

SECTION 13

SIGNING, MARKING, LIGHTING, AND SIGNALS

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SECTION 13

SIGNING, MARKING, LIGHTING, AND SIGNALS

13.1 General

Traffic control devices are necessary to help ensure highway safety by providing the orderly and predictable movement of all traffic, motorized and non-motorized, throughout the highway transportation system, and to provide such guidance and warnings as are needed to ensure the safe and informed operation of individual elements of the traffic stream. The design and layout of signs, signals, pavement marking and lighting should complement the basic highway design.

13.2 Signing and/or Pavement Marking

The Engineer of Record (EOR) is responsible for signing and/or pavement marking on County projects and should be aware that the design must comply with the latest edition of the following standards:

Manual on Uniform Traffic Control Devices (MUTCD) - The ***MUTCD*** was adopted by the County as the uniform system of traffic control for use on the County road system. This action was in compliance with ***Chapter 316.0745*** of the ***Florida Statutes***. The ***MUTCD*** is therefore the basic guide for signing and marking. The requirements of the ***MUTCD*** must be met, as a minimum, on all roads in the County.

Standard Highway Signs, FHWA - This manual contains detailed drawings of all standard highway signs. Each sign is identified by a unique designation. Signs not included in this manual or in the ***FDOT Roadway and Traffic Design Standards*** must be detailed in the plans.

Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, AASHTO and ***Structures Design Guidelines, FDOT*** - These documents provide structural design criteria.

FDOT Roadway and Traffic Design Standards - These standards are composed of a number of standard drawings or indexes which address specific situations which occur on a large majority of construction projects.

Manual on Uniform Traffic Studies (MUTS) - This is a FDOT publication containing documentation for several types of traffic studies. This manual provides a systematic data collection procedure for the studies described.

Sarasota County Technical Provisions TP-700, TP-705, TP-706, TP-710, and TP-711 included in Section 31 of this manual.

13.2.1 Design Criteria

The **MUTCD** and the **FDOT Roadway and Traffic Design Standards** should be consulted for sign location. All signs not bridge or barrier wall mounted and installed within the clear recovery zone, must be frangible or protected by an approved barrier. **Roadside Safety, Section 8** of this manual, contains detailed instructions on safety design.

Post sizes for single column signs are covered in the **FDOT Roadway and Traffic Design Standards**. The supports for multi-post signs are not in that reference and must be included in the plans. The designer must provide post sizes and length for each multi-post sign. The FDOT Structures Design Office has written a program for personal computers that calculates post sizes and length for multi-post signs. This program may be used for these calculations.

The design for all overhead sign structures and foundations shall be included in the plans. Refer to **Section 13.5, Foundation Design**, and **Section 20, Miscellaneous Structures** for more information.

When specified, signs will be illuminated with 175 watt mercury vapor Deluxe White Lamps. The following table gives the number of luminaires for various sign widths. See **FDOT Roadway and Traffic Design Standard Index 17505** for spacing details and mounting location.

Table 13.2.1.1

Sign Width (ft)	To 10	To 21	To 32	To 43
Luminaires	1	2	3	4

13.2.2 Wind Loading Criteria - Signs

The wind loadings for ground signs shall be based on 80 mph winds. These are based on the **AASHTO Standard Specification For Structural Supports For Highway Signs, Luminaires and Traffic Signals**.

The wind loadings for overhead signs is provided in **Section 20, Miscellaneous Structures**.

13.2.3 No Passing Zones

The procedures required by the County for determining the limits of no-passing zones are contained in the **Manual on Uniform Traffic Studies, (MUTS)**. The requirements of this manual must be followed.

Limits of pavement markings for no-passing zones shall be established by one of the following methods:

1. On projects where existing roadway conditions (vertical and horizontal alignments) are to remain unaltered by construction, the no-passing zones study shall be accomplished as part of the design phase. This will be either by in-house staff or included in design consultant contracts.

The limits of the no-passing zones shall be included in the contract documents, and a note to this effect shown on the plans.

2. On projects with new or altered vertical and horizontal alignments, limits for no-passing zones shall be established during construction. The required traffic study and field determination of limits shall be performed through the design consultant as a post design service.

When this service is included as part of post design services, sufficient time shall be included to accomplish the required field operations without delaying or interfering with the construction process.

13.2.4 Use of Local Street Names on Guide Signs

The normal practice is to use route numbers on guide signs to designate roadways. In some areas, the local names for certain roadways are more familiar than the route number. For this situation, the local street name may be used. However, some roadways are known by more than one name as well as the route number. In many instances, the existing sign panel is not large enough to accommodate the street name and would require a new panel. For these reasons, the decision to use local names on guide signs must be evaluated on a case by case basis.

13.2.5 Signing and Marking Project Coordination

Development of signing and pavement marking plans may include the following coordination:

Roadway Design - The designer of a signing and marking project receives the base sheets for design from the roadway designer, who can also provide any required cross sections.

Utilities - The Utilities owners can identify potential conflicts with overhead and underground utilities or verify those which have previously been identified.

Structures Design - The Engineer of Record for Structures Design provides the design of the sign structures for overhead cantilever and overhead truss sign assemblies. This includes the design of the foundation for these structures. The Engineer of Record must be contacted early in the design phase to allow adequate time for coordination with the Geotechnical Engineer in obtaining the necessary soils information.

13.2.6 Foundation Criteria

Refer to **Section 13.5, Foundation Design**, for geotechnical requirements.

13.3 Lighting

The EOR is responsible for highway lighting on County projects and should be aware that the design must comply with the latest edition of the following standards:

An Information Guide for Roadway Lighting, AASHTO - This is the basic guide for highway lighting. It includes information on warranting conditions and design criteria.

Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, AASHTO -- This specification contains the strength requirements of the poles and bracket arms for the various wind loadings in Florida as well as the frangibility requirements. All luminaire supports, poles and bracket arms must be in compliance with these specifications.

FDOT Roadway and Traffic Design Standards -- These indexes are composed of a number of standard drawings or indexes which address specific situations which occur on a large majority of construction projects.

Sarasota County Technical Provision TP-715 included in Section 31 of this manual.

13.3.1 Design Criteria

The AASHTO ***Guide for Roadway Lighting*** permits either the illuminance technique or the luminance technique to be used in the design of highway lighting. The luminance technique requires a more complex design process and a knowledge of the reflective characteristics of the pavement surface used. These reflective characteristics change as the pavement ages and with variations in weather conditions. The County has elected to use the illuminance technique for lighting design. The design values for light levels given by the AASHTO ***Guide for Roadway Lighting*** are maintained values. The light levels given in this criteria have been adjusted and are listed as average initial lux. This, in effect, sets the maintenance factor to be used in the calculation process to a value of 1.

Mounting height (M.H.) for conventional lighting is the vertical distance from the roadway to the light source, regardless of lateral placement of the pole. Pole setback is the horizontal distance from the edge of the travel lane to the pole.

Refer to ***Section 20, Miscellaneous Structures***, for more information.

13.3.2 Pole Design Criteria

Section 7, Roadway Design Criteria, specifies the minimum horizontal clearances for light poles. High mast lighting poles should not be located in gore areas within the runout length as defined in the ***AASHTO Roadside Design Guide***. Engineering judgment should be used when locating high mast poles adjacent to bridges and high fills. All conventional height poles shall be frangible unless bridge or barrier wall mounted.

Frangible pole installations shall not be used in areas of heavy pedestrian traffic where the hazard of a falling pole is a greater hazard to others than it is to the motorist. See ***FDOT Roadway and Traffic Design Standards*** for frangibility requirements.

The installation of lighting in certain locations (e.g. adjacent to residential areas) may require the luminaires to be shielded. This is especially true for high mast poles.

Poles on bridges over open bodies of water or on causeway sections should be considered for dampers. These poles are subject to sustained winds of a critical velocity which may induce vibrations in the pole.

13.3.3 Foundations Criteria

Refer to **Section 13.5, Foundation Design**, for geotechnical requirements and **Section 20, Miscellaneous Structures**, for additional design information.

13.3.4 Wind Loading Criteria - Lighting

See **Section 20, Miscellaneous Structures**.

13.3.5 Lighting Project Coordination

Development of roadway lighting plans may include the following coordination:

Roadway Design - Normally the designer of a lighting project receives the base sheets for lighting design from the roadway designer. The roadway designer can also provide any required cross sections. If the lighting project is not an active roadway design project, base sheets may be obtained from existing plans.

Utilities - The designer provides the coordination with the various utilities involved in the project. This includes advising the power company of the need for electrical service. The designer also needs to identify potential conflicts with overhead and underground utilities or verify those which have previously been identified. The designer should indicate a preferred location for the electrical service.

Drainage - When the locations of high mast poles are established, they should be checked with the Drainage Section to determine if high water level is a problem. High mast poles are often located in the center of interchange loops. These same areas may be used as drainage retention areas. Coordination with the Drainage Section will alleviate this type problem.

Structures Design - Conventional height poles require the standard base shown in the Roadway and Traffic Design Standards and Standard Specifications. A foundation design is only required in special cases. High mast poles, on the other hand, require foundation designs for each location. Soil bores are required for this design. The Engineer of Record for Structures Design provides the foundation design for high mast poles. He must be

contacted early in the design phase to allow adequate time for coordination with the Geotechnical Engineer in obtaining necessary soils information.

Any lighting project, especially high mast, adjacent to or in the vicinity of an airport, may be a potential problem. Any lighting project within 3 miles of an airport should be discussed with the Office of Public Transportation, Aviation Office to determine if a problem exists.

13.3.6 Voltage Drop Criteria

When determining conductor sizes for lighting circuits, the maximum allowable voltage drop from the service point on any one circuit is 7%.

13.4 Traffic Signals

All components for signalization shall be fully compatible and able to integrate with the existing Sarasota computerized traffic signalization system by Peek Traffic Control Technologies, as approved.

The EOR is responsible for traffic signals on County projects and should be aware that the design must comply with the latest edition of the following standards:

Manual on Uniform Traffic Control Devices (MUTCD), FHWA - The ***MUTCD*** was adopted by the County as the uniform system of traffic control for use on the County road system. The action was in compliance with **Chapter 313.0745** of the **Florida Statutes**. The ***MUTCD*** is therefore the basic guide for traffic signals. The requirements of the ***MUTCD*** must be met, as a minimum, on all roads in the State.

Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals AASHTO and ***Section 20, Miscellaneous Structures, of this manual*** - These documents provide structural design criteria.

FDOT Roadway and Traffic Design Standards - These standards are composed of a number of standard drawings or indexes which address specific situations which occur on a large majority of constructions.

Sarasota County Technical Provision TP-600 included in Section 31 of this manual.

13.4.1 Design Criteria

The design of traffic signal supports and foundations shall be included in the plans. Refer to **Section 13.5, Foundation Design**, and **Section 20, Miscellaneous Structures** for more information.

The ***MUTCD***, as noted above, has been adopted as the uniform system of traffic control for use on the County road system. The ***MUTCD*** is the basic guide for traffic signal design; therefore, the traffic signal designer should be familiar with this document. The criteria below supplements the ***MUTCD***.

13.4.2 Certification and Specialty Items

Traffic signal equipment installed on FDOT's roadway system is required to be permitted by the FDOT, in addition to meeting the requirements of Sarasota County.

Standard specifications have not been developed for all signal equipment. Some items are project dependent and the development of standard specifications is difficult. Specifications for these items must be developed on a project by project basis and included in Technical Provisions for the project.

13.4.3 Stop Line Location

A stop line which is not properly located invites violation by the motorist. The **MUTCD** specifies the minimum and maximum distances from the signal head to the stop line for adequate visibility. The traffic signal designer must insure that this requirement is met. Instead of relocating the signal heads, the stop lines at many intersections have been moved from their proper location to comply with these requirements. The tendency for the motorist is not to stop at the new stop line location, but rather to creep beyond the stop line. This could in some cases result in valid calls being dropped, thereby increasing delay and decreasing the overall efficiency of the intersection.

The first step in the design process should be to locate crosswalks and stop lines properly. Then the signal head location should be determined to meet the **MUTCD** requirements. This may require changing the mounting configuration. A box span, for example, may be required where a diagonal span would normally be installed.

13.4.4 Controller Assemblies

Controller Timings: The development of controller timings is a basic part of traffic signal design. A recent ruling from the Board of Professional Engineers stated that the development of timings is considered engineering and therefore requires the signature and seal of a professional engineer.

All traffic signal designs prepared for or by the County shall include initial timings of all controllers. If the timings in the plans are not implemented, it will be the responsibility of the County to insure they were prepared under the supervision of a professional engineer.

Future Intersection Expansion: Any planned intersection improvements, should be considered in the signal design. The controller type, cabinet type and the number of load switches are examples of design features which may be affected by future intersection improvements. It is the responsibility of the signal design engineer to determine if the current design should include capabilities for future improvements.

Upgrade of Existing Controller Assemblies: For projects requiring an upgrade to an existing controller assembly, the assembly may either be expanded or replaced. Minor expansions include the addition of load switches, new controller timings, and/or new controller unit if the cabinet is properly wired. These may be made in the field; therefore,

expansion is the logical choice. On the other hand, major expansions include cabinet rewiring or any work requiring the removal of the cabinet back panel. Major expansions shall not be made in the field and replacement of the assembly is required. The designer may wish to contact the County Traffic Operations Engineer before making the decision to expand or replace an existing controller assembly.

13.4.5 Signal Heads, Pedestrian Assemblies, Electrical Disconnects, Conduit and Pullboxes

A. Signal Indications

1. All signal indications, including pedestrian indications, shall be Light Emitting Diode (LED) only. Signal heads shall be all metal and all black with tunnel visors.
2. Use backplates on all signal heads.
3. Use LED 12" green signal head sections.

B. Pedestrian Assemblies

1. Pedestrian pedestals should be installed using PELCO PB-5334 (or equivalent) base.
2. Use single-section, international symbol pedestrian signals.
3. The pedestrian signal sign shall be FTP-49 modified (9" X 12"). Push button station shall be PELCO model SE2013.

C. Electrical Disconnects

1. Electrical service disconnects and meter sockets are to be placed on a service pole/pedestal.

D. Conduit and Pullboxes

1. When conduit is installed under roadway pavement, include 1 additional run for future use.
2. All pull boxes shall be Quazite type or approved equal.
3. Use 3" Schedule 40 PVC conduit for interconnect cable. Place pull boxes a minimum of 500 feet center to center, or as approved by the County Engineer's representative.

13.4.6 Left Turn Treatments

The guidelines given below should be followed when determining signal treatments for left turns.

- **Single Turn Lane**

Restrictive/Permissive Phasing - A five-section cluster should be used for this location. The head should be installed over the lane line between the left turn lane and through lane. The five-section cluster can serve as one of the two indications required for the through traffic.

Restrictive Phasing - A separate signal head for the left turn lane with red, yellow and green arrow indications should be positioned over the center of the left turn lane.

- **Dual Turn Lanes**

Only restrictive phasing should be used. Permissive movements should not be allowed for dual turn lanes. A single three-section head with red, yellow, and green arrow indications should be centered over each turn lane. These heads are in addition to the dual indications required for the thru movement.

- **Separated Turn and Thru Lanes**

Turn lanes that are separated from the thru lanes more than 12 ft. by a raised or painted island shall not be operated in the permissive mode.

- **Single Lane Approach on Stem of "T"**

Two three-section heads are required as minimum. All indications must be circular in this situation.

- **Two Approach Lanes on Stem of "T"**

Option #1: The approach may display two three-section heads with circular indications on all sections.

Option #2 : The approach may display a five-section cluster in conjunction with a three-section head. If the lanes are exclusive left and right turn lanes, then the five-section cluster should be placed over the center of the lane line and the three-section head over the major movement lane. If one of the lanes is a shared left and right lane, then the five-section cluster should be placed over the center of this lane and the three-section head over the center of the other lane.

Option #3: The approach may display two three-section heads for the major movement and a single three-section head for the secondary movement

- **Three Approach lanes on Stem of "T"**

Option #1: The approach may display two three-section heads for the major movement and one for the secondary movement (Exclusive left and right turn lanes).

Option #2: The approach may display a five-section cluster in conjunction with three-section head (exclusive left and right turn lanes). The five-section cluster should be placed over the center of the lane line separating the left turn lane(s) from the right turn lane(s). The three-section head should be placed over the other lane line to provide dual indication for the major movement.

Option #3: When the middle lane is a shared left and right turn lane, then a five-section cluster should be placed over the center of this lane and a three-section head placed over each of the other two lanes. Each head must contain green and yellow arrow indications in this situation.

NOTE:

1. For all cases, the approach shall display "dual indications". This means that there must be at least two heads with identical indications on the major approach. For example, if a green arrow is displayed on one head of the major movement or approach then a green arrow must be displayed on the second head.
2. The same signal display option should be used throughout an urban area to provide consistency in display to the motorist.
3. The use of advance and/or overhead lane use signs should be used as a supplement to pavement arrows on stems of signalized "T" intersections.

13.4.7 Signal Preemption

The engineer responsible for the design of a traffic signal project should, as a matter of routine, check each intersection to determine if the need for signal preemption is present.

Intersections located within 500 ft. of moveable span bridges or railroad crossings should be considered for preemption. Those located at distances greater than 500 ft. should also be considered if the queues frequently extend to the moveable span or crossing.

Intersections near fire stations require individual study. This is necessary to determine the interaction between the fire station vehicles and the intersection operation. This information must be known before the preemption sequence can be developed.

13.4.8 Intersection Design - Lane Configuration

The engineer responsible for the traffic signal design may be asked to verify the number and configuration of traffic lanes required for an intersection to function properly when signalized.

The results are dependent upon the traffic volumes used in the analysis. The traffic used for this calculation shall be the design hourly volume based on the 30th highest hour (k factor) and not a peak to daily (P/D) ratio based on a 24 hour count. The k factor volumes account for traffic variations through the year, and, in most cases, are higher than P/D volumes. New intersections should be designed for a 20-year time horizon.

The K, D, and T factors convert the two-way AADT volumes to a one-way Design Hourly Volume (DHV). This is appropriate for the total approach movements. The AM and PM peak turning movement counts on each approach should be addressed individually. Current turning movement counts should be taken to determine the percentage of turns for each approach. These percentages should then be applied to the DHV for each approach volume to determine the turning volumes which should be used for the turn lane design calculations. These values should be compared to the movement counts supplied by Planning and the greater of the two values used for the design of turn lanes. The County Planning Department should be contacted to determine if recent counts are available and also if any use changes are planned which would require adjustments to the turn percentages found in the current counts.

Storage lanes for left turns can affect the capacity and safety of intersections. The storage length of a left turn lane is a critical design element. The queue of left turn vehicles in a storage lane of inadequate length may extend into the through lanes. The result is loss of capacity for the through lanes. The queue of through vehicles may also extend beyond the entrance of a short left turn storage lane, blocking access to the storage lane. Either case results in a less efficient operation of the intersection and may cause last minute lane changes, thereby increasing the possibility of conflicts.

Turn lanes should comply with the ***FDOT Roadway and Traffic Design Standards, Index 301*** to the extent practical. The available queue length provided should be based on a traffic study.

The important factors which determine the length needed for a left turn storage lane are:

- The design year volume for the peak hour (see discussion above).
- An estimate for the number of cycles per hour.
NOTE: If the cycle length increases, the length of the storage for the same traffic also increases.
- The signal phasing and timing.

There are several techniques used to determine necessary storage length. The following are suggested guidelines for left turn lanes.

- Where protected left turn phasing is provided, an exclusive turn lane should be provided.

- Left turn lanes should be provided when turn volumes exceed 100 vehicles per hour (VPH) and may be considered for lesser volumes if space permits.
- For signalized intersections, the following formula may be used, assuming an average vehicle length of 25 feet.

$$Q = \frac{(2.0) (DHV) (25)}{N}$$

Where

Q = design length for left turn storage in ft.

DHV = left turn volume during design peak hour, in VPH.

N = number of cycles per hour for peak hour, use N = 30 as default.

- Computer programs, such as TRANSYT-7F, are used to develop signal phasing and timing. One of the outputs of these programs is the queue length. For projects where traffic signal timing is included as a part of the project, the output of these programs should be considered in determining storage length.
- Where left turn volumes exceed 300 vph, a double left turn should be considered.
- When right of way has already been purchased, and the designer has to choose between a long wide grass median or a long left turn lane, the storage length for the left turn should be as long as practical without hindering other access.

Right turn lanes are provided for many of the same reasons as left turn lanes. Right turns are, however, generally made more efficiently than left turns. Right turn storage lanes should be considered when right turn volume exceeds 300 vph and the adjacent through volume also exceeds 300 vehicles per hour per lane (vphpl).

13.4.9 Signal Loops

Video detection should be used as the County Standard because of its ease of installation, maintenance, and ability to be adjusted during road maintenance projects. While video detection tends to be costly, reduced maintenance makes it more cost effective. This determination should be made on a case by case basis during design. When comparing, it should be noted that the County Standards require the use of preformed loops. Video vehicle tracking systems shall conform to Sarasota County Technical Provision TP 600 Standards. The video-tracking unit requires a computer/lap top interface for setup and query. However, if loops are used, they shall be installed under the following standards: Traffic signal loops are detailed in ***FDOT Roadway and Traffic Design Standards, Index 17781***. These loops are standard and will be appropriate for most locations. However, place type “F” loops at least 2’ in advance of stop bars, based on the Signal Detector Placement Policy. For all long loops, use 6’ x 40’ type “F” loops. Type “B” loops in through lanes and left turn lanes are to be installed based on the Signal Detector Placement Policy. System detectors are to be installed on the down-stream side of the applicable movement for the major street only in accordance with detection zone standards.

The traffic signals for each intersection should be individually designed. The requirement for type and placement of loops is a part of this design. The above standard allows for some variation in size and placement of the standard loops. These modifications are intended to be used only when required by the design of a particular location.

All loop home runs are to be in conduit.

13.4.10 Electrical Bonding

FDOT Roadway and Traffic Design Standards, Index 17736 requires a bond wire connecting all poles, controllers, mast arms and pedestrian signal pedestals. The designer is reminded that this conductor must be included in the pay items and quantities.

13.4.11 Wind Loading - Traffic Signals

See ***Section 20, Miscellaneous Structures.***

13.4.12 Foundation Criteria

Refer to **Section 13.5, Foundation Design**, for geotechnical requirements.

13.4.13 Mast Arm Supports

The County requires that all new signals installed on the County road system that are within the approximate ten mile coastline boundary defined by the State Traffic Engineering Office Implementation Guidelines shall be supported by mast arms with the signal head(s) rigidly attached to the mast arm.

Sarasota County traffic signal installations shall make exclusive use of non-galvanized painted steel poles and mast arms. Sarasota County's minimum standards for steel poles and mast arms are provided in Appendix 16C. The pole and mast arm shall be painted in accordance with the Sarasota County specifications.

Street lighting shall be provided at all signalized intersections and shall conform to the Sarasota County Specifications. Davit-type luminaire arms shall be installed on proposed signalization poles. Davit arms shall also be used for mounting video cameras.

Internally illuminated street signs shall be used on all new signals per Sarasota County Standards.

Deviations to this Policy are to be handled as Variations in accordance with **Section 3** of this manual.

13.4.14 Traffic Signal Project Coordination

Development of traffic signal plans may include the following coordination:

Roadway Design - Normally the designer of a signal project receives the base sheets for design from the roadway designer. The roadway designer can also provide any required cross sections.

Utilities - The designer provides the coordination with the various utilities involved in the project. This usually includes advising the power company of the need for electrical service. The designer also needs to identify potential conflicts with overhead and underground utilities or verify those which have previously been identified.

The designer should indicate a preferred location for the electrical service.

Structures Design - The Engineer of Record for Structures Design provides the design of the traffic signal mast arms and strain poles. This includes the design of the foundation for these structures. The Engineer of Record must be contacted early in the design phase to allow adequate time for coordination with the Geotechnical Engineer in obtaining the necessary soils information.

13.5 Foundation Design

Foundation design and drawings for overhead sign structures, high mast light poles, traffic signal mast arms and strain poles shall be the responsibility of the Structures Engineer of Record (EOR). The Geotechnical Engineer shall provide the EOR the following soils information (this information may be derived from the borings of other nearby structures or from roadway borings):

1. Soil Type
2. Effective Unit Weight of the Soil
3. Seasonal High Water Table Elevation
4. Effective Friction Angle of the Soil (if applicable)
5. Cohesion Value (if applicable)
6. Allowable Bearing Capacity (if applicable)

The above soils information shall be included in the plans. Additionally, Soil Boring Data Sheets shall be included in the plans, except for strain poles. This will provide the Contractor with the conditions for which the foundations were designed as compared to actual on-site conditions and establish criteria for any future analysis of the foundations.

For Roadway Lighting Foundations refer to ***FDOT Roadway and Traffic Design Standards Index 17503***. Additionally, for projects allowing the screw type foundation as an alternate, the Geotechnical Engineer shall determine whether the soil characteristics meet the requirements of **Section 715** of the **FDOT Standard Specifications for Road and Bridge Construction**. If it is determined that the soil conditions do not allow the use of the screw type foundation as shown in **Section 715**, an appropriate design shall be provided or a note shall be added to the plans stating: "Use of the screw type foundation is not allowed on this project."

APPENDIX 13-A

TRAFFIC DESIGN CHECKLISTS