General Tolling Requirements (GTR)

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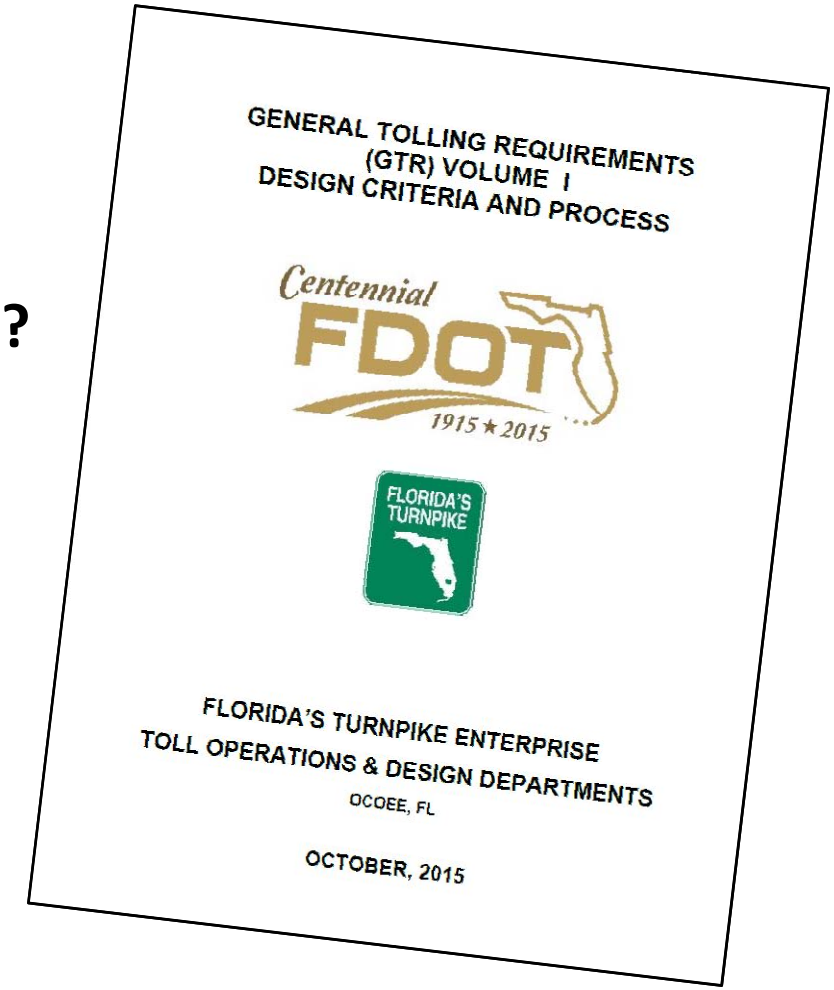
APPROACH

1. WHY use the GTR?
2. WHAT is GTR criteria?
3. WHEN should the GTR be used?
4. WHO should you contact?


GENERAL TOLLING REQUIREMENTS
(GTR) VOLUME I
DESIGN CRITERIA AND PROCESS

Centennial FDOT 1915 ★ 2015

FLORIDA'S TURNPIKE

FLORIDA'S TURNPIKE ENTERPRISE
TOLL OPERATIONS & DESIGN DEPARTMENTS
OCOEE, FL

OCTOBER, 2015

WHY use the GTR?

- The **PPM** addresses **roadway design criteria** and **delivery of plans**
- The **TPPPH** applies to **Turnpike** and **District** facilities with **Express Lanes (EL)**
- **The GTR is FDOT's toll design criteria**

  Provides Consistency, Predictability, and Repeatability (CPR):

  - Planning
  - Design
  - Construction

WHAT is GTR criteria?

- **The GTR provides synchronicity, scalability, and CPR:**
  - Customers
  - Operations
  - Maintenance
  - Planners
  - Designers

WHAT is GTR criteria?

- **The GTR supports efficient:**
  - Plan design
  - Plan submittals
  - Plan reviews
  - Coordination with consultants
  - Avoids "reinventing the wheel"

  Result: Saves time and money

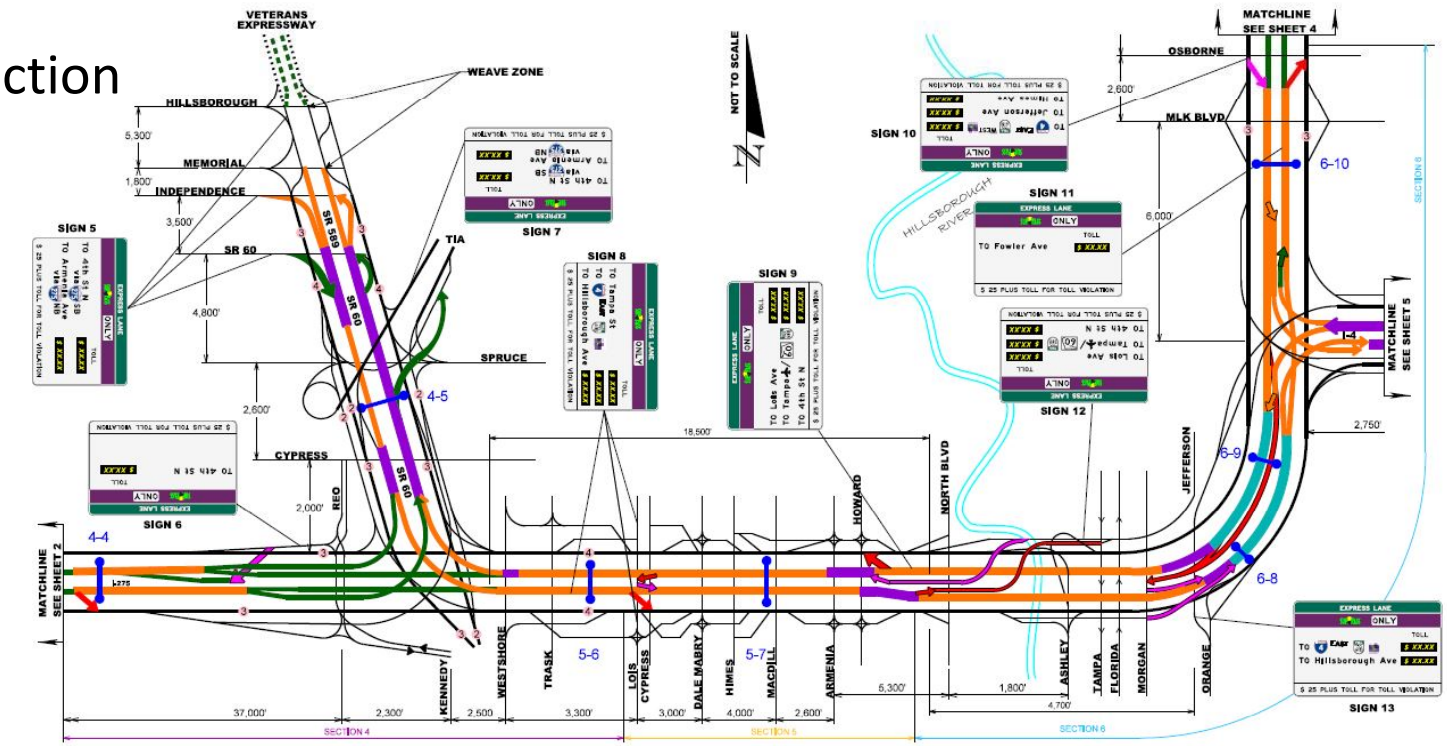
- **The GTR is a living document**
  - Tolling technology is continuously evolving
  - The GTR is regularly updated with innovations, changing technology, codes and standards

WHAT is GTR criteria?

- **The GTR provides toll criteria for:**
  - Roadway
  - Toll site layout and infrastructure
  - Building infrastructure
  - Gantry infrastructure
  - Toll equipment
  - Construction coordination

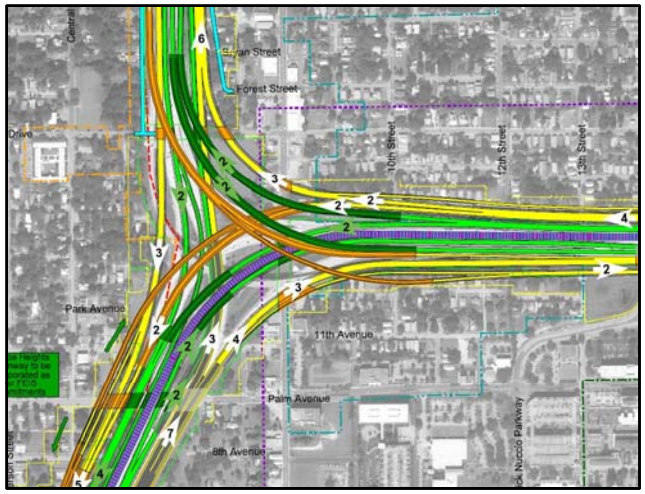
WHEN is the GTR Relevant?

- **The GTR is relevant in ALL stages of planning, design and construction**
  - Concepts/PD&E
  - Design
  - Construction



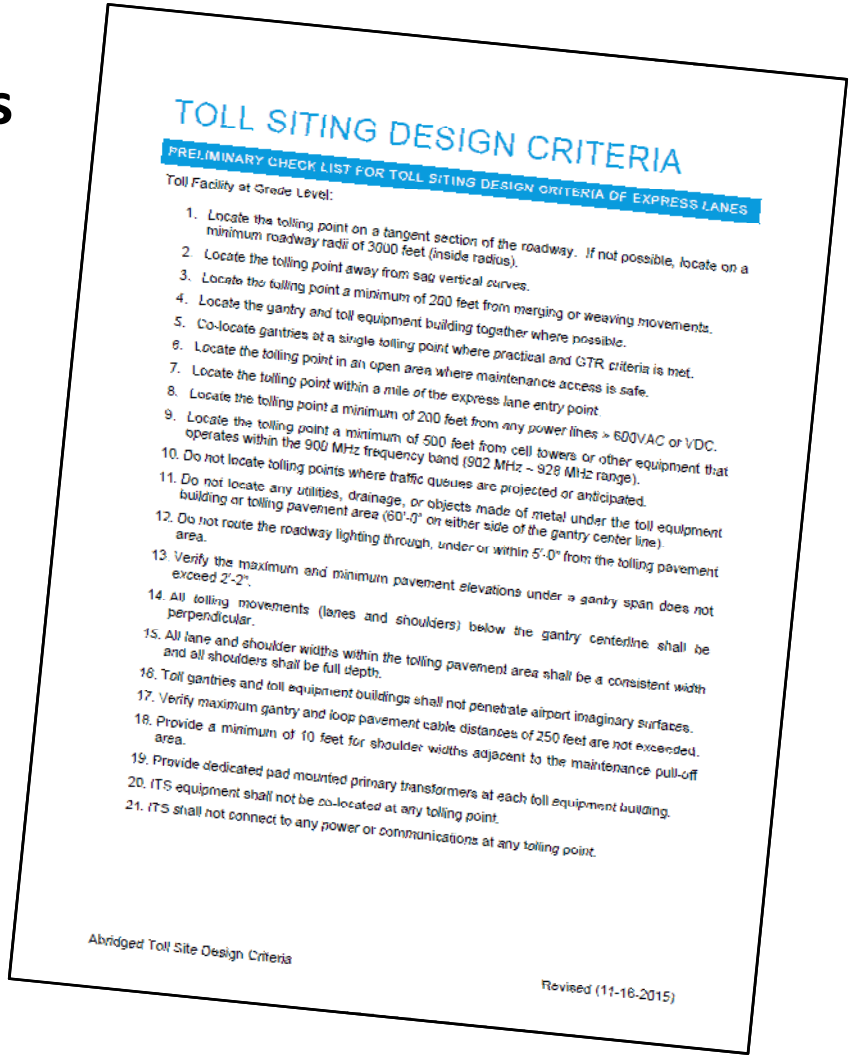
Concepts/PD&E

- **Complex (System-System)**
- **Many variables**
  - Elevated roadway
  - Weave distances
  - Bridges
  - Retaining walls
  - Utilities
  - Committed easements/rail corridors
- **Networked (Interim/Ultimate)**



Concepts/PD&E

- Toll siting design criteria
- Horizontal and vertical curves
- Slip ramps
- Weave lanes/zones
- Maintenance access
- Drainage
- Co-location with power & ITS
- Pavement
- Electrical & RF interference
- Proximity to EL ingress
- Underground utilities
- J-arm adjustability



TOLL SITING DESIGN CRITERIA

PRELIMINARY CHECK LIST FOR TOLL SITING DESIGN CRITERIA OF EXPRESS LANES

Toll Facility at Grade Level:

1. Locate the tolling point on a tangent section of the roadway. If not possible, locate on a minimum roadway radii of 3000 feet (inside radius).
2. Locate the tolling point away from sag vertical curves.
3. Locate the tolling point a minimum of 200 feet from merging or weaving movements.
4. Locate the gantry and toll equipment building together where possible.
5. Co-locate gantries at a single tolling point where practical and GTR criteria is met.
6. Locate the tolling point in an open area where maintenance access is safe.
7. Locate the tolling point within a mile of the express lane entry point.
8. Locate the tolling point a minimum of 200 feet from any power lines > 600VAC or VDC.
9. Locate the tolling point a minimum of 500 feet from cell towers or other equipment that operates within the 900 MHz frequency band (902 MHz ~ 928 MHz range).
10. Do not locate tolling points where traffic queues are projected or anticipated.
11. Do not locate any utilities, drainage, or objects made of metal under the toll equipment building or tolling pavement area (60'-0" on either side of the gantry center line).
12. Do not route the roadway lighting through, under or within 5'-0" from the tolling pavement area.
13. Verify the maximum and minimum pavement elevations under a gantry span does not exceed 2'-2".
14. All tolling movements (lanes and shoulders) below the gantry centerline shall be perpendicular.
15. All lane and shoulder widths within the tolling pavement area shall be a consistent width and all shoulders shall be full depth.
16. Toll gantries and toll equipment buildings shall not penetrate airport imaginary surfaces.
17. Verify maximum gantry and loop pavement cable distances of 250 feet are not exceeded.
18. Provide a minimum of 10 feet for shoulder widths adjacent to the maintenance pull-off area.
19. Provide dedicated pad mounted primary transformers at each toll equipment building.
20. ITS equipment shall not be co-located at any tolling point.
21. ITS shall not connect to any power or communications at any tolling point.

Abridged Toll Site Design Criteria

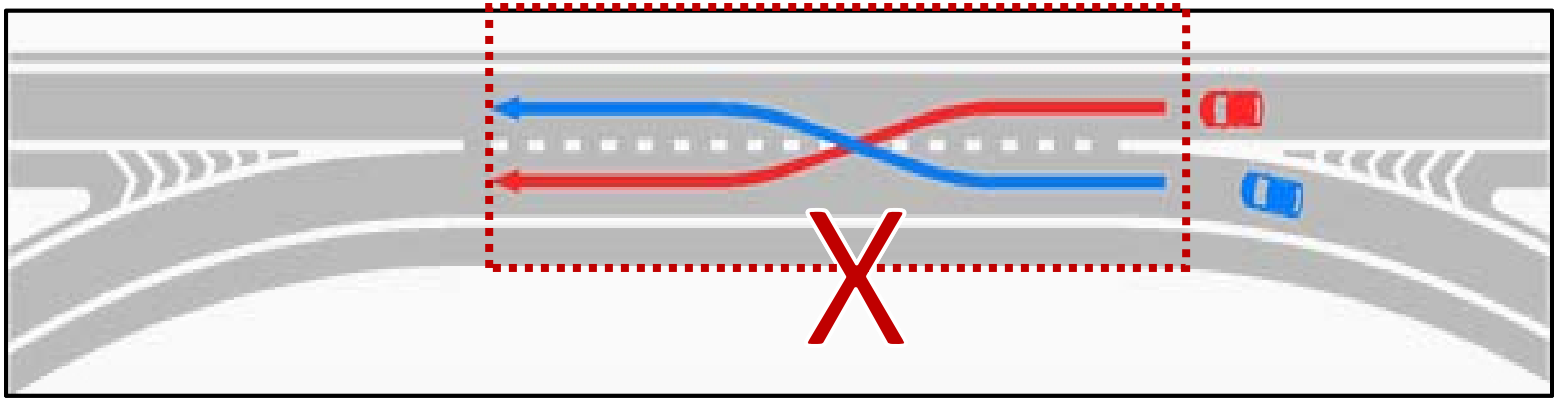
Revised (11-16-2015)

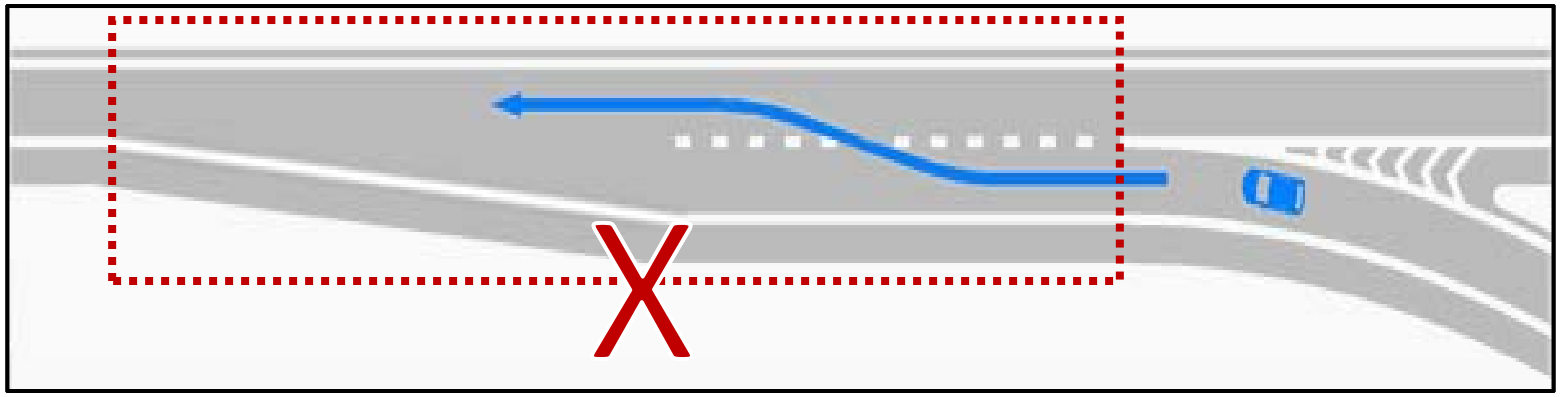
Concepts/PD&E

- **Toll siting criteria**
  - Tangent section, curves > 3,000’ radius
- **Beyond vehicle queuing (Year 2040)**
  - Eliminate “Zero” speed at gantry

Concepts/PD&E

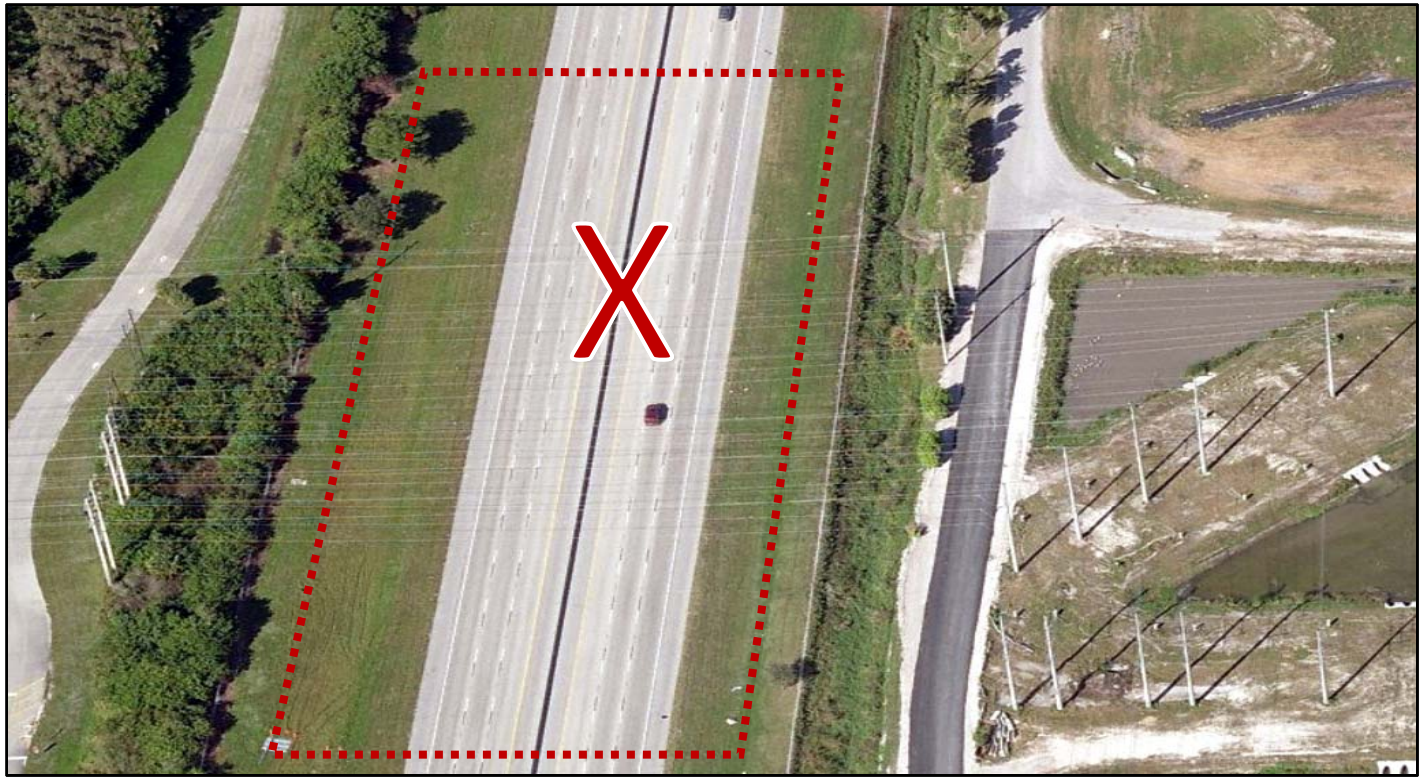
- **Toll siting criteria**
  - Beyond weave and merge areas
  - Minimize vehicles from crossing lanes at toll point





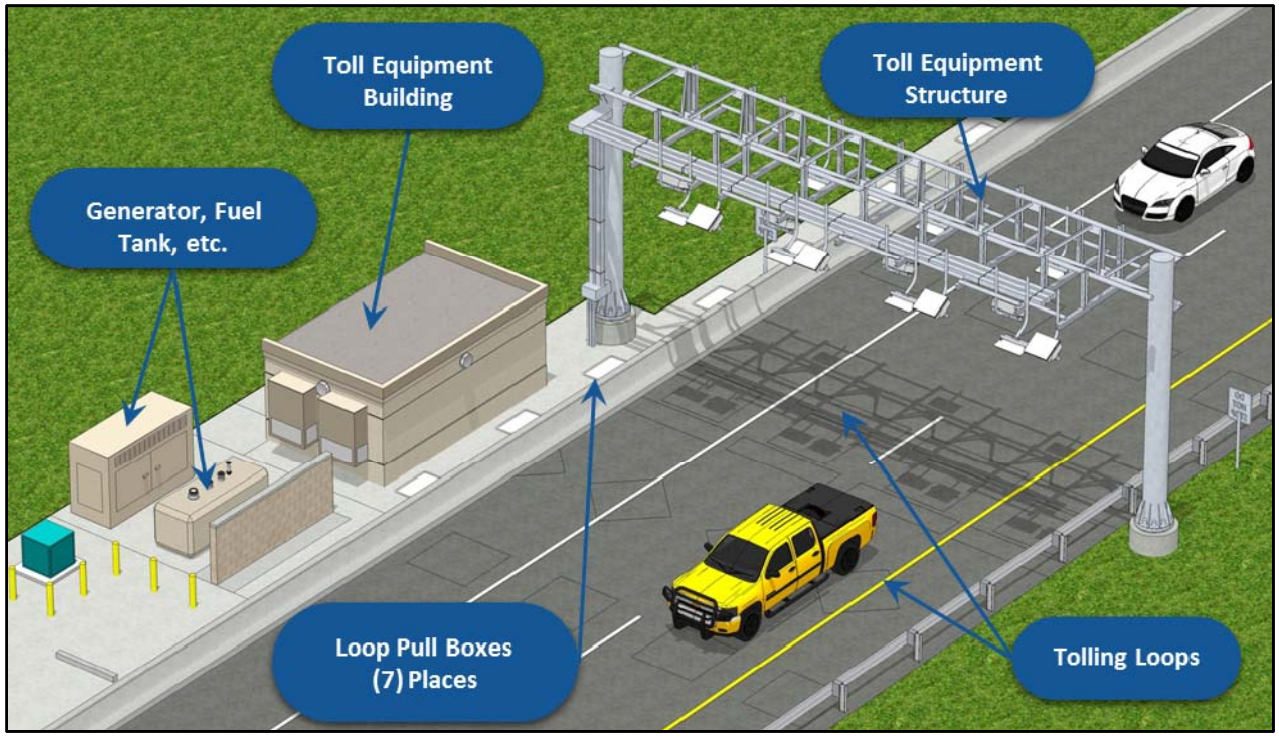
Concepts/PD&E

- **Other toll siting issues to avoid**
  - Interference to toll equipment from high voltage power lines
  - Cell tower frequency (conflicts with toll equipment)
  - Low points in the vertical profile (flooding in the toll site)



Design

- **Elements of a toll point**
  - Maintenance pull-off area (access)
  - Site infrastructure
  - Loop pavement
  - Communications
  - Electrical
  - Building
  - Gantry

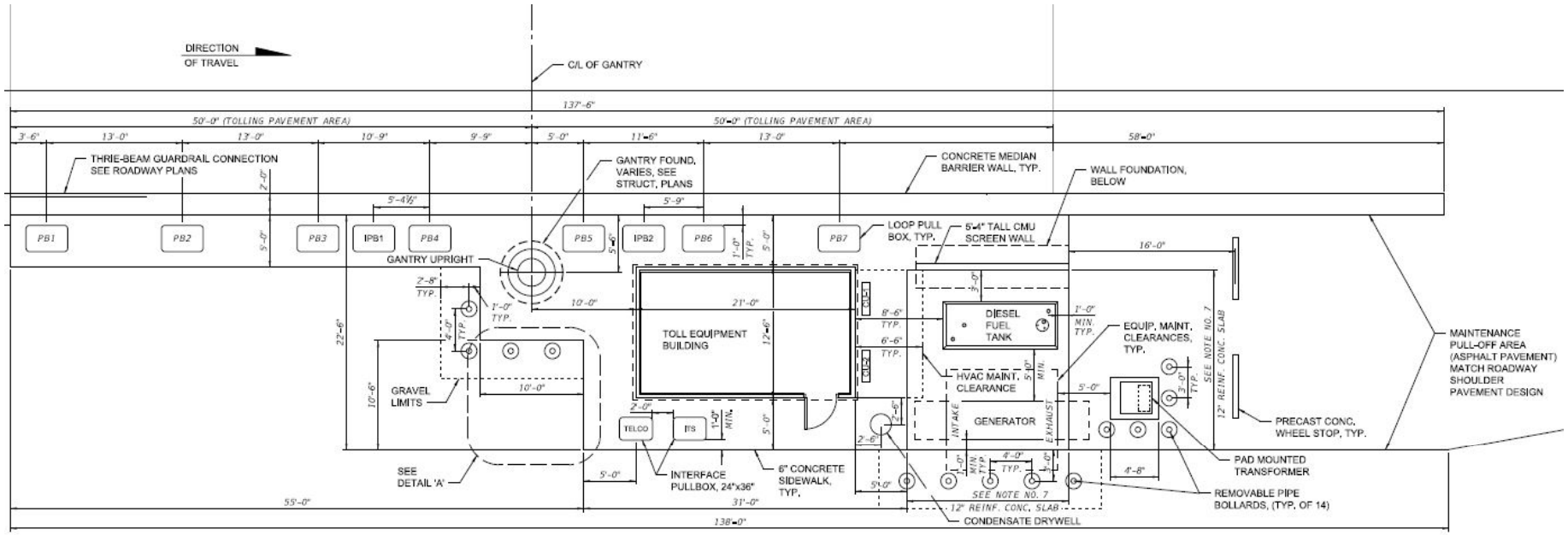


Design

- **Toll site layout considerations**
  - Optimized for tolling
    - Express lanes require median pullboxes
  - Toll and site equipment requirements
    - Maintenance/code clearances
    - Cable distances & mounting heights
  - Standard orientation and layout
  - Coordination required with other disciplines:
    - Roadway/Drainage
    - Structures
    - Lighting
    - Utilities
    - ITS

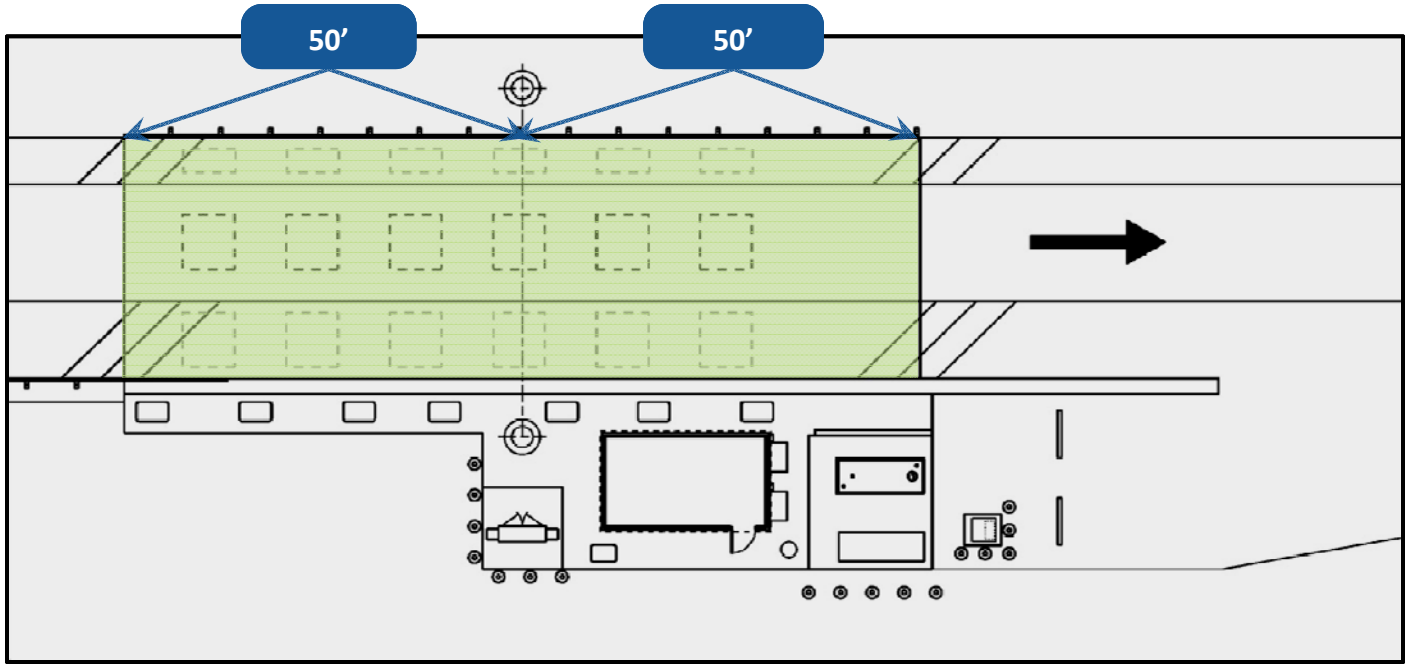
Design

- **Toll site layout - Appendix 17**
  - Standardized pre-fabricated building
  - Site infrastructure layout



Design

- **Toll pavement design**
  - Dense graded FC-12.5
  - Full depth shoulders
  - Loop pullboxes
  - Conduit stub-ups



Design

- **Toll pavement subsurface considerations**
  - NO metal below toll pavement area
    - No reinforcement steel in pavement
    - No metallic retaining wall straps
    - No metallic conduit
    - Relocate existing drainage pipes and inlets (or move tolling point)
  - Low voltage power lines (at least 5 feet away)

Design

- **Gantry types**

Accessible Gantry

Non-Accessible (Tri-Chord)

Design

- **Appendices provide criteria and sample plans to assist the designer**
  - Appendix 1
    - Technical special provisions (TSPs) for vertical construction
  - Appendices 2, 3, 5-15 and 17
    - Requirements for site layout, building infrastructure, etc.
  - Appendix 16
    - Site acceptance check list
  - Appendix 18
    - Plan submittal requirements
  - Appendices 19-22
    - Sample plans

Appendix 1 - Technical Special Provisions

Appendix 2 - Toll Equipment Arm Positioning Diagrams, Wind Load Areas, and Toll Equipment Layouts

Appendix 3 - Toll Equipment Cabling Inventory

Appendix 4 - Not Used

Appendix 5 - Access Control System Details

Appendix 6 - Door Hardware and Access Control Devices Cutsheets

Appendix 7 - Encompass 6 Multiprotocol Product Data and Enclosure Details

Appendix 8 - Toll Equipment Building Power Plans

Appendix 9 - Toll Equipment Building Power Riser Diagrams

Appendix 10 - UPS with External Maintenance Bypass Switch Riser Diagram

Appendix 11 - Emergency Power Off Riser and Wiring Diagrams

Appendix 12 - SCADA Notes and Block Diagram

Appendix 13 - CCTV Riser Diagram and Site Plans

Appendix 14 - Tolling Communications Cabinet and Telco Communications Demarcation Details

Appendix 15 - Toll Equipment Building Fiber Optic Cable Splicing Details

Appendix 16 - Tolling Site Acceptance Checklist

Appendix 17 - Accessible and Non-Accessible Gantry Conceptual Site Plans and Pullbox Details

Appendix 18 - Toll Facility Plan Submittal Requirements

Appendix 19 - Non-Accessible Gantry Sample Plans

Appendix 20 - Accessible Gantry Sample Plans

Appendix 21 - Toll Equipment Building Sample Plans

Appendix 22 - Civil and Electrical Site Sample Plans

Construction

➢ GTR in Construction

- Building permitting and Fire Marshall requirements (Ch. 9.3)
  - Review fees
  - Scheduling of site inspections
  - Gantry component is not required for the building permitting process

Construction

➢ GTR in Construction

- Site acceptance
  - Requirements for scheduling site acceptance walk-throughs in Ch. 15
  - Toll Site Acceptance Checklist in Appendix 16
  - Functional Testing for Site equipment
    - Individual chapters for electrical, mechanical and communications
    - Additional testing requirements in Appendix 1

Construction

- **GTR in Construction**
  - Substantial completion
    - Power turned on
    - Communications operational
    - Infrastructure completed and ready for Toll Equipment Contractor (TEC)
    - Certificate of Occupancy

Construction

GTR in Construction

- Maintenance of Traffic
  - Requirements and restrictions identified in Chapter 16
- As-Built requirements
  - Appendix 1 – TSPs
- Functional Acceptance Testing
  - Building mechanical, electrical, SCADA and communications
  - Appendix 1 - TSPs

Summary

1. **CPR the toll environment**
2. **Utilized in planning, design and construction**
3. **Impacts toll operations and toll maintenance**
4. **It is a living document**
   - The GTR is updated with changing technology which means it will **never be obsolete**
   - Any **innovations** brought to FTE by personnel, EORs, contractors, or other tolling jurisdictions can be incorporated
   - Lessons learned from previous projects are incorporated

Pre-Construction

Construction

Operations

Questions?

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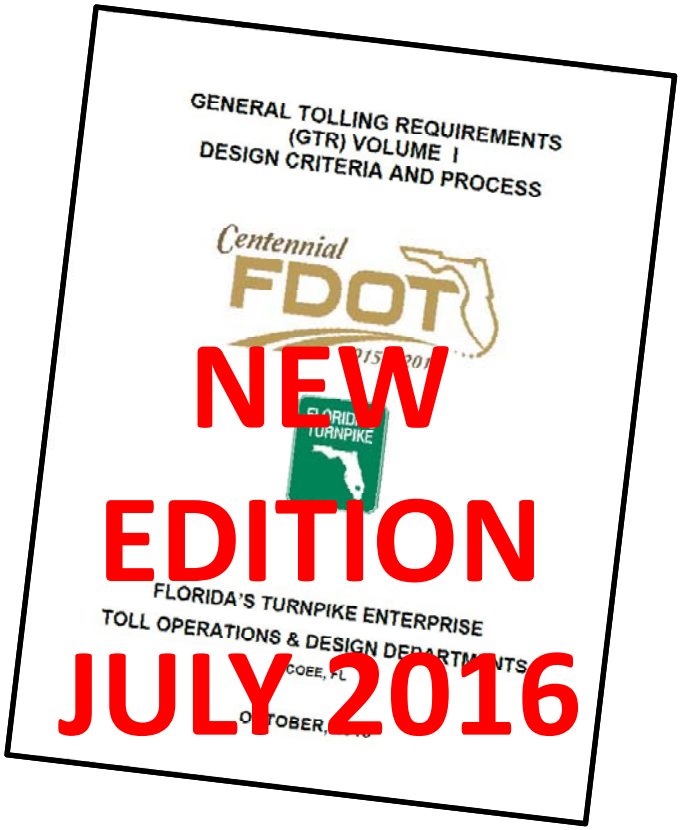
GTR is available at:

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