

Chapter 29

Structural Supports for Signs, Luminaires and Traffic Signals

The following are changes, additions or deletions to the January 2012, Topic #625-000-7 Plans Preparation Manual (PPM), for use on Turnpike projects only:

29.1 General

Add the following paragraphs

For projects that involve the re-use of existing miscellaneous structures, the provisions of Section 25.4.26 applies, even if the project is not a RRR.

During the design process, the Design Consultant should coordinate with FTE Maintenance to secure structure numbers for overhead cantilever and span sign structures. These structure numbers should be used in the Signing and Pavement Markings plan set.

Typically if a drilled shaft supporting a sign structure is deemed unacceptable in construction, a replacement shaft can be constructed nearby. The Consultant shall identify any sign structure foundation locations that are critical (cannot be moved nearby), and follow the construction requirements of gantry drilled shafts in Section 29.2.8 for those foundations

29.2.4 and 29.2.5 Standard Overhead Span/Cantilever Sign Structures

Add the following paragraphs

All overhead sign structures including those carrying DMS, shall be designed to accommodate 25% extra sign area than what is called for in the plans. Sign structures shall be designed for a minimum sign panel weight of 5 lbs/sf for conventional sign panels and 25% extra dead load for DMS. The requirements for minimum and future sign panels in Structures Manual Volume 9 also apply. Refer to TPPPH Section 2.10 for the requirements of minimum vertical clearance.

Minimum vertical clearance requirements are measured to the proposed plan sign panel.

The designer is responsible to determine the dimensions of the 125% panel that will create the worst case loading scenario. For historical documentation, a note shall be added to each sign structure cross-section and to the structural Table of Variable notes that the design accounts for the 25% increase in area.

Application of the 25% extra area and weight is not required when analyzing existing sign structures for re-use.

The designer should verify that the sign panel size conforms to the FDOT Standard Index drawings with regards to vertical hangers, wind beams and luminaire arms. If not, special design and details should be provided in the S&PM plans.

29.2.6 Custom Designs

Add the following paragraph

For bridge mounted sign structures, connection to the traffic railing barrier should be avoided where possible. If it is absolutely necessary to connect to the barrier, the point of connection should be no more than one (1) foot above the top of deck.

29.2.7 Dynamic Message Sign (DMS) Structures

Add the following paragraph

For projects that involve the re-use of existing sign structures carrying DMS signs, at a minimum, existing U-bolts which connect the truss chords to the upright shall be replaced with high-strength U-bolts. Also refer to 29.2.4 and 29.2.5 for additional TPPPH requirements.

29.2.8 Toll Equipment Structures (Gantry Structures)

Add the following paragraphs

Refer to Chapter 34 Tolling Infrastructure Requirements for more information.

See Section 26.9.4 Aesthetics for more information on gantry coatings. Gantry type and aesthetics shall be coordinated on a project-specific basis with the Turnpike Project Manager, Architecture and Structures.

Staff hour estimates for Toll Equipment should be included on Tab 18 Line 22 – Other Structures. The work estimated on this line should include the design and detailing effort for the Toll Equipment and Foundations provide a detailed breakdown of the tasks, sheets and hours in the ‘comments’ section. All other associated tasks should be included on Tab 31 – Architecture. Gantry plan sheets should be numbered with the letter “G”.

All gantries, except for tri-chord style gantries, shall be designed for the highest Florida wind speed (150 mph) without regard for the actual location of the gantry. The foundation design for all gantries may be based on the actual wind speed.

Gantry designs should include a fatigue analysis per LTS-5 and Volume 9 of the FDOT Structures Manual.

The attachment of overhead roadway signs to gantry structures is not permissible without consent of the Turnpike Structures Design Engineer.

Gantry upright shall be filled with concrete 8' above the top of the foundation regardless of roadside protection devices. Details/notes shall be provided in the structural plans. This requirement does not typically apply to ramp gantries, but should be evaluated at ramps for upright in medians, etc.

Tri-Chord style gantries shall meet the span-to depth requirements for DMS Structures as specified in Volume 9 of the FDOT Structures Manual.

Toll equipment structures shall be supported by deep foundations. Lateral deflection shall be limited to less than 1 inch at top of pile or drilled shaft under service design load. Requirements of Soils and Foundations Handbook Appendix B shall be followed for selection of soil and rock design properties and design water table. Where the foundation is located at close proximity to sloping ground, include the portion of the foundation with less than 2.5D horizontal soil cover (face-of-foundation to face-of-slope) in the unsupported length, and design the portion of the foundation with more than 2.5D horizontal soil cover as though founded in level ground (D is foundation width). After foundation length is determined based on design analyses, 2 feet shall be added to the required foundation length when subsurface soil and rock are modeled as non-cohesive material and 4 feet shall be added to the required foundation length when any soil or rock is modeled as cohesive material in design. Foundation design with multiple piles/shafts under each supporting column shall be coordinated with Turnpike Geotechnical Engineer. A minimum safety factor of 2.5 shall be provided for axial capacity of the deep foundations service load. Preformed pile holes installed in rock shall be grouted following Section 455 of the specifications to restore lateral stability of the foundation unless the rock is modeled as non-cohesive soil in design.

In addition, the following construction requirements shall be included. These requirements shall be included in the Design Plans:

Driven Piles: At least one test pile per toll equipment structure shall be dynamically monitored with a Pile Driving Analyzer (PDA) or Embedded Data Collector. (EDC). All preformed pile holes installed through rock shall be grouted following Section 455 of the specifications to restore lateral stability of the foundation unless the rock is modeled as non-cohesive soil in design and sand backfill is used following the Specification requirements.

Drilled Shafts: Drilled shaft supporting a toll equipment structure shall be installed using a temporary casing extending to the drilled shaft tip elevation. Design of the drilled shaft shall include reduction of skin friction in limestone associated with the use of temporary casing.

29.4.2 Mast Arm Signal Structures

Add the following paragraph

Adjust the mast arm length in the plans data table, using variable FAA, such that the mast arm extends no more than four (4) feet beyond the last signal/sign, or the future signal/sign. As per the Index instructions, adjust the tip diameter, using variable FBA, based on the adjusted arm length.