261.8 Evaluating Existing Ancillary Structures

Evaluate existing ancillary structures within the project limits in accordance with this section.

When only retrofitting 'flexible' backplates to existing mast arm or span wire signals, see the ***Traffic Engineering Manual*** ***(TEM), Section 3.9***.

261.8.1 Condition Evaluation

Perform a Condition Evaluation for ancillary structures that have a proposed change in loading conditions or are proposed for relocation. A Condition Evaluation is a physical and functional assessment that includes inventory of attachments, damage, deterioration, or other potential defects that may cause a reduction in service life or design capacity. Coordinate with the District Structures Design Engineer (DSDE) and District Structures Maintenance Engineer (DSME) prior to performing the Condition Evaluation. Consider the findings of the Condition Evaluation and how the condition may affect the structural capacity of the ancillary structure, paying special attention to items added after initial construction and changes to the structure's section properties. Based on the findings, determine if a detailed structural analysis is required in coordination with the DSDE.

Sources for as-built plans include ***ProDo*** (ProDo is accessible to FDOT staff only), the District Maintenance Office, and District Design Office.

261.8.2 Existing Ancillary Structures to Remain In-Place

When adding new or modifying existing attachments to existing ancillary structures, mitigation strategies should be used to reduce additional structural loading to the extent practicable. For example, some mitigation strategies could include:

- Relocating street name signs, no right turn on red signs, or other attachments to the mast arm upright or closer to the base of the arm.
- Shifting location of existing signals closer to the mast arm upright while maintaining tolerance for lane alignment
- Replacing existing rigid signal backplates with flexible backplates
- Replacing existing attachments with lighter/smaller devices that provide the same/similar function and meet MUTCD minimum requirements

261.8.2.1 Determination of need for Detailed Structural Analysis

A detailed structural analysis of an existing ancillary structure is not required for replacing attachments in-kind (e.g., same or less critical location on the structure; same or less weight or size/EPA) unless warranted by the findings of the Condition Evaluation.

A detailed structural analysis may not be required when adding, modifying, or replacing attachments as described in the following for each ancillary structure type. For these cases, provide a justification in the Ancillary Structures Report. The one-time allowance for additional loads/areas herein are for all attachments in excess of the original design configuration throughout the life of the structure.

Commentary: In some cases, the benefit of adding safety devices to existing structures may outweigh the potential risk of structural failures during the design extreme event limit state. The Department has determined that some level of risk is acceptable to improve safety and replacement of a slightly overstressed ancillary structure based on an extreme high-wind event is not desirable.

- **Lighting Structures:**

  Fixtures may be replaced with those having a similar Effective Projected Area (EPA, typically provided by the manufacturer) without detailed structural analysis. The total EPA of all fixtures on the structure must not increase by more than 10% above the documented design EPA (e.g., from Standard Plans Instructions, shop drawings, etc.). If the documented design EPA is not available, use the total existing fixture EPA. Otherwise, perform a detailed structural analysis as described below.

- **Service or CCTV Poles:**

  A total area for existing and proposed attachments of less than 6 square feet may be attached to the upright/vertical pole without detailed structural analysis. For standard CCTV camera support structures, see the ***Standard Plans Instructions*** for ***Index 641-020*** (Concrete CCTV Pole) and ***Index 649-020*** (Steel CCTV Pole) for additional loading allowed for future operating needs without a detailed structural analysis. Otherwise, perform a detailed structural analysis as described below.

- **Span and Cantilever Overhead Sign Structures:**

  Sign panel modifications that comply with the original design (e.g., design has already accounted for future panels) do not require a detailed structural analysis. A total area of less than 6 square feet for existing and proposed attachments (other

than sign panels) may be attached without detailed structural analysis. Otherwise, perform a detailed structural analysis as described below.

- **Tolling Structures:**

A total area of less than 6 square feet for proposed attachments (sign panels may not be attached to tolling structures) may be attached without detailed structural analysis. Otherwise, perform a detailed structural analysis as described below.

- **Strain Pole Structures:**

Additional devices attached only to the vertical upright with a total area of less than or equal to 18 square feet and a total weight less than or equal to 145 pounds, no structural capacity analysis is required. Otherwise, perform a detailed structural analysis as described below.

Commentary: The size and weight limits of the additional devices are roughly based on the maximum allowable for internally illuminated street name signs per ***Standard Specifications 700****.*

- **Standard Mast Arm Structures:**

A "Standard Mast Arm" support structure is one that has previously been, or is currently, included in the ***FDOT Design Standards*** or ***FDOT Standard Plans*** regardless of the publication dates. These structures should contain an Identification Tag specifying the Arm Type which can be used to determine the moment capacity of the horizontal support members. The Arm Type or Identification Tag may be noted in the Department's Bridge Management System (BrM). For structures without an Identification Tag, use the criteria below for Non-Standard Mast Arm Structures.

Commentary: The Identification Tag is typically located under the handhole cover or terminal compartment cover plate. Access to the handhole cover or terminal compartment should be coordinated with the District Maintenance Office.

For Standard Mast Arm support structures with additional devices attached only to the vertical upright with a total area of less than or equal to 18 square feet and a total weight less than or equal to 145 pounds, no analysis is required.

Commentary: The size and weight limits of the additional devices are roughly based on the maximum allowable for internally illuminated street name signs per ***Standard Specifications 700****.*

For Standard Mast Arm support structures with additional loading on the horizontal member that produces a flexural demand/capacity ratio less than or equal to 1.10, no further analysis is required. Use the FDOT Mast Arm Evaluation Program to determine the flexural demand/capacity ratio of the horizontal member.

For Standard Mast Arm support structures with flexural demand/capacity ratios at the base of the horizontal member greater than 1.10, perform a detailed structural analysis.

- **Non-Standard Mast Arm Structures:**

For non-standard Mast Arm structures or those without an Identification Tag, the original as-built plans should be obtained to determine the original configuration of the attachments.

For non-standard Mast Arm support structures with additional devices attached only to the vertical upright with a total area of less than or equal to 18 square feet and a total weight less than or equal to 145 pounds, no analysis is required (see Commentary above).

For non-standard Mast Arm support structures with additional loading (as compared to the configuration of the attachments in the original as-built plans) on the horizontal member that produces an increase in the moment at the base of the horizontal member of less than or equal to 10%, no further analysis is required. Use the FDOT Mast Arm Evaluation Program to determine percentage increase in moments at the base of the horizontal member.

For non-standard Mast Arm support structures with an increase in moment at the base of the horizontal member greater than 10%, perform a detailed structural analysis.

261.8.2.2 Detailed Structural Analysis

When a detailed structural analysis is required, evaluate the capacity of the structure in accordance with the ***Structures Manual*, *Volume 3, Section 18.2***. Report the Demand/Capacity (D/C) ratios, Stress Ratios (SRs), and Combined Force Interactions (CFIs). If all D/C ratios, SRs, and CFIs are less than or equal to 1.10, the existing structure may remain without processing a Design Variation or Design Exception. The DSDE must review the detailed structural analysis and provide final direction to either allow the existing structure to remain, strengthen the existing structure, or replace the structure. For projects not in a typical design-bid-build or design-build contract (e.g., permit, push-button, safety), consult the District Traffic Operations Engineer (DTOE) instead of the DSDE. Obtain

concurrence from the DSME. The DSME must document the DSDEs or DTOEs decision in BrM.

Contact the DSDE for guidance on a detailed structural analysis for existing ancillary structures without plans, shop drawings, foundation depths, or design calculations.

261.8.3 Existing Ancillary Structures to be Relocated

Perform a Condition Evaluation and detailed structural analysis for all ancillary structures to be relocated.

261.8.4 Ancillary Structures Report

Produce an Ancillary Structures Report including the following:

- Listing of ancillary structures within the project limits including the proposed disposition (e.g., remain in place, relocated, replaced)
- Condition Evaluation
- Justification for when a detailed structural analysis is not required
- Detailed structural analysis (if required)
- Documentation of any required remedial actions
- Other items as specified by the District

Submit the Ancillary Structures Report to the DSDE and the DSME. The Ancillary Structures Report will be stored in PSEE.