Introduction

As part of the Florida’s Turnpike Enterprise (Turnpike) continuing quality enhancement efforts, the *Turnpike Design Handbook (TDH)* has been developed to provide consultants, reviewers and management with a single source of additional Turnpike-specific requirements that modify or add to the requirements included in the *Florida Department of Transportation (FDOT) Design Manual (FDM)*.

The *FDM* and the *TDH* are both three-part documents:

- Development and Processes – Part 1
- Design Criteria – Part 2
- Plans Production – Part 3

The *TDH* also includes the *Turnpike Guide Drawings*, which are available electronically on the Turnpike Design website.

For Turnpike requirements related to tolling, please see the *General Tolling Requirements (GTR)* which is a separate document.

The *TDH* is updated on an annual basis, following the official revision of the *FDM*. Interim updates to the *TDH* will be issued as Addenda to the annual revision.

Should you have any comments or suggestions for this *TDH* document, please contact the Turnpike Design Engineer.
200 Context Based Design

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

200.1 General

Add the following item to the list in the second paragraph

- Aesthetics
201 Design Controls

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

201.5 Design Speed

201.5.1 Design Speed Selection

Add the following paragraph

All Turnpike facilities must have a design speed of 70 mph, with the following exceptions.

(1) Turnpike Extension (SR 821) from Milepost 0 to Milepost 27.5 has a design speed of 65 mph in accordance to AASHTO design criteria, for horizontal and vertical curve length and stopping sight distance, with the exception of K-Values for crest vertical curves that must meet or exceed the more stringent FDOT 60 mph design speed criteria. All other design elements must conform to FDOT criteria.

(2) Veteran’s Expressway (SR 589) from Milepost 1.54 to Milepost 13.57 must have a design speed of 60 mph.

(3) Polk Parkway (SR 570) from Milepost 0 to Milepost 12.7 must have a design speed of 65 mph.

201.5.3 RRR Projects

Add the following subsection

201.5.3.1 Turnpike RRR Design

Resurfacing design criteria must follow the modifications shown in TDH 114.

Add the following section

201.7 Turnpike Design Controls

The Turnpike system must be designed to "Interstate" standards with the following exception.
1. Veteran’s Expressway from Milepost 1.54 to Milepost 13.57 is classified as an Urbanized Freeway.
202 Speed Management

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

No changes to this chapter
210 Arterials and Collectors

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

210.10 Vertical Alignment

210.10.3 Vertical Clearances

*Replace the first sentence of item (6) with the following sentence*

The required clearance for new overhead sign structures is 18.0 feet.

*Replace the first sentence of item (7) with the following sentence*

The required clearance for new walk-in Dynamic Message Sign (DMS) structures is 20.0 feet.
211 Limited Access Facilities

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

211.1 General

211.1.1 Interstate Resurfacing Projects

Add the following paragraph

A Design Memorandum must be included within the Design Documentation for utilizing the AASHTO interstate standards that were in effect at the time of original construction.

211.2 Travel Lanes and Auxiliary Lanes

211.2.2 Pavement Cross Slopes

Add the following sentence to the end of the third paragraph

Both shoulder and travel lane transition(s) must be detailed in the roadway plans and all calculations documented in the roadway design documentation.

Add the following paragraphs

New two-lane ramps, must be designed with 0.03 cross slope for both lanes through the gore area. It is understood that FDM Figure 211.2.1 depicts through lanes, and that auxiliary lanes can be applied with a cross slope in the same direction as the adjacent through lane even if this causes more than three lanes to be sloped in the same direction. This approach does not require a Design Variation.

For new construction and widening projects the Turnpike’s typical section with a 70 MPH design speed and eight (8) lanes is to have the two inside travel lanes sloped towards the median as shown in Figure 211.2.1 below.
211.2.2.1 Existing Pavement Cross Slopes

Replace the fourth typical section with the following section

<table>
<thead>
<tr>
<th>Lane</th>
<th>Lane</th>
<th>Lane</th>
<th>Lane</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Median through-lane widening, turn lanes, tapered or parallel single lane ramps adjacent to two through-lanes do not automatically warrant a 0.03 cross slope. Surface drainage will be reviewed and used as the deciding factor.

211.2.3 Hydroplaning Risk Analysis

A hydroplaning analysis is required whenever any additional contributing pavement (ex: express lane buffer, paved shoulder, paved gore, auxiliary lane, etc.) is added to the standard pavement cross slope sections shown in Figure 211.2.1. Super-elevated sections must be analyzed for hydroplaning as outlined in Table 211.2.4 below. For bridges with un-grooved decks that exceed the requirements outlined above, a hydroplaning analysis is required. A grooved bridge deck does not require an analysis. Hydroplaning analyses will apply to all conventional and non-conventional projects; (widenings, reconstruction, and new construction projects). The hydroplaning analysis will include hydroplaning calculations and where a risk is identified, a risk evaluation will be provided in report format to include identifying mitigating strategies to reduce or eliminate the risk. The report will also include a benefit/cost analysis for the mitigating strategies. The preliminary analysis is required to be submitted with the 15% line and grade or Draft Typical Section Package (whichever one is submitted first). A final
recommendation will be prepared and provided to the Turnpike Project Manager in conjunction with the Final Typical Section Package.

Add the following table

Table 211.2.4 Hydroplaning Analysis Requirements in Superelevated Sections

<table>
<thead>
<tr>
<th>Project Type</th>
<th>Number of Lanes Draining in One Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Less Than 3 Lanes</td>
</tr>
<tr>
<td><strong>Capacity Improvements &amp; New Alignments</strong></td>
<td>Not required</td>
</tr>
<tr>
<td><strong>RRR</strong></td>
<td>Not required</td>
</tr>
</tbody>
</table>

Notes: (1) Wet weather crashes attributable to hydroplaning conditions.

211.2.4 Roadway Transitions

Add the following paragraph

At bridge approach slabs, for a 150-foot length before or after the concrete approach slab, the ultimate pavement design asphalt thickness must be placed flush with the concrete at the ultimate profile grade. The initial pavement section must transition to the ultimate thickness at a maximum rate of 0.08 percent (1 inch/100 feet).

211.3 Medians

211.3.2 Median Crossovers

Add the following subsection
211.3.2.2 Crossovers on Turnpike Facilities

Median u-turns are used to accommodate turnarounds between interchanges for maintenance, service, and law enforcement personnel. The primary purpose of the u-turns is to alleviate adverse travel time for emergency vehicles by providing strategic u-turn locations.

Coordination efforts between the Turnpike Roadway Design Engineer, Turnpike Traffic Operations Engineer, FHP Troop Commander, and Turnpike Maintenance Engineer helped provide the direction needed to identify and develop Turnpike specific criteria for the design and locations (sometimes relocation) of the official use u-turns on the system. Design guidelines from AASHTO’s A Policy of Highway and Streets, along with outcome of the internal coordination efforts, were used to develop Turnpike specific criteria during the time when the state was developing standards for crossovers on Limited Access Facilities.

The following is a summary of crossover spacing criteria:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Turnpike Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median width opening</td>
<td>≥ 20 feet (concrete barrier wall separated)</td>
</tr>
</tbody>
</table>

All crossovers within a project’s limit must be evaluated for the spacing criteria and for sight distance deficiency. Findings and recommendations for crossovers to remain or be relocated must be documented and submitted in a Design Memorandum. In the special case of managed lanes with buffers separating the managed lanes from general use lanes, crossovers will be prohibited. Evaluate alternative crossing locations.

Emergency Crossover Design Guide Drawings can be found on the Turnpike Design Website.

211.4 Shoulders

Add the following paragraphs

On ramps, the left and right shoulder widths may be reversed or adjusted if needed to provide additional sight distance on the inside of a curve. However, the sum of the right and left shoulder widths must be greater than or equal to the sum of the standard shoulder widths and in no instance will the shoulder width on the outside of the curve be less than 4 ft. Even though this is an acceptable practice for mitigating sight distance per AASHTO Chapter 10.9.6, a Design Variation Memorandum for shoulder width will be required.
Where single lane ramps meet cross roads, additional ramp lanes are usually added for acceleration/deceleration of right or left turns. Unless these additional lanes are more than 500 feet long measured along the ramp baseline, single lane six-foot-wide ramp shoulders must be used throughout. A similar 500 feet length would apply to ramp toll facility approaches and departures. Frequent short changes in ramp width do not warrant corresponding short changes in ramp shoulder width. The shoulder transitions may be longer than the multi-lane ramp segment.

Other shoulder requirements:

1. Four-foot paved inside shoulders on one lane ramps and profiled edge lines on both sides of the travel way for all ramps must be evaluated at each ramp location within a project before implementation. The evaluation must consider horizontal and vertical geometry, sight distance, crash data, and other site-specific factors to compare safety benefits to constructability and cost considerations.

2. “Two Lane Ramp Interstate” within FDM Table 211.4.1 must also be applied to ramps with more than two lanes, and thus have a four-foot paved inside shoulder and a ten-foot paved outside shoulder.

3. Though FDM 260.1.1 only shows “two lanes” for multi-lane ramps, the shoulder configuration (six-foot inside shoulder and ten-foot outside shoulder) must also be applied when more than two ramp lanes occur.

4. Twelve-foot inside and outside paved shoulders must be provided for mainline sections that are three lanes or more in one direction, and that have greater than 250 DDHV trucks. Additional stabilization and continuation of the shoulder cross slope beyond the twelve feet of paved width are not required. This shoulder width requirement must be applied to roadway on retaining wall and bridge when the above conditions occur.

5. Shoulder requirements for 100 feet of pavement centered on the toll gantry, are listed in the General Tolling Requirements.

### 211.4.2 Shoulder Cross Slopes

Add the following subsections

#### 211.4.2.1 Shoulder Rocking

When a minimum 0.3% longitudinal gutter grade cannot be maintained using uniform shoulder cross slopes then shoulder rocking may be used to achieve positive drainage. The cross slope for shoulders may be varied from minimum 3% to a maximum 6% in tangent sections. The design must maintain balance between inlet spacing and flat
shoulder cross slopes. A 0.24% minimum longitudinal gutter grade may be used to achieve a minimum distance of 100-feet between the low point and the high point of the shoulder rocking should be maintained to the greatest extent practical.

Designs adjacent to a single slope barrier wall must include provisions to maintain the minimum height required by the *FDOT Standard Plans*. Designs adjacent to an F-Shape concrete barrier wall must include provisions to maintain the gutter profile within the 3” vertical face of the wall and maintain a minimum height required by the *FDOT Standard Plans*.

For outside shoulder rocking, use one of the three options below to meet minimum spread criteria. Options 1 and 2 are preferred and must be shown as not feasible, as determined by the District Roadway and District Drainage Engineers, before Option 3 can be considered.

1. Use concrete barrier wall with inlets to collect storm water. The varying shoulder cross slope must be designed to meet then the above criteria for shoulder cross slope and longitudinal gutter grade.

2. Use guardrail with shoulder gutter and inlets to collect storm water. The varying shoulder cross slope must be designed to meet the above criteria for shoulder cross slope and longitudinal gutter grade.

3. Use guardrail in conjunction with a permanent turf reinforcement mat in fill sections with a front slope steeper than 1:4 (maximum slope of 1:2) and maximum height of 10 feet. Shear stress calculations are required to be submitted for the design/selection of the permanent turf reinforcement mat. If slope and height criteria cannot be achieved then Option 3 is not feasible, use Option 1 or 2.

### 211.4.2.2 Shoulder Rocking Gutter Line Profiles

A gutter profile must be provided within the roadway plan set for all areas with shoulder rocking. Provide the profile in either table format or in graphical profile format. The profiles can be depicted on the roadway profile sheet or on a separate sheet at the EOR’s discretion. A special detail must be provided that details the barrier wall reveal in all areas of shoulder rocking.

Provide a profile of both gutter lines (each side of the barrier wall) and a top of the wall profile. The top of concrete barrier wall profile must be designed to follow the roadway profile grade; not the ‘sawtooth’ shoulder profile grade. The height of the proposed concrete barrier wall will vary (minimum height per *FDOT Standard Plans*) between the high and low points of the shoulder rocking profile to allow the top of the barrier wall profile to follow the grade of the roadway profile grade. The intent is to avoid an undulating top of barrier wall profile.
211.4.4 Audible and Vibratory Treatment

211.4.4.1 Ground-in Rumble Strips

The minimum thickness of structural asphalt on shoulders where ground-in rumble strips must be used is 1.5 inches. On existing shoulders without rumble strips that call for new rumble strips to be placed, the minimum thickness of existing structural asphalt and proposed asphalt must be no less than 1.5 inches.

211.8 Superelevation

For ramp design speeds less than 35 mph see AASHTO Exhibit 3-30 Maximum Relative Gradient for superelevation transition rates.

211.9 Vertical Alignment

211.9.1 Grades

The desired minimum profile grade is 0.5%; 0.3% is the minimum to the greatest extent practical. Roadway profiles will be designed to avoid the need for shoulder rocking to the greatest extent practical. Use of flatter grades can be justified in special cases but consideration to future widening and resurfacing must be given.

211.9.2 Vertical Curves

The minimum K values and minimum vertical curve lengths found in FDM Tables 211.9.2 and 211.9.3 require some clarifications and restrictions:

Service Interchanges: Per AASHTO, it is intended that a "platform" about 200 feet in length be provided on the ramp in advance of the gore using the Freeway K values.
System Interchanges: K values for the higher system ramp design speeds must be used except for the "platform" area.

211.11 Structures

*Add the following paragraph*

The width of all Turnpike-owned roadways on retaining wall and bridge must equal the paved width of the approach roadway and shoulder. The unpaved width of shoulder is not included in the width. *TDH 211.4* provides criteria for design of shoulders.

211.13 Ramp Terminals

*Add the following paragraph*

According to *AASHTO*, parallel designs are preferred over tapered design. To optimize safety and operations within interchanges, all new construction, widening, and capacity improvement projects must provide parallel entrance and exits unless project specific circumstances warrant the need for tapered designs. The project specific circumstances must be coordinated with the Turnpike Roadway Design Engineer and the justification documented in the Design Decisions Journal.

*Add the following sections*

211.17 Sodding

On resurfacing projects where there is more than 12 feet of travel lane pavement draining to the edge, the minimum sod dimension is 2 feet 8 inches. Where there is less than 12 feet of travel lane pavement draining to the edge, the minimum sod dimension is 1 foot 4 inches. Typically, the 2 feet 8 inches occurs on the outside shoulder and the 1 foot 4 inches on the inside shoulder.

For all slopes adjacent to new construction or widening, sodding must be used throughout the entire limits of the project.
211.18 Interchange Fence

On all projects involving interchanges between a Turnpike system facility and any roadway classified as “Urban”, use Type B fence along the limited access right of way within the limits of the interchange.

Limits of Type B fence within the interchange begin at the theoretical gore point of each ramp and terminate at the end of the limited access right of way adjoining the urban roadway being crossed. Quadrants that do not contain a theoretical gore point will extend Type B fence to the point where the typical mainline right of way is resumed.

211.19 Roadway and Bridge Approach Slab Evaluation

**RRR Projects** – The ERCAR must evaluate the profile, cross slope, and rideability of all roadway and bridge approach slab locations throughout the limits of the project. When deficiencies are identified, summarize the potential underlying causes and provide a recommendation for correcting the deficiencies along with an estimated cost of construction.

**Capacity Improvement Projects** – Perform the same evaluation as required for the RRR Projects and provide evaluation in the design documentation submitted with the 15% line and grade submittal. Existing bridges and approach slabs that are scheduled for complete reconstruction do not need to be evaluated for corrective measures.

211.20 Flexible Pavement Design

Flexible pavement designs must be done to the following minimum standards.

(1) All pavement designs on new construction must be calculated using a minimum reliability (%R) of 95%.
(2) All pavement designs on rehabilitation projects must be calculated using a minimum reliability (%R) of 99%.
(3) All temporary pavement designs for use during construction must be calculated using a minimum reliability (%R) of 80%.
(4) All pavement designs, with the exception of temporary pavement, must be calculated for a 20-year design life. The minimum design life and traffic (ESALd) for temporary pavements must be no less than the construction period for the project.
(5) Table 5.5 of the *FDOT Flexible Pavement Design Manual* is the required minimum thickness for new construction and resurfacing projects.
(6) All travel lanes pavement must include PG 76-22 in the top structural lift and friction course regardless of traffic level.

(7) The pavement design report must document what the existing friction course is and compare that to the existing crash patterns in determining the friction course when resurfacing ramps. Determine the location where speeds on the ramp are expected to drop below or exceed approximately 50 mph and make a recommendation for the logical transition between FC-5 and FC-12.5.

(8) Using a much higher traffic level mix than traffic requires can cause premature deterioration and cracking of the pavement. Therefore, do not increase the traffic level mix in the pavement design documents or plans to anticipate optimization of contractor operations. FDOT Specifications, Section 334 provides the contractor this flexibility within the realms of required criteria.

(9) If new pavement is proposed to be joined to existing pavement such as widening, auxiliary lanes, ramps, and turn lanes, a minimum 6-inch wide shelf must be created at the longitudinal joint by milling the existing pavement structure. The minimum depth of the milling equals the thickness of the final lift of structural course in the new pavement structure. This creates a milled offset in the longitudinal pavement joint from preceding lifts of structural asphalt. Tack coat is used in the shelf to aid in adhesion and imperviousness. A detail of the longitudinal joint must be developed and placed in the project typical section details. The traffic control plan must accommodate the space necessary for this work in the phasing sequence. Plan notes or a table of dimensions must describe the limits of the milled shelf width and depth.

(10) All pavement designs through toll loop pavement area must meet the minimum pavement designs listed in the GTR. If necessary, the pavement thickness must be increased from the GTR minimums in order to provide the required pavement structural number.
212 Intersections

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

No changes to this chapter
213 Modern Roundabouts

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

*No changes to this chapter*
214 Driveways

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

No changes to this chapter
215 Roadside Safety

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

215.2 Roadside Features

215.2.3 Clear Zone Concept

Add the following figure

**Figure 215.2.16 Clear Zones at a Ramp**

FDOT Standard Plans, Index 000-525

215.2.4 Lateral Offset

Add the following paragraphs

For side streets owned and maintained by local agencies where the minimum lateral offset criteria required by FDM Table 215.2.2 cannot be achieved then provide the greatest achievable lateral offset. A Formal Design Variation will be required for any deviations from FDOT clear zone criteria subject to approval by the Turnpike Design Engineer and local agency.
215.2.6 Roadside Slope Criteria

*Replace the third paragraph with the following*

New permanent slopes steeper than 1:2 are not allowed.

*Add the following paragraphs*

A 1:2 front slope rate with guardrail can be applied regardless of fill height when constrained conditions exist. Written documentation (email or meeting notes documentation is acceptable) of concurrence from the Turnpike Roadway Design Engineer and the Turnpike Maintenance Engineer must be obtained prior to incorporating this approach into design plans.

Provide 5 feet from face of guardrail to the beginning of the 1:2 cut slope on all guardrail and 1:2 cut slope applications to allow for a 5 feet guardrail deflection. If a concrete barrier is used instead of guardrail and shoulder gutter, then a 4 feet wide level bench must be constructed within the fill behind the barrier before proceeding with a 1:2 slope.

215.3 Roadside Hazards

215.3.2 Canal Hazards

*Add the following paragraphs*

A water body is defined as a natural or manmade feature, such as a pond, lake, ditch or canal that has a depth of water of 3 feet or more for an extended period of time (24 hours or more), as measured from the seasonal high water level or control elevation, to the water feature’s bottom elevation.

Provide shielding for all water bodies within the interchange areas.

Evaluate for the need to shield all water bodies within Turnpike right of way and those that run along and may fall slightly outside of Turnpike right of way. Evaluation must include the review of traffic data, facility characteristics, 5-year crash history, and a cost estimate of recommended improvements.

<table>
<thead>
<tr>
<th>Modification for Non-Conventional Projects:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delete the above paragraph and see RFP for specific shielding requirements.</td>
</tr>
</tbody>
</table>
215.4 Longitudinal Barriers, Barrier Transitions, End Treatments & Crash Cushions

215.4.1 Longitudinal Barriers

215.4.1.1 Flexible Barrier

The following criteria apply to the placement of high tension cable barrier and supplement the FDOT Developmental Specifications, Dev540 High Tension Cable Barrier System.

(1) The preferred slope for high tension cable barrier placement is 1V:10H. The maximum allowable slope is 1V:6H.

(2) Areas where high tension cable barrier must not be placed are shown in Figure 215.4.8 below.

(3) Post spacing must be installed such that the dynamic deflection is no more than a maximum of 8 feet.

(4) End anchors must be protected from vehicle impact with rigid barrier, guardrail, or overlapping cable barrier.

For median applications retro-reflective sheeting must be specified on both sides of the posts.
Figure 215.4.8  Flexible Barrier Placement

215.4.1.2 Semi-Rigid Barrier

Add the following paragraph

The treatment of guardrail post installed in areas with soils that exceed the standard AASHTO soil requirements for guardrail post must conform to the W-Beam Guardrail Installations In Rock and In Mowing Strips Detail Guide Drawing which can be found on the Turnpike Design Website.
215.4.6 Barrier Placement

215.4.6.4 Continuous Median Barriers

Add the following subsections

215.4.6.4.1 Median Barrier Grading Requirements

The preferred median slope is 1V:10H. This is flatter than the standard 1V:6H median typical section slopes. The slopes ahead and in front of guardrail installation are particularly critical on the older and narrow medians of 40 feet wide (see AASHTO Roadside Design Guide). In most cases, regrading requires the median ditch profile to be realigned horizontally and vertically. Therefore, drainage and earthwork in these areas need special attention in developing the typical sections and drainage profiles.

215.4.6.4.2 Access Openings

On projects that add roadside barrier to existing facilities (e.g. canal protection, spot/system wide safety improvement projects), locate maintenance and operations access points to existing facilities that are outside the clear zone and would not be accessible from the shoulder.

The maximum continuous length of a guardrail run along the outside of the roadway is 2,500 feet between end terminals. An access opening must be provided when long guardrail runs are broken up. Coordinate with the Turnpike Maintenance Engineer and Turnpike ITS Design Engineer on the final access location points to meet the needs of maintenance and operations.

The preferred typical detail for roadside guardrail access openings is depicted in the Maintenance Access Detail Guide Drawings, found on the Turnpike Design Website.

215.4.7 Warrants for Roadside Barriers

Add the following paragraph

Light pole foundations are not considered a hazard if built in accordance to FDOT Standard Plans, Index 715-001 Conventional Lighting, though the roadway slope may cause a portion of the foundations to protrude more than 4” in height.
215.7 Existing Barrier Systems

Add the following paragraphs

For added capacity and reconstruction projects, existing guardrail sections that do not meet current mounting height design standards must be replaced or upgraded to meet current standards. If a run of guardrail extends beyond the project limits, then a 25-foot transition detail will be used to connect to the existing guardrail.

For resurfacing and spot or system wide safety improvement projects, existing guardrail sections that do not meet current mounting height design standards AND are impacted by project improvements must be replaced or upgraded such that the entire run of guardrail meets current standards. Guardrail that does not meet the mounting height requirements at the time it was installed and the condition of the miscellaneous pavement under the guardrail must also be considered when making the determination. It is the intention of the Turnpike to bring guardrail up to current standards, however if extenuating circumstances exist and if the impacted length is less than 50 percent of the total length of guardrail then only the impacted length may be replaced or upgraded. Written documentation (email or meeting notes documentation is acceptable) of concurrence from the Turnpike Roadway Design Engineer must be obtained prior to incorporating this approach into design plans or ERCAR Reports. A Design Variation Memorandum is required to be submitted and approved showing justification for the modified replacement or upgrade. If the run of guardrail extends beyond the project limits, then a 25-foot transition detail will be used to connect to the existing guardrail. Existing guardrail within the limits of the project not impacted by the project improvements is not required to be upgraded or replaced but should be considered where practical.
216 Earthwork

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

216.1 General

Add the following sentence to end of the third paragraph

Landscape work may require excavation to remove and replace soils unsuitable for plant growth and finish grading for drainage and aesthetic purposes.

216.5 Earthwork Pay Items

216.5.6 Borrow Excavation (Truck Measure)

Replace the second paragraph with the following paragraph

Borrow material, if available, may be obtained from within the right of way of the project, upon approval from the Turnpike Design Engineer. Obtaining material from the project right of way must not create an unsafe condition or unprotected hazard. Any borrow excavation occurring within the FDOT right of way must meet the pond dimensional criteria depicted in Figure 5-1 of the FDOT Drainage Manual. The control elevation must be determined if a slope steeper than 1:4 is proposed in order to confirm compliance with Figure 5-1 of the FDOT Drainage Manual. The proposed borrow areas must be reviewed and coordinated with the Turnpike Environmental Permit Coordinator, Turnpike Drainage Design Engineer, and Turnpike Roadway Design Engineer.

216.6 Summary of Earthwork

Add the following sentence to the end of the first paragraph

Specify and quantify material necessary to meet the drainage design requirements, such as select material beneath swales, on fill, and ponds designed to percolate runoff.
220 Railroads

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

No changes to this chapter
221 Utilities

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

221.1 General

*Add the following sentence to end of the third paragraph*

For stand-alone landscape projects, it may not be necessary or cost effective to do full utility coordination. Utilize best available information (Level D) to show utilities on landscape plans and add plan notes stating utilities will not be relocated as a result of planting. Notes will be included requiring the contractor to provide utility designates and locates for Department-owned and private utilities.
222 Pedestrian Facilities

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

*No changes to this chapter*
223 Bicycle Facilities

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

No changes to this chapter
224 Shared Use Paths

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

No changes to this chapter
225 Public Transit Facilities

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

*No changes to this chapter*
226 Patterned Pavement and Architectural Pavers

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

No changes to this chapter
227 Freight

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

*No changes to this chapter*
228 Landscape Design

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

228.1 General

Add the following paragraph

The use of resilient, low maintenance shrubs is encouraged to provide slope stabilization and as an underplanting for palms and trees to protect from mower damage.

228.2 Landscape Design Requirements

Add the following item to the list in the first paragraph

- Turnpike Landscape Program Master Plan

Add the following item to the list in the second paragraph under item (2)

(q) Address listed wildlife and plant species within the project, such as burrowing owl, gopher tortoise, sand skink/blue-tailed mole skink and various listed snake species. Listed species permits if needed are to be addressed by the design consultant.

Add the following sentence to item (3)(d) on the list in the second paragraph

Water use permits, if needed, are to be addressed by the design consultant.

Add the following paragraph

Setback guidelines from roadway and other related features to proposed landscape materials are identified in a summary table in the Turnpike Landscape Program Master Plan.

228.3 Landscape Opportunity Plan

Add the following sentence to the end of the first paragraph

Coordinate early in the design process, during PD&E preliminary plans development or prior to the Phase I submittal in the final engineering design phase to ensure conservation
and landscape improvements are considered in all phases of planning and design development.

Add the following item to the list in the second paragraph

(5) When conceptual roadway and drainage design is provided as part of a PD&E Study.

Add the following item to the list in the third paragraph

(5) Consider and show applicable elements from FDM 228.2.1.
229 Selective Clearing and Grubbing Design

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

No changes to this chapter
230 Signing and Pavement Marking

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

230.1 General

Add the following paragraphs

Traffic Guide Drawings establish guidelines for traffic design and traffic engineering plan development. The Guide Drawings attempt to improve the quality of plans, provide system consistency, reduce plan development time and reduce plan review time. The Guide Drawings represent the compilation of engineering manuals, best practices and effective design experience. The Guide Drawings show layouts and details of an example condition.

Use these Guide Drawings to exercise proper engineering judgment and prepare a safe and effective design that fits the specific conditions of a project. The inappropriate use of and adherence to these Guide Drawings does not serve as exemption from the professional responsibility of developing an appropriate design. Become familiar with the information contained in the Guide Drawings and discuss specific design details with Turnpike design staff.

The Traffic Guide Drawings are available on the Turnpike Design Website.

Ancillary structures must not be placed in drainage features. If project geometry or other constraints require the placement of an ancillary structure in a drainage feature, coordinate with the Turnpike Drainage Design Engineer to confirm these structures and their associated components are placed above the appropriate elevation as follows:

- Treatment Swales – Weir Elevation
- Conveyance Ditches – Normal Depth
- Stormwater Ponds – Design Storm Peak Stage
- Floodplain Compensation or Other Systems – Seasonal High Water Level
- Provide the applicable elevation in the component specific cross sections and typical cross sections.
230.1.1 Structural Supports

Replace the second paragraph with the following paragraph

Refer to TDH 261 for information regarding structural support requirements. Refer to TDH 325 for information regarding plan requirements.

230.1.3 Vertical Clearance

Replace this subsection with the following sentence

Refer to TDH 210.10.3 for vertical clearance requirements for sign structures.

230.2 Signing

230.2.1 Sign Placement

Add the following paragraphs

The placement of signs must avoid presenting too much information, interfering with other traffic control devices, impairing the visibility of other signs and violating minimum spacing distances (see Table 1, Minimum Spacing Distances for Signs in Florida Administrative Code 14-51.014). The design must adhere to the sign spreading concept presented in MUTCD 2E.11. The minimum sign spacing between a Dynamic Message Sign (DMS) and guide signs or directional signs should be 1000 feet, when the guide sign is upstream of the DMS sign.

Consider the physical placement of sign supports as well as the visibility of the sign panel. Clearing and grubbing must be included in the project to remove trees and other vegetation that blocks or diminishes the visibility of the sign panel. Refer to the Traffic Guide Drawings for guidance.

All advance guide signs should use the physical gore as the point of reference for distance messages. The only time this should not be done is if the physical gore and theoretical gore are separated by more than 500 feet.

Destination guide signs on ramps must include destinations that repeat advance guide sign and supplemental guide sign information and provides route guidance to the driver.

Follow Typical Off Ramp Signing Diagrams, located on Turnpike Design Website, for Advisory Speed Warning Signing at all Turnpike exit ramps.
For all post-interchange distance signs, the maximum letter height used must be 10” E or 10” EM.

For size of signs, lettering and plaques, follow the Freeway Classification in *MUTCD Tables 2B-1, 2C-2, 2E-4 and 2E-5*. The minimum sizes for regulatory and warning signs on exit or entrance ramps to/from Turnpike facilities must be Freeway Classification.

### 230.2.2 Overhead Signs on Limited Access Facilities

*Add the following item to the list in the second paragraph*

(4) Mount exit direction signs on overhead structures when the number of travel lanes in one direction is three or more. Supplemental guide signs must remain ground mounted under sections of three or more travel lanes.

*Add the following item to the list in the third paragraph*

(4) Mount advance guide signs on overhead structures when the number of travel lanes in one direction is three or more. Supplemental guide signs must remain ground mounted under sections of three or more travel lanes.

*Add the following sentence to end of the fifth paragraph*

Align the far edge of the sign panel, furthest from the upright, flush with the end of the horizontal chord of the cantilever structure.

*Add the following paragraph*

The express lane toll amount sign closest to an express lane ingress must be supported on a mid-or full-span structure.

### 230.2.4 External Lighting of Overhead Signs

*Add the following paragraphs*

If a sign panel on an existing structure is being replaced, all sign panels on the structure should be consistent. For example, if a structure has three existing signs with lights, one panel is being replaced, the plans should call for either A) lights on the new panel or B) the other two panels replaced with Type XI sheeting and removal of the lights.

Top mounted luminaires are prohibited on mainline or ramps.
230.2.5 Signs on Barriers and Traffic Railings

Add the following item to the list in the second paragraph

- Do Not Stop (TPK-7)

Add the following subsections

230.2.11 Toll Route Markers

The Turnpike mainline must use the Turnpike route marker sign panel shown in the most current Traffic Guide Drawings.

On side streets, leading to the Turnpike Mainline, use the Toll Auxiliary Sign (M4-15) in combination with the Turnpike route marker. On numbered routes, use the Toll Route Shield (FTP-79-06, FTP-80-06, or FTP-81-06) without the additional Toll Auxiliary Sign.

The width of the attached cardinal direction sign, directional arrow auxiliary sign, or other auxiliary sign must match the width of the parent route marker sign.

230.2.12 Truck Lane Restrictions

Include truck lane restriction signs on corridors that have three or more lanes in each direction of travel.

Sample panel designs for the restriction are included in the Traffic Guide Drawings. Locate the signs similar to a post-interchange sign so that drivers entering the system are informed at each entry point. If installation of the truck lane restriction sign is not possible on the mainline due to sign clutter, the truck lane restriction sign can be located on the entrance ramp after the toll facility, when necessary, to maintain proper sign spacing.

230.3 Pavement Markings

Add the following to the end of the first paragraph

TDH Traffic Guide Drawings
231 Lighting

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

231.1 General

Add the following paragraphs

Lighting Guide Drawings establish guidelines for lighting design and plan development. The Lighting Guide Drawings are available on the Turnpike Design website.

In addition to the FDOT Specifications, the following standards should be consulted:

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

Recommended Practice for Roadway Lighting IES RP-8-00 (R2005), ANSI/IESNA.

American National Standard Practice for Tunnel Lighting IES RP-22-11, ANSI/IESNA.

The IESNA Lighting Handbook Reference & Application, IESNA.

Federal Aviation Regulation, Part 77, Safe, Efficient Use, and Preservation of the Navigable Airspace, USDOT/FAA. This regulation sets the requirements to follow on projects near airports.

Federal Aviation Administration Advisory Circular AC 70/7460-1, Obstruction Marking and Lighting, FAA. This advisory circular defines the requirements identify objects that require special lighting near airports.

Federal Aviation Administration Advisory Circular AC 150/5345-43, Specification for Obstruction Lighting Equipment, FAA. This advisory circular contains the FAA specification for obstruction lighting equipment.


231.1.3 Voltage Drop Criteria

Replace this subsection with the following paragraph
The maximum allowable voltage drop for determining the conductor sizes for light branch circuits is 6 percent. It must include a combination of both feeder and branch circuit runs from the power company service point to the last luminaire within a circuit.

**231.1.5 Underdeck Bridge Lighting**

*Add the following sentence to the end of the first paragraph*

In addition to piers and pier caps, underdeck lighting can also be mounted to other substructure elements such as end bents and wall copings.

*Add the following subsections*

**231.1.5.1 Nighttime Underdeck Lighting**

Where there is continuous roadway lighting during the night, roadways under bridge structures must be lighted to the same level (or criteria) of the adjacent roadway. If the adjacent roadway is not lighted, lighting under bridge structures is still required where frequent nighttime pedestrian traffic exists, or where unusual/critical roadway geometry occurs adjacent to or underneath the bridge structure.

**231.1.5.2 Daytime Supplemental Underdeck Lighting**

Tunnel or daytime lighting may be required when the bridge structure limits natural sunlight penetration and limits a driver's visibility under the structure. Evaluation of existing/proposed roadway design regarding the need for tunnel or daytime lighting must be included in the LDAR. Tunnel or daytime supplemental lighting must be provided as warranted by evaluation or as required by the Turnpike Electrical Design Engineer or Turnpike Maintenance Engineer. These requirements include not only Turnpike facilities, but any roadway crossing under a Turnpike facility.

Methodology from the *ANSI/IES RP-22-11 Tunnel Lighting Guide* must be used to determine the need for daytime supplemental lighting for underpasses. *ANSI/IES RP-22-11* provides *Table 2* and *Table 3* for determining the need for daytime lighting of tunnels/underpasses and for preliminary determination of the target luminance value for threshold zone lighting.

When the adjustment factor per *ANSI/IES RP-22-11 Table 2* is zero, no daytime lighting is recommended.

No daytime lighting is recommended for underpasses of 80’ or less.
No daytime lighting is recommended for underpasses between 80’ and 250’ long with traffic volume below 15000 AADT, if there is good daylight penetration and good wall reflectance. However, where skewed roadway geometry, pedestrian/bike facilities, or local jurisdictional request(s) are present, a daylight study (per Turnpike procedure and with consideration of these factors) must be performed to verify the need for daytime lighting.

(1) Consider several factors when determining the proper adjustment factor from ANSI/IES RP-22-11 Table 2:

(a) Exit Visibility- Where the exit is completely visible from the site safe stopping distance, the silhouette of objects beneath the underpass against the bright aperture at the exit may provide better detection by contrast for a driver. Make an assessment to determine if the roadway beneath the underpass is straight and allows contrast detection from the driver’s viewpoint at the site safe stopping distance. This is considered “good” exit visibility. Otherwise, for example where curved roadways (horizontal curve with radii of 880 ft. or less in rural areas, 2500 ft. or less in urban areas) are present beneath the underpass, the exit must not be considered visible.

(b) Daylight penetration- The overall luminance level is assisted by natural light entering the underpass. Assess daylighting through openings such as entrance/exit portal, columns, wall embankments beneath the underpass, and median separations (10 ft. or greater) between the bridges. 3-D modeling lighting simulation software with daylighting features (i.e. AGi32) is the recommended method for determining daylight penetration for proposed/existing conditions. For existing bridge daylighting retrofits, results from software simulation may be field verified using photometric meters at the site prior to completion of design.

(c) Reflectance of Underpass Walls- For narrow underpasses, retaining walls help to improve the luminance on the pavement due to the amount of light that will be reflected. For wide underpasses with three or more lanes and those with embankments, the reflectance has much less effect due to the inter-reflection between the bridge deck and embankment surfaces. Assess the reflectance based upon the material reflectivity (i.e. concrete reflectivity varies between 20-30%, see recommended reflectivity in Table 231.1.1 below) of the underpass’ surfaces.

(d) Traffic volume and pedestrian/cyclist traffic- Underpasses in urban areas are likely to have high traffic volume and pedestrian/cyclist traffic, therefore daytime lighting is required for underpasses exceeding 80 ft. as warranted per ANSI/IES RP-22-11, Table 2.

(2) Determine the pavement luminance value from ANSI/IES RP-22-11, Table 3 and apply the adjustment factor from Table 2.
(3) Perform a daylight study using lighting simulation software capable of 3-D modeling of proposed underpasses and with features required to account for contribution of sunlight per weather station data. The Study must be performed at 9am, 12 noon, & 3pm at proposed underpass locations.

The average luminance value in the threshold zone of the underpass must be determined per Tables 2 and 3 of the ANSI/IES RP-22-11 guide.

A daylight study (to be included in the LDAR) must be performed by software simulation and field investigation to account for sunlight that may contribute to achieving the overall luminance value at the roadway beneath the underpass. See recommended surface material reflectivity percentages for use in software modules following the recommended procedure below.

The Procedure for Design of Photometrics for Daytime Lighting is as follows (ANSI/IES RP-22-11 and AGi32 or equivalent software will be needed to implement this procedure):

(1) Determine the AASHTO SSSD per ANSI/IES RP-22-11 Table 1. Typical underpass will likely be evaluated for threshold zone only lighting. Calculations must be performed to confirm this assumption.

(2) Determine threshold zone luminance value.
   (a) Per ANSI/IES RP-22-11 Table 2, evaluate table parameters to determine adjustment factor.
   (b) Evaluate proposed roadway “scene” and select scene per ANSI/IES RP-22-11 Figure 3.
   (c) Evaluate and determine the “Suggested Maintained Average Pavement Luminance Levels in the Threshold Zone of Vehicular Tunnels”, per ANSI/IES RP-22-11 Table 3.
   (d) Apply adjustment factor from 2a.

(3) Perform daylight study for proposed underpass. AGi 32 lighting software is recommended. Other equivalent software/field methods may also be used. Considerations include but may not be limited to: luminance contributions from the sun, material reflectance, underpass orientation, etc. per ANSI/IES RP-22-11.
   (a) Create a proposed underpass model. The model must include, but not be limited to: all surfaces that reflect light, any openings, roadway layout below underpass, bridge structures beneath underpass, as well as other contributors.
   (b) Apply surface reflectivity characteristics. The recommended material reflectivity characteristics may be obtained from Table 231.1.1 below.
(c) Create calculation zones for the roadway(s) beneath the proposed underpass. Data points near the edges of the underpass may artificially inflate the luminance average. It is recommended that those data points not be considered in the overall average luminance. Points within the first 23 ft. of the entrance and exit portals must not be included in the overall average.

(d) Run daylighting module and calculate average luminance values within calculation zones established in 3c. Site location coordinates are required for weather station data (if available, the Perez All Weather module). Luminance value determined in previous step 2 must be used. As a worst-case scenario, daylight module study must be run assuming the orientation of the sun at 9am, 3pm, and 12 noon.

(e) If average luminance value cannot be met using daylight, then layout supplemental wall mount luminaires beneath underpass as needed to meet the calculated average luminance value. Use of nighttime luminaires in conjunction with the daytime supplemental luminaires may be required. The goal should be to meet the average luminance value using the least amount of fixtures.

(f) Adjust and re-run daylight module and re-calculate as needed to meet the average luminance value as determined in Step 2 above.

Deliverables from the daylighting study must include, but not be limited to:

- Snapshots of all 3-D views of underpass models
- Summary of luminance value achieved with point to point photometrics layout that shows the calculation zones
- All designer’s assumptions/judgements made to support the study

Coordination with the Turnpike Structures Design Engineer, power utility service provider, and electrical design sub-consultant (if separate from lighting designer) may be required.

**Modification for Non-Conventional Projects:**

Average pavement luminance value for daytime lighting must be implemented as directed in the RFP.
Add the following table

Table 231.1.1 Material Reflectivity

<table>
<thead>
<tr>
<th>Material (Surface)</th>
<th>Recommended Reflectivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete</td>
<td>0.25</td>
</tr>
<tr>
<td>Steel</td>
<td>0.20</td>
</tr>
<tr>
<td>Asphalt</td>
<td>0.38</td>
</tr>
</tbody>
</table>

231.2 Design Criteria

Add the following paragraphs

All design considerations must be documented in the Lighting Design Analysis Report (LDAR). Design variations and exceptions from Department criteria must be identified separately in the table of contents and fully clarified under the “Design Methodology” section of the LDAR. See Lighting Design Analysis Report template, available from the FTE Design website, for additional information. Correspondence regarding deviations/exceptions should be included as an appendix to the report and referenced as needed for clarification. A summary of deviations/variants/exceptions described in the design methodology shall be documented in the “Conclusions” section of the LDAR. Coordinate with maintaining agencies, as well as other Department stakeholders as applicable, to ascertain their preferences and obtain all other pertinent information required to provide an acceptable design.

Lighting pole layout and design must employ practices, where possible, to reduce the risk of light poles in high crash and high risk locations. Some of these design considerations are, but not limited to: lane drop and intersection locations, sections of roadway where the paved shoulder narrows, and curve/vehicle departure directions.

Conventional lighting must be used. Conventional lighting must be mounted within the right of way beyond the outside shoulders of the roadway along the mainline. For ramps and auxiliary lanes separated from the mainline, outside shoulder mounting is preferred. Conventional roadway lighting luminaires must be pole top style, for Turnpike owned roadways.
Modification for Non-Conventional Projects:

Conventional roadway lighting employing shoulder mounted light poles must be used for Turnpike owned and maintained lighting systems.

Projects with conventional lighting must be designed for an average initial illumination as indicated in Table 231.2.1. Rest areas and service plazas must also be designed for an average initial illumination as indicated in Table 231.2.1. This includes the ramps to and from the service plazas.

The lighting design must include mainline transition lighting to allow a reasonable reduction in lighting levels from a lighted roadway to an unlighted road. The mainline transition lighting must extend beyond the project lighting limits by approximately four-to-six-pole spacing. The mainline transition illumination levels must be 1.0 foot candles average initial intensity (horizontal foot candles) with the same uniformity ratios specified in Table 231.2.1.

Evaluation of the use of luminaire shielding will be required for all areas of the roadway adjacent to residential, highly urbanized, or environmentally sensitive locations where potential light pollution may be perceived. Photometric analysis using luminaires with the manufacturer’s shield option must be included in the Lighting Design Analysis Report. Coordination with other disciplines for review of areas of concern is required.

If the length of the mainline between any two lighted areas (roadway sections, interchanges, service plazas, and/or tolls facility) is 0.5 mile or less, then that section of the mainline must be lighted.

All widening and resurfacing projects must be reviewed for compliance with current lighting criteria. Project begin and end limits must define project lighting scope to be considered, regardless of the limits of resurfacing unless otherwise noted.

Projects with open road tolling gantries are not required to have roadside lighting unless required by another section of the TDH and/or a Lighting Justification Report. Where roadside lighting exists, the roadway lighting must be reviewed for compliance with current lighting criteria and GTR. All deficiencies within the project scope must be identified and corrected. The Turnpike Electrical Design Engineer and the Turnpike Project Manager must be notified regarding all lighting deficiencies found outside the project limits.

Where new poles and luminaires are being proposed, all poles, luminaires, foundations, and infrastructure within the project scope must be new.
Modification for Non-Conventional Projects:

All poles, luminaries, foundations and infrastructure must be new unless directed otherwise in the RFP.

Table 231.2.1 Lighting Initial Values

<table>
<thead>
<tr>
<th>Roadway Classification</th>
<th>Illumination Level Average Initial Foot Candle</th>
<th>Illumination Uniformity Ratios</th>
<th>Veiling Luminance Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Or Project Type</td>
<td>Horizontal (H.F.C.) Vertical (V.F.C.)</td>
<td>Avg./Min.</td>
<td>Max./Min.</td>
</tr>
<tr>
<td>Conventional Roadway Lighting and Signalized Intersections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limited Access Facilities, Major Arterials &amp; Highway Speed Tolling Gantry</td>
<td>1.7</td>
<td>N/A</td>
<td>4:1 or Less</td>
</tr>
<tr>
<td>All Other Roadways</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pedestrian Ways and Bicycle Lanes(^{(1)})</td>
<td>2.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sign Lighting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Ambient Luminance(^{(2)})</td>
<td>5.0 to 10.0</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Medium Ambient Luminance(^{(2)})</td>
<td>10.0 to 20.0</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>High Ambient Luminance(^{(2)})</td>
<td>20.0 to 40.0</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Rest Area Lighting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entrance and Exit</td>
<td>1.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interior Roadways</td>
<td>1.5</td>
<td>N/A</td>
<td>4:1 or Less</td>
</tr>
<tr>
<td>Parking Areas</td>
<td>1.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:

(1) This assumes a separate facility. Facilities adjacent to a vehicular roadway should use the levels for that roadway.
(2) Ambient luminance classifications are defined in the AASHTO Roadway Lighting Design Guide, Section 10.3. Refer to the Traffic Guide Drawings for information on sign panel sheeting.

For conventional lighting: These average illumination values should be considered standard, but should be increased, if necessary, to maintain a uniform ratio. The maximum illumination level average initial horizontal foot-candle value must be 2.25 FC for interstate, expressway, freeway, major arterials, and highway speed tolling gantries. The maximum illumination level average initial horizontal foot-candle values must be one and one-half values for all other roadways, pedestrian ways, and bicycle lanes.

For rest area and service plaza lighting: These average illumination values should be considered standard, but should be increased if necessary, to maintain a uniform ratio. The maximum illumination level average initial horizontal foot-candle values must be one and one-half values.

Add the following subsections

231.2.2 Box Girder Maintenance Lighting and Power

Welding or burning of the structure is not allowed. The electrical work associated with the box girders involves working in confined space areas. All precautions and rules according to "confined spaces" of the Code of Federal Regulations, 29 CFR 1910.146 apply. Emergency lighting must be provided within each box girder per NFPA 101.

The minimum conductor size must be No. 10 AWG. A green insulated conductor must be installed in each conduit run. The minimum conduit size must be 1 inch.

The six-hour timers must control the lighting contactors. Timers must be provided at each hatch entrance and mid span.

The light fixtures must be connected to branch circuit breakers separate from the receptacle branch circuit breakers.

The service voltage for the box girders must be 240/480 volts, single-phase, three-wires and then step down to the 120/240 volts through the mini power centers. A main disconnect switch must be provided immediately adjacent to the hatch door of each girder. The 240/480 volt-feeder must terminate in a distribution panelboard. The distribution panelboard must provide 480 volt power to each mini power center.

The number of mini power centers within each box girder must be determined based on the number of lights and receptacles. The maximum number of lights and receptacles within a mini power center must be as indicated on FDOT Standard Plans, Index 715-240 Maintenance Lighting for Box Girders.
231.2.3 Lighting Load Center and Wiring Criteria

The standard service voltage for the roadway lighting load centers must be 240/480 volts, single-phase, three-wires.

Roadway lighting load centers must be coordinated with utility service provider prior to Phase III Plan Submittal. Utility service transformers must be coordinated for connected and spare loads. Consideration must be given for utility standard transformer sizes and limitations. Where a lighting load exceeds typical utility service transformer sizes, the lighting load must be split, and multiple load centers provided to serve the load.

*FDOT Standard Plans, Index 639-001 Service Point Details* and *Lighting Guide Drawings* must be coordinated with the utility service provider’s requirements for electrical service (or electrical service standards). The electrical service point must be designed to meet all utility service provider’s requirements.

The load center location and surrounding area must have a minimum of 1’-0” between the load center and the design high water elevation.

Load center enclosure minimum dimensions must be as shown in the Turnpike Lighting Guide Drawings.

Where a load center is being replaced and existing poles, equipment, etc. are being re-fed, all equipment and identification labels must be replaced to include the new load center designation and circuit. Coordinate with the Turnpike Maintenance Engineer to properly update identification of equipment.

The voltage for the roadway luminaires must be 480 volts, single-phase, two-wires.

Roadway lighting circuit conductors must not be larger than #1 AWG. Circuits requiring conductors larger than #1 AWG must be coordinated with the Turnpike Electrical Design Engineer and Turnpike Maintenance Engineer.

Where existing conductors within a circuit are being replaced, the size of the new conductors must not be smaller than the existing conductors.

Dedicated circuits must be provided for daytime supplemental underdeck lighting. Daytime dedicated circuits must be in separate conduits from roadway lighting circuits. Where conduits are run in the same trench with roadway lighting conduits, the conduits must be separated in the pull boxes. Dedicated daytime lighting circuit conduits must be wrapped with electrical hazard tape in the pull boxes. Dedicated daytime lighting circuit conductors must be identified with an additional tag that states the conductors are live 24 hours a day, seven days a week.
Underdeck light fixture mounting details must be provided. Light fixtures/associated conduit may be field routed. Attachment of lighting equipment/associated conduit to MSE wall panels is not allowed. Attachment of lighting equipment/associated conduit to MSE copings is acceptable. Attachment to other bridge elements must conform to the Structures Design Guidelines Appendix 1A.

Roadway lighting must be connected to alternate circuits to prevent a total blackout of any section of the highway in the event a circuit is out of service. Minor replacements must be evaluated on a case by case basis.

<table>
<thead>
<tr>
<th>Modification for Non-Conventional Projects:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roadway lighting must be connected to alternate circuits unless directed otherwise in the RFP.</td>
</tr>
</tbody>
</table>

The maximum distance between pull boxes and/or splice boxes in long conduit runs is 300 feet.

A special power distribution design is required when new poles and luminaires are being proposed behind noise walls. Conduit, junction boxes, and pull boxes must be installed in front of noise walls on the roadside.

There must be no more than three circuits in a single conduit. Provide multiple conduits as needed in the plans.

All roadway crossings must be provided with a spare conduit and a dedicated pull box at each end of the crossing road. Use of light pole pull boxes is not allowed, where space is sufficient for providing dedicated pull boxes.

### 231.2.4 Temporary Lighting Criteria

The design of temporary lighting must meet the criteria shown in TDH 231.2. Temporary lighting design may require review from Central Office for the purposes of opening a project specific pay item. Photometrics, details, quantities, and layout in the roadway temporary traffic control plan for specific construction phases will be required.

### 231.2.5 Pole Design Criteria

Bridge mounted light poles (bridges and approach slabs) are not desirable and should be avoided where possible. This can be done by adjusting the pole spacing before and after bridge approaches. If bridge mounted light poles are unavoidable, their location must be
coordinated with the Engineer of Record for Structures Design (see Standard Plan Instructions for Index 521-660). Bridge-mounted poles must have pull box as specified in *FDOT Standard Plans, Index 630-010 Conduit Details-Embedded*.

Nominal mounting heights for conventional poles must be 40 and 50 feet as specified in *FDOT Standard Plans, Index 715-002 Standard Aluminum Lighting*. Nominal mounting heights for high mast poles must be between 80 and 120 feet as specified in *FDOT Standard Plans, Index 715-010 High Mast Lighting*. Technical special provisions (TSP) and details must be provided in those cases where special designs are required. TSPs must be signed and sealed by a Professional Engineer, licensed in the State of Florida.

Conventional roadway light poles must be aluminum and must not be painted.

A concrete slab is not required in those instances when the poles are located behind sidewalks. The pull box must be located flush with the sidewalk in front of the light pole. Plan details will be required for light poles located behind sidewalks to show layout of pull box, conduits, pole foundation, etc., especially for sites where limited Department-owned right of way exists.

A combination pole and pull box concrete slab is not required where the grade is 1:2 or greater and protected by guardrail.

All foundations and pull boxes must be coordinated with current and future grading to ensure that the top of the foundations and the pull boxes are not below grade. In addition, foundations, boxes (pull, splice, junction or similar), and lighting equipment must not be located within the limits of any drainage systems or other locations where water may intrude, or debris may accumulate.

All components of the pole cable distribution system must be listed by a nationally recognized testing laboratory.

The pole cable distribution system must be installed in the pull box adjacent to each light pole.

For poles with two luminaires, a single TC cable must be run from the adjacent pull box to the pole's handhole. From the pole's handhole, a pole cable distribution system is required for each luminaire.
231.3 Design Methodology

Add the following item to the list in the first paragraph

(3) For Roadway Segments beneath Bridge Underdecks: 5 feet longitudinally and 5 feet transversely along the roadway, including pedestrian travel ways.

Add the following paragraphs

A point-by-point, computerized photometric analysis must be performed for all roadway areas being illuminated throughout the project. Photometric data points must be legible. A copy of the results of this analysis must be included in the LDAR. The photometric analysis must identify and evaluate each roadway classification and area of illumination, as defined by the **FDM 231.3.1**, within the project scope. Each analysis zone must be identified for all distinct area/sections of roadway within the project scope. Some of these distinct areas may include: mainline, ramps, and roadway directions. Results must indicate foot-candle values displayed on plan view on 11” x 17” pages with 1/100th accuracy (0.XX foot-candles). Where solid objects, such as bridges, block light fixture contributions, a 3D graphic representation must be included to ascertain that solids were accounted for. Typical section photometric analyses are not considered a complete or thorough photometric analysis.

A point-by-point, computerized photometric analysis must be performed for all signs being illuminated throughout the project. A 1 foot by 1 foot maximum point spacing must be used for the point by point photometric for the entire area of the sign panel(s). A copy of the results of this analysis must be included in the LDAR. Results must indicate foot-candle values displayed on each sign panel with 1/100th accuracy (0.XX foot-candles).

A photometric analysis is required for projects where the relocation of light poles is included in the scope of work.

Provide an angle convention detail, if any tilting is required, to clearly depict fixture tilt orientation. A detail is required for each type of fixture being used (fixture on pole, sign luminaire, etc.). The detail(s) must be provided in the LDAR and the plan sheets.
231.3.1 Analysis Zones

Replace the first paragraph under the header “Limited Access Facilities” with the following paragraph:

Limited Access Facilities:

Establish independent analysis zones for the mainline roadway segments, ramp segments, underdeck segments, and crossroad segments at interchanges.

Add the following item to the list under the header “Limited Access Facilities”

(5) Analyze underdeck divided roadway segments using two analysis zones, one for each direction of travel. Include pedestrian travel ways (i.e. bike lanes and sidewalks). Each zone will be bounded by the back edge of the pedestrian travel ways or travel lane (where no pedestrian travel ways are provided).

231.6 Lighting Coordination

Replace the last paragraph with the following paragraphs:

Per FDM 110.5.1, all projects must be reviewed and coordinated with the FDOT State Aviation and Spaceports Office to determine if notification and/or permitting are required by the Federal Aviation Administration (FAA), (FDOT), and any local jurisdictions.

The preferred method of determining FAA notification requirements must be the FAA’s Online Notice Criteria Tool.

The designer must provide copies of all lighting related notifications and permits for review in the LDAR. If none are required, written notification must be given to that effect in the LDAR. For FAA accounts, designate the “Sponsor” as Florida’s Turnpike Enterprise (FTE) with the Turnpike Production Project Manager identified as the “Attention of.”

Coordination with the manager of any affected airport and/or heliport may be required to fully address the airspace aspects of the project.
Add the following paragraph

**Turnpike ITS and Tolls** – Once the light pole locations are established, they should be checked with the ITS layout and the toll equipment layouts for any conflicts with the light poles, the light pole pull boxes, and the roadway lighting circuits.

Add the following section and subsections

### 231.8 Electrical Systems Design and Analysis

The design of all electrical systems (Lighting, Traffic Signals, ITS, etc.) must comply with *FAC 61G15-33, Responsibility Rules of Professional Engineers Concerning the Design of Electrical Systems*. These responsibilities are applicable for all new projects and any major modifications or renovations.

The following analyses are required, yet not limited to: voltage drop calculations, load analysis and calculations, arc flash hazard analysis, and short circuit analysis and device coordination. These designs and analyses must be prepared, reviewed, signed and sealed by a Professional Engineer licensed in the State of Florida. The Professional Engineer must be competent in electrical engineering through training and/or experience. The design analyses must be submitted with each plan submittal as part of the LDAR for lighting projects and the Power Design Analysis Report (PDAR) for ITS projects.

Electrical system design analysis should be completed using accepted industry power system analysis software (i.e. ETAP, SKM, etc.). If calculations by hand are used, engineering judgment, assumptions and methods must be clearly explained in the report. All supplemental information used or referenced in the power design analysis must also be provided in the report.

#### 231.8.1 Voltage Drop

Voltage drop calculations must be submitted for all branch circuits and service feeders. Voltage drop calculations must be limited to the percentages shown in the *TDH* and/or *Guide Drawings*. If no criteria exist within the *TDH* and/or *Guide Drawings*, the standards set forth in the *FDM, FDOT Standard Plans*, and *FDOT Specifications* must be used. If no Turnpike or FDOT criteria exist, use the guidelines set forth in the *NEC*. Voltage drop calculations must be performed when additional loads are added to existing infrastructure to ensure the proposed conductors are sized appropriately for the total voltage drop resulting from the addition of new loads further from the existing circuits. Formulas, description of variables, and any other supplemental information required to evaluate design results must be included in the report.
231.8.2 Load Analysis

A complete load analysis must be submitted. This analysis must include but is not limited to: calculation of cabinet loads, circuit loads, and total loads for each service to determine and evaluate the appropriate capacity and rating for all components of the electrical system.

For any major modifications or renovations, calculations must consist of providing the existing load (prior to modification), the load being removed, the load being added, and new total load. A load analysis must be provided any time electrical load is added to existing infrastructure. All existing loads must be field verified by metering or calculated based on existing conditions.

New service points and load centers must be provided with a minimum of 20-percent spare capacity.

Manufacturer’s product data cut sheets containing equipment power requirements must be provided in the report. Generator sizing calculations, UPS sizing calculations, and any other calculations affected by power loads for the project must be provided in the report.

231.8.3 Arc Flash Hazard Analysis

Provide an arc flash hazard analysis for new electrical distribution equipment (panelboards, transformers, load centers, disconnects, etc.), per the latest version of the Standard for Electrical Safety in the Workplace, NFPA 70E. An arc flash hazard analysis must determine the arc flash protection boundary and the personal protective equipment (PPE) that personnel within the arc flash boundary must use. The arc flash hazard analysis must be updated when a major modification or renovation takes place. Arc flash and shock warning labels must be field installed on each piece of new electrical distribution equipment. The labels must indicate the flash hazard boundary, the flash hazard at 18 inches, the PPE level requirements, and the approach restrictions. All labels proposed for use on electrical equipment must be provided (in .pdf format) as part of the report and in the plans.

231.8.4 Short Circuit Analysis and Device Coordination

A short circuit analysis must determine maximum fault current on each piece of new electrical distribution equipment and proper fault current interrupting capacity. Provide documentation from the utility provider on the maximum available fault current at the utility transformer. This value must be used in the short circuit analysis. Software programs or hand methods used must be capable of calculating the maximum short circuits at all
Electrical distribution equipment must be designed as fully rated and selectively coordinated systems. The protective features of the electrical distribution system must automatically and selectively isolate a faulted or overloaded circuit from the remainder of the electrical system. Only the closest protective device to the fault must operate to isolate the fault without affecting other parts of the system.
232 Signalization

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

232.1 General

Add the following paragraph

Make every reasonable effort to incorporate the design preferences of the local maintaining agency. These preferences may include but are not limited to pole types, detector loop strategies, conduit routing, specific equipment, signal timing methods, etc. Meet with the maintaining agency to ascertain their preferences and obtain all other pertinent information. Report all findings to the Turnpike Project Manager before proceeding with design.

232.1.1 Structural Supports

Replace the second paragraph with the following paragraph

Refer to TDH 261 for information regarding structural support requirements. Refer to TDH 327 for information regarding plan requirements.

232.1.3 Certification and Specialty Items

Add the following paragraph

The design of traffic signals compatible with local signal systems may require the use of materials for which there are no approved FDOT Specifications. In those cases, develop project specific TSPs for inclusion in the contract document.

232.10 Traffic Signal Project Coordination

Add the following paragraphs

Verify that documentation exists that the signal is warranted. If documentation does not exist, contact the Turnpike Traffic Operations Office.
In general, the Turnpike will actively work with the local maintaining agencies and the geographic District Traffic Operations office for coordination of design and maintenance issues.

**Signal Systems** - At the request of the local maintaining agency any signals designed by the Turnpike will include features and equipment typically used for their signals and signal systems. This will include time base, closed loop, UTCS or other technologies. The communications medium must match those already in place.

**Legal Authorization and Maintenance Agreements** - New traffic signal locations must be discussed with the Turnpike Traffic Operations Engineer so the new traffic signals can be included in the existing agreement. Maintenance agreements exist between the geographic district and local agency. The Turnpike Traffic Operations Office is responsible for communicating and coordinating directly with each District Traffic Operations Office (District Traffic Operations Engineer and Traffic Signals Engineer (or equivalent)) on new or modified traffic signals, signal systems and/or intersection beacons. Refer to the Traffic Signal Maintenance and Compensation Agreement (TSMCA) Procedure for details.

Add the following note to the Signal General Notes sheet:

> Coordination must be made with the Turnpike Traffic Operations Engineer and Assistant Traffic Operations Engineer to prepare a traffic regulation for a warranted signal a minimum of 30 days prior to the signal going active.

Add the following section

**232.11 Electrical Systems Design and Analysis**

Refer to *TDH 231.8*. 
233 Intelligent Transportation Systems (ITS)

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

233.1 General

Add the following paragraph

Refer to **FDM 228** and Standard Scope of Services for information regarding landscaping and landscape design. Coordinate with the Turnpike Landscape Architect to avoid potential conflicts with existing or proposed landscape improvements.

233.1.3 ITS Device Approval and Compatibility

Add the following paragraph

Equipment requirements must be coordinated at time of final RFP or specification development with the Turnpike Traffic Operations Engineer to ensure the most appropriate manufacturers and models at the time.

233.3 ITS Power Design

Add the following paragraphs

Refer to **TDH 231.8** for electrical design requirements for ITS.

600V step-up electrical systems are prohibited.

Include Power Distribution Unit (PDU) within each device cabinet. The PDUs provide maintenance technicians the capability to instantly reboot, start, and stop equipment remotely. Coordinate with the Turnpike Traffic Operations Engineer for requirements.
233.3.2 Local Backup and Alternative Power Sources

*Add the following paragraph*

If any DMS has secondary backup power through a permanent generator, then the corresponding UPS for the sign must be able to operate on battery power and display messages for a minimum of 15 minutes.

233.3.5 Power Load Requirements

*Add the following paragraph*

Design for 100% of load for all ITS device types. Include 20% spare load capacity in every cabinet (excluding DMS loads) and in addition, include a 15A load at 120V, at the end of every circuit.

233.3.6 Voltage Drop

*Add the following paragraphs*

The total voltage drop from the service point or separately derived system to the furthest ITS equipment shall be as recommended by NEC. See 233.3.7 for additional information.

For the calculation of the voltage drop and the size of conductors from the ITS cabinet UPS to the ITS devices (and for DMS DC circuits), use the allowable voltage drop recommended by the manufacturer of the ITS equipment.

233.3.7 Installation of Power Cable

*Add the following paragraphs*

Maximum conductor size for ITS power circuits shall be #1/0 AWG. Larger Conductor sizes may be permitted from the utility service transformer to the service disconnect and from the service disconnect to the main distribution panel (load center, if applicable) to accommodate the total demand load calculated for all of the circuits. Coordinate with the utility company to provide service transformers at suitable locations to meet the maximum conductor size requirements.

Provide requirement to use gel-cap splices to splice electrical wires. No wire nut or electrical tape splicing is acceptable.
Power conduits must be sized adequately, as determined by the overall cable diameter and recommended percentage of fill of conduit area, per requirements in the latest National Electric Code (NEC) and FDOT Specifications, or a minimum of two inches (2”) conduits, whichever is larger.

233.3.9 Emergency Generator Power Systems (Generators)

233.3.9.1 Generator Design Requirements

Replace the second paragraph with the following paragraph

Use Diesel as the fuel type for permanent generator designs. The fuel tank shall be sized to provide 48 hours of run time at full (rated) load.

Add the following paragraphs

If permanent generators are included on a project, then the generator must include Automatic Transfer Switch (ATS), Communications cabinet, fuel tank, and support SCADA module. Coordinate with FTE ITS for requirements. Refer to the ITS Permanent Generator Installation Guide Drawings for guidance.

Provide Generator pad with a minimum clearance of 30” around the generator and fuel tank. Include pad design details with adequate information such as reinforcing, concrete class type/strength and installation notes.

233.4 ITS Support Infrastructure

Add the following paragraphs

All foundations, cabinets and pull boxes must be coordinated with current and future grading to ensure that the top of the foundations, cabinets and the pull boxes are not below grade.

Provide callouts/notes in the plans to indicate that existing infrastructure including but not limited to concrete poles, support structures, pull and splice boxes, foundations, conduit, fiber and wiring that are no longer used as part of the permanent ITS system must be removed and legally disposed.
233.4.1 Conduit Infrastructure

The fiber optic conduit system must consist of a minimum of four (4) 1-1/4” conduits. One (1) of the conduits must contain the fiber optic cable (FOC) backbone. One (1) of the conduits must contain tone wire and the other two (2) remaining conduits are spares. The conduits must utilize the colors as described below. In addition, for conduits that require stripes, include three (3) equally spaced longitudinal stripes of sufficient width and color intensity to be easily distinguished:

- Orange without stripes (fiber optic cable backbone);
- Orange with white stripes (tone wire);
- Orange with green stripes (spare); and
- Orange with black stripes (spare).

The electrical conduit system must consist of a minimum of one (1) 2” conduit, and must utilize Red colored (without stripes) conduit.

Lateral fiber conduit requirements for ITS must include two (2), 1.25-inch conduits, one of which one is a spare. The lateral conduits must utilize the following colors:

- Orange without stripes (lateral); and
- Orange with white stripe (spare).

Neither bridge-mount conduit nor barrier wall embedded fiber/electrical service wires will be allowed.

Each conduit shall include only one fiber cable; no collocation of fiber cables inside the same conduit is permitted.

233.4.2 Pull, Splice, and Junction Boxes

Provide requirements for splice vault wire management such as non-metallic cable supports to allow the slack cable to be positioned without resting on the ground. The railing system must provide at least 3 inches of separation from the cabling to the bottom of vault. Provide concrete apron as indicated in the standard index, ensuring appropriate compaction to reduce the possibility of washouts.
The top of pull, splice and junction boxes should be placed at a minimum of 2' above the appropriate drainage feature elevation described in TDH 230.1.

All splice boxes must be H-20 or HS-20 load rated with a minimum dimensions of 54"(L)x54"(W)x48"(D).

Any pull box proposed on shoulders or roadways must be H-20 or HS-20 load rated and include a solid bottom with provisions for weep holes and conduit entry. Pull boxes that are proposed outside shoulder/roadway must be Tier 22 load rated.

Pull boxes and splice boxes for fiber optic cable must be labeled and include the words “TPK FIBER OPTIC” permanently cast into their top surface.

Locate fiber pull/splice boxes such that the spacing between two consecutive fiber boxes (between pull box & pull box or pull box & splice box) does not exceed 1760 feet. Electrical pull boxes must be spaced at a maximum distance of 500 feet for the entire length of new projects.

Electrical pull box covers and Locate pull box covers for ITS must include the words “TPK ITS Electric” and “TPK ITS Locate” permanently cast into their top surface.

Pull boxes with low voltage (50V or less) ITS cables must include the words “TPK ITS Composite” permanently cast into their top surface.

233.4.3 Fiber Optic Cable Designating System

Add the following paragraphs

In addition to the Sunshine One Call number (800-432-4770) provided on each route marker, the following contact information must be shown:

Florida’s Turnpike Enterprise, Traffic Management Center 954-934-1400

The labeling on the Fiber Route Marker must be:

BEFORE DIGGING IN THIS AREA CALL
Florida’s Turnpike Enterprise
954-934-1400
AND
SUNSHINE ONE CALL
1-800-432-4770
For general coordination, provide the following contact information:

General ITS Coordination: 954-934-1400.

233.5 Fiber Optics and Network Design

233.5.1 Fiber Optic Cable

Add the following paragraphs

For new systems, the FOC backbone should utilize 144 single-mode fibers as a minimum (Minimum FOC 144 fibers mainline).

Lateral connections for ITS drops to the backbone must utilize 24 fibers as a minimum. Terminate all 24 fibers in the patchpanel at the local hub. See TDH 233.5.1.1 for additional details.

The wording on the warning tape shall include “CAUTION: TURNPIKE FIBER OPTIC CABLE BURIED BELOW”.

Ensure labeling on splice enclosures, exiting conduits, and FOC entering the boot with weatherproof laser printed tags (no sharpie or marker). Ensure labeling on patch panels inside of building installations. Use a permanent laser printed tag, waterproof labels, with a printout indicating the department, number of strands, stations upstream and downstream to the next hub. For example:

Department: TP-ITS Strands: 144
Install Date: 07/07/2013 Project: 420735-1-A
Current MP: 152.6
Upstream MP: 153.4
Downstream MP: 151.9

233.5.1.1 Splices, Terminations, and Connection Hardware

Add the following paragraphs

For new patchpanels at the local hubs, use preloaded SC duplex single mode, 12-port splice cassette(s) with pre-routed factory polished fiber pigtails and integral splice tray. Ensure the pigtailed splice cassette module(s) matches the appropriate patchpanel housing.

Terminate all fibers that enter a structure inside the rack.
Bring the entire backbone fiber and terminate all fibers inside a hub building. Do not bring any laterals into the hub building.

Do not use multimode fiber or copper in any underground backbone or lateral locations.

When the project work necessitates a break in the fiber cable, include provisions regarding allowable downtime. Provide any temporary splice drawings required during construction.

Permanent fiber optic cable must include replacement of the entire cable from the nearest existing termination point (butt end splice) to the next existing termination point (butt end splice) removing all temporary splices.

Add the following subsection

233.5.1.2 Fiber Optic Cable Assignment and Allocation Scheme

Assign the backbone fiber optic cable buffers based on the following functionalities:

- Blue and Green buffers → ITS Layer 3 Communications
- Orange buffer → ITS Distribution
- Red and Black buffers → Tolls
- Rest of the buffers → Reserved for other functionalities

Allocate Orange buffer fibers to respective ITS device(s) based on the following:

<table>
<thead>
<tr>
<th>ORANGE BUFFER FIBERS</th>
<th>ITS DEVICE TYPE</th>
<th>FIBER ALLOCATION REPETION/SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CCTV AND COLLOCATED DEVICES</td>
<td>Stagger between fiber pairs for each adjacent CCTV</td>
</tr>
<tr>
<td>3</td>
<td>DMS AND COLLOCATED DEVICES</td>
<td>Stagger between fiber pairs for each adjacent DMS</td>
</tr>
<tr>
<td>5</td>
<td>MVDS GENERATOR BLUETOOTH AVI WRONG WAY DETECTION</td>
<td>ALTERNATE BETWEEN FIBER PAIR</td>
</tr>
<tr>
<td>7</td>
<td>MVDS GENERATOR BLUETOOTH AVI WRONG WAY DETECTION</td>
<td>ALTERNATE BETWEEN FIBER PAIR</td>
</tr>
<tr>
<td>9</td>
<td>MVDS GENERATOR BLUETOOTH AVI WRONG WAY DETECTION</td>
<td>ALTERNATE BETWEEN FIBER PAIR</td>
</tr>
<tr>
<td>11</td>
<td>MVDS GENERATOR BLUETOOTH AVI WRONG WAY DETECTION</td>
<td>ALTERNATE BETWEEN FIBER PAIR</td>
</tr>
</tbody>
</table>
Coordinate with the Turnpike Network Administrator prior to Phase III submittal.

233.6 ITS Poles and Structures

233.6.1 Camera Lowering Device

Add the following paragraphs

The CCTV camera must be mounted at a minimum of 45 feet above the highest crown elevation of the mainline roadway, and in some cases may need to be higher to maintain 100% coverage of the roadway.

All new CCTV deployments must utilize a camera lowering device to facilitate maintenance for locations that are difficult to access or where pole heights greater than 45 feet.

233.7 ITS Enclosures

233.7.3 Equipment Shelter

Add the following paragraph

The design layout must include necessary master hub locations to minimize network traffic with an optimum spacing. However, it must be supported by a network layout and analysis with appropriate design loss calculations to meet the intent and requirements of this section and all applicable Turnpike and FDOT standards.

Add the following subsection

233.7.4 Maintenance Service Pads

Maintenance pads are required at each new ITS component support pole location. These pads must provide adequate clear space for maintenance access and protected from erosion and silt.

Provide a concrete service pad at all cabinet locations, which are new or existing with safety concerns, to allow a technician to stand on comfortably while working on equipment inside the cabinet. Service pad must allow access to cabinet equipment from each door.
At DMS locations with separate generators a leveled concrete pad of minimum eight feet (8’) by ten feet (10’) and six-inch (6”) thickness must be installed to support the DMS controller cabinet and generator.

### 233.8 Communication and Networking Devices

*Add the following paragraph*

Coordinate with the Turnpike Traffic Operations Engineer to ensure the most appropriate ITS device and equipment manufactures and models are included in the plans.

### 233.9 Vehicle Detection Systems

#### 233.9.3 Microwave Vehicle Detection Systems (MVDS)

*Add the following paragraphs*

In rural areas, MVDS devices must be spaced at 1 mile intervals and co-located with other ITS equipment, like CCTV. For urban areas, the MVDS devices must be spaced at ½ mile intervals.

The MVDS should be installed at CCTV Camera locations to minimize costs, and where conflicts between the MVDS and CCTV lowering device can be avoided. The use of roadway lighting poles or sign structures for the installation of CCTV cameras and MVDS sites is not allowed.

#### 233.9.5 Automatic Vehicle Identification (AVI) Systems

*Add the following paragraphs*

For travel time data collection, provide VDS-AVI equipment based on Bluetooth technology. VDS-AVI equipment must be installed at each walk-in DMS and every interchange, with a maximum spacing of approximately 3 to 5 miles, and in accordance with the manufacturer’s requirements.

Provide a travel time origin-destination and link development submittal. This submittal must be coordinated with the Turnpike Traffic Operations Engineer, ensuring adequate link and site design / selection to provide adequate read and matches to provide a reliable travel time. This submittal must clearly identify each VDS-AVI location, message origin and destination, segment length, and anticipated DMS travel time message. In addition,
this submittal must identify the links and messages for the FL 511 designation, which will be provided for critical segments from interchange to interchange.

233.10 Closed-Circuit Television Systems

*Add the following paragraphs*

Provide IP-addressable CCTV cameras with, Power over Ethernet (PoE) and built-in encoder utilizing H.264 video compression standard. Provide camera capable of providing 1080p resolution.

Provide 100% video coverage of the project corridor General Toll Lanes, and managed lanes (as applicable) including shoulders, entrance/exit ramps, Master Hubs, ITS Cabinets, generators and walk-in DMS. Show cone of vision guidelines to ensure the CCTVs can view corresponding DMS clearly.

*Add the following subsection*

233.10.1 Video Display Systems

Video wall requirements must be coordinated at time of final RFP or specification development with the Turnpike Traffic Operations Engineer to ensure the most appropriate manufactures and models.

233.11 Motorist Information Systems

233.11.1 Dynamic Message Sign (DMS)

*Add the following paragraphs*

When general purpose mainline DMS is proposed, a travel time sensor compatible with the existing Vehicle Detection System – Automatic Vehicle Identification (VDS-AVI) System, formerly known as travel time system (TTS), must be installed at the site.

Any walk-in DMS proposed on structures collocated with static signage in the same direction requires a signed approval from the Turnpike Traffic Operations Engineer and local agency, if applicable. Submit a Design Memorandum prior to the Phase II submittal detailing background information, proposed sign structure location, reasons for collocation, any disadvantages to collocation, illustration of the sign structure with proposed DMS and collocated sign(s), adjacent guide signs, and any additional details to
support the recommendation. Include signature and date entries for the EOR and the Turnpike Traffic Operations Engineer.

New walk-in DMS installed on the mainline must be capable of displaying 18" characters, 21 characters per line, three lines, full color, full matrix messages with 20mm pixel pitch (resolution).

Arterial DMS (also known as “ADMS” or “Front Access DMS”) must be capable of displaying 15 characters per line, three lines, full color and full matrix messages with 20mm pixel pitch (resolution).

Toll Facility Approach DMS (TDMS) must be full-color with 20mm pixel pitch (resolution). TDMS must be located 1-mile to 2-miles from the toll facility being considered, and must be located to provide adequate perception-reaction distance for the approaching motorists.

For all types of DMS, provide a ground accessible cabinet to install UPS head units and associated battery equipment to meet backup power requirements. Transfer switch, auxiliary power and generator connection must be installed. Coordinate with the Turnpike Traffic Operations Engineer to see if a separate generator is required.

233.11.2 Highway Advisory Radio (HAR)

*Add the following paragraphs*

Existing HAR Transmitter (HART) and HAR Beacon (HARB) locations impacted by project work must be relocated to maintain system effectiveness, in accordance with FCC licensing requirements.

A typical HAR deployment consists of one (1) HART and two (2) HARB signs. One HARB is installed in each direction approaching the HART. A frequency study should be performed to determine a location for the HARB and HART. Ideal locations provide adequate signal strength and minimal potential interference of the radio signal between HARB and HART locations. A practical spacing of 3 miles is recommended between the HART and HARB location to ensure adequate signal strength at the beacon locations.

Coordinate HAR relocations with FDOT State Traffic Engineering and Operations, who maintains FCC licensing information for each HART. The Radio Frequency (RF) output is power adjustable up to the FCC maximum of 10 watts. The maximum power level must be in accordance with the requirements of the FCC License.

The existing and desired radio frequency is established at 1640 AM (1640 KHz), as licensed by the FCC.
240 Transportation Management Plan

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

240.1 General

*Replace the second sentence in the second paragraph with the following sentence*

Depending on the project logistics, the team composition may include FHWA, local government, business representatives, Florida Highway Patrol, and Emergency Responders.

240.1.1 TMP Reference Documents

*Add the following items to the list in the first paragraph*

(9) FDOT Drainage Manual
(10) Turnpike Supplement to the FDOT Drainage Manual
(11) General Tolling Requirements (GTR)

240.2 Temporary Traffic Control Plan

240.2.1 TTCP Details

240.2.1.2 Work Zone Speed

*Add the following paragraph*

All transitions and tapers for work zones must be based upon the preconstruction speed limits. For any locations incorporating speed reductions, speed limit signs must be installed departing the work zone to "restore" the speed limit to its preconstruction limit. During non-construction periods the speed limits must be restored to preconstruction limits.
240.2.1.4 Superelevation

*Add the following paragraphs*

The transition from existing to temporary pavements is a critical area. These areas are prone to flooding since all the permanent construction features do not exist. These incomplete features include final pavement elevations and drainage facilities. Frequently, these temporary pavement transitions are superelevated with almost flat profiles. Elevations and grades with all superelevation data are required to be shown to ensure the intended design is constructed.

Diversions with construction speeds of 50 mph or greater are considered high speed facilities. Curvature and superelevation criteria for open highway conditions apply and must meet superelevation criteria described in the *FDM 210.9* and *211.8*.

240.2.1.5 Lane Widths

*Add the following paragraphs*

The minimum lane width for work zone travel lanes is 11 feet on Turnpike facilities, except at least one 12 ft. lane located on the outside in each direction must be provided. Auxiliary, turning, acceleration or deceleration lanes are not to be considered as the outside lane.

The lane width for work zone travel lanes on single lane ramps shall be no less than 12 feet minimum. For single lane ramps the lane width provided for turning movements must accommodate WB-62FL trucks entirely within the pavement markings of the travel lane. Ramps that service Tandem trucks must accommodate the WB-109D truck entirely within the pavement markings of the travel lane. Truck turning templates and AutoTurn Analysis must be provided in the TTCP design documentation.

Shoulder widths associated with the travel lanes must be designed to achieve a minimum of two feet in width (paved). Spread must be checked to verify that the provided shoulder width complies with the criteria in *Chapter 3.9.1* of the *FDOT Drainage Manual*.

Milling and resurfacing must utilize a minimum offset of four feet from Turnpike traffic and the milling operation or the resurfacing operation.

Consideration should also be given to maintain the maximum shoulder width up to 12-feet whenever possible to benefit motorists and for use by law enforcement and emergency responders for incident management.
240.2.1.6 Lane Closure Analysis

Add the following after the third paragraph

Approval must be obtained prior to Phase II plans being submitted for review.

Add the following paragraphs

The Turnpike System is a major intrastate facility that is vital in the case of evacuations due to weather and other disasters. The Turnpike also serves as a diversion route for various Interstates, including I-95 and I-4. All construction zones must be able to reopen all lanes in the event of evacuation. The development of a traffic control plan must not include prolonged lane reductions on mainline, ramps, auxiliary lanes, etc. The staging of a particular construction project must permit the roadway to be restored to its original number of lanes within 24 hours. If necessary the use of temporary bridges must be included in the traffic control plans to avoid prolonged lane closures due to work on the bridge.

Lane closure traffic data must be obtained from Turnpike Traffic and Planning Office including a growth rate factor and peak seasonal factor for all production design projects. See Turnpike Lane Closure Guidelines for additional information and guidance. The Lane Closure Guidelines can be found on the Turnpike Design website.

Develop analysis for both the begin construction year and the end construction year for projects twenty-four months and longer. Lane closure analyses are to be submitted for review in electronic format and include traffic data as attachment for reference. If a detour and/or a prolonged closure is proposed on a project, the lane closure analysis must also include traffic analysis of the affected ramps. In terms of prolonged closure, include analysis and effect of closure(s) on the capacity and operations at the interchange.

Daytime closures will be considered/allowed if a closure is more beneficial to the Turnpike, its customers and adjacent property owners. For example, driving guardrail posts at night adjacent to homes is not as desirable as daytime closures which would support the work during the day and minimize the noise pollution and complaints from the adjacent property owners. Provide all supporting documentation including, but not limited to, lane closure analysis and the specific reasons why the request is being made. On certain projects, daytime lane closures may not be applicable throughout the entire project. This aspect must be considered for the design when making a recommendation. Evaluate adjacent project closure hours and include analysis and recommendation.

In addition to daytime lane closures, lane closures from sunup Friday until sundown Sunday (weekend) are prohibited. Weekend lane closures will also be considered/allowed if a closure is more beneficial to the Turnpike, its customers and adjacent property owners.
Refer to the *Turnpike Lane Closure Policy* for more information.

**Add the following subsections**

### 240.2.1.6.1 Requesting Deviations from the Turnpike Lane Closure Policy

Deviations from the *Turnpike Lane Closure Policy* are highly discouraged and should only be considered when all other alternatives are deemed impossible, impractical, or unsafe. Deviations must be requested with the necessary justification in accordance with the *Turnpike Lane Closure Policy*. A Design Variation Memorandum must be prepared and approved by the Turnpike Director of Transportation Operations or designee(s) in addition to the Turnpike Design Engineer as soon as possible in the design and no later than Phase III. In addition to the requirements of *FDM 122*, the Design Variation Memorandum must contain justification that includes:

1. Summarization of the Lane Closure Analysis
2. Evaluation of the 5-year crash data (including time of day analysis)
3. Alternatives Considered
   - Explain why these alternatives are impractical, impossible, or unsafe.
   - Include rough cost, impacts to right of way, environment, community, operations, etc.

The Design Variation Memorandum must also include a summary, conclusions and appendices of the supporting documentation.

A coordination meeting with Turnpike Traffic Operations Engineer, Turnpike Roadway Design Engineer and Turnpike Construction Engineer is required prior to requesting the deviation which is done as part of the 45% MOT meeting and no later than Phase II.

### 240.2.1.7 Traffic Pacing

**Add the following paragraphs**

*FDOT Standard Plans, 102 Series Traffic Pacing* also includes a design table applicable to most work times of 20 minutes or less. The table is based on a pacing speed of 20 mph. Slower pacing speeds are not recommended but can be selected when necessary to shorten the pacing distance. See *Turnpike Lane Closure Policy* for additional guidelines on Traffic Pacing.
Site specific conditions will dictate whether a pacing operation can be implemented; therefore, coordination is required at the time the Traffic Control Plan is being developed. The type of work will determine the construction equipment and required staging areas the contractor will need, particularly for placing bridge beams. Review of these issues will determine if lane closures will need to be used along with the pacing operation, or if the traffic will have to be detoured instead of paced.

Refer to *TDH 242.7* for Traffic Pacing Restrictions.

### 240.2.1.8 Detours, Diversions, and Lane Shifts

*Add the following items to the list in the fourth paragraph*

1. Cross-slope break overs must be located on stripe lines except when the lane is actively transitioning.
2. Lane cross slopes are required to be per *FDM 211.2.2*.
3. TTCP will provide provisions that pavement drop offs must be on lane lines.

*Add the following subsection*

### 240.2.1.16 Exit Ramp Opening

Work in the vicinity of an exit ramp shall adhere to the requirements shown in the *Figure 240.2.1* below. All other elements not specified herein shall meet the requirements shown on the MUTCD latest edition Figure 6H-42.
Figure 240.2.1 Work in the Vicinity of an Exit Ramp
240.2.2 Temporary Traffic Control Devices

240.2.2.1 Signs

_Add the following paragraph_

Prepare details for nonstandard TTC signs that do not have a standard MUTCD or FTP number. Provide the details on guide sign worksheets in the plans.

240.2.2.2 Work Zone Pavement Markings

_Add the following paragraphs_

All proposed, temporary, or pavement markings to be removed must be detailed completely in the plans for a proper layout. This includes either dimensions to physical features or stations and offsets.

Overlays or milling with overlays is the only acceptable method(s) to achieve a positive means for the obliteration of existing pavement markings in areas such as long-term crossovers, diversions and in some cases tangent sections that provide a rough riding pavement.

High pressure water blasting is the only acceptable method for the removal of conflicting pavement markings in those areas not mentioned above. When removing pavement messages via water blasting, the entire area within the pavement message, including the interior of the message that is not painted or have thermoplastic, must be water blasted so that the message outline is completely obliterated and drivers are not able to read or see the scar outlining the former message.

240.2.2.3 Temporary Raised Pavement Markers

_Add the following paragraph_

RPMs used to delineate traffic control lane lines must be installed in conjunction with lane stripes.

240.2.2.7 Portable Changeable Message Signs

_Add the following paragraphs_

Use of remotely programmable portable changeable message signs (PCMS) should be considered as needed. These PCMS could be activated and changed in real-time by Turnpike TMC for better work zone management.

For planned lane closures and detours, a PCMS must be placed and must display an advanced notification message one week prior to lane closure or detour. Time may be extended if deemed necessary but should not extend 14 calendar days. The message must include the month and day(s) of the implementation of the closure or detour. Prior to closure, the message must read location “TO CLOSE” with the date. During the closure the message must read the location is “CLOSED”.

### 240.2.2.11 Law Enforcement Officers

Add the following paragraphs

All lane and ramp closures require the use of traffic control officers for the duration of the closure. Coordinate the use of additional traffic control officers with the Turnpike Construction Engineer at the preliminary TCP submittal, or at a minimum, prior to the Phase II submittal. This must be an item of discussion at the 45% Traffic Control Meeting.

The locations and/or need for additional traffic control outside of the conditions called out in the **FDOT Specifications, Section 102** and must be documented in a Design Variation Memorandum identifying the additional locations and the corresponding considerations of a safety issue to the motorist and workers.

A matrix indicating the estimated hours for traffic control must be developed and provided to the Turnpike Construction Engineer during coordination with law enforcement personnel. Coordination with the Turnpike Construction Engineer must include discussion on placement of the matrix within the plans and/or the design documentation.

<table>
<thead>
<tr>
<th>TRAFFIC CONTROL OFFICER ESTIMATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direction/Phase</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>NB Phase I</td>
</tr>
<tr>
<td>NB Phase II</td>
</tr>
<tr>
<td>SB Phase I</td>
</tr>
<tr>
<td>SB Phase II</td>
</tr>
<tr>
<td>Total Hours</td>
</tr>
</tbody>
</table>

This matrix is *an example* and must be modified as required for each project.
240.2.2.12 Motorist Awareness System

Add the following paragraphs

Required real-time communication and coordination with Turnpike TMC for traveler information device usage should be utilized. Dynamic message signs and other traveler information devices can be used by Turnpike TMC for motorist information.

All lane and ramp closures require the use of FDOT Standard Plans, 102 Series Motorist Awareness System.

240.2.2.15 Temporary Highway Lighting

Replace paragraph 1 with the following paragraph

When practical, existing highway lighting is to remain in service during all phases of construction or until new lighting is installed and placed in service. Temporary lighting systems are required for all roadways where existing lighting is being replaced or new lighting is being constructed. Prepare a specification that completely describes what is to be done during all phases of construction. Give detailed information on poles, conduit, and/or conductors that would have to be installed. A field survey must be conducted to establish the condition of any existing system(s) and what responsibility the contractor will have in bringing the existing lighting system(s) back to an acceptable condition. When used, temporary highway lighting must comply with the following:

Add the following subsections

240.2.2.20 Emergency Pull Off Area

All capacity improvement (widening, reconstruction, etc.) or interchange projects that are greater than one mile in length along the mainline, and reduce the outside mainline shoulder width less than eight feet wide, must include provisions for an emergency pull off area. The emergency pull off area must be located to the right of the outside travel lane for use by patrons and emergency management personnel. The emergency pull off area must be a minimum of twelve feet wide and 500 feet long located every one-half to one mile and no closer than one-half mile from an interchange. The emergency pull off area must maintain the adjacent lane or paved shoulder cross slope and be paved with chevron pavement markings at 60 foot spacing. The emergency pull off area must not be designated as an ingress/egress location for the contractor.
240.2.2.21 Temporary Drainage

Design the temporary drainage facilities necessary during all construction phases. This includes but is not limited to designing temporary ditches, the size and length of pipes, placement of inlets and where necessary, calculating inlet hydraulics and spread where water may pool along temporary barrier wall or curbing adjacent to an inside lane. All temporary drainage items must be shown in the plans and quantified.

240.2.2.22 Friction Course on Temporary Pavement

New structural asphalt has similar friction factors as friction course. The use of friction course asphalt on temporary pavement during construction will be used on a case by case basis and consider the duration of the construction phase, drainage, cross slope, operating speed and horizontal curvature.

240.2.2.23 Standard MOT General Notes

See the Roadway Guide Drawings for standard MOT General Notes that must be shown on traffic control plans as applicable. Roadway Guide Drawings are located on the Turnpike Design website.

240.2.2.24 Paving Milled Surfaces Prior to Opening to Traffic

The temporary traffic control plan must ensure that all milled surfaces are paved prior to opening to traffic. Incorporate FDOT Developmental Specifications, DEV327SDP Milling of Existing Asphalt Pavement – Restricted Milling Operations into the project specification package.
240.3 Transportation Operations Plan

Table 240.3.1 Transportation Operation Strategies

*Add the following items under the column “Safety Management and Enforcement”*

<table>
<thead>
<tr>
<th>Safety Management and Enforcement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specialty tow or flatbed wreckers, incident response trucks (IRT)</td>
</tr>
<tr>
<td>Emergency Access, Emergency Stopping Sites, Glare Screens</td>
</tr>
</tbody>
</table>
241 Lane Closure Analysis

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

*No changes to this chapter*
242 Traffic Pacing Design

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

242.1 General

Add the following paragraph

*FDM 242.4* is not applicable. See [Turnpike Lane Closure Policy](#) for allowable hours of Traffic Pacing.

Add the following section

242.5 Traffic Pacing Restrictions

The construction of span sign structures or span toll gantry structures shall be performed utilizing detours where practical. Project specific needs may warrant the use of traffic pacing for these activities. If traffic pacing is determined to be necessary, provide sufficient justification and obtain concurrence from the Turnpike Traffic Operations Engineer prior to designing traffic pacing for these construction activities.

The number of allowable detours, durations, and restrictions must be defined in the plans.

<table>
<thead>
<tr>
<th>Modification for Non-Conventional Projects:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delete <em>TDH 242.5</em> and refer to the RFP for Traffic Pacing Restrictions.</td>
</tr>
</tbody>
</table>

243 Portable Changeable Message Signs

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

*No changes to this chapter*
250 Hydraulic Data and Agency Permits

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

250.1 General

Add the following paragraph

For projects with bridges over water bodies, the 15% submittal should depict the existing and proposed bridge pile alignments (substructures) to indicate any impact or change to the hydraulics.
251 Stormwater Pollution Prevention Plan (SWPPP) Development

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

No changes to this chapter
260 Bridge Structures

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

260.6  Vertical Clearance

Add the following note to Table 260.6.1

(1) Existing bridge vertical clearances between 16 feet and 16.5 feet must be maintained or increased.
261 Structural Supports for Signs, Signals, Lighting, and ITS

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

261.1 General

*Add the following sentence to the end of the first paragraph*

Use of a custom design sign structure requires written (email) approval of the Turnpike Structures Design Engineer.

*Add the following item to the list in the third paragraph*

- **FDOT Standard Plans, Indexes 700-040 Cantilever Sign Structure** and **700-041 Span Sign Structure**: avoid truss depths greater than 8 feet due to inspection issues.

*Add the following paragraph*

Ancillary structures (signs, signals lighting, ITS) must use a galvanized coating per the **FDOT Standard Plans**. Do not paint or otherwise coat these structures without consent of the Turnpike Structures Design Engineer.

261.2 Sign Support Structures

*Add the following sentence to the end of the sixth paragraph*

Coordinate with the Turnpike Maintenance Engineer to request structure identification numbers for overhead sign structures. See **TDH 325.9** for more information.

261.5 ITS Support Structures

*Add the following paragraph*

Every effort should be made to use ITS support structures from the **FDOT Standard Plans**. Confirm that the **FDOT Standard Plans** are applicable by comparing project-specific attachments and site conditions versus the assumptions in the Standard Plans Instructions (SPI). Provide design and details based on the proposed attachments to ITS poles. Symmetrically placed prestressing should be considered where applicable.
261.7 Evaluating Existing Sign, Signal, Lighting and ITS Support Structures

261.7.2 Category 2 Analytical Evaluation

Add the following sentence to the end of the paragraph

Design Exceptions typically will not be approved.
262 Retaining Walls

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

262.2 Retaining Wall Plans Submittal Procedures

Add the following paragraph

If any wall system is proposed to be connected to an existing MSE wall, and the existing soil reinforcement provides resistance for the new wall, the design life of the existing wall system must be analyzed to confirm that it has the same design life as the new wall. This analysis must be submitted for review with the Phase III submittal (or 90% Plans). Internal and external wall stability analyses must use the lowest soil friction angle, as determined by direct shear tests following FM 3-D3080 to model existing MSE wall backfill.
263 Geosynthetic Design

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

263.1 General

*Add the following sentences to the end of the second paragraph*

The use of Reinforced Soil Slopes will most likely preclude the installation of large plant material and relegate the use of sod which necessitates expensive and dangerous mowing operations. Prior to deciding to use Reinforced Soil Slopes, coordinate with the Turnpike Landscape Architect to assure that geosynthetic reinforcement is compatible with beautification goals and programmed or planned landscape projects.
264 Noise Walls and Perimeter Walls

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

264.2 Noise Walls

264.2.2 Noise Abatement Criteria

264.2.2.2 Reasonableness

Add the following paragraphs

Maintenance access points must be provided for noise walls constructed along the Turnpike system. The spacing between openings or the ends of the noise wall must be no greater than one-half mile. Coordinate all maintenance openings with the Turnpike Project Manager and the Turnpike Maintenance Department. Refer to the Noise Wall Maintenance Access Detail included as part of the Turnpike Structures Guide Drawings, which can be found on the Turnpike Design web site, for acceptable access opening types and example details of maintenance doors. Prepare the final Control Drawings and all details required for the proposed openings.

Ensure that the noise wall study station limits, for Concrete Barrier/Noise walls, are extended to account for any tapers, attenuators or guardrail required during final design as required by the FDOT Standard Plans. This also applies to overlapping noise wall installations. These changes may require reanalysis in an updated Noise Study Report Addendum document due to site specific geometry.

Show the location and limits (stations and offsets), including any tapers, for the traffic railing/noise walls in the contract plans. Provide dimensions “D” and “L” depicted in the Noise Wall Maintenance Access Guide Drawings for any proposed access points.
265 Reinforced Concrete Box and Three-Sided Culverts

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

No changes to this chapter
266 Bicycle and Pedestrian Bridges

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

266.2 Design Criteria

*Add the following sentences to item (7)(b) on the list in the first paragraph*

(b) Use full screening on pedestrian bridges crossing Turnpike right of way. When fencing is required, the limits of fencing is from the beginning of the approach slab at Begin Bridge to the end of the approach slab at End Bridge.
267 Working Drawing Submittals

The following are changes, additions or deletions to the January 2020 FDOT Design Manual (FDM), Topic #625-000-002, for use on Turnpike projects only.

*Replace within whole chapter*

Any references outlined within *FDM 267* to the Engineer of Record shall be replaced with Architect of Record or Engineer of Record (AOR or EOR).

267.4 Submittals Requiring a Specialty Engineer or Contractor’s Engineer of Record

*Replace the first paragraph with the following paragraph*

When required, the Specialty Engineer or Contractor’s Engineer of Record must provide a digitally signed and sealed Working Drawing submittal. The signed and sealed Working Drawings, as well as a working copy for comments and stamping, will be retained by the Department as the official, Record Working Drawing as a portfolio.

267.5 Transmittal of Submittals

267.5.2 Requirements for Consultant EOR (Full Services)

267.5.2.2 Review by Engineer of Record and the Department

*Replace this subsection with the following paragraph*

On projects where the EOR is a Consultant to the Department and has been retained by the Department to review construction items, submittals (unless otherwise noted below) must be transmitted by the Contractor directly to the Consultant. Upon receipt of the submittal, the Consultant must perform the review, note any comments on the sheets, indicate his disposition by stamping the sheets as described hereinafter, and transmit the sheets to the FDOT Shop Drawing Review Office for review and distribution. When submittals require a Specialty Engineer, the original digitally signed and sealed submittal forms the official, Record Working Drawing submittal and must be retained by the Department. Upon completion of his review, the Consultant must add his comments to a working copy of the digitally signed and sealed sheets.
267.6 Disposition of Submittals

Modification for Non-Conventional Projects:

Replace blue box with the following

Delete the above paragraph and replace with the following:

The approval or disapproval of submittals by the EOR must be indicated by one of the following designations: "APPROVED" (no further action required), "APPROVED AS NOTED" (make corrections noted - no further submittal required), "RESUBMIT" (make corrections noted and resubmit for approval), or "NOT APPROVED" (rejected - do not resubmit the concept or component as submitted). Only working drawings that have been "APPROVED", or "APPROVED AS NOTED" must be submitted to the Department for review. Submit copies of QA/QC working drawing check prints to the CEI along with the working drawing.

The CEI must stamp the drawings “RELEASE FOR CONSTRUCTION”, “RELEASE FOR CONSTRUCTION AS NOTED”, OR "RESUBMIT". Where possible, mark all necessary requirements on the working drawing sheet and stamp “RELEASE FOR CONSTRUCTION AS NOTED” instead of requiring a resubmittal.

Replace item (2) on the list in the eighth paragraph with the following item

(2) The Working Drawings are correctly digitally signed and sealed by the Specialty Engineer or Contractor’s Engineer of Record.

267.9 Submittal Activity Record (Logbook)

Replace this section with the following paragraphs

Turnpike Shop Drawing Review Office is the Final Review Office and keeps the Shop Drawing Activity Record (Logbook), using ProjectSolve. An activity log (or Status Report) of submitted working drawings can be generated for each project on a daily basis. The following data is entered and generated within the ProjectSolve System.

(1) Financial Project ID
(2) Contract Number
(3) Roadway Division or Specification Section
(4) Turnpike Working Drawing Number
(5) Description of Working Drawing Entry (Title)
(6) AOR or EOR Submittal Number (if applicable)
(7) Contractor Submittal Number (if applicable)
(8) Date Submitted by Contractor to the AOR or EOR
(9) Date Submitted by AOR or EOR to Florida’s Turnpike Enterprise Shop Drawing Review Office
(10) Date Distributed by the Final Review Office to the Contractor
(11) AOR or EOR Disposition
(12) Turnpike Disposition

ProjectSolve gives a historical record of individual working drawing reviews. It can serve as verification of review time, to respond to inquiries regarding a working drawing’s status and as a record of manpower effort to aid in estimating and allocating future workload. It is also used as inventory for FDOT Statewide components for future maintenance.

267.10 Archiving Record Working Drawings

*Replace this section with the following paragraphs*

The ProjectSolve Team is working on an automatic system for archiving Working Drawings once they are processed. They will be working with Turnpike Shop Drawing Review Office to train them on this process. Any previous forms of archiving Working Drawings will be replaced by the new process.

Refer to the Section 267.9 above, which explains the Shop Drawing Activity Record (Logbook).
267.11 Working Drawing Flow Diagrams

Replace the first paragraph with the following paragraph

Figures 267.11.1 through 267.11.4 show the submittal and distributional flow of working drawings for reviews.

Replace Figures 267.11.1 through 267.11.5 with the following figures
Figure 267.11.1 Turnpike Working Drawing Flow Chart for Reviews with Consultant EORs without FDOT Review (Design Bid Build/Conventional Projects)
Figure 267.11.2  Turnpike Working Drawing Flow Chart for Reviews Performed by Consultant EORs with FDOT Review (Design Bid Build/Conventional Projects)
Figure 267.11.3  Turnpike Working Drawing Flow Chart for Design Build/Non-Conventional Projects – Working Drawings Affecting Public Safety

- **Subcontractors, Suppliers, Fabricators**
- **Design Build Contractor**
  - Initiates and submits shop drawing thru ProjectSolve™
- **Independent Peer Reviewer**
- **Design Build Architect of Record or Engineer of Record (DB AOR or EOR)**
  - ProjectSolve™ provides a system generated email notification
  - Reviews shop drawing
  - Reviewed shop drawing is routed to Turnpike thru ProjectSolve™
- **Turnpike Shop Drawing Review Office**
  - ProjectSolve™ provides a system generated email notification
  - Distributes shop drawing to Turnpike Reviewer
  - Turnpike reviews shop drawing and routes to CEI for RCP stamping thru ProjectSolve™
  - Submits final processed shop drawing thru ProjectSolve™
- **Engineer (CEI)**
  - ProjectSolve™ provides a system generated email notification
  - Incorporates “Release for Construction” and/or “Release for Construction as Noted” stamp
  - Routes back to Turnpike thru ProjectSolve™
- **Design Build AOR or EOR**
- **Design Build Contractor**
- **Engineer (CED)**
- **Turnpike Construction Project Manager**
- **Turnpike Project Manager**
- **FDOT District Precast Inspector** (If Applicable to Project)
- **Welding Inspection and/or Structural Coating Inspection Firms** (If Applicable to Project)
Figure 267.11.4  Turnpike Working Drawing Flow Chart for Design Build/Non-Conventional Projects – Working Drawings Not Affecting Public Safety

Subcontractors, Suppliers, Fabricators

Design Build Contractor
- Initiates and submits shop drawing thru ProjectSolve™

Design Build Contractor
- Coordinates review with DB AOR or EOR outside of ProjectSolve™ and either DB Contractor or DB AOR or EOR submits reviewed shop drawing thru ProjectSolve™

Design Build Architect of Record or Engineer of Record (DB AOR or EOR)
- ProjectSolve™ provides a system generated email notification
- Reviews shop drawing
- Reviewed shop drawing is routed to Turnpike thru ProjectSolve™

Turnpike Shop Drawing Review Office
- ProjectSolve™ provides a system generated email notification
- Distributes shop drawing to Turnpike Reviewers
- Turnpike reviews shop drawing and Shop Drawing Review Office routes to CEI for RFC stamping thru ProjectSolve™
- ProjectSolve™ provides a system generated email notification
- Submits final processed shop drawing thru ProjectSolve™

Engineer (CEI)
- ProjectSolve™ provides a system generated email notification
- Incorporates “Release for Construction” and/or “Release for Construction as Noted” stamp
- Routes back to Turnpike thru ProjectSolve™

Design Build AOR or EOR

Design Build Contractor

Engineer (CEI)

Turnpike Construction Project Manager

Turnpike Project Manager

FDOT District Precast Inspector
- If Applicable to Project

Welding Inspection and/or Structural Coating Inspection Firms
- If Applicable to Project