

South Carolina Department of Transportation
Engineering Directive Memorandum

Number: 2

Primary Department: Traffic Engineering

Referrals: S.C. Code of Laws 57-1-370

Subject: Fiscal and Maintenance Responsibilities for Traffic Signal Installations on the State Highway System

This directive details the South Carolina Department of Transportation's policy concerning traffic signals on roads on the state highway system. For the purpose of this directive, traffic signals include stop-and-go signals, flashing beacons, and railroad signals.

Traffic Signals – General

Traffic signal studies, design, installation, operation, and maintenance shall conform to the Manual on Uniform Traffic Control Devices (MUTCD) and SCDOT Traffic Signal Design Guidelines. Unless otherwise stated, the Department is responsible for the approval, design, equipment, installation, operation, maintenance, and electric current for stop-and-go signals and flashing beacons. Railroad signals are operated and maintained by the respective railroad companies. Railroad signal installations are federally funded, with installations prioritized utilizing a safety ranking system.

Traffic Signal Studies

Stop-and-Go Signal/Flashing Beacon Studies – Approval authority for stop-and-go signals will be in accordance with S.C. Code of Law Section 57-1-370(N). The district engineering administrator will have the necessary studies conducted to determine whether a stop-and-go signal or a flashing beacon is justified and will make a recommendation concerning the request. The district will also review studies performed by other parties, such as consultants or local governments. The district engineering administrator will make recommendations for stop-and-go signal installations based upon the MUTCD and engineering judgment.

Railroad Signal Studies – The director of traffic engineering will make recommendations for installation or upgrade of railroad signals based upon a statewide ranking system. Railroad companies will design, install, and maintain railroad signals. The Department will reimburse railroad companies for design, fabrication, and installation costs.

Traffic Signal Inventories

Stop-and-Go Signal/Flashing Beacon Inventory – The director of traffic engineering is responsible for providing a traffic signal management tool to inventory and house pertinent signal information. The Traffic Engineering Asset Management Software (TEAMS) program is available for use by both SCDOT signal maintainers and local government signal maintainers as a web-based program. The districts are responsible for maintaining electronic inventories of SCDOT-maintained signal locations and equipment. Local governments participating in the signal maintenance agreement program are responsible for maintaining the same data for signals they maintain for SCDOT.

Railroad Signal Inventory – The director of traffic engineering will maintain a statewide inventory of railroad signals.

Design

Stop-and-Go Signal Design – Signal design should be in accordance with SCDOT Traffic Signal Design Guidelines. Design includes the collection of geometric and traffic data, preparation of timing plans, and preparation of signal plans. Signal plans shall be signed and sealed by a South Carolina professional engineer (P.E.). Original plans are to be maintained in the district offices. CADD files and electronic images of signal plans shall be housed on a central server location, for access by the TEAMS program.

Flashing Beacon Design – Plans for flashing beacons are more schematic in nature and do not require a P.E. seal. A record of the location and type of flashing beacon should be maintained within the TEAMS program.

Railroad Signal Design – The railroad companies will perform the design for installation, coordinating with the Department (director of traffic engineering) concerning the type (mast mounted, cantilever, gates, etc.) of railroad signal and placement.

Installations/Revisions

Stop-and-Go Signals – Installation involves the erection of signal equipment, including poles, detector loops, cables, brackets, electrical work, labor, equipment rental, and all other necessary incidental materials. The district engineering administrator will authorize modifications (revisions) such as revising or adding phases. Revisions to signal timing will be authorized by the district traffic engineer. New signals or revisions to existing signals within areas where the Department has a signal maintenance agreement with the local government must also be authorized by the district engineering administrator. The installation procedure for installing new stop-and-go signals should be followed as detailed in SCDOT Traffic Signal Design Guidelines.

Flashing Beacons – Installations/revisions of flashing beacons will be at the discretion of the district traffic engineer. New flashing beacons within areas where the Department has signal

maintenance agreements with local governments must also be authorized by the district traffic engineer.

Railroad Signals – An agreement that addresses the work to be performed at the railroad crossing will be executed between the railroad company, the Department, and any other pertinent parties. The agreement will detail the type of work to be performed, who will perform the work, and the financial responsibilities of all parties. The design plans will be included as attachments to the agreement.

Maintenance

Stop-and-Go Signals – Maintenance includes repair or replacement of equipment as defined above, including loop or signal head installation and the labor costs associated with this work. The Department is responsible for maintenance costs for all stop-and-go signals on the state's highway system unless noted otherwise in an agreement (encroachment permit) with a local government or other entity. The Department pays qualified local governmental agencies for normal signal maintenance including emergency repairs through the signal maintenance agreement program, described later in this document. The local government shall notify the Department when major equipment replacement, such as the controller or cabinet, signal heads, traffic signal signs, or poles, becomes necessary. Upon verification and approval by the Department that replacement is necessary, the Department will provide the necessary equipment to the local government.

Flashing Beacons – Maintenance of flashing beacons includes repair or replacement of equipment as defined above and the labor to accomplish this. The cost to maintain flashing beacons on the state's highway system is the responsibility of the Department. The Department reimburses some qualified local governmental agencies for this service through the signal maintenance agreement program, described later in this document.

Railroad Signals – Railroad companies are responsible for maintenance of railroad signals.

Electric Current Costs

Stop-and-Go Signals – The Department generally pays electric current costs for stop-and-go signals maintained by SCDOT forces and generally reimburses local governments participating in the signal maintenance agreement program for electric current costs. Some entities pay electrical costs based upon agreements (encroachment permits) with the Department, such as for signals at fire stations, schools, or private driveways. These exceptions are detailed later in this document.

Flashing Beacons – The Department generally pays electric current costs for flashing beacons maintained by the SCDOT forces. The Department generally reimburses local governments participating in the signal maintenance agreement program for electric costs as well. Some entities pay electrical costs based upon agreements (encroachment permits) with the Department,

such as for flashers at fire stations, schools, or private driveways. These exceptions are detailed later in this document.

Railroad Signals – Railroad companies pay electrical costs for their railroad signals.

Equipment

Stop-and-Go Signals – Equipment includes the controller and a complete operating cabinet, detector units, signal heads, including pedestrian heads and push buttons if utilized, and steel, concrete, or wood poles. The Department has equipment specifications for each of these items, which are available on our website.

Flashing Beacons – Equipment includes the flasher module, the flasher cabinet and signal heads, and the mounting assembly, possibly including steel, concrete, or wood poles. Flashing beacon equipment may be solar powered.

Equipment That Is Not SCDOT Standard Equipment

Mast Arms or Decorative Poles – Decorative poles or mast arms are not considered to be standard equipment and are to be paid for by the requesting entity. Engineering Directive Memorandum Number 33, “SCDOT Mast Arm Standards,” defines the Department’s policy concerning mast arms.

Vehicle Preemption Systems – Vehicle preemption systems are not considered to be standard equipment but can be installed upon approval of an encroachment permit submitted by the appropriate local government. All costs associated with the installation of these systems are the responsibility of the local government, and the Department will inspect the installation or perform the installation. The Department will not maintain these systems. The Department will coordinate with local governments concerning needed equipment replacement.

Traffic Adaptive Signal Equipment – Traffic adaptive systems are experimental systems that operate in conjunction with SCDOT-approved traffic controller equipment. The separate processing units are the sole responsibility of the entity that maintains the signal system or the entity that secured funds for the adaptive signal processing units. All repairs or replacements, such as for lightning or other non-warranted issues, will be the responsibility of the securing entity.

Other – Signal equipment that is not SCDOT standard, including but not limited to aluminum signal heads, signal heads with non-highway yellow housings, and signal controllers not on the Department’s state contract, will not be provided by the Department. However, if desired by the local government and approved by the district engineering administrator, reimbursement for such can be obtained up to the state contract cost of the appropriate standard equipment. The district engineering administrator reserves the right to provide standard equipment to the local government in lieu of reimbursement for non-SCDOT standard equipment. The Department is not obligated to reimburse the local government for purchases of non-SCDOT standard

equipment if prior approval has not been obtained. If non-SCDOT standard equipment has been installed without approval, the Department reserves the right to instruct that the equipment be removed and/or replaced at the expense of the local government. The Department also reserves the right to replace signal cabinets, controllers, and/or software at SCDOT traffic signals if deemed in the public's best interest by the Department.

Qualified Products List (QPL)

SCDOT has established a QPL process and listing for signal equipment. Information on products listed on the QPL and how to obtain a review of signal equipment is available on SCDOT's website.

Stop-and-Go Signals at Private Developments

New Signals at Private Drives – An approved stop-and-go signal that only serves a private business will be the fiscal responsibility of the business. All costs involving design, equipment, installation, and electric current will be the responsibility of the developer. The signal installation will be performed by the developer under an approved encroachment permit. The Department may furnish the controller, software, and cabinet to the developer to ensure compatibility with Department equipment, however, the developer will reimburse the Department for all equipment costs, equipment integration, and programming costs. If the new signal is in close proximity to an existing signal or a railroad crossing with active warning devices, the Department will require the developer to provide, at their cost, interconnection between the signals and/or railroad warning devices.

New Signals at Private Drives and Public Side Roads – If a new signal will also serve traffic entering from a public side road, and the traffic volume generated by the development is the warranting factor for justifying the signal, the developer will be responsible for all costs as above. If volumes are equal or near equal, the developer will pay one half of the cost of the signal and the Department will install the signal and pay electric current.

Private Drives Tying into Existing Signals – If a development intersects opposite an existing signalized "T" intersection, the developer will pay actual costs to modify the existing signal to accommodate the developer's access.

In all above cases, the Department will assume maintenance of the signals after the final inspection, or add the signal to an existing signal maintenance agreement.

Stop-and-Go Signal Systems

The cost of signal system design, equipment, and installation will generally be funded with federal funds, with any required match to be funded by the state and/or local government. Should the local government elect to install all or part of the system, such participation will be considered as a portion of the local government's contribution at a rate to be negotiated between the local government and the department. If the signal system is inside or adjacent to the local

government and the local government has a maintenance agreement with the Department, maintenance of the signals within the system may be made a part of the agreement upon mutual agreement between the Department and the local government.

Stop-and-Go Signals and Flashing Beacons in Construction Contracts

When traffic signal installations or modifications are required in state road construction projects, the work will generally be included in the contract. If the work is not in the contract, the work will be constructed in accordance with procedures for a new installation and charged to the project. When contracts are not initiated by the Department (county sales tax projects, etc.) signal revisions should be included as part of the contracts.

School Speed Limit Sign Flashing Beacons

SCDOT Maintenance - Equipment for school speed limit sign beacons, including signs, will be provided by the Department. Installation and maintenance for equipment on SCDOT right-of-way will be by the Department unless within a local government participating in the signal maintenance agreement program. If flashers are powered from the school facility, the school will pay electric charges. However, if flashers are powered at the flasher locations, the Department will pay electric charges.

Signal Maintenance Agreement Participants – Local governments that participate in the signal maintenance agreement program must obtain approval from the district traffic engineer prior to installing school flashing beacons. If approved by the district traffic engineer, the Department will reimburse the local government for installation of equipment on SCDOT right-of-way. Maintenance and electric current costs will be paid by the Department in accordance with the signal maintenance agreement if the flashers are powered at the flasher locations.

Traffic Signals at Moveable Bridges

All costs relating to traffic signals at moveable bridges on SCDOT-maintained roadways are the responsibility of the Department.

Emergency Stop-and-Go Signals and Flashing Beacons at Fire Stations

All costs relating to emergency stop-and-go signals and flashing beacons for fire stations will be the responsibility of the fire department or governmental agency that funds the fire department. The Department will maintain these signals unless they are within a local government that participates in the signal maintenance agreement program.

If preemption is needed for a signal at an intersection in close proximity to the fire station, the fire station or jurisdictional body is responsible for costs to install the interconnect from the fire station to the traffic signal and costs to install and maintain the switching mechanism in the fire station.

Stop-and-Go Signals with Railroad Preemption

When interconnection between active railroad warning devices and a stop-go traffic signal is required, a signal plan shall be submitted by the district traffic engineer or other qualified engineer to the director of traffic engineering for review and approval. The director of traffic engineering will review and approve the signal plan and coordinate with the railroad company to implement the needed changes. A preemption agreement may be developed to detail the needed work and the responsibilities of the parties involved, and provide a cost estimate for the work.

If another funding source is available, such as federal funding allocated for railroad upgrades or roadway construction, or if the signal is being installed under encroachment permit such as for private development, these resources should be used to pay the railroad company for the work necessary to obtain interconnection. If no other funding source is available, district signal funding must be used to pay for upgrades.

Signal Maintenance Agreements

The Department has a signal maintenance agreement program in which qualified local governments maintain traffic signals within and sometimes adjacent to their jurisdictions. Agreements are developed in which the local governments certify they are able to perform the necessary work to maintain traffic signals to Department standards. A set payment rate is established for routine and emergency maintenance per signal per year, based on the device type. See Appendix A for a listing of device types.

Spare equipment and equipment upgrades and replacements should be requested by the local government. The Department will furnish equipment as defined herein to the local government as budgets permit. If the local government wishes to procure equipment other than what is offered on the Department's state contract, and the district engineering administrator approves the request, reimbursement can be obtained up to the standard equipment rate. The district engineering administrator reserves the right to provide standard equipment to the local government in lieu of reimbursement for non-standard equipment. The Department is not obligated to reimburse the local government for purchases of non-standard equipment if prior approval has not been obtained. If the non-standard equipment violates any SCDOT policy, the Department reserves the right to instruct that the equipment be removed and/or replaced at the expense of the local government. The Department also reserves the right to replace signal cabinets, controllers, and/or software at SCDOT traffic signals if deemed in the best public interest by the Department.

Approved By: John V. Walsh
John V. Walsh, Deputy Secretary for Engineering

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Appendix A

Signal Classifications

Device Types for Signal

Device	Category	Detection	Mode - Device Description
A	Flasher	n/a	Intersection or Sign Beacon
B	Flasher	n/a	School Flashers
C1	Stop & Go Signal	Pre-Timed	Isolated Traffic Signal
C2	Stop & Go Signal	Pre-Timed	Time Based Coordinate System
D	Stop & Go Signal	Pre-Timed	Signal System (w/out remote communication)
E	Stop & Go Signal	Pre-Timed	Signal System (with remote communication)
F1	Stop & Go Signal	Actuated	Isolated Traffic Signal
F2	Stop & Go Signal	Actuated	Time Based Coordinate System
G	Stop & Go Signal	Actuated	Signal System (w/out remote communication)
H	Stop & Go Signal	Actuated	Signal System (with remote communication)

Categories for Signals, Flashers and Railroad Signals

Stop-and-Go Signals

- Stop-and-Go Signal w/Overhead Prepare to Stop When Flashing
- Stop-and-Go Signal w/ Overhead Signal Ahead (w/flasher)
- Stop-and- Go Pedestrian Signal
- Stop-and-Go Emergency Signal
- Stop-and-Go Signal w/ RR Preemption
- Stop-and-Go Signal w/ Shoulder Signal Ahead (w/flasher)
- Stop-and-Go Signal w/Fire Preemption
- Stop-and-Go Signal w/ Fire and RR Preemption
- Stop-and-Go Signal at Movable Bridges

Flashing Beacons, Overhead and Shoulder-Mounted, and Combinations

- Flashing Beacon - Overhead - Intersection Beacon
- Flashing Beacon - Overhead - School Zone Sign
- Flashing Beacon - Overhead - Other
- Flashing Beacon - Overhead - Stop Panel
- Flashing Beacon - Overhead - Speed Limit Sign
- Flashing Beacon - Shoulder - Stop Sign
- Flashing Beacon - Shoulder - Stop Ahead Sign
- Flashing Beacon - Shoulder - Yield Sign
- Flashing Beacon - Shoulder - Yield Ahead Sign
- Flashing Beacon - Shoulder - Speed Limit Sign
- Flashing Beacon - Shoulder - School Zone sign
- Flashing Beacon - Shoulder - Curve Warning Sign
- Flashing Beacon - Shoulder - Side Road Warning Sign
- Flashing Beacon - Shoulder - Pedestrian Warning Sign
- Flashing Beacon - Shoulder - Other
- Flashing Beacon - Shoulder - Signal Ahead Sign
- Flashing Beacon - Shoulder - RR-Be Prepared to Stop When Flashing
- Flashing Beacon -Combination-Shoulder and Overhead - School Zone Sign

Railroad Signals

- Standard Flasher
- Cantilever Flasher
- Standard Flasher w/ Gates
- Cantilever Flasher w/ Gates