to SCDOT. These are SCDOT specific requirements that extend or modify the California Department of Transportation (CALTRANS) Specification.

Further, equipment shall conform to the applicable requirements of Underwriter's Laboratory Incorporated (UL); the Electronic Industries Association (EIA); the National Electric Code (NEC); the American Society for Testing and Materials (ASTM); the American National Standards Institute (ANSI); and other applicable standards and specifications.

Described below:

- **EQUIPMENT DETAILS**
- **DELIVERY**
- **WARRANTIES AND SERVICE**
- **DOCUMENTATION**
- **EQUIPMENT DETAILS**

Item 1 Controller Model 2070 Controller

This item consists of furnishing Model 2070 Standard, single port, non-switch, RJ45, Ethernet controller. The controller shall also be digital, solid-state, micro-processor based, keyboard (push-button) programmable, and in accordance with the Network Services Security Policy for Network Attached Devices included in this solicitation. Units shall conform to CALTRANS Transportation Electrical Equipment Specifications (TEES), dated July 21, 2008 except as required herein. Provide model 2070 Controllers composed of the unit chassis and at a minimum, the following modules, assemblies, and software:

- Model 2070-4B Power Supply Module, 3Amp
- Model 2070-3B Front Panel Module
- Model 2070 1B CPU Module, single board
- Model 2070-2A Field I/O Module
- Model 2070-7A Asynchronous Serial Com Module (price as an optional or add on item)
- Controller must be able to accept and operate fully with Apogee firmware version 65 and 76 and shall be able to communicate with central ATMS.NOW software.

Item 2 Cabinet Assembly (larger) Model 332A

A complete operating Cabinet Assembly containing the standard CALTRANS equipment complement with/including: one (1) Conflict Monitor, twelve (12) Load Switches, two (2) DC Isolators, Fourteen (14) Flash Programming Sockets, Seven (7) Flash Transfer Relays, and eight (8) LCD Enhanced Loop Detectors. The 332A Cabinet Assembly shall NOT include a 2070 Controller.

The Model 332A Cabinet Assembly (66" x 24" x 30") shall be as specified in the CALTRANS Specifications. This Cabinet shall incorporate an INPUT TERMINATION PANEL. The Cabinet shall be base mounted. 332A Cabinet Assembly shall be configured for eight (8) vehicle phases, four (4) pedestrian phases and shall include an AUXILIARY MODEL 420 OUTPUT FILE, for six (6) overlap phases. The Auxiliary Output File shall house three (3) Flash Transfer Relays and six (6) Flash Programming Sockets. The Auxiliary Output File shall be wired to ensure that all six (6) phases flash correctly during flashing operation where 18 channels are being used, no dark signals shall be allowed during the flashing operation. See additional requirements for all cabinet assemblies following this detail.

Item 3 Cabinet Assembly (smaller) Model 336S

A complete operating Cabinet Assembly containing the standard CALTRANS equipment complement with/including: one (1) Conflict Monitor, eight (8) Load Switches, two (2) DC Isolators, eight (8) of Flash Programming Sockets, four (4) Flash Transfer Relays, and six (6) LCD Enhanced Loop Detector. The 336S Cabinet Assembly shall NOT include a 2070E Controller.

The Model 336S Cabinet Assembly (46" x 24" x 22") shall be as specified in the CALTRANS Specifications. The Cabinet shall be capable of side-pole mounting, as well as base mounting. See additional requirements for all cabinet assemblies following this detail.

The 336S Cabinet shall NOT have an AUXILIARY OUTPUT FILE. Additionally, Auxiliary Output files will not be added to a 336S Cabinet Assembly, therefore the additional wiring necessary to add an Auxiliary Output file shall not be installed. All assemblies in the 336S Cabinets shall be installed in the upper most position so that free space at the bottom of the cabinet is maximized. See additional requirements for all cabinet assemblies following this detail.

Items 2, 3 Cabinet Assemblies

The equipment to be furnished shall be in accordance with CALTRANS Transportation Electrical

Equipment Specifications (TEES), dated July 21, 2008 except as required herein. Further, the equipment shall meet the special SCDOT requirements, as stated in the following Specifications. In case of conflict, SCDOT Specifications shall govern. In addition to meeting the CALTRANS specifications, **Item 2** and **Item 3** shall also meet the following:

Cabinet structure details

- Front and back door switches shall be fully insulated against water intrusion and located on the bottom door hinge.
- Railroad inputs shall be easily accessible for input installations.
- A Fellowes 99111, or equivalent, power strip shall be installed along the wall on the high voltage side of the cabinet and plugged in to a non-GFI switch on the back of the cabinet power supply.
- Nylon card-guides shall be integrated into the cabinet assemblies where all Load Switch, Flasher, Input File and Power Supply Hardware may be installed. The card guide slots shall be of sufficient depth to support pluggable devices when they are not fully inserted into the electrical receptacles, and the installation or removal of pluggable devices shall not require excessive force.
- AC Service terminal blocks shall be a minimum of 6" from base of the rack-supports.
- To prevent accidental, electrical contact between the Cabinet Assembly and Conflict Monitor Unit, the entire side panel within the output file that is directly adjacent to the solder-side of the Conflict Monitor Unit shall be insulated with non-conductive sheeting, including covering screw heads, rivets, etc. This sheeting shall not degrade over time and shall remain attached to the output file throughout the life of the Cabinet Assembly. This sheeting shall be of minimal thickness as to not impede the insertion and/or removal of the Conflict Monitor Unit.
- Four (4) support braces (two (2) installed on each side) for the rack assembly shall be welded, with a continuous seam, directly under the rack assembly uprights.
- A Nylon Sleeved cable shall be hard wired directly to the cabinet on one end, and have a plugin adapter for the conflict monitor on the other end for monitoring the absence of red. The pin assignments of the Nylon Sleeved cable shall be provided with the Cabinet plans. The Nylon Sleeved cable connection for the conflict monitor shall be physically "keyed" to prevent the cable from being plugged in incorrectly. The Nylon Sleeved cable shall be latched to the conflict monitor. The Nylon Sleeved cable shall be attached to the cabinet so it has to be unplugged before the Conflict Monitor can be removed.
- The 206L Power supply in all Cabinet Assemblies shall be provided with a device that would prevent the power supply from being removed unintentionally. This device must be strong enough to support the weight of the power supply and shall be accessible from the FRONT of the Cabinet Assembly. The insertion or removal of the 206L Power Supply and security device shall not require the use of any tool. The shipping wing nut must be removed.

Internal Cabinet Requirements

- Furnish two (2) sets of non-fading cabinet diagrams and schematics that are to be placed in a clear, sealable, water tight, plastic bag and stored within the front-door-mounted laptop shelf/storage compartment. See "Laptop Shelf" requirements later in this specification.
- Furnish two (2) Model 242 DC Isolators with all 332A and 336S Cabinet assemblies. These items are to be installed within the cabinet input file, in the pedestrian input slots.
- Furnish eight (8) Enhanced LCD Loop Detectors with all 332A Cabinet Assemblies. These are to be installed in the first eight (8) slots of the upper input file assembly. See LCD Detector requirements later in this specification.
- Furnish six (6) Enhanced LCD Loop Detectors with all 336S Cabinet Assemblies. These are to be installed in the first four (4) slots of the input file assembly. See LCD Detector requirements later in this specification.
- Furnish twelve (12) PDC 200 (SSS-87IO), or equivalent, Load Switches with all 332A Cabinet Assemblies. These are to be installed in the following output file channels: 1, 2, 4, 5, 6, 8, 13, 14, 15, 16, 17, and 18. See for Load Switch requirements later in this specification. All load switch locations in the Output file and Auxiliary output file shall be clearly labeled with permanent screening, with the default CALTRANS phase assignment, in all 332A Cabinet Assemblies.
- All terminations to output files shall be soldered to the back side of the panels.

- Furnish eight (8) PDC Model 200(SSS-87IO), or equivalent Load Switches with all 336S Cabinet Assemblies. These are to be installed in the following output file channels: 2, 4, 6, 8, 13, 14, 15, and 16. See Load Switch requirements later in this specification. All load switch locations in the Output file shall be clearly labeled with permanent screening, with the default CALTRANS phase assignment, in all 336S Cabinet Assemblies.
- Furnish two (2) Model 204 Flasher Load Switches with all 332A and 336S Cabinet Assemblies. These are to be installed in the flasher slots within the Power Distribution Assembly (PDA). See Flasher requirements later in this specification.
- Load Switches and Flashers are to be secured within their respective slots for shipment, with 1/2" string-reinforced tape as a minimum.
- Furnish a Thermostat-controlled, dual-fan (100CFM minimum rating per fan) ventilation system in all 332 series Cabinet Assemblies.
- Furnish a Thermostat-controlled, single-fan (100CFM minimum rating) ventilation system in all 336S Cabinet Assemblies.
- 332A and 336S Cabinet Assemblies shall NOT utilize a Mercury Contactor switch. A field-proven solid-state device or equivalent shall be used.
- The Flash Sense/Stop Time terminations in the Input File Assembly shall be wired such that a DC Isolator will not be required for implementation of these functions by the Conflict Monitor Unit.

Power Supply

- The Power Supply furnished in all 332A and 336S Cabinet Assemblies shall be the EDI 206L Switching Power Supply, or equivalent.

Conflict Monitor

- The Conflict Monitor shall be an EDI Model 2018 ECL-IP Conflict Monitor with absence of red monitoring.
- The Conflict Monitor Unit shall contain a 10/100 Ethernet port on the front panel for the uploading of alarms and/or event logs with a standard laptop computer. This port shall also allow for future communication within an Ethernet-based infrastructure.
- The Nylon Sleeved cable shall be routed internally or between the rack assembly and cabinet wall. The cable shall be anchored to the front of the output file so that the Conflict Monitor Unit cannot be removed with the cable attached.

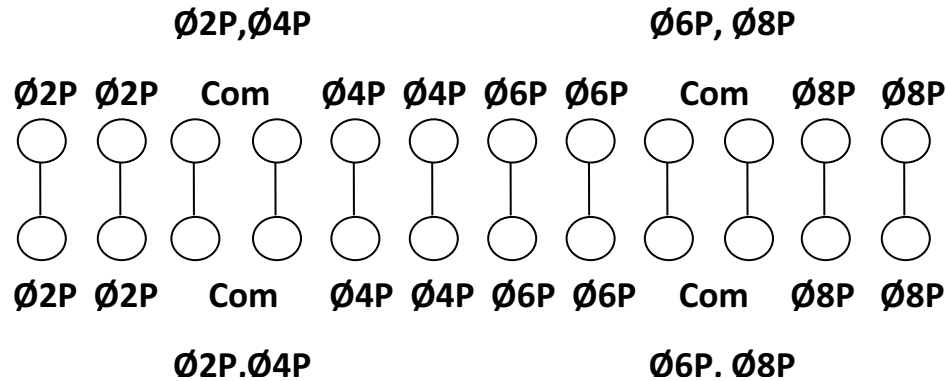
Thermostat

- Cabinet Thermostat to be factory-set to 90 degrees in all Cabinet Assemblies.
- Cabinet Thermostat and thermostat temperature setting shall be easily accessible and adjustable from the front of all 332A Cabinet Assemblies.
- Cabinet Thermostat and thermostat temperature settings shall be easily accessible and adjustable from the rear of all 336S cabinet assemblies.
- Cabinet Thermostat terminals shall be insulated to prevent accidental electric shock.

Pedestrian Button and Loop Detection Inputs

- All Vehicle and Pedestrian terminals on the Loop Input Termination Panel shall be clearly labeled with permanent screening, with the default CALTRANS phase assignment, in all 332A and 336S Cabinet Assemblies.
- "Ped-Yellows" shall be provided with "dummy loads" consisting of load resistors rated at 5 Watts minimum. The impedance of the load resistors shall be such that the Conflict Monitor Unit does NOT see a false indication for the yellow output of the pedestrian channels.
- The 332A Cabinet Assembly shall include additional terminations for Pedestrian Pushbutton inputs. A Minimum of twenty-four (24) extra terminals (12-position, dual-bus terminal strip) shall be provided, allowing sixteen (16) additional termination points for four (4) Pedestrian Phases. The remaining eight (8) termination points shall be for the shared or "common" input for the adjacent Pedestrian Phase terminations. These are to be wired in parallel with the standard input file terminations and surge protection. This termination panel shall be easily accessible, clearly labeled with permanent screening and may be placed in any available space on the side panel containing the

standard Loop and Pedestrian input terminations. The required configuration is shown here:



- The 332A and 336S Cabinet Assemblies shall have a 'Detector Test Panel' installed above the Controller Unit. The panel shall be installed within the rack assembly and will have eight (8) 3-position mini-toggle switches, symmetrically spaced and horizontally arranged for placing calls to the Controller Unit. 3-position On-Off-On switches shall activate inputs. Upward motion of the switch shall lock into place and shall place a vehicle call to the Controller Unit until the switch is manually returned to center position. The center position of the switch shall not inhibit normal detector operation. Downward motion of the switch shall place a momentary closure vehicle call and will allow the intersection to resume normal detector operation when released. This panel shall be clearly labeled with permanent screening beneath each switch. The labeling shall identify each detector switch and default phase assignment for phases 1 through 8. The panel should also be titled "Vehicle Call Panel" and shall include a legend for switch operation: "On, Auto, Pulse". The panel shall be wired as follows:

336S Cabinet		332A cabinet	
Detector Switches	Terminal	Detector Switches	Terminal
Phase 1	I1-F	Phase 1	I1-W
Phase 2	I2-F	Phase 2	I4-W
Phase 3	I3-F	Phase 3	I5-W
Phase 4	I4-F	Phase 4	I8-W
Phase 5	I5-F	Phase 5	J1-W
Phase 6	I6-F	Phase 6	J4-W
Phase 7	I7-F	Phase 7	J5-W
Phase 8	I8-F	Phase 8	J8-W

Key Sets and Doors

- Front and rear doors of all cabinet assemblies shall implement a #2 Corbin Locking assembly. Two (2) BRASS keys are to be included with each Cabinet Assembly.
- The front and rear door locks for all Cabinet Assemblies shall have a minimum of 1 mm (0.03937") clearance between the edge of each side of the lock bolt and the cabinet's latch cam assembly.
- Both doors shall be ventilated and are to include disposable filters that are secured in place, yet easily removed or re-installed for replacement.
- Front and rear door handles for all cabinet assemblies shall turn away from the door lock/key to open the cabinet door.

Cable

- Appropriate Red, Yellow or Green color-coding shall be used for all Load Switch input and Load Switch output wiring within the Output and Auxiliary Output Files.

- Applicable 170-style cabling shall be included in all 332A and 336 S Cabinet Assemblies.

Police Panel/Button

- Police panel door shall be insulated to prevent water from entering the cabinet assembly. The insulation material used and its ability to resist water-penetration shall not degrade over time.
- The Police panel assembly shall have a drain to prevent water from collecting within the assembly. Per CALTRANS, the drain shall be channeled to the outside of the cabinet. There shall be no additional holes within the police panel.
- The protective cover for the police panel key opening shall be snug with the police panel door and shall not move freely. However, this protective cover shall be easily opened without having to use any tool.
- Manual Control cord shall be permanently hard-wired into the Police panel assembly to prevent removal.
- Manual Cord shall be anchored to the inside of the cabinet chassis to prevent over-extension and/or damage to the Police Panel terminations when the cord is extended for use.
- For storage, the Manual Control cord should be fed into the cabinet assembly through a grommet opening at the top of the police panel. The location of the opening shall not allow water to enter the cabinet. Additionally, the cord shall be fed for storage into an area where there is no risk of 'snagging' the cable when it is extended for use. The storage area shall be sealed completely to prevent water from entering the cabinet when the police panel door is open.
- For additional security, a quick-connect/quick-disconnect, molex-style connector shall be used for the Police Panel wiring inside the Cabinet Assembly. This connector shall NOT be accessible from the Police Panel and should be easily accessible from inside the cabinet. The wiring of this connector shall be such that, when disconnected, the Manual Control Enable/Advance Enable function on the Police Panel, as well as the Interval Advance/Advance function on the manual cord cannot be applied to the Controller Unit.
- The Police panel shall be wired such that the Interval Advance/Advance function cannot be applied to the Controller Unit when the Manual/Auto switch is in the Auto position.
- Each 332A and 336S Cabinet Assembly shall be provided with a manual police push button on an insulated cord allowing the operator to stand a minimum of 6' from the Cabinet Assembly, permanently mounted in conjunction with a manual/auto switch. When placed in the manual position, Manual Control Enable or Advance Enable shall be applied to the Controller, and Minimum Recall shall be applied to all used phases. Activation of the push button shall apply the Interval Advance or Advance input to the Controller Unit. Manual advancement will be prohibited in the minimum green, and clearance timing intervals.

Laptop Shelf

- For all 332, 332A and 336S Cabinet Assemblies, a hinged, aluminum shelf and integrated storage compartment shall be installed on the front door, inside the Cabinet Assembly. The hinge, shelf, or shelf parts shall not come off or interfere with closing the shelf or the cabinet door.
- To allow better ventilation throughout the cabinet and rack, a sliding shelf/drawer within the rack assembly will not be permitted.
- The shelf shall have a smooth, non-slip surface, sufficient for use as a writing platform and of sufficient size and rigidity to support any laptop computer when extended for use.
- This shelf shall have rounded or insulated edges that do not have the potential to physically harm the user.
- The shelf shall lock into place when folded for storage.
- Locking the shelf for storage and/or extending for use shall not require the use of any tool.

Cabinet Lighting

- Each Cabinet shall include two (2) LED lighting fixtures with the switch built-in.
- One mounted inside the top-front portion of the Cabinet and one mounted inside the top-rear portion of the cabinet.
- Both shall illuminate equivocally to a 15-watt, cool white fluorescent light fixture and shall include an easily accessible on-off switch.

- Door-actuated switches shall be installed to turn on the cabinet lights when either the front or rear door are opened.

Mounting

- Each 336S Cabinet shall be supplied with a removable base plate. Two (2) pole mounting brackets shall be attached to each 336S cabinet.
- Install an aluminum plate for reinforcement of the pole-mounting brackets. This plate shall be installed inside the 336S Cabinet Assembly and shall utilize threaded Penn Engineering & Manufacturing Corporation (PEM) nuts or self-clinching fasteners for simple installation and removal of exterior pole-mount bracket bolts without the use of any tool, inside the Cabinet Assembly.
- For 336S and 332A Cabinet Assemblies, the base mounting anchor-bolt pattern shall be as specified in the CALTRANS Specifications.

Surge Protection

- Cabinet assemblies shall include the Emerson (Edco) SHA-1250 Surge Protection device or equivalent, and shall be a plug-in type installation, or shall be integrated onto a plug-in style panel for simple replacement. This assembly should be easily accessible within the Cabinet Assembly shall be mounted a minimum of 6" from base of the rack-supports and secured to prevent unintended removal.
- Removal/replacement of the surge suppressor or manufacturer-designed panel assembly shall not require the connection or disconnection of any wiring within the cabinet and shall be a simple procedure for one (1) technician.
- Each 336S and 332A Cabinet shall be provided with devices to protect the control equipment from surges and over voltages. This shall include incoming power lines, the Input File, the Output File (load switch-packs), and communication lines.
- For any existing on-street twisted-pair communication, an Emerson (Edco) PC642 surge protection device and applicable 170-style cabling shall be included in 332A and 336S Cabinet Assemblies.
- The surge protection for the Input File shall be in accordance with the assignment of the slots of a standard 336S Cabinet assembly. Surge protector termination panels shall be provided, attached to the Cabinet rack assembly. AC isolation terminals shall be on the same side of the Cabinet as the AC service inputs. DC terminals and loop detector terminals shall be installed on the opposite side of the Cabinet from the AC power lines, to reduce electromagnetic induction. The surge protector panels shall be designed to allow for adequate space for a wire connection and surge protector replacement. Surge protection shall be provided for the full capacity of the Cabinet Input File.
- It is the intent of SCDOT to require surge protection on each CALTRANS defined input; that is, full protection. For example, on the 336S Cabinet, Vehicle Loop Detector Surge Protection would be required on two (2) channels each, of Slots 1 to 8 of the Input File. In addition, on the remaining Slots 9 to 14, Pedestrian surge protection; plus Auxiliary (pre-emption) protection as defined.
- On the 332A Cabinet, full protection is desired on both Input Files. For example, Vehicle Loop Detector Surge Protection would be required on two (2) channels each, of Slots 1 to 8 of BOTH INPUT FILES I AND J; together with pedestrian and auxiliary protection on both racks.
- For the 332A Cabinet, appropriate input surge protection shall be mounted on the INPUT TERMINATION PANEL. For the 336S Cabinet, appropriate input surge protection shall be mounted on a FOLD-DOWN TERMINATION PANEL on the rear of the cabinet assembly. This fold-down panel shall not obstruct the Output File Field wiring when in the closed position and shall utilize thumb-screws to secure the panel under normal operating conditions. The fold-down portion of this panel shall be easily accessible and shall be mounted to the rack assembly.
- Under no circumstance (normal operation or short-circuit condition) shall the ampacity of the internal wiring and printed circuit board traces be less than the protecting threshold of circuit breakers and surge protectors provided.

Power Distribution Assembly

- The Power Distribution Assembly of each Controller Cabinet shall include a surge protective device (SPD) on the AC Service Input. It shall be capable of reducing the effect of lightning transient voltages applied to the AC line. The protector shall be a two-stage series/parallel device, and shall be an Emerson (Edco) SHA-1250 or equivalent. The SPD shall meet or exceed the following

requirements:

- Maximum AC line voltage: 140 VAC
- Twenty pulses of peak current, each of which will rise in 8 μ s and fall in 20 μ s to one-half the peak: 20,000 A
- The protector shall be provided with the following terminals:
 - Main line (AC Line first stage terminal)
 - Main Neutral (AC Neutral input terminals)
 - Equipment Line Out (AC Line second stage output terminal, 10 A).
 - Equipment Neutral Out (Neutral terminal to protected equipment).
 - Ground (Earth connection)
- The Main AC line in and the Equipment Line out terminals shall be separated by a 200 Micro Henry (minimum) inductor rated to handle 10 A AC Service.
- The first stage clamp shall be between Main Line and Ground terminals.
- The second stage clamp shall be between Equipment Line Out and Equipment Neutral.
- The protector for the first and second stage clamp shall have a Metal Oxide Varistor (MOV) or similar solid-state device rated at 20 KA; and be of a completely solid stage design (i.e. no gas discharge tubes allowed).
- The Main Neutral and Equipment Neutral Output shall be connected together internally, and shall have an MOV (or similar solid state device, or gas discharge tubes) rated at 20 KA between Main Neutral and Ground terminals.
- Peak clamp voltage: 250 V at 20 KA. (Voltage measured between Equipment Line Out and Equipment Neutral Out terminals. Current applied between Main Line and Ground Terminals with Ground and Main Neutral terminals externally tied together).
- Output voltage shall never exceed 280 volts.
- The Protector shall be epoxy-encapsulated in a flame retardant material.
- Continuous service current; 10 A at 120 VAC RMS.
- The Equipment Line Out shall provide power to the Controller, and to the 24 V power supply.

Inductive Loop Detector Inputs

- Each inductive loop detector input channel shall be protected by an external, surge protective device which shall be an Emerson (Edco) SRA-6LC-6 or equivalent. The SPD shall meet or exceed the following requirements:
 -
 - It shall be a three-terminal device, two of which shall be connected across the signal inputs of the detector. The third terminal shall be connected to chassis ground to protect against common mode damage.
 - It shall instantly clamp differential mode surges (induced voltage across the loop detector input terminals) via a semiconductor array. The array shall be designed to appear as a very low capacitance to the detector.
 - It shall clamp common mode surges (induced voltage between the loop leads and ground) via solid state clamping devices.
 - It shall meet or exceed the following requirements:

Peak Surge Current:	250A
Differential Mode:	400 A (8x20 μ s)
Common Mode:	1000 A (8x20 μ s)
Estimated Occurrences:	500 @ 200 A
Response Time:	40 ns
Input Capacitance:	35 pf typical
Temperature:	-40 degrees to +85 °C
Mounting:	No. 10-32 x 3/8" bolt
Clamp Voltage:	130VDC
@400 A Differential Mode	30 V maximum
@1000 A Communication Mode	30 V maximum

Signal Load Switches (Switch-Packs)

- The outputs of each switch-pack in the output file shall be provided with a surge protective device comprised of metal oxide varistors (MOVs) which shall be a V150LA20A or equivalent. The SPD shall meet or exceed the following requirements:

Communication Inputs

- Each low voltage communication input shall be protected as it enters the cabinet with a modular type surge protective device comprised of three-stage hybrid technology protection consisting of gas discharge tubes (GDT), silicon avalanche diodes (SAD) and positive temperature coefficients (PTC), which shall be and Emerson (Edco) PC642C Series or equivalent. The SPD shall meet or exceed the following requirements:
 - US 497B Listed
 - Operating current: 0.15A
 - Peak surge current: 10kA
 - Frequency range: 0 to 20MHz
 - Insertion loss: <0.1 dB at 20 MHz

Low Voltage DC Inputs

- Each DC Input channel shall be protected by an external, surge protective device which shall be an Emerson (Edco) SRA64-030N or equivalent. The SPD shall meet or exceed the following requirements:
 - It shall be a five terminal device. Two terminals shall be connected to the line side of the low voltage pair, two terminals shall be connected to the Input File side, and the fifth terminal shall be connected to chassis ground.
 - It shall meet the following minimum requirements:

Peak Surge Current	2000 A 8x20 μ s Wave-shape
Occurrences at Peak Current	100 typical
Response Time	5 to 30 nanoseconds
Shock	Withstands 10-foot drop on concrete
Voltage Clamp	30 V
Series Resistance	5 Ohms typical
Temperature	-40 Degrees to +85 °C

Pre-Emption, Interconnect & 115 VAC Signaling Inputs

Each pre-emption, interconnect, or AC signaling input channel shall be protected by an external surge protective device, which shall be an Emerson (Edco) PC642 Series or equivalent. The Emerson (Edco) PC642 shall use a PCB 1B base for quick changeability.

Items 4-22 are individual replacement parts or optional items. These items must meet the specifications of the equipment to be included in the cabinet or otherwise described. There is no guarantee on the quantity of these items.

Item 4 Conflict Monitor Model 2018 ECL-ip

The Conflict Monitor shall be an EDI Model 2018 ECL-IP Conflict Monitor with absence of red monitoring. The Conflict Monitor Unit shall contain a 10/100 Ethernet port on the front panel for the uploading of alarms and/or event logs with a standard laptop computer. This port shall also allow for future communication within an Ethernet based infrastructure.

Item 5 Conflict Monitor Model 2010 ECL-ip

This is an option for replacement parts only, not to be furnished with the 332A and 336S Cabinet Assemblies for this contract. The Conflict Monitor shall be an EDI Model 2010 ECL-IP Conflict Monitor with absence of red monitoring. The Conflict Monitor Unit shall contain a 10/100 Ethernet port on the

front panel for the uploading of alarms and/or event logs with a standard laptop computer. This port shall also allow for future communication within an Ethernet based infrastructure.

Item 6 Red Enable Board

This is an option for replacement parts only, not to be furnished with the 332A and 336S Cabinet Assemblies for this contract. Red enable board shall implement individual, 2-position Rocker style DIP switches allowing any unused red channel to be tied to AC+. The Red Enable board shall be easily removable and replaceable from the outside of the Output File Assembly. Removal and replacement shall not require the Output File Assembly to be opened. The design shall be such that the board can be easily un-plugged and replaced. During normal operation the board shall be secured to the Output File Assembly.

Item 7 Load Switch Model 200

The Load Switch shall be a PDC MODEL SSS-87PI/O LOAD SWITCH, meeting or exceeding the CALTRANS Specifications.

Item 8 DC Isolator EDI Model 242

The D. C. Isolator unit shall be a EDI MODEL 242 or equivalent as specified in the CALTRANS Specifications.

Item 9 Flash Transfer Relay Model 430

The Flash Transfer Relay unit shall be a MODEL 430 as specified in the CALTRANS Specifications.

Item 10 Loop Detector Rack Mount, LCD Enhanced/Intelligent

The Loop Detector Amplifier Unit shall be an EDI Oracle or Reno A&E Model C Rack Mount Detector Amplifier or equivalent. The Detector shall perform properly when installed in new or existing Cabinet Assemblies in South Carolina.

Item 11 Loop Detector Amplifier Model 222

This is an option for replacement parts only, not to be furnished with the 332A and 336S Cabinet Assemblies for this contract. The Loop Detector Amplifier Unit shall be an EDI MODEL 222, or equivalent, as specified in the CALTRANS Specifications. The detector shall be two (2) channels and shall perform properly when installed in new or existing Cabinet Assemblies in South Carolina.

Item 12 Surge Protection for Twisted-Pair Communications

Surge protection for twisted-pair communication shall be included at SCDOT request when ordering. This device is not standard for all cabinets. The surge protection device shall be an Emerson (Edco) PC642C Series, or equivalent. This shall utilize the PCB1B base.

Item 13 Flasher Load Switch Model 204

The flasher module shall be a PDC MODEL SSF-87P FLASHER, meeting or exceeding the CALTRANS.

Item 14 Cabinet Power Supply Model 206L

The Cabinet Power Supply shall be the EDI Model 206L Power Supply or equivalent. The Power Supply Unit shall incorporate switching design technologies as well as Power Factor Correction.

Item 15 Power Strip

The Power Strip shall be a Fellowes 99111 or equivalent.

Item 16 #2 Lock and Key Set

The #2 Lock and Key Set shall meet the specifications of this contract.

Item 17 Aluminum Extender Base for Cabinet

This item shall be ordered as SCDOT option. For cabinets, an 8" to 12", aluminum extender base shall be available, manufactured in the shape and dimensions that match the shape, dimensions and bolt-pattern of a Cabinet Assembly. The appropriate stainless steel hardware (nuts, bolts and washers) shall be included with each extender base to sufficiently mount the base to the Cabinet Assembly.

Item 18 Low Voltage Protection

- Each low voltage communication input shall be protected as it enters the cabinet with a surge protection unit which shall be an Emerson (Edco) PC-642C-30-X, or equivalent, that meets or exceeds the following requirements:
 - It shall be a dual pair (four wire) module with a printed circuit board connector, double-sided and gold-plated for reliability.
 - It shall mate and be installed in a ten (10) circuit Buchanan connector PN PCB1B-10A or equivalent.
 - It shall be utilized as two independent signal pairs. The data circuits shall pass through the protection in a serial fashion. It shall be a hybrid two-stage unit.
 - It shall meet the following minimum requirements:

Peak Surge Current	10 KA(8x20 μ s, wave shape)
Occurrences at 2000 A	>100
Response Time	<1nanosecond
Voltage Clamp	30
Series Resistance	➤ 15 Ohms per line
Temperature	-40 degrees to +85 degrees C
Primary Protector	Three element gas tube 10KA, 8x20 μ s per side
Secondary Protector	Rugged solid state clamps, 1.5 KW minimum

- The line side shall be connected to the Communication field wires.
- The load side shall be connected to the C2 connector of the 170 Controller or the 2070-6B Communication Module of the 2070 Controller.
- The ground terminal shall be connected to chassis ground.

Item 19 2070-7A Card

This is an optional item.

Item 20 Conflict Monitor Tester

The Conflict Monitor Tester shall be the ATSI Model 8000. This shall be a stand-alone portable "Tester", intended for use on a workbench.

Item 21 Suitcase Tester for 2070 controllers

This is an optional item.

Item 22 Cabinet Assembly Display Unit

The unit required for this contract will be used by signal shop technicians during the set up and integration of 336S and 332A Cabinet Assemblies. Via permanent screening, the unit will display a

mock-up of a quad intersection with left turns, to include flashing yellow arrow indications for the left turn phases, and shall implement appropriately arranged and colored AC-driven indications of all channels for eight (8) vehicle phases and four (4) pedestrian phases. The unit shall also have additional indications for six (6) auxiliary vehicle overlaps and four (4) pedestrian yellow channels. The display unit shall include a harness that is a minimum of 10' in length, Termination wires shall be red, yellow, and green color-coded and phase marked for all indications, as well as one (1) white, AC Neutral and one (1) green, Chassis Ground termination. All wires shall have #10 stud spade lugs installed and shall be labeled by phase and color.

The display unit shall provide proper load to accurately simulate on-street, AC signal terminations for testing purposes within a signal shop environment. This unit shall be designed so that it can be placed on top of the Cabinet Assembly, or hung on the inside of the front door of any Cabinet Assembly supplied for this contract.

Item 23	Evaluation of Equipment for Repair outside Warranty Period (Unit is EACH)
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SCDOT shall submit equipment to the vendor for evaluation to determine cost to repair. Cost for repair shall be provided to the requestor within seven (7) days of submission.

Item 24	Repair Equipment outside Warranty Period (Unit is HOURS)
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SCDOT shall have the option to have equipment repaired based on cost determined through evaluation. Repair shall be completed within thirty (30) days of submission.

Item 25	SCDOT Signal Cabinet Training (Unit is EACH)
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SCDOT requires the option of a four (4)-day, formal, "hands-on" classroom-training for traffic signal cabinet assemblies.

The training shall provide a personal "take-home" package of training materials/documentation for each student, as well as a pdf of training materials for SCDOT Headquarters Signals group. Training shall be provided for up to fifteen (15) participants.

The Vendor representing the procurement of Items 1 and 2, Complete Cabinet Assemblies, shall provide training in the design, operation, and maintenance of cabinets and associated equipment; and of cabinet set-up and configuration. The Vendor shall provide all necessary equipment for appropriate demonstration of training. The trainer shall be prepared to present a minimum of eighteen (18) hours of classroom and "hands-on" training.

The Vendor of other, individual items included in this contract shall be prepared to present six (6) hours of classroom and hands-on training for individual bid Items each year. This includes providing appropriate equipment for demonstration and contracting with other vendors as necessary. Details of this training shall be coordinated with SCDOT, and with other Vendors, including subject and materials required.

Sample Training Agenda to include: (Actual training agenda to be at the discretion of SCDOT.)

Day 1: A maximum of fifteen (15) people, would receive "engineering related training", including: Introduction, Equipment description, Operation, and engineer controlled cabinet setup.

Day 2, Day 3: A maximum of fifteen (15) persons would receive "hands-on" training on maintenance and repair of all user serviceable equipment. Maintenance training shall include field level troubleshooting. This training shall be for a minimum duration of two (2) days.

Day 4: The group of fifteen (15) as above shall receive Training on Individual cabinet Items. The subjects shall be coordinated between Vendors, to avoid duplication.

Training classes shall be prepared to start within two (2) months of the receipt of the first shipment of equipment by SCDOT (unless otherwise directed).

Item 26	Conflict Monitor Training (Unit is EACH)
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SCDOT requires the option of a one (1)-day training for conflict monitors and testing.

Vendor shall provide training to include Conflict Monitor Testing and programming, including special functions and flashing yellow arrow programming in accordance to SCDOT design guidelines. Vendor shall provide curriculum, three (3) bound copies and a pdf, to SCDOT prior to training. Training shall be provided for up to fifteen (15) participants.

DELIVERY

Direction concerning delivery is for **Items 1-22** is listed below:

- Time
 - Vendor to be prepared to provide these items immediately after award. The maximum delivery time permitted will be SIXTY (60) DAYS from the date of the Purchase Order.
- Packaging
 - Equipment shall be appropriately boxed or crated for shipment, to prevent physical damage. The Vendor shall make shipments using the minimum number of containers consistent with the requirements of safe transit, available mode of transportation, and routing. The boxes or crates shall be sealed in 3 mil thick polyethylene plastic sheeting for outdoor storage. Complete Cabinet Assemblies shall be shipped as one unit. Items of equipment packed inside the Cabinet shall be protected and secured for shipment.
- Pallets
 - Cabinet(s) shall be bolted to shipping pallets.
- Labeling
 - Each cabinet/box shall be clearly labeled, IN PLAIN ENGLISH as to the contents; for example: "Type 332A Cabinet". All packages shall be identified with the **Local Vendor Name, Manufacturer Name, SCDOT Purchase Order Number and Shipment Date**. Packing lists and EQUIPMENT LABELS shall be glued to every carton showing its contents. A "Certificate Of Compliance" shall be attached to the packing list of each shipment.
- Schedule
 - The deliveries for **Items 1-22** shall be made to the Supply Depot (1418 Shop Road, Columbia, SC 29201-4844) in Columbia or to the District Signal Shops if requested by SCDOT. When purchased as part of a System the delivery shall be made to a District/location near the Site of work if it is deemed necessary.

SCDOT District 1 Signal Shop
803-737-6974
1408 Shop Rd
Columbia, SC 29201-4844

SCDOT District 3 Signal Shop
803-241-1117
13 Saluda Dam Rd
Greenville, SC 29611-3818

SCDOT District 5 Signal Shop
803-661-4812
3018 East Palmetto St
Florence, SC 29506-

SCDOT District 7 Signal Shop
803-395-7188
1768 Charleston Highway
Orangeburg, SC 29115-7722

SCDOT District 2 Signal Shop
864-889-8030
510 W. Alexander Avenue
Greenwood, SC 29646-4029

SCDOT District 4 Signal Shop
803-581-8551
1143 SCDOT Rd
Chester, SC 29706-6393

SCDOT District 6 Signal Shop
843-740-1668
6355 Fain Blvd
N. Charleston, SC 29406-4907

- Special Orders
 - The Vendor shall follow the shipping instructions as stated on the Purchase Order or attachments.

WARRANTIES, REPAIRS AND SERVICE

- Service - The vendor/manufacturer shall provide services adequate for the operation, repair, and replacement for each item. Adequate service will apply to reasonable response provided by technical personnel experienced with each item.
- Repair Parts – The Vendor shall be able to ship to the Department within three (3) business days, any component parts required to maintain this equipment.
- Maintenance and Repair Services – Complete data on maintenance and repair services shall be available, for the convenience of the Department, in the post-warranty period as listed below.
- This maintenance data shall include location of the service facility, services offered, turn-around

- time, and estimated repair costs.
- Warranty Period
 - The Vendor shall fully guarantee all items, services, equipment and materials provided under this contract. If the equipment Vendor is other than the Manufacturer, then the Vendor shall be fully responsible for all warranties and requirements of this Specification. The duration of the warranty or guarantee shall be the standard of the industry, with a minimum period of twenty-four (24) months from the date of shipment to the SCDOT. The warranty shall cover all Manufacturer's defects, including parts, labor, and shipping costs. Any item found not in accordance with this Specification will be rejected, and returned to Vendor at the Vendor's expense for immediate replacement. A second occurrence of this infraction will be sufficient reason for total rejection of the contract for that item.
 - Repair
 - The vendor shall have an office and/or authorized factory representative within 150 miles of Columbia, SC and be able to perform on-site warranty repair or replacement of items purchased from this contract, within two (2) business days after receiving complaint. The authorized factory representative shall have a permanent office located within the state of South Carolina. This office shall have a permanent street address, Air Conditioning and Heat, a permanent indoor restroom, a listed voice number, and computer/internet access with a valid e-mail address. Warranty repairs are to be performed at no additional cost.
 - Extension
 - Following warranty repair or replacement, the warranty period (for that item or module), shall be extended for an additional period of one (1) year.
 - Required Equipment Submittals:
 - One each of the exact cabinets, FULLY OPERATIONAL WITH REQUIRED EQUIPMENT, WIRING, LABELING, ETC., the Vendor intends to supply, INCLUDING PACKAGING, (one 336S and one 332A) for inspection before the contract is awarded.

DOCUMENTATION – (This Section supersedes the CALTRANS Specification.)

- Cabinet Assemblies
 - The Vendor of COMPLETE CABINET ASSEMBLIES shall be responsible for providing with each and every Complete Assembly Cabinet, two (2) complete Cabinet Wiring Diagrams
- Other Equipment
 - Documentation is also required for each auxiliary piece of equipment in the Cabinet Assembly. The intent is to require documentation sufficient for operation and maintenance of each item to the satisfaction of SCDOT. All documentation shall be prepared in a clear, concise manner; with appropriate illustrations, tables, and cut-away drawings, and voltage/waveform reference pictures.
- Binding
 - The documentation shall be adequately BOUND, for protection and to prevent loss of pages. Binding should consist of two heavy-duty staples, with binding tape; or plastic spiral binding. Fonts and sizes shall be per CALTRANS Specifications.
- Contents
 - The vendor shall provide ten (10) sets of documentation material as described below at the request of SCDOT.
 - The documentation material shall include, but not be limited to, the following:
 - General description.
 - Installation procedure.
 - Operating procedure.
 - Theory of operation, voltages, wave forms.
 - Maintenance and troubleshooting procedures.

- Schematic diagrams of circuits and IC boards.
- Pictorial layout of IC board components.
- Parts list including description, reference symbol, part number and location.

M688.9 SOLAR POWERED FLASHER ASSEMBLY

1.1 Description

This specification describes requirements for furnishing a Solar Powered Flasher Assembly.

1.2 Materials

1.2.1 24/7 Single Solar 24 Hour Flashing Beacon

1.2.1.1 Overview

This specification is for the Single Beacon Solar 24 Hour Flashing Beacon. Each unit shall consist of a solar engine, LED signal module and signal housing, and mounting hardware. The system shall conform to all provisions of the MUTCD, Chapter 4K, and Flashing Beacons.

1.2.1.2 Mechanical Specifications

The solar engine shall be vented to provide cooling of the battery and electronic system. Venting shall be covered by wire mesh to prevent intrusion of insects. The unit shall have the provision to mount a external device for remote activation. System must have capability to power such device.

1.2.1.3 Solar / Battery System

The solar engine shall have a field replaceable sealed lead acid battery or batteries. Solar panel and battery system shall be 12 Volt DC.

The solar panel or panels shall meet the design qualification and type approval of photovoltaic modules in accordance with IEC 61215. This specification includes radiation testing, thermal testing, and mechanical testing for environmental conditions such as UV-exposure, thermal cycling, as well as degradation of maximum power output.

Battery shall be mechanically secured into the housing. System shall have an auxiliary 12 VDC power output to power third party devices such as wireless radios or sensing equipment.

1.2.1.4 Signal Housing

The signal housing shall meet the equipment standard of the Institute of Transportation Engineers (ITE) Vehicle Traffic Control Signal Heads (VTCSH) Chapter 2.

1.2.1.5 LED Signal Module

The LED signal module shall conform to the mandatory specifications of: Light Emitting Diode (LED) Circular Signal Supplement as required by the Manual of Uniform Traffic Control Devices 2003 Edition Revision 1.

1.2.1.6 Operational Specifications

The system shall conform to all standards for flashing beacons as required in the Manual of Uniform Traffic Control Devices 2003 Edition Revision 1 or current version.

- The beacon shall flash at a rate set by MUTCD.
- The beacon shall have a minimum operating autonomy of 30 days.
- The beacon shall automatically reduce light output in case of low battery situations, reducing risk that the beacons will fail entirely under conditions of poor solar insolation.

1.2.1.7 Activation

The beacon shall operate continuously when the battery is connected. The beacon shall have the option to be turned on by a third party switch or third party device with a compatible contact closure output.

1.2.2 **24/7 Single Compact Solar 24 Hour Flashing Beacon**

1.2.2.1 Overview

This specification is for the Single Beacon Compact Solar 24 Hour Flashing Beacon.

Each unit shall consist of a self-contained solar engine, LED signal module and signal housing, and mounting hardware such that the entire assembly mounts to the top of the pole. The solar engine shall contain all electronics, batteries & solar panels. No additional cabinet is required. The system shall conform to all provisions of the MUTCD, Chapter 4K, and Flashing Beacons. See Diagrams 1a and 1b.

Diagram 1a.
Single Beacon
Compact – Pole
Mount
(Square/Round)



Diagram 1b.
Single Beacon
Compact – Top of
Pole Mount
(4 1/2" Round)



1.2.2.2 Mechanical Specifications

The Solar panel shall be mounted to the solar engine. All batteries and electronics shall be mounted in the solar engine, with no external control cabinet or battery cabinet required. The solar engine shall be vented to provide cooling of the battery and electronic system. Venting shall be covered by wire mesh to prevent intrusion of insects.

The solar engine shall have the provision to mount an external device for remote activation. System must have capability to power such device. Solar engine must contain sufficient space to house third party device inside a sealed enclosure located inside the solar engine.

The entire system must be delivered as a complete unit ready to install and requiring no assembly.

1.2.2.3 Solar / Battery System

The solar engine shall include a minimum 10-watt solar panel. The solar engine shall house a field replaceable sealed lead acid battery or batteries. Solar panel and battery system shall be 12 Volt DC.

The solar panel shall meet the design qualification and type approval of photovoltaic modules in accordance with IEC 61215. This specification includes radiation testing, thermal testing, and mechanical testing for environmental conditions such as UV-exposure, thermal cycling, as well as degradation of maximum power output.

The solar panel shall consist of a solar panel or panels, mounted to the solar engine.

Battery or batteries shall be mechanically secured into the housing. Battery bracket shall enclose the battery in a manner to restrict the thermal expansion of the battery.

System shall have an auxiliary 12 VDC power output to power third party devices such as wireless radios or sensing equipment.

1.2.2.4 Signal Housing

The signal housing shall meet the equipment standard of the Institute of Transportation Engineers (ITE) Vehicle Traffic Control Signal Heads (VTCSH) Chapter 2.

The signal head shall be mounted below the solar engine.

1.2.2.5 LED Signal Module

The LED signal module shall conform to the mandatory specifications of: Light Emitting Diode (LED) Circular Signal Supplement as required by the Manual of Uniform Traffic Control Devices 2003 Edition Revision 1.

1.2.2.6 Operational Specifications

The system shall conform to all standards for flashing beacons as required in the Manual of Uniform Traffic Control Devices 2003 Edition Revision 1 or current version.

- The beacon shall be flash at a rate of set by MUTCD.
- The beacon shall have a night dimming feature.
- The beacon shall have a minimum operating autonomy of 30 days.
- The beacon shall automatically reduce light output in case of low battery situations, reducing risk that the beacons will fail entirely under conditions of poor solar insolation.

1.2.2.7 Activation

The beacon shall operate continuously when the battery is connected. The beacon shall have the option to be turned on by a third party switch or third party device with a compatible contact closure output.

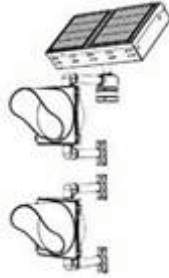
1.2.3 *Dual 24 Hour Solar Powered Flashing Beacon*

1.2.3.1 Overview

This specification is for the solar powered 24 hour flashing beacon. Each unit shall consist of a self-contained solar engine, two LED signal modules and signal housings, and mounting hardware to fit the

installation. The solar engine shall connect to two 12" yellow or red LED lens. The solar engine, mounting hardware, and signal heads shall be available in black, yellow, and green. See Diagrams 2.

**Diagram 2.
Dual Beacon
Compact – Top of
Pole Mount
(4 ½" Round)**



1.2.3.2 Mechanical Specifications

The weight of the solar engine shall not exceed 52 pounds. The solar engine must be able to rotate 360 degrees and tilt for maximum solar energy collection. Batteries shall be field replaceable.

1.2.3.3 Signal Housing

The signal housings shall be constructed of polycarbonate material, and must be adjustable independent from the bracket for lens alignment. The signal housings shall meet the equipment standard of the Institute of Transportation Engineers Vehicle Traffic Control Signal Heads (VTC SH) Chapter 2. The lenses shall be ITE compliant 12" yellow LED lenses.

1.2.3.4 Standards

The system shall conform to all standards for flashing beacons as required in the Manual of Uniform Traffic Control Devices 2003 Edition Revision 1 or current version. These include complying with the VTC SH specifications.

- The flash rate shall be MUTCD compliant.
- The beacons shall have a night dimming feature.
- The beacons shall have a minimum operating autonomy of 30 days
- The beacons shall automatically reduce light output in case of low battery situations, reducing risk that the beacons will fail entirely under conditions of poor solar insolation.

1.2.4 *Dual Solar Powered School Flashing Beacon*

1.2.4.1 Overview

This specification is for the solar powered school flashing beacon. Each unit shall consist of a solar engine, two LED signal modules and signal housings, and mounting hardware with timing device. The system shall conform to all provisions of the MUTCD, Chapter 4K, and Flashing Beacons.

1.2.4.2 Mechanical Specifications

The solar engine shall be vented to provide cooling of the battery and electronic system. Venting shall be covered by wire mesh to prevent intrusion of insects. The solar engine shall have the provision to

mount an external device for remote activation. System must have capability to power such device. Unit must provide a cabinet or contain sufficient space to house third party device inside a sealed enclosure.

1.2.4.3 Solar / Battery System

The solar engine shall have a field replaceable sealed lead acid battery or batteries. Solar panel or panels and battery system shall be 12 Volt DC.

The solar panel or panels shall meet the design qualification and type approval of photovoltaic modules in accordance with IEC 61215. This specification includes radiation testing, thermal testing, and mechanical testing for environmental conditions such as UV-exposure, thermal cycling, as well as degradation of maximum power output.

Battery or Batteries shall be mechanically secured into the housing.

System shall have an auxiliary 12 VDC power output to power third party devices such as wireless radios or sensing equipment.

1.2.4.4 Signal Housing

The signal housings shall meet the equipment standard of the Institute of Transportation Engineers Vehicle Traffic Control Signal Heads (VTC SH) Chapter 2.

1.2.4.5 LED Signal Module

The LED signal module shall conform to the mandatory specifications of: Light Emitting Diode (LED) Circular Signal Supplement as required by the Manual of Uniform Traffic Control Devices 2003 Edition Revision 1.

1.2.4.6 Standards

The system shall conform to all standards for flashing beacons as required in the Manual of Uniform Traffic Control Devices 2003 Edition Revision 1 or current version.

- The flash rate shall be MUTCD compliant.
- The beacons shall have a minimum operating autonomy of 30 days
- The beacons shall automatically reduce light output in case of low battery situations, reducing risk that the beacons will fail entirely under conditions of poor solar insolation.

1.2.4.7 Activation

The beacon shall operate continuously when the battery is connected. The beacon shall have the option to be turned on by a third party switch or third party device with a compatible contact closure output. A timer shall be included in this as an option.

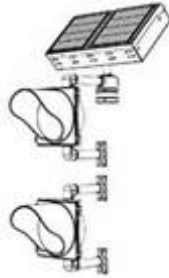
1.2.5 *Dual Compact Solar School Zone Flasher*

1.2.5.1 Overview

This specification is for the Dual Compact Solar School Zone Flasher.

Each unit shall consist of a self-contained solar engine, two LED signal modules and signal housings, and mounting hardware such that the entire assembly with the exception of the bottom LED mounts to the top of the pole. The solar engine shall contain all electronics, batteries & solar panels. No additional cabinet is required. The system shall conform to all provisions of the MUTCD, Chapter 4K, and Flashing Beacons. See Diagram 3.

Diagram 3
Dual Beacon
Compact School
Zone Flasher



1.2.5.2 Mechanical Specifications

The Solar panel shall be mounted to the solar engine. All batteries and electronics shall be mounted in the solar engine, with no external control cabinet or battery cabinet required. The solar engine shall be vented to provide cooling of the battery or batteries and electronic system. Venting shall be covered by wire mesh to prevent intrusion of insects.

The solar engine shall have the provision to mount an external device for remote activation. System must have capability to power such device. Solar engine must contain sufficient space to house third party device inside a sealed enclosure located inside the solar engine.

The overall weight of the assembly, including mounting hardware, signal housing, LED module, and solar engine shall not exceed 55 lbs.

1.2.5.3 Solar / Battery System

The solar engine shall include a minimum 10-watt solar panel. The solar engine shall house a replaceable sealed lead acid battery or batteries. Solar panel and battery system shall be 12 Volt DC.

The solar panel shall meet the design qualification and type approval of photovoltaic modules in accordance with IEC 61215. This specification includes radiation testing, thermal testing, and mechanical testing for environmental conditions such as UV-exposure, thermal cycling, as well as degradation of maximum power output.

The solar panel shall consist of one single solar panel, mounted to the solar engine.

Battery shall be mechanically secured into the housing. Battery bracket shall enclose the battery in a manner to restrict the thermal expansion of the battery.

System shall have an auxiliary 12 VDC power output to power third party devices such as wireless radios or sensing equipment.

1.2.5.4 Signal Housing

The signal housing shall meet the equipment standard of the Institute of Transportation Engineers (ITE) Vehicle Traffic Control Signal Heads (VTCSH) Chapter 2.

The signal head shall be easily removable from the assembly. The signal housing must be adjustable independent from the bracket for lens alignment.

1.2.5.5 LED Signal Module

The LED signal module shall conform to the mandatory specifications of: Light Emitting Diode (LED) Circular Signal Supplement as required by the Manual of Uniform Traffic Control Devices 2003 Edition Revision 1.

1.2.5.6 Operational Specifications

The system shall conform to all standards for flashing beacons as required in the Manual of Uniform Traffic Control Devices 2003 Edition Revision 1 or current version.

The beacon shall be flash at a rate set by MUTCD. The illuminated period of each flash shall not be less than one-half and not more than two-thirds of the total cycle.

- The beacon shall have a night dimming feature.
- The beacon shall have a minimum operating autonomy of 30 days.
- The beacon shall automatically reduce light output in case of low battery situations, reducing risk that the beacons will fail entirely under conditions of poor solar insolation.

1.2.6 **Warranty**

The Vendor shall furnish SCDOT with any warranties on equipment and materials that are provided by the Manufacturer or Vendor as normal trade practice.

1.3 Measurement

Furnishing a Solar Powered Flasher Assembly shall be measured by EACH and shall include all electrical connections and all required mounting and incidental hardware.

1.4 Payment

Furnishing a Solar Powered Flasher Assembly, accepted and measured as provided above, will be paid at the contract unit price bid for:

FURNISH SINGLE BEACON/COMPACT/MODEL R247C (INCLUDES ALL ASSOCIATED HARWARE FOR A COMPLETE AND OPERATIONAL ASSEMBLY)	EA
FURNISH SINGLE BEACON/STANDARD/MODEL R247 (INCLUDES ALL ASSOCIATED HARWARE FOR A COMPLETE AND OPERATIONAL ASSEMBLY)	EA
FURNISH DUAL BEACON COMPACT/MODEL R247 DUAL (INCLUDES ALL ASSOCIATED HARWARE FOR A COMPLETE AND OPERATIONAL ASSEMBLY)	EA
FURNISH DUAL BEACON STANDARD/MODEL R829 (INCLUDES ALL ASSOCIATED HARWARE FOR A COMPLETE AND OPERATIONAL ASSEMBLY)	EA
FURNISH DUAL BEACON COMPACT/MODEL R829C (INCLUDES ALL ASSOCIATED HARWARE FOR A COMPLETE AND OPERATIONAL ASSEMBLY)	EA
FURNISH DUAL BEACON COMPACT/MODEL R829C-D4 (INCLUDES ALL ASSOCIATED HARWARE FOR A COMPLETE AND OPERATIONAL ASSEMBLY)	EA

FURNISH DUAL BEACON COMPACT/MODEL R820C (INCLUDES ALL ASSOCIATED HARWARE FOR A COMPLETE AND OPERATIONAL ASSEMBLY)	EA
FURNISH DUAL BEACON STANDARD/MODEL R820 (INCLUDES ALL ASSOCIATED HARWARE FOR A COMPLETE AND OPERATIONAL ASSEMBLY)	EA
FURNISH TIME CLOCK/CONNECTOR/MODELAP22-503544	EA
FURNISH TIME CLOCK SO'WARE KIT/MODELAP22-KIT	EA
FURNISH 12" YELLOW LED/MODEL 47553	EA
FURNISH 12" RED LED/MODEL 48820	EA
FURNISH 1 SECTION SIGNAL HEAD/MODEL CAMSIG	EA
FURNISH SOLAR FLASHER SCHOOL ZONE SOFTWARE/CPK	EA
FURNISH EMERGENCY MANAGEMENT SYSTEM/MODEL 46319	EA
FURNISH 12V DC SEALED BATTERY/MODEL 37912	EA
FURNISH LED HARNESS 15'/MODEL 48901	EA
FURNISH LED HARNESS 36 ' ./MODEL 48902	EA
FURNISH LED HARNESS 75 ' ./MODEL 56928	EA
FURNISH FIXED WEDGE TOP PLATE/BASE ASSEMBLY/WEDGE	EA
FURNISH COMMUNICATION CABLE/SZ FLASHER/MODEL COMSCH	EA
FURNISH UPLOAD HOUSING KIT/MODEL 48941	EA
FURNISH HOUSING BOX FOR TIME SWITCH/MODEL 47256	EA
FURNISH MANUAL ON/OFF SWITCH HARNESS/MODEL47223	EA
FURNISH TOP PLATE WEDGE/MODEL 50571	EA
FURNISH 2" SQUARE POLE MOUNT(C BRACKET)/MODEL47362	EA
FURNISH SLIP FILLER, 1&2 WAY/MODEL SE-3302-P29	EA
FURNISH SIDE-OF-POLE ASSEMBLY/MODEL SP-5641-P29	EA
FURNISH SIDE POLE W/HUB PLATE/MODEL SP-5641-P29	EA
FURNISH 1-WAY TRI-STUD MOUNTING/MODEL SE-0567-P29	EA
FURNISH UPPER/LOWER ARM ASSEMBLY/MODEL SE-3148-P29	EA
FURNISH 1 WAY ASTRO-BRAC ASSEMBLY/MODEL AB-0125-96	EA
FURNISH SPAN WIRE HANGAR/MODEL SP-1004SC-P29	EA
FURNISH HORIZONTAL MOUNT SOLAR ENGINE SUPPORT ARM/MODEL 46560	EA
FURNISH PIPE ADAPTOR FOR WEDGE/MODEL 47504	EA
FURNISH 8' 4 1/2" ALUMINUM PED POLE/MODEL PB-5100-8	EA
FURNISH 10' 4 1/2" PED POLE/MODEL PB-5100-10	EA
FURNISH 12' 4 1/2" PED POLE/MODEL PB-5100-12	EA
FURNISH 15' 4 1/2" PED POLE/MODEL PB-5100-15	EA
FURNISH DOUBLE PUSH BUTTON STATION/MODEL SE-6042	EA
FURNISH ALUMINUM SQUARE PED BASE /MODEL PB-5335-1S	EA
FURNISH PED BASE COLLAR/MODEL PB-5325	EA
FURNISH 2" SQUARE POST MOUNT SINGLE W/SIGNAL/LED/2SQ	EA
FURNISH SOLAR ENG 10W/MODEL R247ENGINE ONLY 10	EA
FURNISH SOLAR ENG 20W/MODEL R247ENGINE ONLY 20	EA
FURNISH SOLAR ENG 10W/SCHOOL/R829ENGINE ONLY10	EA

FURNISH SQUARE WOOD POST MOUNT W/WEDGE/MODEL SWP	EA
FURNISH TOP POLE MOUNT W/WEDGE/MODEL 45RS	EA
FURNISH TOP POLE MOUNT W/WEDGE/MODEL 45RDV	EA
FURNISH TOP POLE MOUNT W/WEDGE DUAL HORIZONTAL/45RDH	EA
FURNISH SIDE POLE MOUNT W/WEDGE/MODELSPS	EA
FURNISH SIDE POLE MOUNT W/WEDGE/DUAL/MODEL SPD	EA
FURNISH MAST ARM MOUNT W/WEDGE/SINGLE/MODEL MAMS	EA
FURNISH MAST ARM MOUNT W/WEDGE/DUAL/MODEL MAMD	EA
FURNISH CPR/AP22 COMMUNICATION CENTRAL/MODEL 501638R	EA
FURNISH CPR2102 UPDATE/MODEL 500900	EA
FURNISH CPR2102 TIME CLOCK/MODEL 503602-D	EA
FURNISH CPR2102 VERIFY UNIT/MODEL 503600-D	EA
FURNISH MASTER RADIO UNIT/POWER SUPPLY/MODEL 503646	EA
FURNISH CPR INTERNAL RADIO/MODEL 503645	EA
FURNISH CPR EXTERNAL RADIO/MODEL 503645E	EA
FURNISH CPR SOLAR REPEATER STATION/MODEL 503649F	EA
FURNISH CPR AC REPEATER STATION/MODEL 503649FAC	EA
FURNISH CPR RADIO REPEATER W/PS/MODEL 503647	EA
FURNISH CPR PROGRAMMING KIT/MODEL 501662NB	EA
FURNISH 10db YAGI ANTENNA/MODEL 503525Y	EA
FURNISH 6db OMNI ANTENNA/MODEL 503525OMNI	EA
FURNISH 11db OMNI ANTENNA/MODEL 505472-11db	EA
FURNISH DISC ANTENNA/MODEL 503544	EA
FURNISH TABLE TOP ANTENNA/MODEL 503501M	EA
FURNISH 25 ' ANTENNA LEAD/CPR RADIO/505472L-25	EA
FURNISH 50 ' ANTENNA LEAD/CPR RADIO/505472L-50	EA
FURNISH 100' ANTENNA LEAD/CPR RADIO/505472L-100	EA
FURNISH 150' ANTENNA LEAD/CPR RADIO/505472L-150	EA
FURNISH CPR RADIO/TIME SWITCH CONVERTER/503648C	EA
FURNISH CPR 2101 TIME SWITCH/503645W	EA
FURNISH 3db WI-FI ANTENNA W/3' LEAD/504413WF	EA
FURNISH WI-FI to TIME SWITCH CONVERTER/503485	EA
FURNISH WI-FI TRANSCEIVER/MODEL 501680	EA
FURNISH ANTENNA BRACKET/MODEL 502356	EA
FURNISH CPR DISPLAY TERMINAL/MODEL 502620	EA
FURNISH CPR AUDIO VISUAL ALARM/MODEL 503626	EA

RR COORDINATION AND PERMISSIONS**1.1 Description**

This work shall consist of coordinating with the appropriate railroad company to obtain right of entry and all other permits to perform signal work within and adjacent to the railroad right of way. This includes provisions for paying for flagging and engineering.

1.2 Materials

n/a

1.3 Construction**1.3.1 General**

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Railroads at Traffic Signals.
- Contractor shall perform all work upon or adjacent to RR'S property in accordance with these Special Provisions.
- Contractor to copy SCDOT RR personnel and Engineer on all documentation provided to RR company.

1.3.2 Right of Entry Permit

- Contractor shall obtain a Right of Entry Permit prior to commencement of Work on RR's property or right-of-way or within fifty (50) feet of railroad property or which affects a RR railroad bridge or trestle, tracks, roadbeds, tunnel, underpass or crossing,
- Submit a copy of the signed ROE Permit to the Engineer.

1.3.3 Authority of RR Engineer

- The authorized representative of RR ("RR Representative") shall have final authority in all matters affecting the safe maintenance of RR operations and RR property, and his or her approval shall be obtained by the DEPARTMENT or its Contractor for methods of construction to avoid interference with RR operations and RR property and all other matters contemplated by the Agreement and these Special Provisions.

1.3.4 Interference with RR Operations

- Contractor shall use reasonable care and diligence at all times and cooperate with RR officials in order to avoid accidents, damages, or delay to, or interference with, RR operations. Contractor shall not work on RR'S tracks or allow any of Contractor's equipment or material to encroach or to present a risk of encroachment without first obtaining authority from RR'S Chief Engineer or his authorized representative.
- Contractor shall arrange and conduct its work so that there will be no interference with RR operations, including train, signal, telephone and telegraphic services, or damage to RR's property, or to poles, wires, and other facilities of tenants on RR's Property or right-of-way. Contractor shall store materials so as to prevent trespassers from causing damage to trains, or RR Property. Whenever Work is likely to affect the operations or safety of trains, the method of doing such Work shall first be submitted to the RR Representative for approval, but such approval shall not relieve Contractor from liability in connection with such Work.
- If conditions arising from or in connection with the Project require that immediate and unusual provisions be made to protect train operation or RR's property, Contractor shall make such provision. If the RR Representative determines that such provision is insufficient, RR may, at the expense of DEPARTMENT or its Contractor, require or provide such provision as may be deemed necessary, or cause the Work to cease immediately

1.3.5 Notice of Starting Work

- Contractor shall not commence any work on RR Property or rights-of-way until it has complied with the following conditions:
 - a. Notify RR in writing of the date that it intends to commence Work on the Project. The notice must identify the Project by reference to the RR OP# and Railroad Milepost and SCDOT File No. and Project No..
 - b. Notify RR in writing if contract flagging service is required, and desired date Work is scheduled to commence.
 - c. Obtain authorization from the RR Representative to begin Work on RR property or right-of-way such authorization to include an outline of specific conditions with which it must comply.
 - d. Obtain from RR the names, addresses and telephone numbers of RR's personnel who must receive notice under provisions in the Agreement. Where more than one individual is designated, the area of responsibility of each shall be specified.

1.3.6 Work for the Benefit of the Contractor

- No temporary or permanent changes to wire lines or other facilities (other than third party fiber optic cable transmission systems) on RR property that are considered necessary to the Work are anticipated or shown on the Plans. If any such changes are, or become, necessary in the opinion of RR or DEPARTMENT, such changes will be covered by appropriate revisions to the Plans and by preparation of a force account estimate. Such force account estimate may be initiated by either RR or DEPARTMENT, but must be approved by both RR and DEPARTMENT. DEPARTMENT or Contractor shall be responsible for arranging for the relocation of the third party fiber optic cable transmission systems, at no cost or expense to RR.
- Should Contractor desire any changes in addition to the above, then it shall make separate arrangements with RR for such changes to be accomplished at the Contractor's expense.

1.3.7 Cooperation and Delays

- Contractor shall arrange a schedule with RR for accomplishing staged construction involving work by RR. In arranging its schedule, Contractor shall ascertain, from RR, the lead time required for assembling crews and materials and shall make due allowance therefor.
- Contractor may not charge any costs or submit any claims against RR for hindrance or delay caused by RR traffic, work done by RR or other delay incident to or necessary for safe maintenance of RR traffic, or for any delays due to compliance with these Special Provisions.
- Contractor shall cooperate with others participating in the construction of the Project to the end that all work may be carried on to the best advantage.
- Contractor understands and agrees that RR does not assume any responsibility for work performed by others in connection the Project. Contractor further understands and agrees that it shall have no claim whatsoever against RR for any inconvenience, delay or additional cost incurred by DEPARTMENT or its Contractor on account of operations by others.

1.3.8 Storage of Materials and Equipment

- Contractor shall not store its materials or equipment on RR's property or where they may potentially interfere with RR's operations, unless Contractor has received RR Representative's prior written permission. Contractor understands and agrees that RR will not be liable for any damage to such materials and equipment from any cause except the negligence, recklessness or intentional wrongdoing of RR, or its agents or employees. RR may move, or require Contractor to move, such material and equipment, at Contractor's sole expense. To minimize the possibility of damage to the RR tracks resulting from the unauthorized use of equipment, all grading or other construction equipment that is left parked near the tracks unattended by watchmen shall be immobilized to the extent feasible so that it cannot be moved by unauthorized persons.

1.3.9 Construction Procedures

- Construction work on RR property shall be subject to RR's inspection and approval.
- Construction work on RR property shall be in accordance with these Special Provisions and the Right of Entry permit.

1.3.10 Flagging / Inspection Service

- Contractor shall utilize RR flagmen, watchmen, or other protective measures that are required, in the sole opinion of RR, to promote safety and/or continuity of RR traffic. RR has sole authority to determine the need for flagging required to protect its operations and property. In general, flagging protection will be required whenever the Contractor or its equipment are, or are likely to be, working within fifty (50) feet of live track or other track clearances specified by RR, or over tracks.
- Contractor shall reimburse RR directly for all costs of flagging that is required on account of construction within RR property shown in the Plans, or that is covered by an approved plan revision, supplemental agreement or change order.
- Contractor shall give a minimum of ten (10) days advance notice to RR Representative of anticipated need for flagging service. No work for which flagging service is required shall be undertaken until the flag person(s) is/are at the job site. [The estimated number and classifications of flag-persons are shown in the Estimate.] If it is necessary for RR to advertise a flagging job for bid, it may take up to ninety (90) days to obtain this service, and RR shall not be liable for the cost of delays attributable to obtaining such service.

- RR shall have the right to assign an individual to the site of the Project to perform inspection service whenever, in the opinion of RR Representative, such inspection may be necessary. Contractor shall reimburse RR for the costs incurred by RR for such inspection service. Inspection service shall not relieve DEPARTMENT or its Contractor from liability for its Work.
- RR shall render invoices for, and Contractor shall pay for, the actual pay rate of the flagpersons and inspectors used, plus standard additives, whether that amount is above or below the rate provided in the Estimate. If the rate of pay that is to be used for inspector or flagging service is changed before the work is started or during the progress of the Work, whether by law or agreement between RR and its employees, or if the tax rates on labor are changed, bills will be rendered by RR and paid by DEPARTMENT using the new rates. Contractor shall perform Work that requires flagging protection or inspection service in such a manner and sequence that the cost of such will be as economical as possible.

1.3.11 Utility Facilities on RR Property

- Contractor shall arrange to have any utility facilities on or over RR Property changed as may be necessary to provide clearances for the proposed trackage.

1.3.12 Clean-Up

- Contractor, upon completion of the Project, shall remove from RR's Property any temporary grade crossings, any temporary erosion control measures used to control drainage, all machinery, equipment, surplus materials, falsework, rubbish, or temporary buildings belonging to Contractor. Contractor, upon completion of the Project, shall leave RR Property in neat condition, satisfactory to RR Representative.

1.3.13 Insurance

- Contractor must submit its original insurance policies and two copies and all notices and correspondence regarding the insurance policies, together with completed Insurance Approval Request Form (attached) to the appropriate RR entity and to the Project Manager for the Department.
- Contractor may not begin Work on RR's property or right-of-way or within fifty (50) feet of railroad property or which affects a RR railroad bridge or trestle, tracks, roadbeds, tunnel, underpass or crossing until it has received RR's written approval of the required insurance policies.

Measurement

- Railroad Liability Insurance pay item included all necessary application payments and payments for liability insurance.
- Railroad Flagging pay item includes payment to the railroad for flagging and all other charges necessary to complete the flagging operation.

Payment

1071401	CSX RAILROAD INSURANCE AND FLAGGING	LS
1071402	RR COORDINATION FOR TRAFFIC SIGNALS	LS
9610201	RAILROAD LIABILITY INSURANCE	EA
9610202	RAILROAD FLAGGING	HR

MAST ARM SPECIFICATIONS

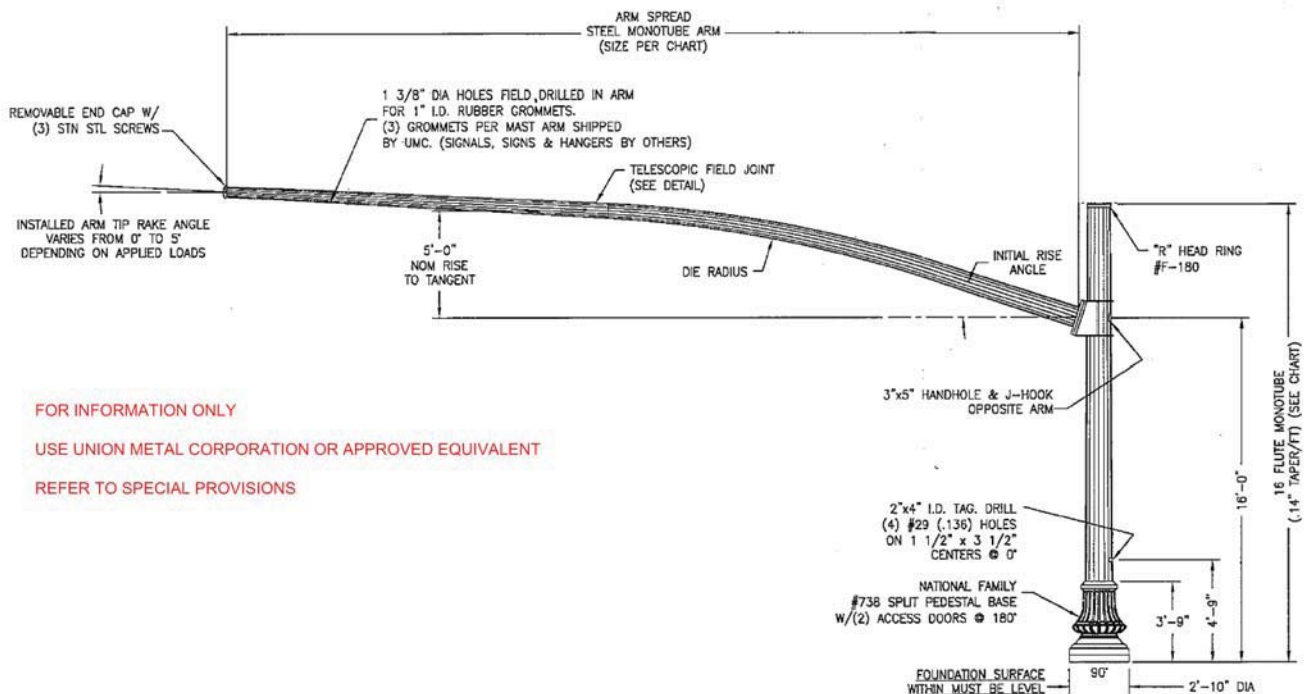
DESIGN, FURNISH AND INSTALL MAST ARM TRAFFIC SIGNAL POLES

Refer to SCDOT Traffic Signal Specifications, Supplemental Specifications SC-M-675 (as included in Section E), and the following:

Use Union Metal Corporation 16 fluted, tapered steel pole with two mast arms and "National" family pedestal base (or approved equivalent) with luminaires powder coated black. Contractor/Vendor shall supply long-hand structural calculations and drawings for mast arm poles, arms and foundation by professional engineer registered in SC to verify compliance with AASHTO Standard Specifications for Structural supports for Highway Signs, Luminaires and Traffic Signals (latest edition) and SCDOT Traffic Signal Specifications prior to ordering and construction. Wind load design speed per SCDOT Traffic Signal Specifications of 100 mph and AASHTO requirements shall apply.

Mast arm height shall allow a minimum of 15' and a maximum of 19' clearance (typical 17') between roadway and bottom of signal head. Mast arms and poles shall not obstruct (horizontally or vertically) sidewalks or crosswalks complying with Americans with Disabilities Act (ADA) requirements. Mast arm poles and foundations shall match SCDOT approved bolt pattern. Use hot dipped galvanized steel in accordance with ASTM A123 and SCDOT Traffic Signal Specifications. Poles and arms shall be capped and anchor bolts protected with removable bolt covers. Provide pre-drilled holes for pedestrian heads and buttons on poles where these appurtenances are shown on signal plans.

All existing equipment shall remain operational and in full view of the intended traffic at all times until activation and acceptance of the new equipment. If necessary, temporary poles and overhead cable shall be provided by the Contractor at their own expense to maintain operations of the existing traffic signals and equipment. All existing traffic signal equipment shall be returned to SCDOT District 7 Signal Shop upon removal.



SECTION F: BID FORMS

BID BOND

Any singular reference to Bidder, Surety, Owner, or other party shall be considered plural where applicable.

BIDDER (Name and Address):

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address):

BID

Bid Due Date:

Project (Brief Description Including Location):

BOND

Bond Number:

Date (Not later than Bid due date):

Penal Sum:

(Words)

(Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Bid Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

BIDDER

SURETY

(Seal)

Bidder's Name and Corporate Seal

(Seal)

Surety's Name and Corporate Seal

By:

Signature and Title

By:

Signature and Title

(Attach Power of Attorney)

Attest:

Signature and Title

Attest:

Signature and Title

Note: Above addresses are to be used for giving required notice.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder any difference between the total amount of Bidder's Bid and the total amount of the Bid of the next lowest, responsible Bidder who submitted a responsive Bid as determined by Owner for the work required by the Contract Documents, provided that:
 - 1.1. If there is no such next Bidder, and Owner does not abandon the Project, then Bidder and Surety shall pay to Owner the penal sum set forth on the face of this Bond, and
 - 1.2. In no event shall Bidder's and Surety's obligation hereunder exceed the penal sum set forth on the face of this Bond.
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation shall be null and void if:
 - 3.1. Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
 - 3.2. All Bids are rejected by Owner, or
 - 3.3. Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default by Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

**CERTIFICATION REGARDING DEBARMENT, SUSPENSION,
INELIGIBILITY AND VOLUNTARY EXCLUSION LOWER TIER COVERED TRANSACTIONS**

10/16

This certification is required by the regulations implementing Executive Orders 12549 and 12689, Debarment and Suspension, and 2 CFR Part 200, Participants' responsibilities.)

(BEFORE COMPLETING CERTIFICATION, READ INSTRUCTIONS BELOW)

- (1) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principles are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction 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.

Grant Number: 4-CE-15-008

Name of Participant: _____

Address of Participant: _____

Name and Title of Authorized Representative	Signature	Date
<ol style="list-style-type: none"> 1. By signing and submitting this proposal, the prospective lower tier participant is providing the certification set out below. 2. 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. 3. 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 when submitted or has become erroneous by reason of changed circumstances. 4. The terms "covered transaction", "debarred", "suspended", "ineligible", "lower tier covered transaction", "participant", "person", "primary covered transaction", "principal", "proposal", and "voluntarily excluded", as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Orders 12549 and 12689. 5. 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. 6. The prospective lower 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", without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions. 7. 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 may decide the method and frequency by which it determines the eligibility of its principals. Each participant may check the System for Award Management (SAM). 8. 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 a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings. 9. Except for transactions authorized under paragraph 5 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. 		

Section 3 Information Sheet for Contractors/Businesses

What is Section 3?

Section 3 is a provision of the Housing and Urban Development (HUD) Act of 1968 that helps foster local economic development, neighborhood economic improvement, and individual self-sufficiency. The Section 3 program requires that recipients of certain financial assistance, to the greatest extent feasible, provide job training, employment, and contracting opportunities for low-income residents in connection with projects and activities in their neighborhoods.

Who are Section 3 residents?

Section 3 residents are:

- Public housing residents or
- Persons who live in the area where an assisted project is located and who have a household income that falls below income limits.

What is a Section 3 business concern?

A business that:

- Is 51 percent or more owned by Section 3 residents;
- Employs Section 3 residents for at least 30 percent of its full-time, permanent staff; or
- Provides evidence of a commitment to subcontract to Section 3 business concerns, 25 percent or more of the dollar amount of the awarded contract.

What types of economic opportunities should be made available under Section 3?

- Job training
- Employment
- Contracts

Examples of Opportunities include:

<ul style="list-style-type: none"> • Accounting • Architecture • Appliance repair • Bookkeeping • Bricklaying • Carpentry • Carpet Installation • Catering • Cement/Masonry • Computer/Information • Demolition • Drywall 	<ul style="list-style-type: none"> • Electrical • Elevator Construction • Engineering • Fencing • Florists • Heating • Iron Works • Janitorial • Landscaping • Machine Operation • Manufacturing 	<ul style="list-style-type: none"> • Marketing • Painting • Payroll Photography • Plastering • Plumbing • Printing Purchasing • Research • Surveying • Tile setting • Transportation • Word processing
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Who receives priority under Section 3?

For training and employment:

- Persons in public and assisted housing
- Persons in the area where the HUD financial assistance is spent
- Participants in HUD Youthbuild programs
- Homeless persons

For contracting:

- Businesses that meet the definition of a Section 3 business concern

How can businesses find Section 3 residents to work for them?

Businesses can recruit Section 3 residents in public housing developments and in the neighborhoods where the HUD assistance is being spent. Effective ways of informing residents about available training and job opportunities are:

- Contacting resident organizations, local community development and employment agencies
- Distributing flyers
- Posting signs
- Placing ads in local newspapers

Are recipients, contractors, and subcontractors required to provide long-term employment opportunities, not simply seasonal or temporary employment?

Recipients are required, to the greatest extent feasible, to provide all types of employment opportunities to low and very low-income persons, including permanent employment and long-term jobs.

Recipients and contractors are encouraged to have Section 3 residents make up at least 30 percent of their permanent, full-time staff.

A Section 3 resident who has been employed for 3 years may no longer be counted towards meeting the 30 percent requirement. This encourages recipients to continue hiring Section 3 residents when employment opportunities are available.

What if it appears an entity is not complying with Section 3?

There is a complaint process. Section 3 residents, businesses, or a representative for either may file a complaint if it seems a recipient is violating Section 3 requirements are being on a HUD-funded project.

Will HUD require compliance?

Yes. HUD monitors the performance of contractors, reviews annual reports from recipients, and investigates complaints. HUD also examines employment and contract records for evidence that recipients are training and employing Section 3 residents and awarding contracts to Section 3 businesses.

BIDDER'S SECTION 3 ESTIMATED NEW HIRES

NOTE: This form must be filled out by the contractor and is used to determine if any new hires will be needed as part of the project and if so, if any will be filled with Section 3 residents.

Job Category	Total Estimated Positions Needed (for this project)	No. Positions Occupied by Permanent Employees (for this project)	Number of Positions Not Occupied (for this project)	Number of Positions to be Filled with Section 3 Residents (for this project)
Officer/Supervisors				
Professionals				
Technical				
Hsq. Sales/Rental Mgmt.				
Office/Clerical				
Service Workers				
Others				
TRADE:				
Journeyman				
Apprentices				
Trainees				
Others				

Section 3 Resident Definition:

Individual residing in a public housing project or within the non-metropolitan county in which the project is located and whose income does not exceed 80% of the higher of the median income, adjusted by family size, for the county of residence or the non-metropolitan area of the state.

Company
Highway 278 Streetscape

Project Title
4-CE-15-008

CDBG Grant Number

Name of Person Completing Form

Date

BIDDER'S PROPOSED SECTION 3 CONTRACT/SUBCONTRACTS

[illegible]

Section 3 Business Concern

- 1. A business that is 51% or more owned by section 3 residents, or**
- 2. A business whose permanent full time work force is at least 30% section 3 residents or,**
- 3. A business which contracts a dollar amount of all subcontracts with businesses as defined in numbers 1 and 2 above.**

Company
Highway 278 Streetscape

Project Name
4-CE-15-008

Project Number

Person Completing Form

Date _____

Section 3 Business Self-Certification

BASIC INFORMATION

1. Company Name: _____
2. Company Address: _____
City _____ State _____ Zip _____ County _____
3. Telephone Number: _____ Fax Number: _____
Email address: _____
4. Contractor's License: Class ☐A ☐B ☐C ☐N/A License Number: _____
5. Business License _____ Number Federal ID Number _____
6. Type of Business: _____

TYPES OF SECTION 3 BUSINESS ENTERPRISES

Please check "Yes" or "No". If you answer "YES" to one or more of the following questions, you may designate your company as a Section 3 Business Enterprise.

1. 51% or more of your business is owned by a Section 3 residents*; or
☐ Yes ☐ No

Attach list of Section 3 owners and income certifications

2. At least 30% of your full time employees include persons that are currently Section 3 residents*, or within three years of the date of first employment with the business concern were Section 3 residents; or
☐ Yes ☐ No

Attach list of employees, Section 3 employees, and self certifications

3. You can provide evidence, as required, of a commitment to subcontract in excess of 25% of the dollar award of all subcontracts to be awarded to business concerns that meet the qualifications in the above two paragraphs.
☐ Yes ☐ No

Attach list of subcontracted businesses, types and amounts

VERIFICATION - The company hereby agrees to provide, upon request, documents verifying the information provided on this form.

I declare and affirm under penalty of law that the statements made herein are true and accurate to the best of my knowledge. I understand that falsifying information and incomplete statements will disqualify certification status.

Signature of Business Owner or Authorized Representative: _____

Signature: Date: _____

Attested by: Date: _____

***Section 3 resident is:** 1) a public housing resident; or 2) a low- or very low-income person residing in the metropolitan area or Non-metropolitan County in which the Section 3 covered assistance is expended.

SOUTH CAROLINA ILLEGAL IMMIGRATION REFORM ACT

CONTRACTOR CERTIFICATION

In accordance with the requirements of the South Carolina Illegal Immigration Reform Act, Contractor Name ("Contractor") hereby certifies that it is currently in compliance with the requirements of Title 8, Chapter 14 of the S.C. Code Annotated and will remain in compliance with such requirements throughout the term of its contract with Town of Varnville ("Owner").

Contractor hereby acknowledges that in order to comply with requirements of S.C. Code Annotated Section 8-14-20(B), it will:

1. Register and participate in the federal work authorization program (E-Verify) to verify the employment authorization of all new employees; and require agreement from its subcontractors, and through the subcontractors, the sub-subcontractors, to register and participate in the federal verification the employment authorization of all new employees.

Contractor agrees to provide to Owner any documentation required to establish the applicability of the South Carolina Illegal Immigration Reform Act to the Contractor, subcontractor, or sub-subcontractor. Contractor further agrees that it will provide Owner with any documentation required to establish that the Contractor and any subcontractors or sub-subcontractors are in compliance with the requirements of Title 8, Chapter 14 of the S.C. Code Annotated.

Date: _____

By: _____

Title: _____

TOWN OF VARNVILLE**HIGHWAY 278 STREETScape PROJECT****BID FORM AND SUMMARY OF QUANTITIES****BID OF:**

(Contractor)

BID TO:

Town of Varnville Procurement, Varnville South Carolina
Agency/Owner

PROJECT NAME:**HIGHWAY 278 STREETScape PROJECT****RFB NO:****4-CE-15-008****BID OPENING DATE & TIME:****THURSDAY, MAY 24, 2018 AT 2:00 PM**

I/We the undersigned have reviewed the work at the work-site for the construction of improvements shown on the contract documents for the project, and after having examined all the bidding documents and acknowledged all addendum as follows:

Addenda

I agree, if selected by The Town, to execute the entire work in the bidding documents for:

(See Following Page)

**Varnville Streetscape
Base Bid—RFB 4CE-15-008**

<u>Item No.</u>	<u>Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Total Price</u>
1031000	Mobilization	1	LS		
1031200	Bonds and Insurance	1	LS		
1050800	Construction Stakes, Lines & Grades	1	EA		
1071000	Traffic Control	1	LS		
2025000	Removal & Disposal of Existing Asphalt Pavement	74	SY		
2027000	Removal & Disposal of Existing Concrete	18	CY		
2031000	Unclassified Excavation (Gravel Area)	38	CY		
2033000	Contingent Borrow Excavation (Shoulder Dressing)	25	CY		
2081001	Fine Grading (Main St @ Palmetto Ave)	335	SY		
3069900	Maintenance Stone	20	TON		
3063310	Cement Modified Recycled Base (10" Uniform)	5,585	SY		
3064000	Portland Cement for Cement Modified Recycled Base	218	TON		
4011004	Liquid Asphalt Binder PG64-22	31	TON		
4030320	Hot Mix Asphalt Surface Course Type B	530	TON		
4030340	Hot Mix Asphalt Surface Course Type C	65	TON		
6021120	Permanent Construction Signs (Ground Mounted)	624	SF		
6241030	White Single Arrows (Lt, Strght, Rt) - Perm. Pvmt. Mark	4	EA		
6241035	White Word Message "Only" - Perm. Pvmt. Mark	4	EA		
6241040	White Combination Arrows (Str&Rt or Str&Lt) - Perm. Pvmt. Mark	0	EA		
6241050	Handicap Symbol - Perm. Pvmt. Mark	0	EA		
609115A	4" White Solid Lines (Temporary Paint)	1,229	LF		
609125A	8" White Solid Lines (Temporary Paint)	176	LF		
609135A	24" White Solid Lines (Temporary Paint)	66	LF		
609115B	4" Yellow Solid Lines (Temporary Paint)	3,670	LF		
6250106	4" Blue Solid Lines (Handicap Parking) - Fast Dry Paint	0	LF		
6271005	4" White Broken Lines (Gap Excl.) - Thermo-90Mil	150	LF		
6271010	4" White Solid Lines (Pvt Edge Lines) - Thermo-90Mil	1,229	LF		
6271015	8" White Solid Lines (Crosswalk) - Thermo-125Mil	176	LF		
6271025	24" White Solid Lines (Stop/Diag Lines) - Thermo-125Mil	66	LF		
6271074	4" Yellow Solid Lines (Pvt Edge Lines) - Thermo-90Mil	3,670	LF		
6510105	Flat Sheet Sign, Type III, Fixed Sz. & Msg. Sign	10	SF		
6888177	Design, Furnish, Install Steel Pole with Twin Mast Arms	2	EA		
6750278	Furnish & Install 2.0" Schedule 80 PVC Conduit	1,143	LF		
6770388	Furnish and Install No. 14 Copper Wire, 4-Conductor-Black	350	LF		
6770389	Furnish and Install No. 14 Copper Wire, 4-Conductor-Gray	400	LF		
6770393	Furnish and Install No. 14 Copper Wire, 8-Conductor-Black	700	LF		
6770394	Furnish and Install No. 14 Copper Wire, 8-Conductor-Gray	1,665	LF		
6770413	Furnish and Install No. 14 Copper Wire, 1-Conductor For Loop Wire	824	LF		
6780495	Sawcut for Loop Detector	315	LF		
6800508	Furnish & Install 12"x12"x12" D.Elect.Flush.Undgrd.Encl.	3	EA		
6800518	Furnish & Install 13"x24"x18" D.Elect.Flush.Undgrd.Encl.	2	EA		
6825482	Furnish & Install 8' Break-Away Aluminum Ped Pole and Base	3	EA		

<u>Item No.</u>	<u>Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Total Price</u>
6865723	Furnish & Install 12" - 3 Section Signal Head	8	EA		
6865783	Furnish & Install Countdown Pedestrian Signal Head	3	EA		
6865793	Furnish & Install Ped Push Button Microswitch Ass'y (9x12) and Sign	3	EA		
6865821	Furnish & Install No Right/Left Turn Symboli LED Module	1	EA		
6865834	Furnish & Install Backplate w/Retroreflective Borders	8	EA		
6885990	Removal, Salvage, Disp of Existing Traf Signal Equipment	1	LS		
6888225	Furnish and Install Controller and 332 Cabinet-Base Mounted-Inc. Found	1	EA		
7203110	Concrete Curb and Gutter (1'-6") Vertical Face	103	LF		
7203130	Concrete Curb and Gutter (1'-6") Ogee	225	LF		
7203210	Concrete Curb and Gutter (2'-0") Vertical Face	225	LF		
7204100	Concrete Sidewalk 4" Uniform	91	SY		
7204900	Detectable Warning Material	30	SF		
7205000	Concrete Driveway (6" Uniform)	15	SY		
7209000	Pedestrian Ramp Construction	24	SY		
7209100	Surface Applied Detectable Warning	0	SF		
8152004	Inlet Structure Filter - Type F (Weighted)	45	LF		
				TOTAL:	

BASE BID PRICE: \$ _____
(numerals)

(words)

Name of Authorized Contractor Representative (Please Print)

Add Alternate #1 - Palmetto Avenue and Landscaping

<u>Item No.</u>	<u>Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Total Price</u>
2022000	Removal & Disposal Existing Light Pole	5	EA		
2025000	Removal & Disposal of Existing Asphalt Pavement	39	SY		
2031000	Unclassified Excavation (Gravel Area)	38	CY		
3063310	Cement Modified Recycled Base (10" Uniform)	585	SY		
3064000	Portland Cement for Cement Modified Recycled Base	22	TON		
4011004	Liquid Asphalt Binder PG64-22	4	TON		
4030340	Hot Mix Asphalt Surface Course Type C	25	TON		
6241030	White Single Arrows (Lt, Strght, Rt) - Perm. Pvmt. Mark	1	EA		
6241040	White Combination Arrows (Str&Rt or Str&Lt) - Perm. Pvmt. Mark	1	EA		
6241050	Handicap Symbol - Perm. Pvmt. Mark	1	EA		
609125A	8" White Solid Lines (Temporary Paint)	110	LF		
609135A	24" White Solid Lines (Temporary Paint)	29	LF		
609115B	4" Yellow Solid Lines (Temporary Paint)	290	LF		
6250106	4" Blue Solid Lines (Handicap Parking) - Fast Dry Paint	150	LF		
6271010	4" White Solid Lines (Pvt Edge Lines) - Thermo-90Mil	625	LF		
6271015	8" White Solid Lines (Crosswalk) - Thermo-125Mil	110	LF		
6271025	24" White Solid Lines (Stop/Diag Lines) - Thermo-125Mil	29	LF		
6271074	4" Yellow Solid Lines (Pvt Edge Lines) - Thermo-90Mil	290	LF		
6750213	2.0" Schedule 40 PVC Conduit (SCEG Lighting)	727	LF		
7203110	Concrete Curb and Gutter (1'-6") Vertical Face	122	LF		
7204100	Concrete Sidewalk 4" Uniform	19	SY		
7204900	Detectable Warning Material	40	SF		
7205000	Concrete Driveway (6" Uniform)	10	SY		
7209000	Pedestrian Ramp Construction	9	SY		
7209100	Surface Applied Detectable Warning	24	SF		
8110001	American Boxwood	21	EA		
8111180	Sabal Palmetto	27	EA		
8110220	Double-Shredded Hardwood Mulch	500	SF		
				TOTAL:	

ADD ALTERNATE #1 PRICE: \$ _____
(numerals)

(words)

Name of Authorized Contractor Representative (Please Print)

ADD ALTERNATE #2

Provide adder if contract completion duration is decreased by thirty (30) days to 110 days.

ADD ALTERNATE #2 PRICE: \$ _____
(numerals)

(words)

Name of Authorized Contractor Representative (Please Print)

RFB NO: 4-CE-15-008

TOWN OF VARNVILLE**HIGHWAY 278 STREETScape PROJECT****BID FORM**

The costs as indicated herein, are inclusive of all costs, including labor, supervision, materials, supplies, transportation, taxes or any other costs, incidental or otherwise, for the specified improvements. Additionally, I / We the undersigned understand that due to budget constraints, The Town reserves the right to adjust or amend the work requirements and/or negotiate with the lowest, most responsive, qualified, and responsible bidder in an effort to reach a cost that is fair, reasonable and acceptable to both parties.

DISCREPANCIES, CONTRACTOR PROJECT ELEMENTS

I/We the undersigned, acknowledge and understand that all Contractor "As Bid" unit measures for the various Project Elements will be reviewed by The Town and, where any discrepancies are noted The Town reserves the right to advise the bidder and make the necessary corrections and thereby adjust the Contractor's sum total bid amount accordingly. All adjustments, if any, will be predicated on work measurement as represented on the plans. I/We shall have the option to decline any reasonable unit measure adjustment that will reflect an increase in my/our base bid. Therefore, it is understood that unless declined, any adjustments reflecting an increase in the element costs will, when adjusted, reflect an overall increase in the base bid and will be considered in determining the most responsive bid.

Printed Name of Person Binding Bid _____

Signature (X): _____

Date: _____

RFB NO: 4-CE-15-008

TOWN OF VARNVILLE**HIGHWAY 278 STREETScape PROJECT****BID FORM****LISTING OF SUBCONTRACTORS**

Any bidder in response to this Request for Bids shall set forth in his bid the name and location of the place of business for each of the following subcontractors (if so specified) who may perform work or render services to the prime Contractor to or about the construction, or who will specifically fabricate or install a portion of the work. If the prime Contractor determines to use his own employees to perform any portion of the work for which he would otherwise be required to list a subcontractor, and if the prime Contractor is qualified to perform such work under the terms of the Request for Bids, the prime Contractor shall indicate this in his bid and not subcontract any of that work except with the approval of owner for good cause shown.

<u>Description of Work</u>	<u>Subcontractor's Name</u>	<u>Location</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____

Failure to list specified subcontractors shall render the prime Contractor's bid non-responsive. No prime Contractor whose bid is accepted shall substitute any person as a subcontractor in place of the subcontractor listed in the original bid, except as specified within the contract documents.

SUPERINTENDENT, PRIME CONTRACTOR

If, as a result of this Bid a Contract is awarded, the Prime Contractor's job superintendent shall be

Name _____

RFB NO: 4-CE-15-008

TOWN OF VARNVILLE

HIGHWAY 278 STREETScape PROJECT

BID FORM

ANTI-TRUST/NON-COLLUSION STATEMENT

I, the undersigned, certify that this Bid does not violate Federal or State Antitrust Laws and I have received and read the Request for Bids and understand that this Bid is subject to all conditions thereof. A signature below indicates that the Offeror herein, his agents, servants and/or employees, have not in any way colluded with anyone for and on behalf of the Offeror or themselves, to obtain information that would give the Offeror an unfair advantage over others, nor have they colluded with anyone for and on behalf of the Offeror, or themselves, to gain any favoritism in the award of the Contract herein.

BID HOLDING TIME AND ACCEPTANCE

The undersigned agrees that this bid shall not be revoked or withdrawn after the time set for the opening for bids, but shall remain open for acceptance for a period of not less than ninety (90) days following the bid date.

RESPONSIBILITY

The undersigned understands that before awarding a contract, the Bids and Purchases Committee may require additional information in order to ascertain the Bidder's capacity to meet the terms of the Contract. Failure to provide disclosure of this information to The Town within five (5) days after having been duly notified and requested may be just cause for rejection of bid and Bidder shall be considered noncompliant.

CERTIFICATION REGARDING DRUG-FREE WORKPLACE

The undersigned certifies that the Contractor listed below will provide a "drug-free workplace" as that term is defined in Section 44-107-30 of the Code of Laws of South Carolina, 1976, as amended, by complying with the requirements set forth in Title 44, Chapter 107.

FEDERAL IDENTIFICATION NUMBER: _____

CONTRACTOR'S CLASSIFICATIONS AND SUBCLASSIFICATIONS WITH LIMITATIONS

_____	_____	_____
(Classification)	(Sub-Classification)	(Limitations)

(S.C. Contractor's License Number)

RFB NO: 4-CE-15-008

TOWN OF VARNVILLE**HIGHWAY 278 STREETScape PROJECT****BID FORM****AUTHORIZATION:**

(Print Name of Contractor/Company)

(Address)

(Printed Signature)

(Title)

(Mailing Address)

(City)

(State)

(Zip)

(Area Code & Telephone Number)

(Area Code & Fax Number)

SECTION G: PROJECT INFORMATION

LOCATION MAPS / INFORMATION



TRANSPORTATION ENHANCEMENT IMPROVEMENTS
AT EAST CAROLINA HIGHWAY AND
MAIN STREET IN THE TOWN OF VARNVILLE,
HAMPTON COUNTY, SOUTH CAROLINA

DENNIS
CORPORATION
1800 HUGER STREET | COLUMBIA | SOUTH CAROLINA | 29201
(803) 252-0891 | WWW.DENNISCORPORATION.COM

PROJECT NUMBER: V000-01
AUGUST 14, 2017