Florida Interchange Access Request Process

Training

Webinar

Welcome

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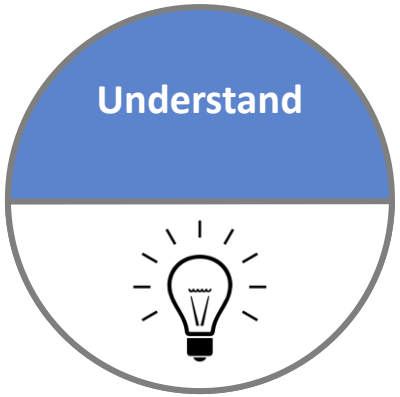
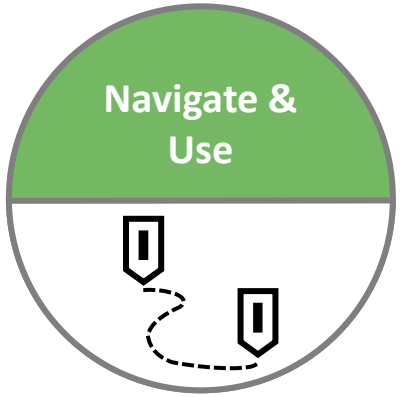
Training Objectives

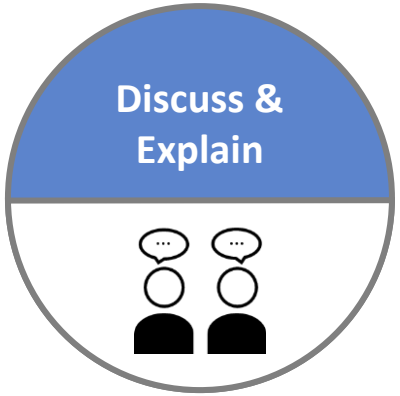
- At the conclusion of this training, you will be able to…



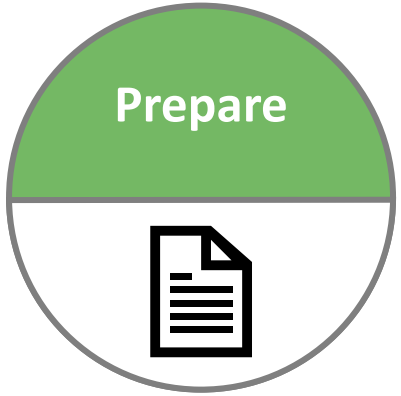
Understand the purpose of the Florida Department of Transportation (FDOT) Interchange Access Request User's Guide (IARUG)



Navigate and use the FDOT IARUG



Discuss and explain FDOT guidance on preparing and processing Interchange Access Requests (IARs)



Prepare documents that support requests for new or modified access to the Florida Interstate Highway System, Florida's Turnpike Enterprise (FTE) and non-interstate limited access facilities on the State Highway System (SHS)

General Concepts being Covered

Agenda

- This webinar includes eight Modules covering the Interchange Access Request User's Guide Overview & Application

- ❑ Introduction to Interchanges
- ❑ IAR Process and Types
- ❑ Programmatic Agreement & Acceptance Authorities
- ❑ Methodology Letter of Understanding
- ❑ Interchange Access Requests
- ❑ IARUG Safety Analysis Guidance
- ❑ Interchange Access Request Review and ERC
- ❑ Interchange Access Request Re-evaluations
- ❑ Quizzes

Module 1 Introduction to Interchanges

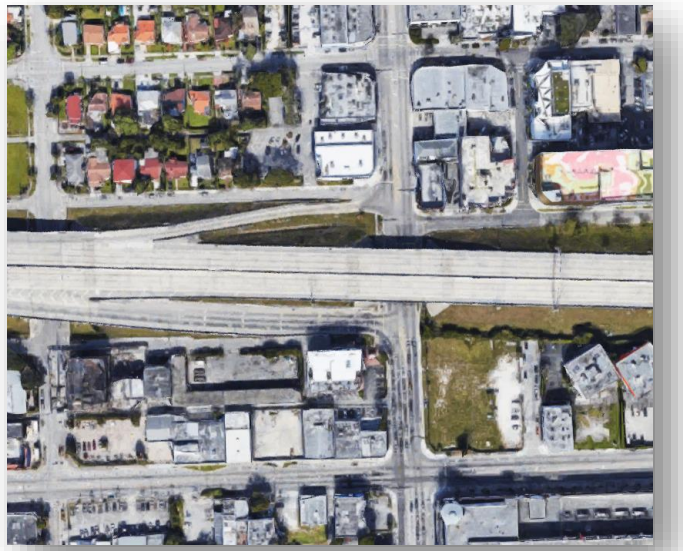
- What is an Interchange?
- Interchange Access Requests
- Why Prepare IARs?
- Interchange Access Request User's Guide
- Quiz

What is an Interchange?

- A system that provides for the movement of traffic between intersecting roadways via one or more grade separations.
  - Complete Interchange: accommodates movements in all applicable directions
  - Partial Interchange: does not accommodate movements in all applicable directions

- The primary objective of an interchange is to maintain mainline traffic flow
  - while allowing access to and from the limited access facility.

I-75 at I-10 (Complete Interchange)

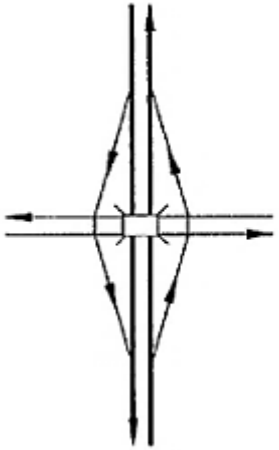


I-195 at N Miami Avenue (Partial Interchange)

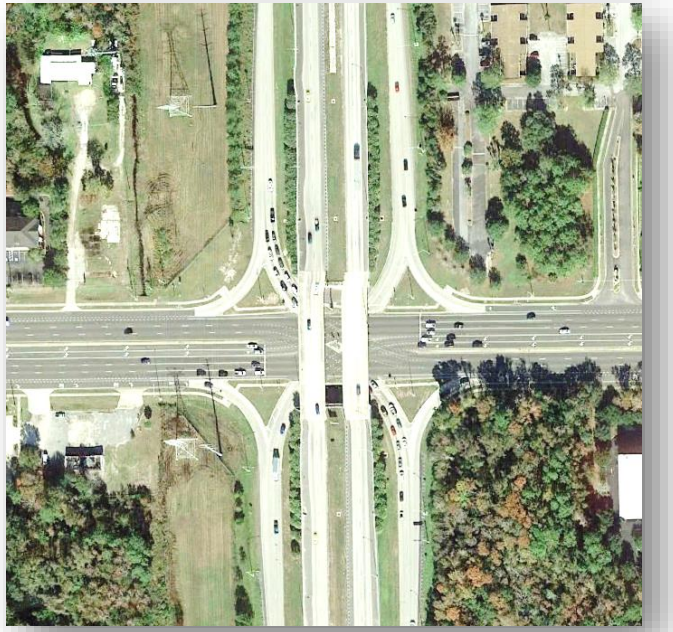
What is an Interchange?

- Types of Interchanges

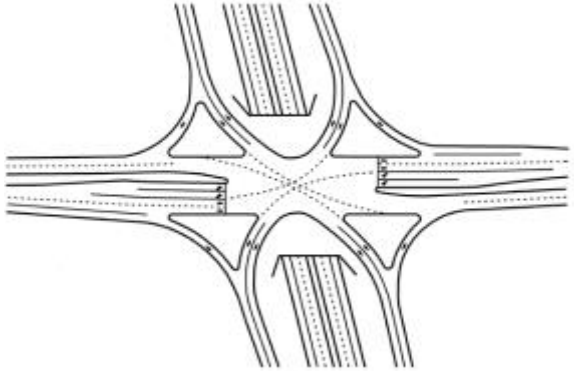
I-10 at SR 85



Conventional Diamond



I-295 at Beach Boulevard

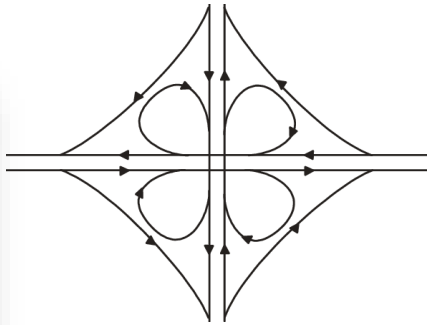


Single-Point Urban Interchange (SPUI)/ Single-Point Diamond

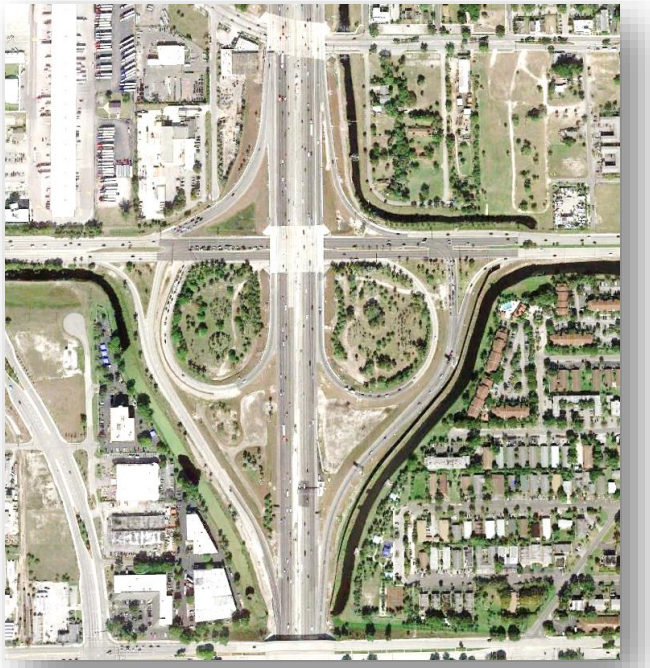
What is an Interchange?

- Types of Interchanges

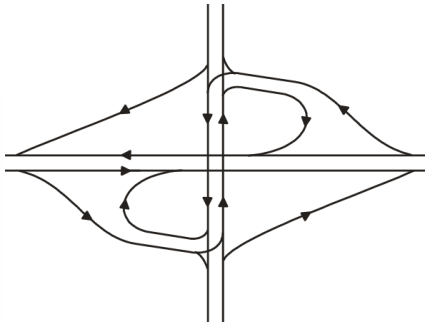
I-4 at US 301



Full Cloverleaf



I-95 at SR 814

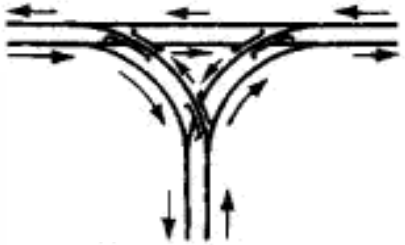


Partial Cloverleaf

What is an Interchange?

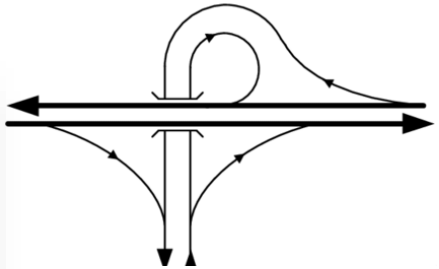
- Types of Interchanges

I-4 at FL 429 Toll



Directional T
(also known as a Y)

SR 202 at A1A

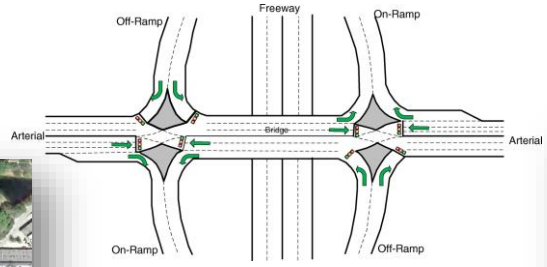


Trumpet

What is an Interchange?

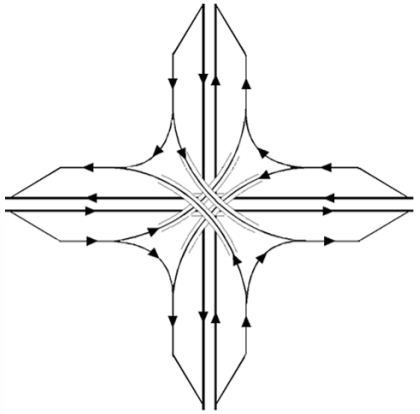
- Types of Interchanges

I-75 at University Parkway



Diverging Diamond Interchange (DDI)

I-95 at I-195/Airport Expressway



System to System/ Stacked

What is an Interchange?

- Interchange Access Points
  - Each entrance or exit point is considered an access point.
  - Ramps providing access to rest areas, information centers and weigh stations are not considered interchange access points.
  - Interchange reconfiguration is considered to be a change in access
    - even if the number of access points remain the same.

I-95 at Lantana Road

Interchange Access Request

- Requests for new or modified access to
  - Interstate Highway System
  - Non-interstate limited access facilities on the SHS

I-4 at SR 557

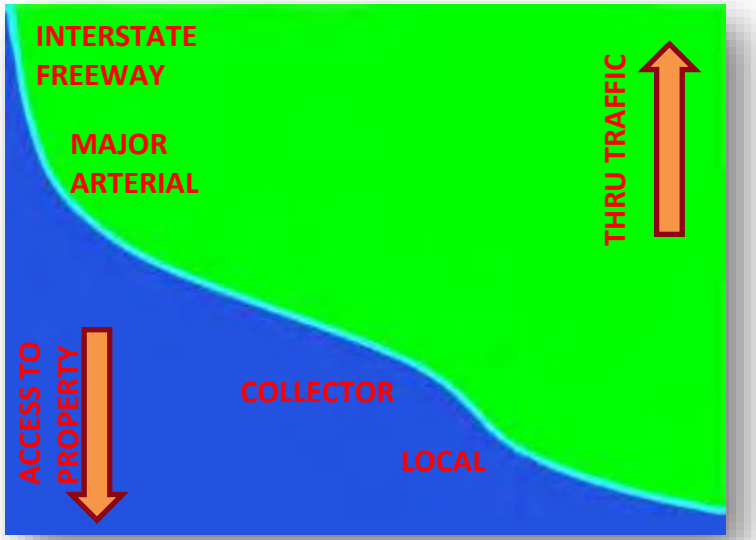
- An IAR shows that a proposed interchange is Safety, Operational and Engineering (SO&E) viable

- The Requestor of an IAR can be
  - FDOT
  - Local government
  - Metropolitan Planning Organization (MPO) or Transportation Planning Organization (TPO)

Why Prepare IARs?

- **Why Prepare IARs?**
  - Purpose of interstates/freeways is to serve uninterrupted, high speed, high volume and long-distance trips safely.
  - Any proposal to add or modify access can have an adverse impact on mobility and safety.
  - FDOT and FHWA approval is required as per Rule Chapter 14-97, F.A.C. and the Programmatic Agreement.

Florida's Turnpike at Atlantic Avenue

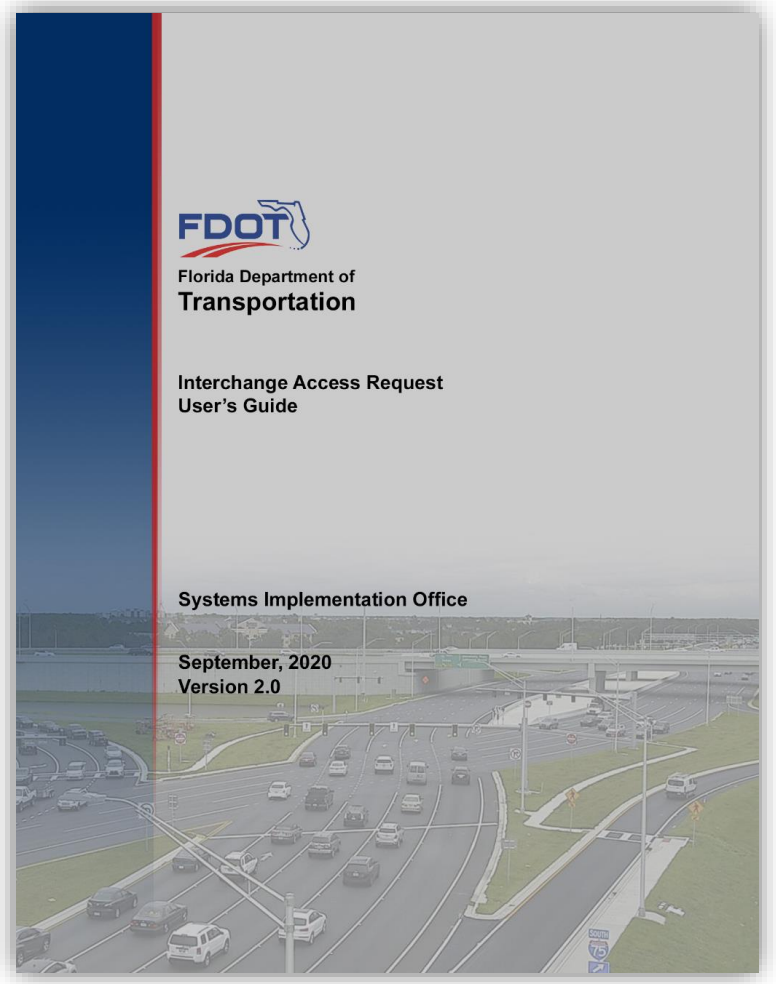


Interchange Access Request User's Guide

- It is the purpose of the FDOT
  - To provide information necessary to substantiate any proposed changes in access to limited access facilities on the State Highway System (SHS), including the Interstate System in Florida

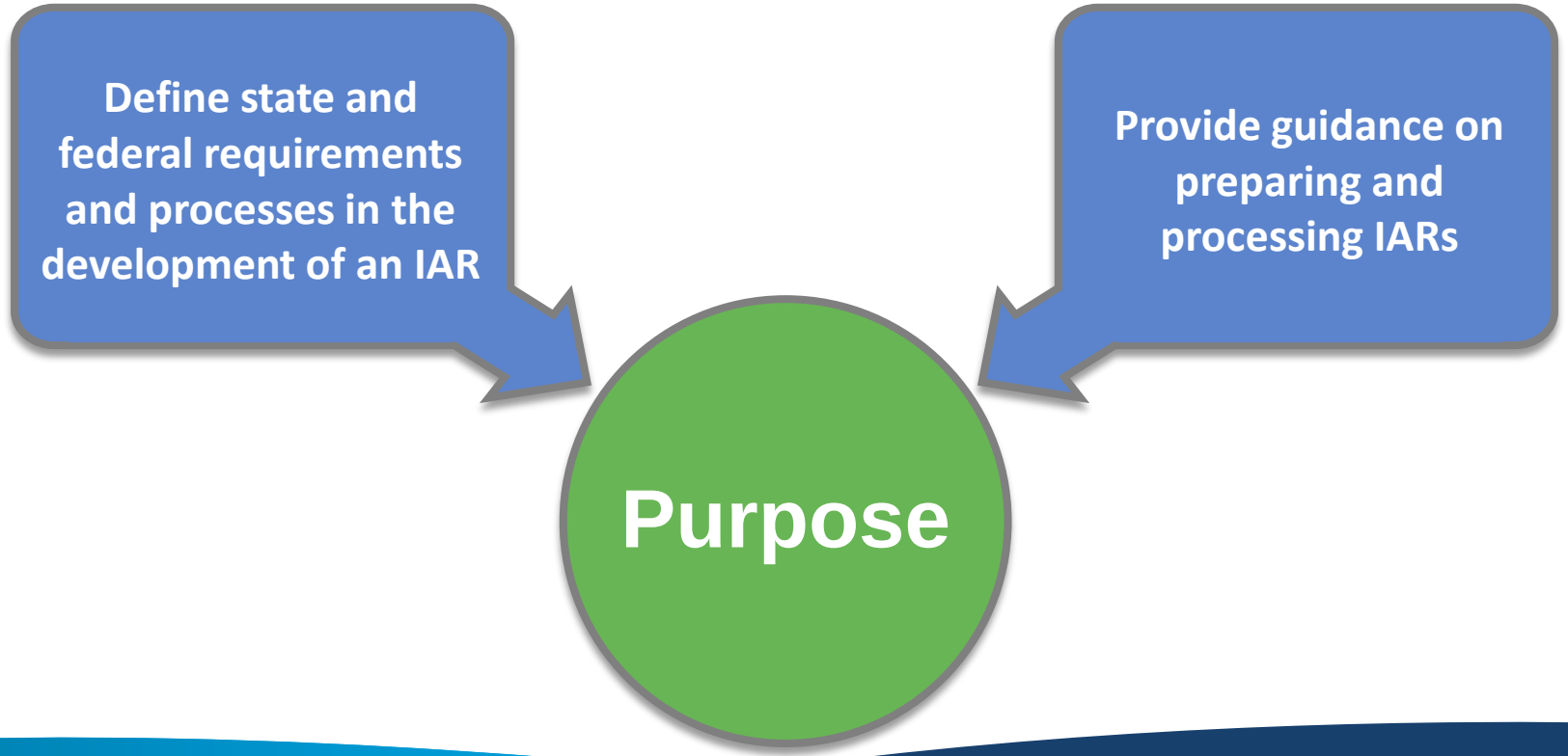
- The IARUG supplements the New or Modified Interchanges Procedure Topic No.525-030-160

- 2020 Interchange Access Request User's Guide



Interchange Access Request User's Guide

- Purpose of the IARUG



Interchange Access Request User's Guide

- Who uses the IARUG?
  - FHWA
  - FDOT
  - Florida's Turnpike Enterprise
  - Local agencies
  - Consultant engineers and planners

This User's Guide shall be used when developing and reviewing SO&E acceptability of new or modified interchange access proposals on limited access facilities.

Introduction to Interchanges

QUIZ

Florida Interchange Access Request Process

Training

Webinar

Module 2 Interchange Access Request Process and Types

- FHWA's Interstate System Access Policy
- FHWA's Policy Requirements
- Florida Statutes, FDOT Rules, Policies and Procedures
- IAR Approval Process
- Stakeholders
- Types of IARs and Documentation
- Non-Vehicular Access
- Locked Gate Access
- Quiz

Federal Highway's (FHWA's) Interstate System Access Policy

- **Title 23, United States Code, Highways Section 111 (23 U.S.C. 111) requires**
  - The state will not add any points of access to, or exit from the project without prior approval of USDOT Secretary

- **Policy statement entitled "Access to the Interstate System"**
  - Published in Federal Register on October 22, 1990
  - Last modified May 22, 2017

FHWA's Interstate System Access Policy

- It is in the National interest to ensure all new or revised Interstate access points:

Are considered using a decision-making process that is based on information and analysis of planning, environmental, design, safety and operations

Supports the intended purpose of the interstate highway system

Does not have an adverse impact on the safety or operations

Are designed to applicable standards

Palmetto Expressway at Okeechobee Road

FHWA's Policy Requirements

- Policy statement entitled "Policy on Access to the Interstate System"
  - Last modified May 22, 2017
- The Policy focuses on technical feasibility of proposed changes in terms of
  - SO&E Acceptability
- All Interchange Access Requests are required to follow the May 2017 Policy
  - Two (2) FHWA Policy Points

I-75 at University Parkway

FHWA's Policy Requirements

- FHWA Policy Point 1

An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes, existing or modified ramps, and intersections with crossroads) and the local street network based on both the current and the planned future traffic projections. The analysis should, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access (23 CFR 625.2(a), 655.603(d) and 771.111(f)). The crossroad and local street network serving the first major intersection on either side of the proposed change in access, should be included in this analysis to the extent necessary to fully evaluate the safety and operational impacts that the proposed change in access and other transportation improvements may have on the local street network (23 CFR 625.2(a) and 655.603(d)). Requests for a proposed change in access should include a description and assessment of the impacts and ability of the proposed changes to safely and efficiently collect, distribute, and accommodate traffic on the Interstate facility, ramps, intersection of ramps with crossroad, and local street network (23 CFR 625.2(a) and 655.603(d)). Each request should include conceptual plans of the type and location of the signs proposed to support each design alternative (23 U.S.C. 109(d) and 23 CFR 655.603(d)).

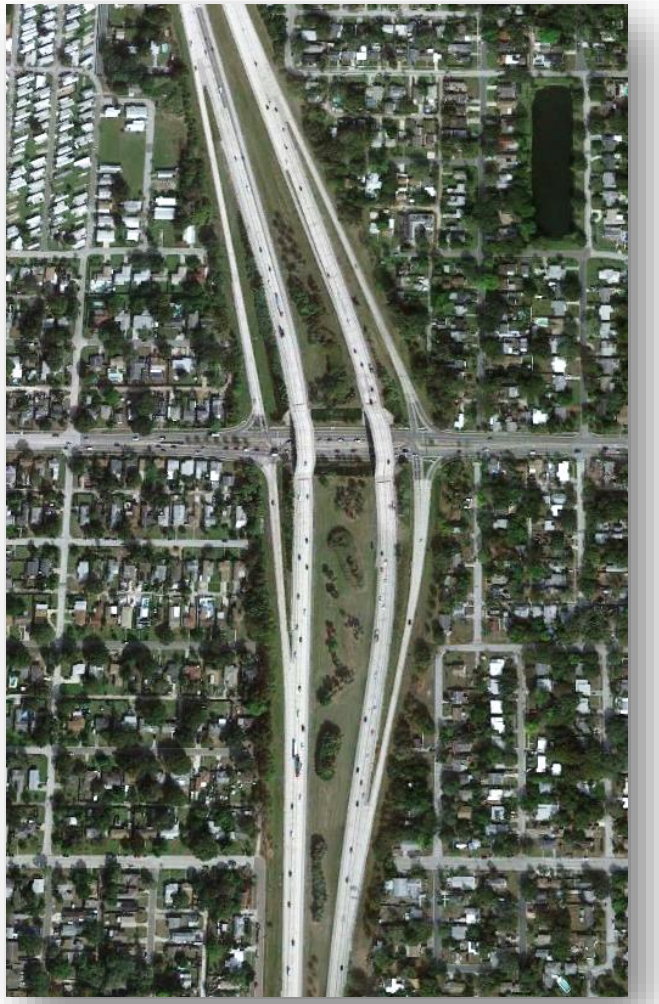
"The IAR does not have a significant adverse impact on the operation and safety of the freeway system"

FHWA's Policy Requirements

- FHWA Policy Point 2

The proposed access connects to a public road only and will provide for all traffic movements. Less than "full interchanges" may be considered on a case-by-case basis for applications requiring special access, such as managed lanes (e.g., express, HOV, HOT lanes), park and ride lots. The proposed access will be designed to meet or exceed current standards (23 CFR 625.2(a), 625.4(a)(2), and 655.603(d)). In rare instances where all basic movements are not provided for in the proposed design, the report should include a full interchange option with a comparison of the operational and safety analyses to the partial-interchange option. The report should also include the mitigation proposed to compensate for the missing movements, including wayfinding signage, impacts on local intersections, mitigation of driver expectation leading to wrong-way movements, and ramp, etc. The report should describe whether future provision of a full interchange is precluded by the proposed design.

"The proposed access connects to a public road only and will provide for all traffic movements"



I-275 at 38th Avenue N

Florida Statutes, FDOT Rules, Policies and Procedures

- **Florida Statute – 338.01, F.S.**
  - New or modified interchanges must meet requirements of the "Authority to Establish and Regulate Limited Access Facilities"

- **FDOT Rule Chapter – 14-97 F.A.C.**
  - "State Highway System Access Management Classification System and Access Management Standards," provides guidance on the adoption of an access classification system and standards to implement the State Highway System Access Management Act of 1988 for the regulation and control of vehicular ingress to and egress from the SHS

- **FDOT Policy Statement – 000-525-015: Approval of New or Modified Access to Limited Access Highways on the State Highway System (SHS)**
  - To minimize the addition of new access points to limited access facilities to maximize operation and safety

Florida Statutes, FDOT Rules, Policies and Procedures

- **FDOT Procedure – 000-525-045: Managed Lanes Policy**
  - This procedure provides guidance for employing managed lanes on appropriate facilities that experience significant congestion in existing or projected future conditions

- **FDOT Procedure – 525-030-120: Project Traffic Forecasting**
  - Provides instructions for using design traffic criteria to forecast corridor traffic and project traffic

- **FDOT Procedure – 525-030-160: New or Modified Interchanges**
  - Includes state and federal requirements and processes to be used for determination of SO&E acceptability

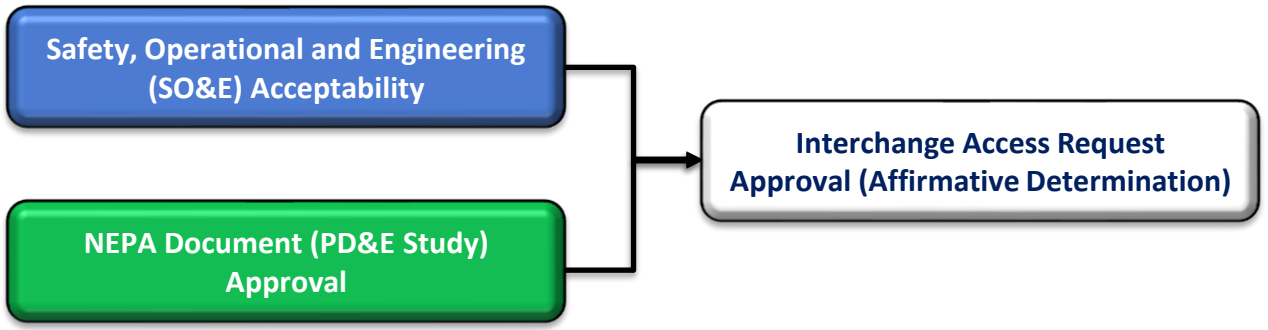
Florida Statutes, FDOT Rules, Policies and Procedures

- **FDOT Procedure – 525-030-260: SIS Highway Component Standards and Criteria**
  - This procedure addresses the responsibilities of the various offices within FDOT to develop and implement the SIS.

- **FDOT Procedure – 650-000-001: Project Development and Environment Manual**
  - This manual describes in detail the process by which transportation projects are developed by the department to fully meet the requirements of the National Environmental Policy Act (NEPA), Council of Environmental Quality (CEQ) and other related federal and state laws, rules and regulations.

IAR Approval Process (Affirmative Determination)

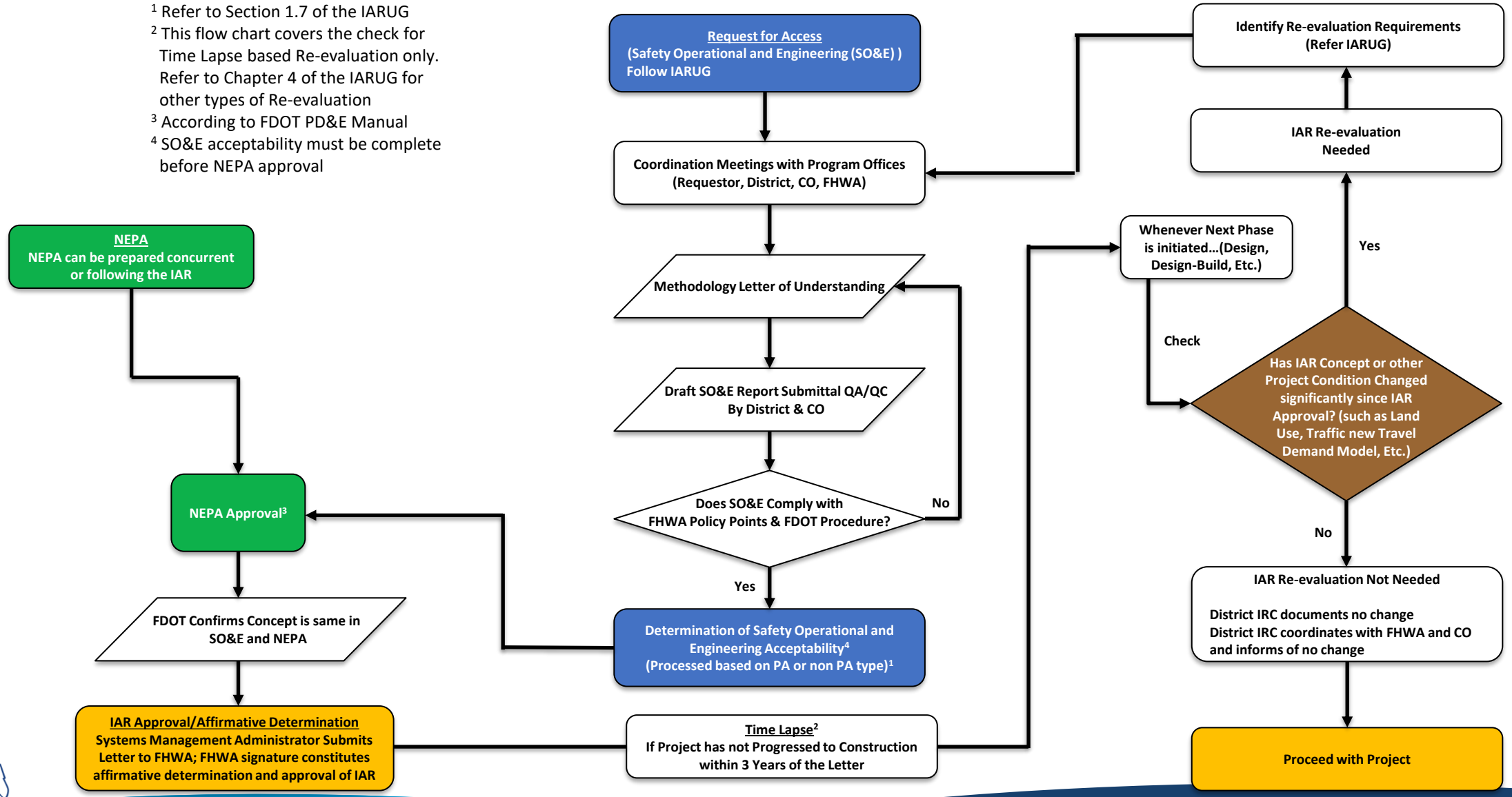
- **IAR Approval process consists of two parts:**
  - Step 1 - SO&E Acceptability
    - Compliance with FHWA's two policy points and FDOT's Procedure 525-030-160
    - Indicates access proposal is a viable alternative to include in the environmental analysis stage
  - Step 2 - PD&E
    - Can be performed concurrently or following SO&E acceptance
    - However, approval can only occur following SO&E acceptance
    - NEPA documents are prepared per guidelines and requirements outlined in the PD&E Manual



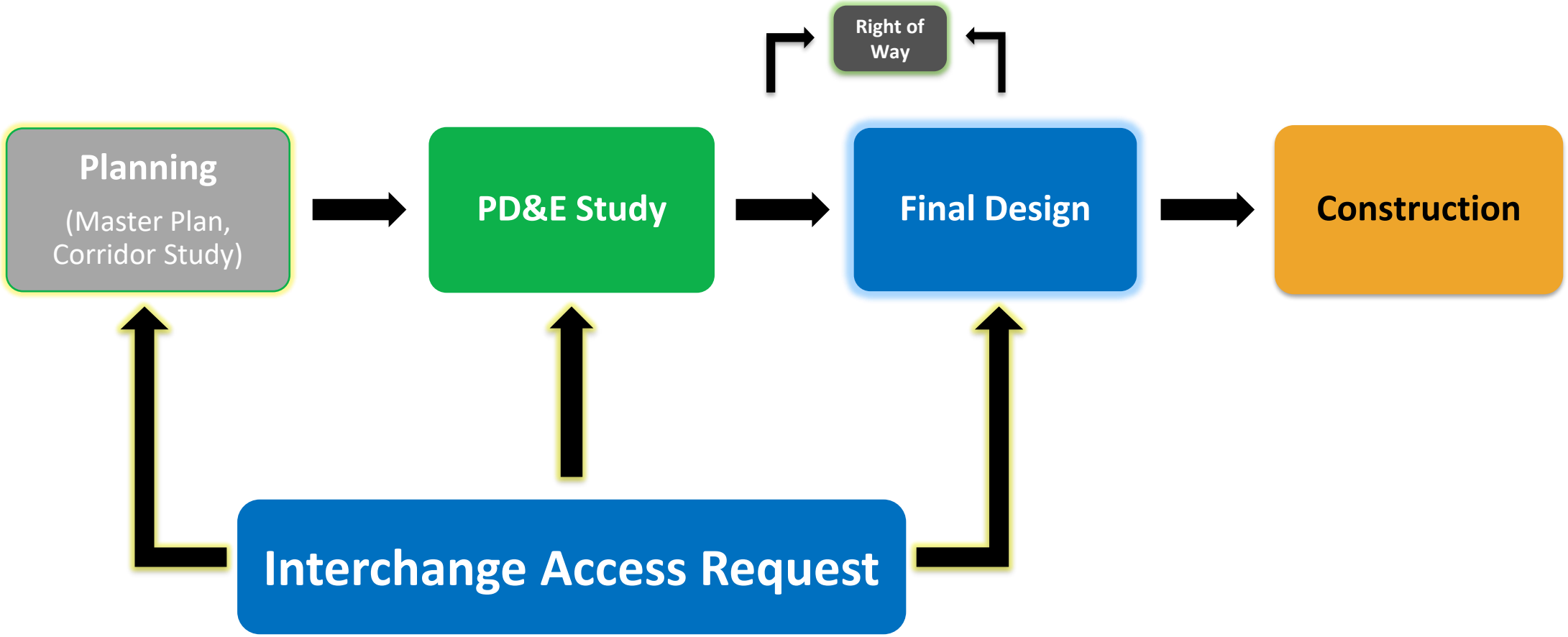
IAR Approval Process
Safety, Operational & Engineering (SO&E) Process

Notes

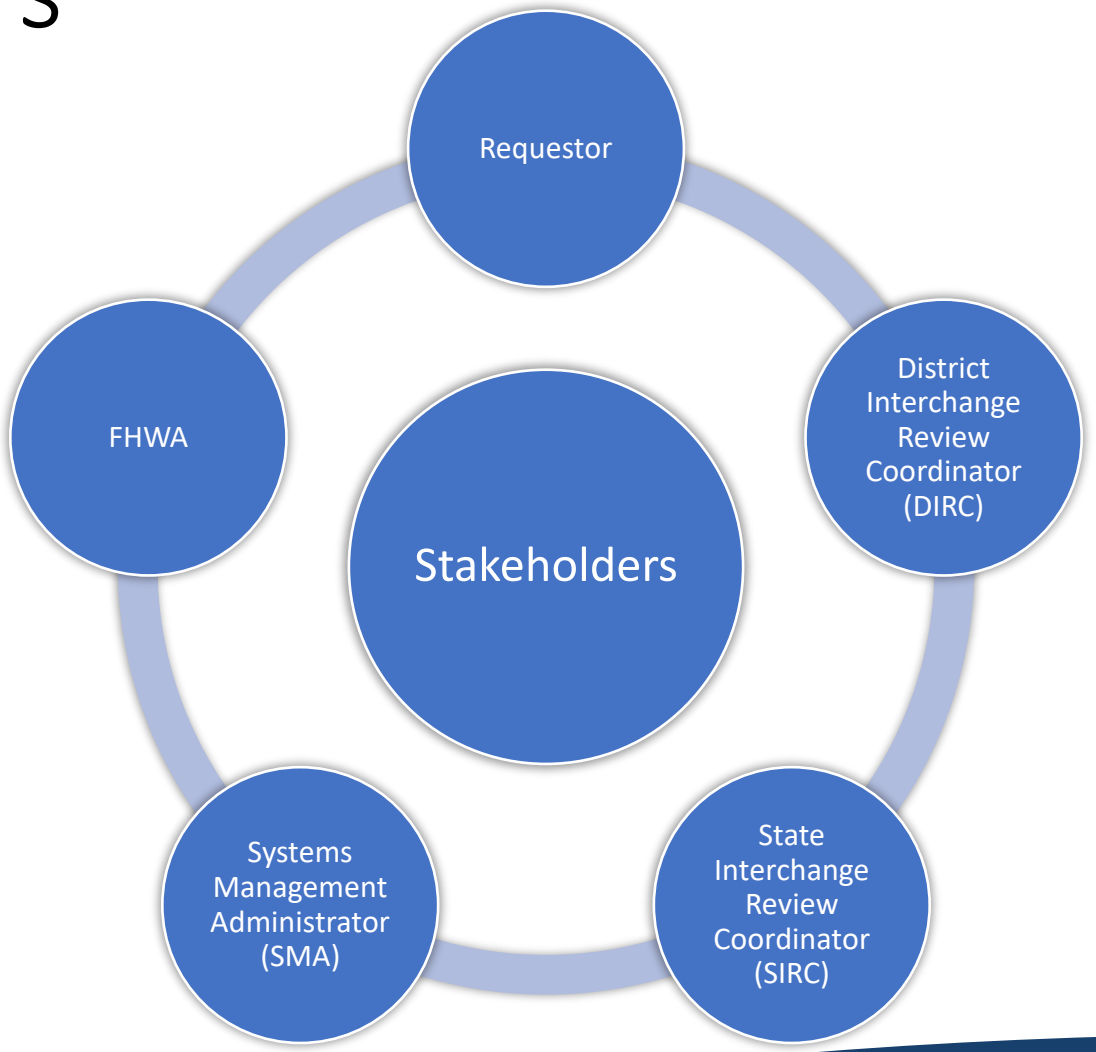
[1] Refer to Section 1.7 of the IARUG
[2] This flow chart covers the check for Time Lapse based Re-evaluation only. Refer to Chapter 4 of the IARUG for other types of Re-evaluation
[3] According to FDOT PD&E Manual
[4] SO&E acceptability must be complete before NEPA approval



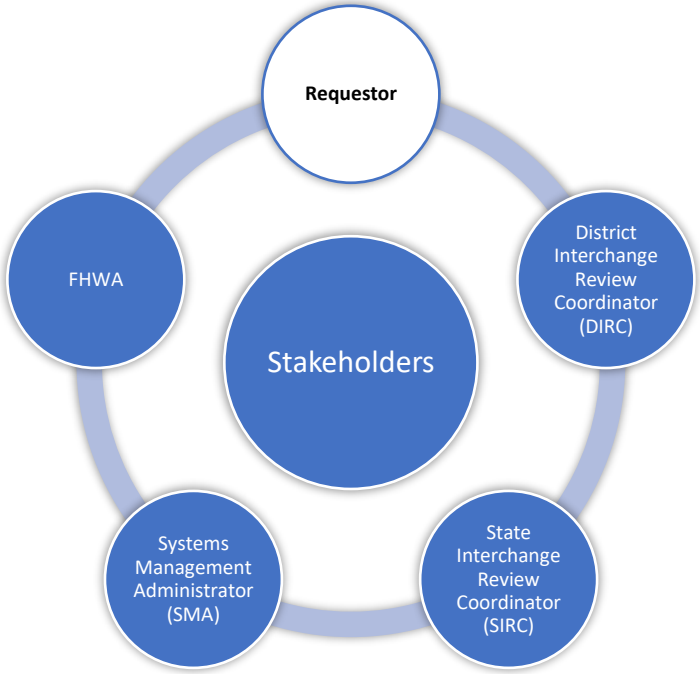
Project Development Process



Stakeholders

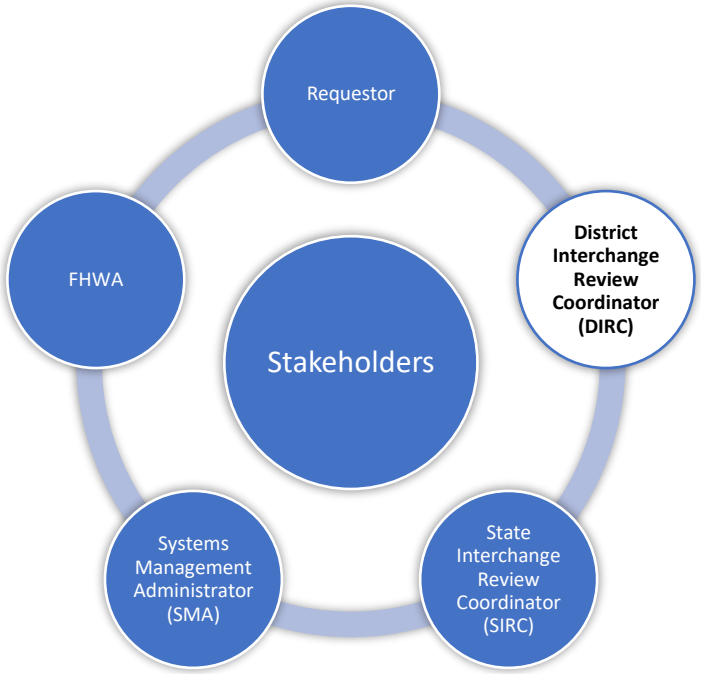


Stakeholders

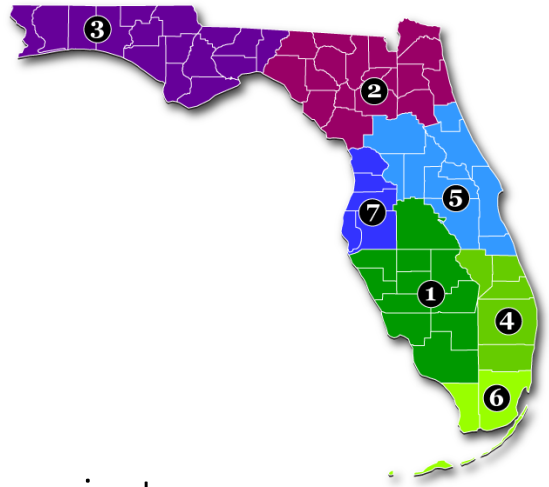


- **Requestor**
  - A requestor shall be
    - FDOT
    - Local government entity
    - Transportation authority
  - Responsible for
    - Reaching an agreement with the applicable acceptance authorities on the type of IAR
    - Developing, signing and submitting the MLOU
    - Performing appropriate quality control
    - Developing and submitting the draft IAR
    - Responding to or resolving all comments and requests for additional information
    - Revising the IAR document
    - Signing and submitting the final IAR document for an acceptance decision.

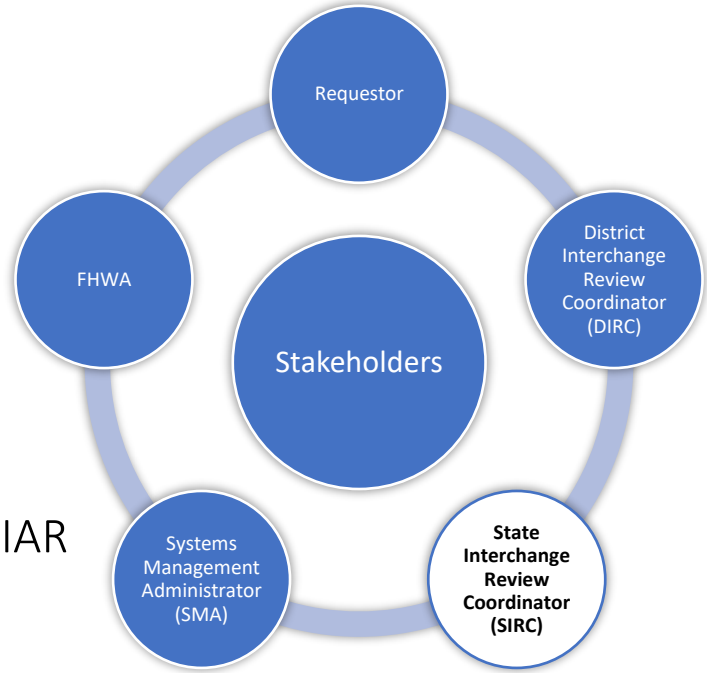
Stakeholders



- **District Interchange Review Coordinator (DIRC)**
  - Each District and FTE appoint a DIRC
  - Primary point of contact for all requestors
  - Responsible for
    - Quality control
    - Establishing and documenting the basis for
      - Acceptance
      - Evaluation criteria
      - Level of coordination needed
      - Scope of technical analysis
      - Documentation
    - Conducting regular meetings to discuss milestones and status for the IAR projects



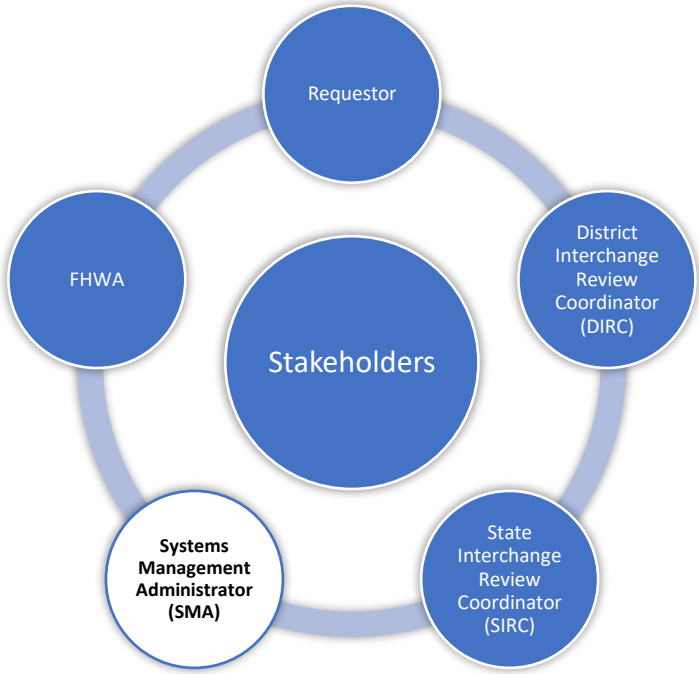
Stakeholders



- **State Interchange Review Coordinator (SIRC)**
  - Responsible for
    - Providing guidance for rules, policies and procedures related to IAR reviews
    - Ensuring consistency
    - Coordinating with FHWA, District and FTE DIRCs
    - Notifying FHWA of the approval decision of IARs through the PA Process
    - Confirming that the concept in the IAR and NEPA documents are the same

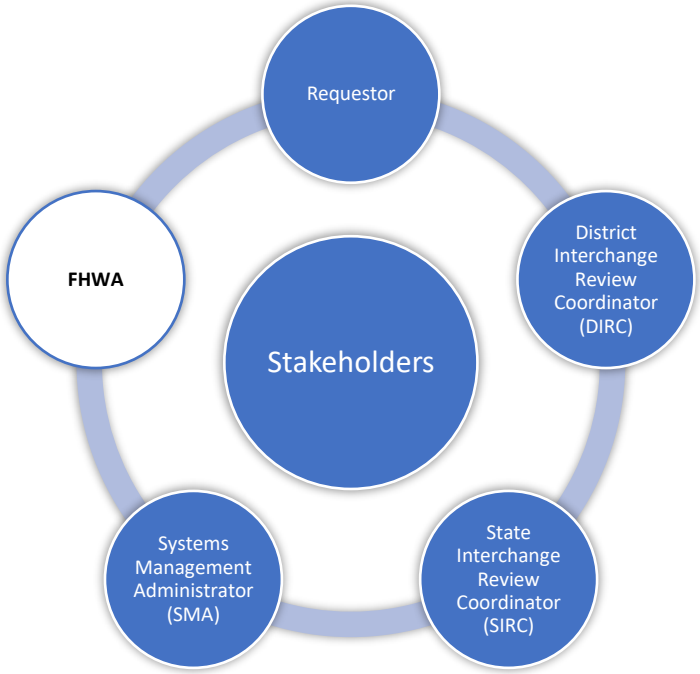
Stakeholders

- Systems Management Administrator (SMA)
  - Responsible for
    - Approval of IARs after they have been reviewed by the SIRC
    - Coordination with FHWA on matters related to interchange projects and FDOT processes



Stakeholders

- FHWA
  - Responsible for
    - Protecting the structural and operational integrity of the interstate system
    - Providing a District Transportation Engineer (DTE)
  - The FHWA DTE is the FHWA Florida Division Offices' point of contact
  - The DTE is responsible for
    - Reviewing the IAR
    - Making a recommendation on acceptance

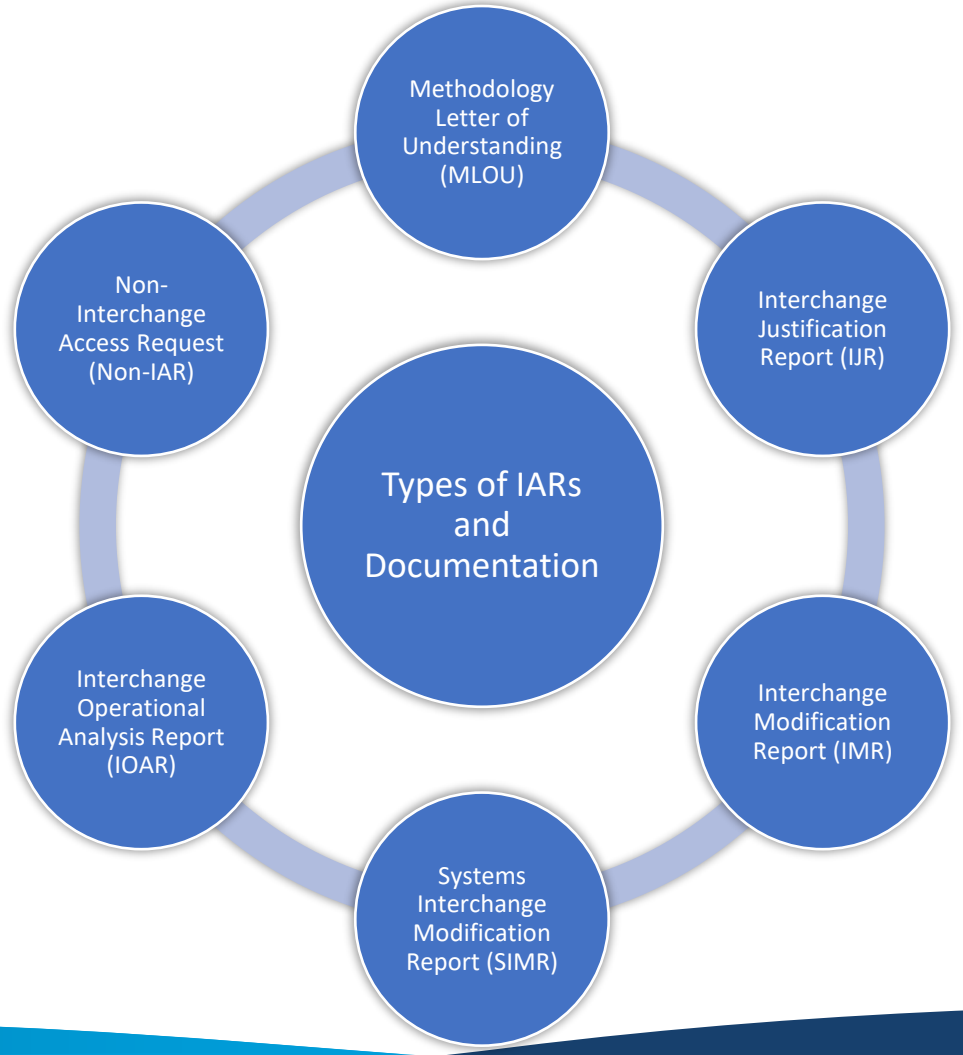


U.S. Department of Transportation
Federal Highway Administration

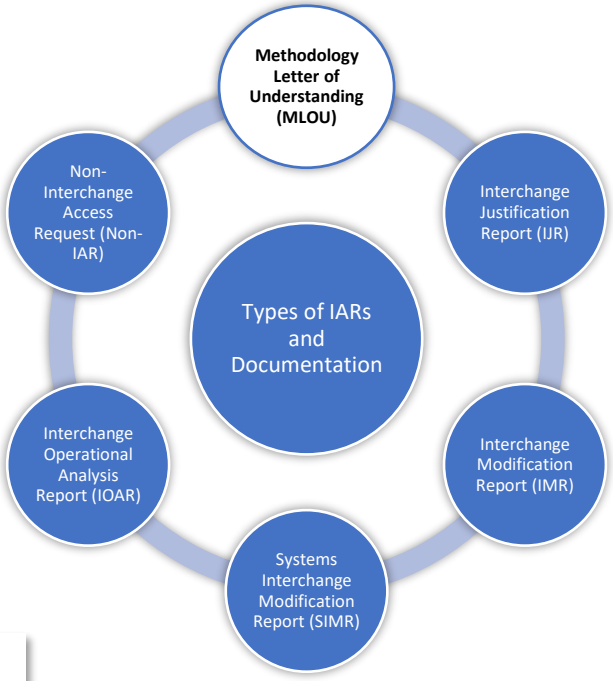
Stakeholders

- **Interchange Coordination Meetings**
  - Interchange coordination meetings should discuss proposals for change-in-access requests
  - It is recommended that DIRCs should hold at least quarterly district interchange coordination meetings
  - IAR should take an interdisciplinary approach
  - Staff should include other division offices such as
    - Environmental Management
    - Design
    - Traffic Operations
    - Structures
    - Safety
    - ROW
    - Maintenance and
    - Program Management
  - FHWA DTE and SIRC must be invited

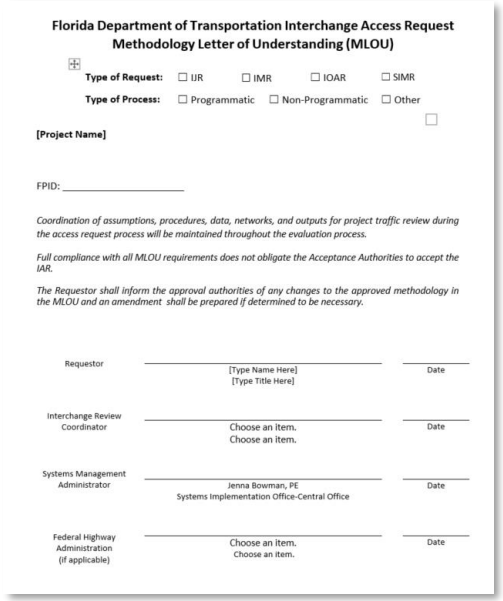
Types of IARs and Documentation



Types of IARs and Documentation



- MLOU
  - Identifies the parameters and primary focus for the IAR
  - Documents the procedures to be followed in the IAR development
  - Used to reach a consensus among all stakeholders
  - Required for all IJRs and IMRs
  - For IOAR projects, the DIRC will determine the need for MLOU on a case-by-case basis



Florida Department of Transportation Interchange Access Request Methodology Letter of Understanding (MLOU)

Type of Request: ☐ IJR ☐ IMR ☐ IOAR ☐ SIMR

Type of Process: ☐ Programmatic ☐ Non-Programmatic ☐ Other

[Project Name]

FPID: _____

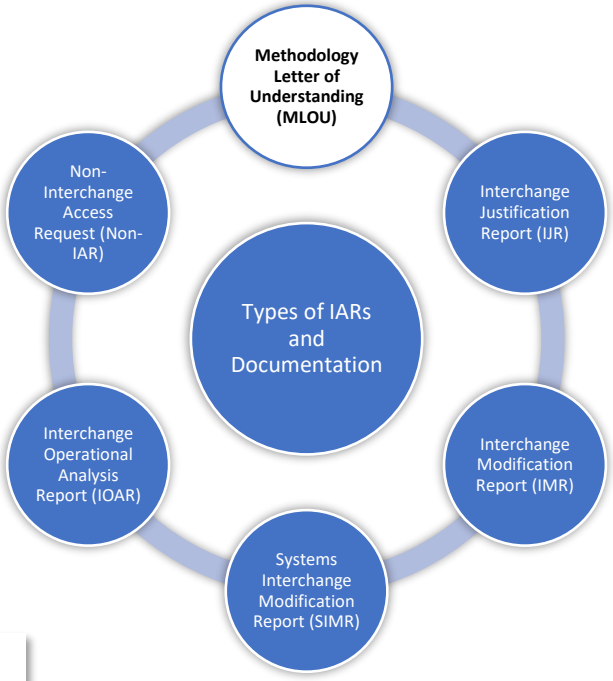
Coordination of assumptions, procedures, data, networks, and outputs for project traffic review during the access request process will be maintained throughout the evaluation process.

Full compliance with all MLOU requirements does not obligate the Acceptance Authorities to accept the IAR.

The Requestor shall inform the approval authorities of any changes to the approved methodology in the MLOU and an amendment shall be prepared if determined to be necessary.

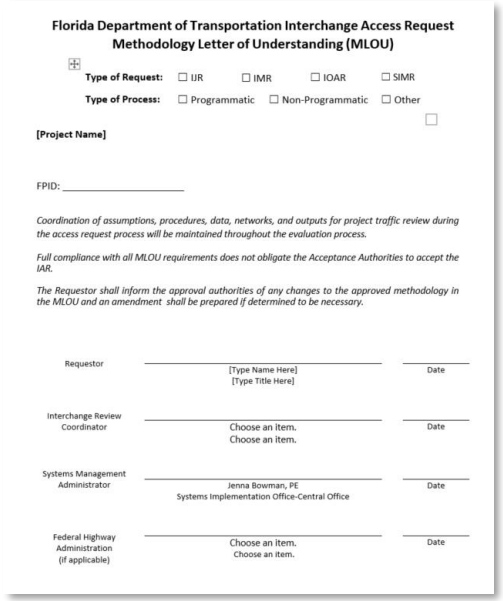
Requestor	[Type Name Here] [Type Title Here]	Date
Interchange Review Coordinator	Choose an item. Choose an item.	Date
Systems Management Administrator	Jenna Bowman, PE Systems Implementation Office-Central Office	Date
Federal Highway Administration (if applicable)	Choose an item. Choose an item.	Date

Types of IARs and Documentation



- MLOU
  - Meeting should be conducted to discuss the access proposal and MLOU for the access request
  - Any fatal flaws to IAR acceptance should be identified and resolved
  - The MLOU does not serve as a scope of work

*Any work done prior to approval is at risk



Florida Department of Transportation Interchange Access Request Methodology Letter of Understanding (MLOU)

Type of Request: ☐ IJR ☐ IMR ☐ IOAR ☐ SIMR

Type of Process: ☐ Programmatic ☐ Non-Programmatic ☐ Other

[Project Name]

FPID: _____

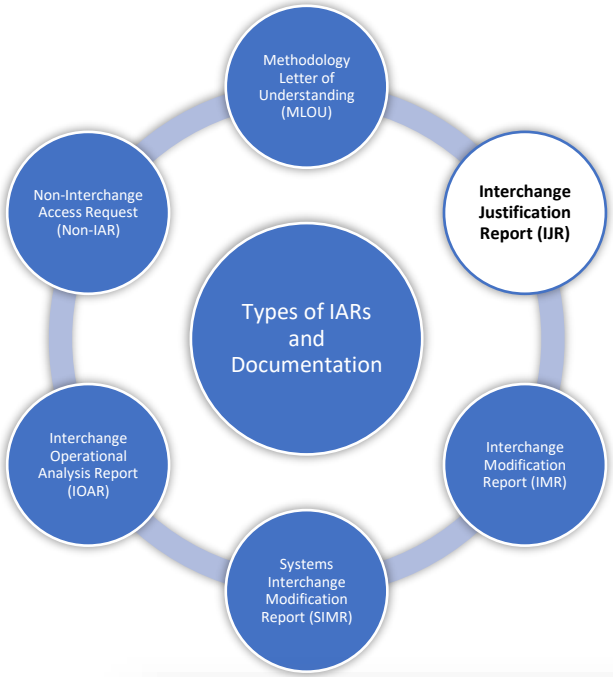
Coordination of assumptions, procedures, data, networks, and outputs for project traffic review during the access request process will be maintained throughout the evaluation process.

Full compliance with all MLOU requirements does not obligate the Acceptance Authorities to accept the IAR.

The Requestor shall inform the approval authorities of any changes to the approved methodology in the MLOU and an amendment shall be prepared if determined to be necessary.

Requestor	[Type Name Here] [Type Title Here]	Date
Interchange Review Coordinator	Choose an item. Choose an item.	Date
Systems Management Administrator	Jenna Bowman, PE Systems Implementation Office-Central Office	Date
Federal Highway Administration (if applicable)	Choose an item. Choose an item.	Date

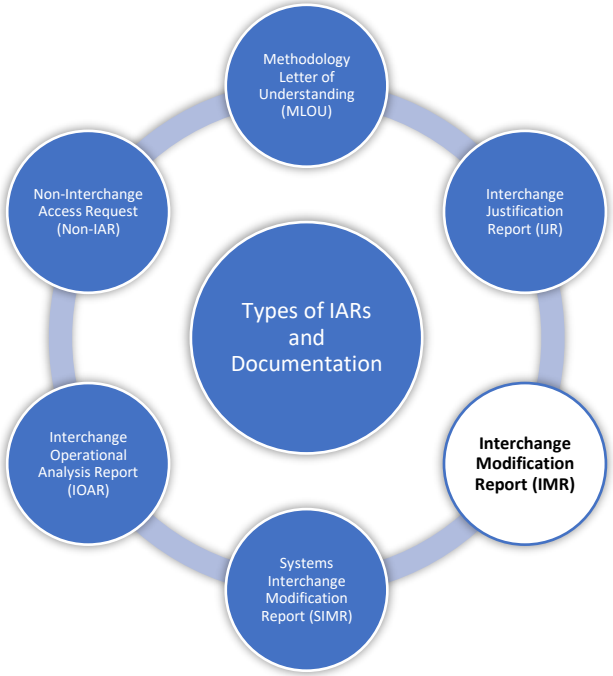
Types of IARs and Documentation



- IJR
  - Required when the proposed action provides new access to the limited access facility
  - Requires the highest level of analysis and documentation
  - IJR is required for the following situations
    - New system to system interchange
    - New service interchange
    - New partial interchange

New Interchange at the I-75 and Overpass Road

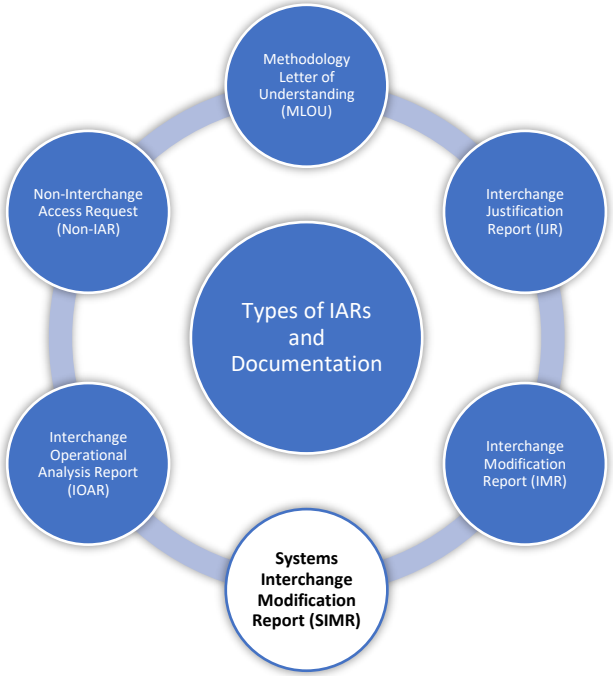
Types of IARs and Documentation



- IMR
  - Required for modification of configuration or travel patterns at an existing interchange
  - Typically, improvements require right of way acquisition
  - Long term improvements – at least 20 years
  - Extent and complexity of proposed modification will determine the level of analysis and documentation

I-10 at SR 23/US 90

Types of IARs and Documentation

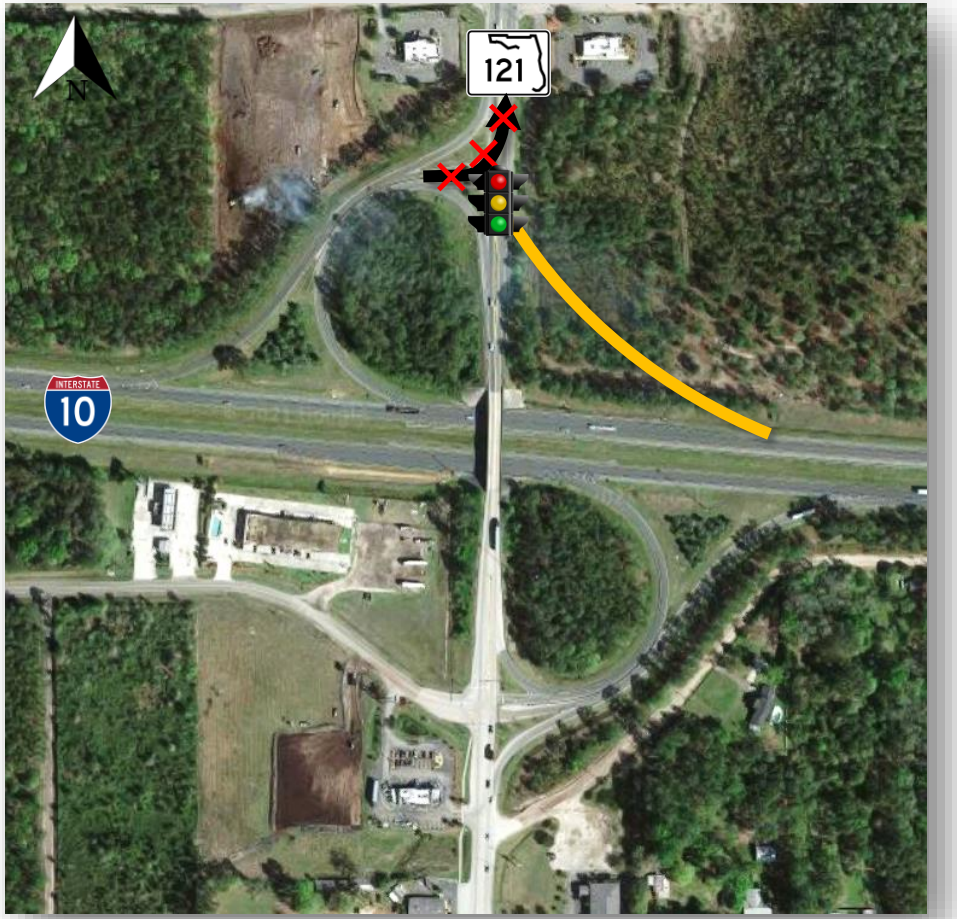


- SIMR
  - Purpose of an SIMR is to evaluate the impacts of closely spaced interchanges
  - The limits of an SIMR should be carefully chosen and discussed with SIRC and FHWA
  - Recommended limits of an SIMR are
    - Four to seven miles in length and
    - Including three to five interchanges

I-4 at I-75

Types of IARs and Documentation

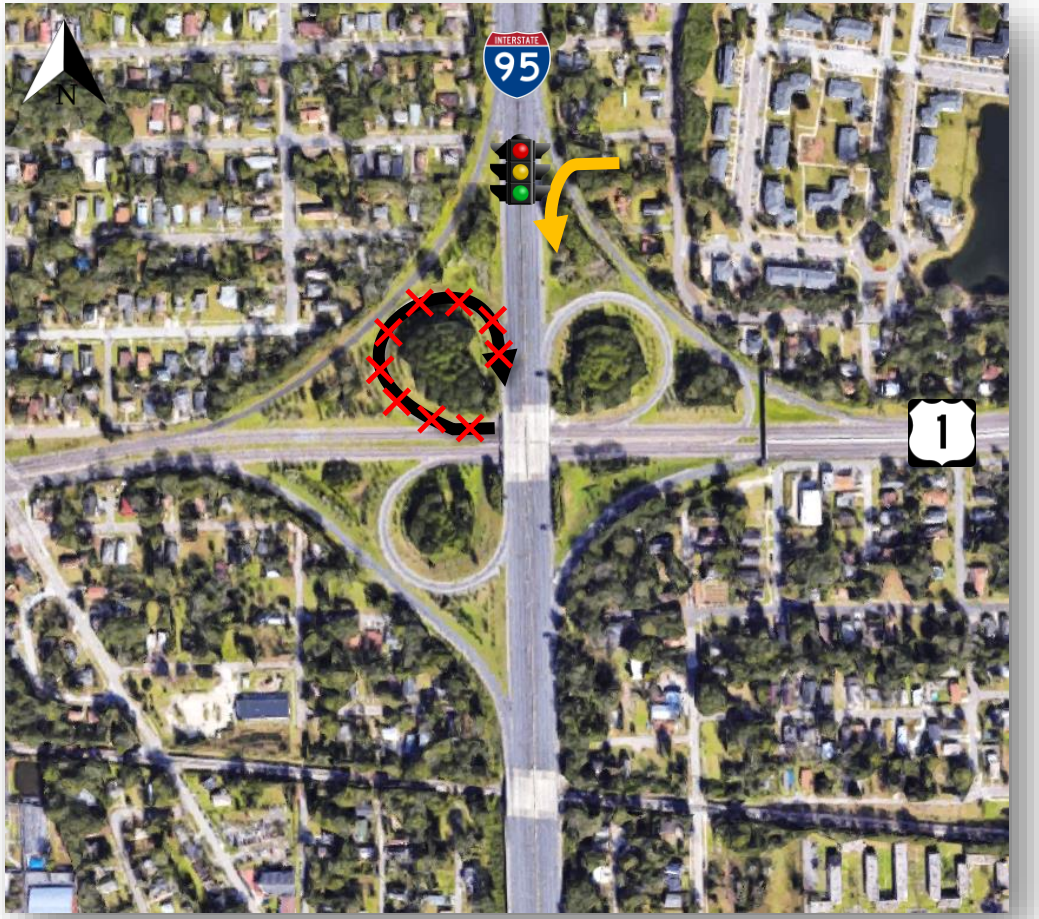
- **When to prepare an IMR**
  - Modification to the geometric configuration of an interchange
    - Adding new ramp(s)



I-10 at SR 121

Types of IARs and Documentation

- **When to prepare an IMR**
  - Modification to the geometric configuration of an interchange
    - Abandoning/removing ramp(s)



I-95 at US 1/Martin Luther King Jr. Parkway

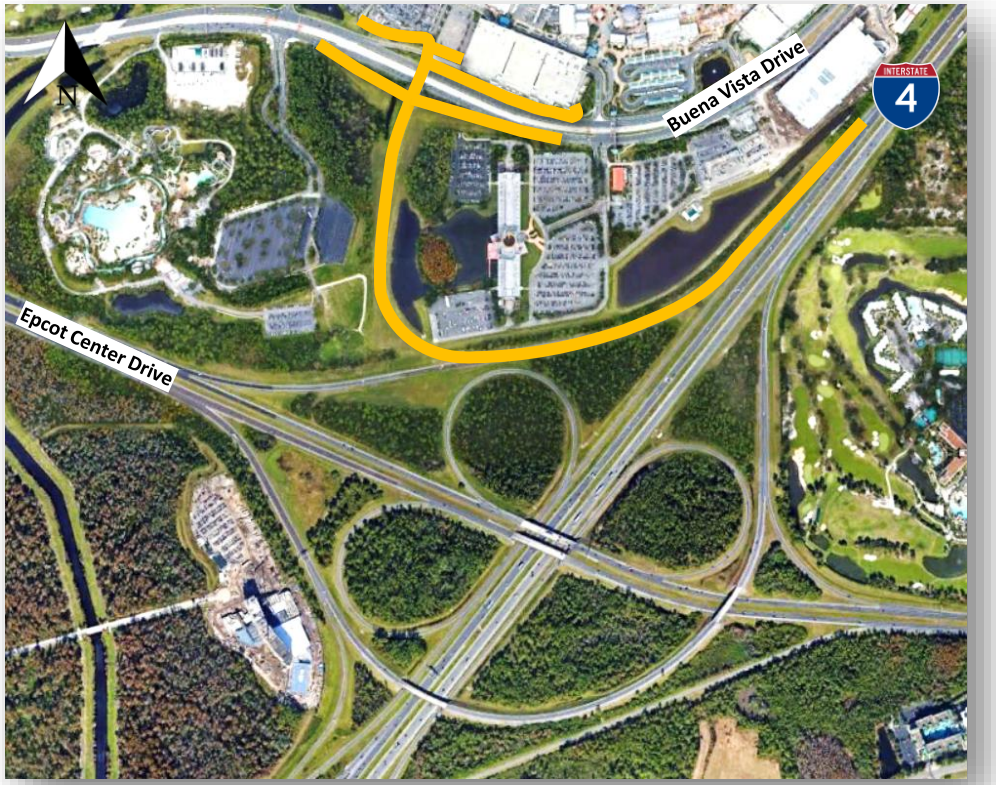
Types of IARs and Documentation

- When to prepare an IMR
  - Completion of basic movements at an existing partial interchange.

Florida's Turnpike at US 192

Types of IARs and Documentation

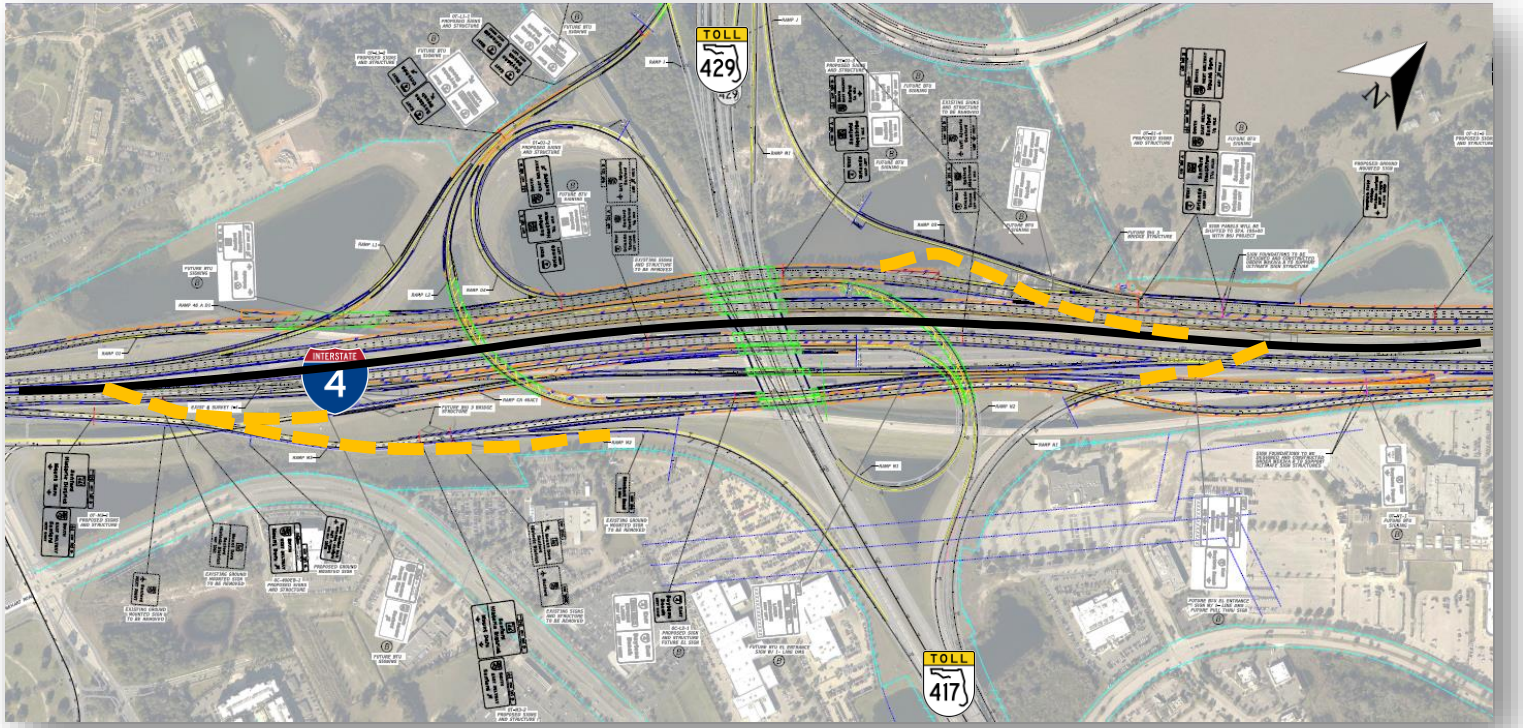
- **When to prepare an IMR**
  - Modification of existing interchange ramp to provide access to a different local road that requires a break in the limited access right-of-way.



I-4 at Epcot Center Drive and Buena Vista Drive

Types of IARs and Documentation

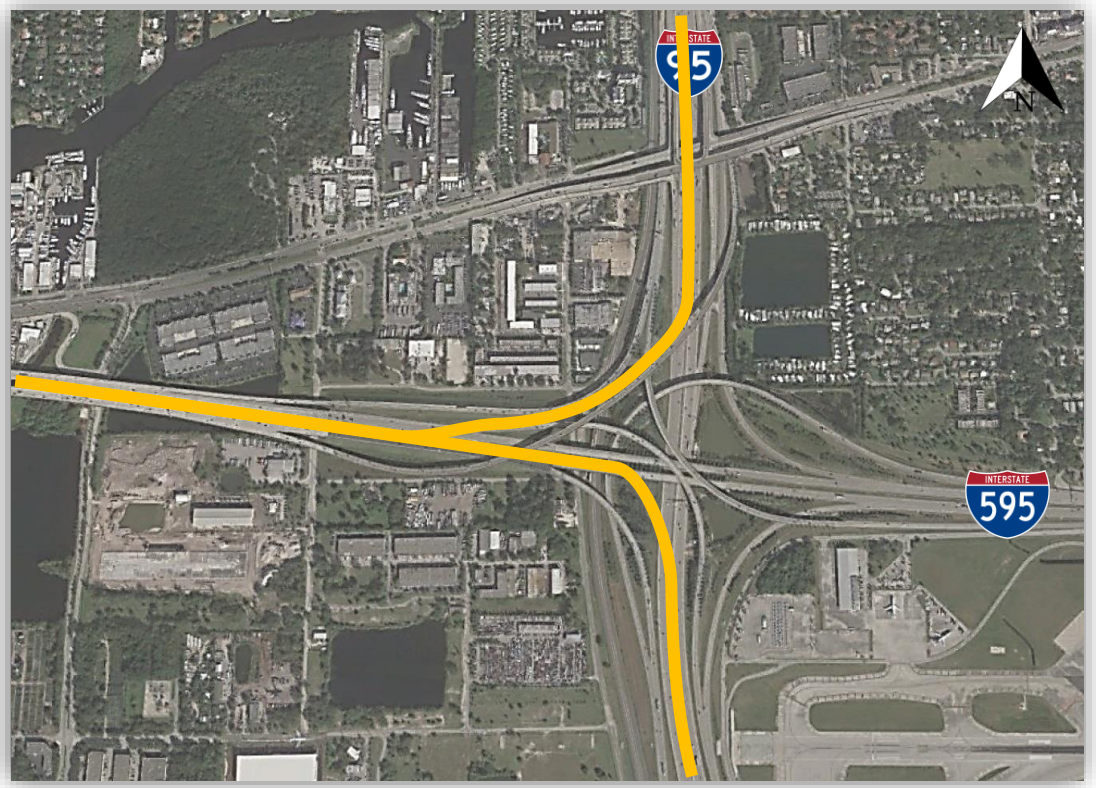
- When to prepare an IMR
  - Managed lanes access to an existing interchange that provides direct connection to the crossroad



I-4 at Florida Toll 417/Toll 429

Types of IARs and Documentation

- When to prepare an IMR
  - Direct managed lane to managed lane ramp connections



I-95 at I-595

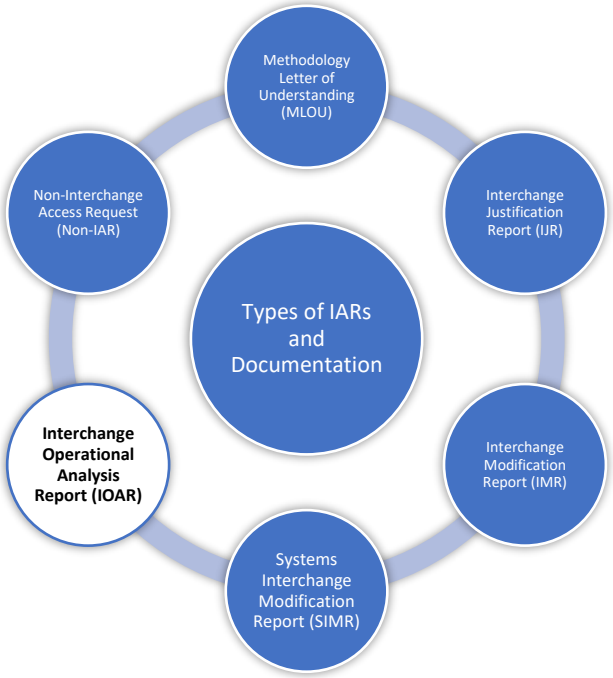
Types of IARs and Documentation

HCM Methodology	
$L_{Seg} < L_{Max}$	Analyze as a weaving segment
$L_{Seg} \geq L_{Max}$	Analyze the merge and diverge junctions as separate segments

- When to prepare an IMR
  - Any changes that result in an increase in the number of lanes at the gore point of an on-ramp within a weaving area, as determined by the HCM weaving methodology

I-75 at SR 884

Types of IARs and Documentation



- IOAR
  - Prepared for minor modifications with no change in existing interchange configuration or travel patterns
  - Typically, does not require right of way acquisition
  - Short term and low-cost improvements – last about 10 years
  - Determination of an IOAR vs. an IMR is critical
    - Level of effort could vary significantly
  - The requestor should coordinate with the DIRC, SIRC and FHWA in determining if IAR is an IOAR or IMR
    - Determination shall be done at beginning of the project, during the MLOU stage

I-10 at US 90

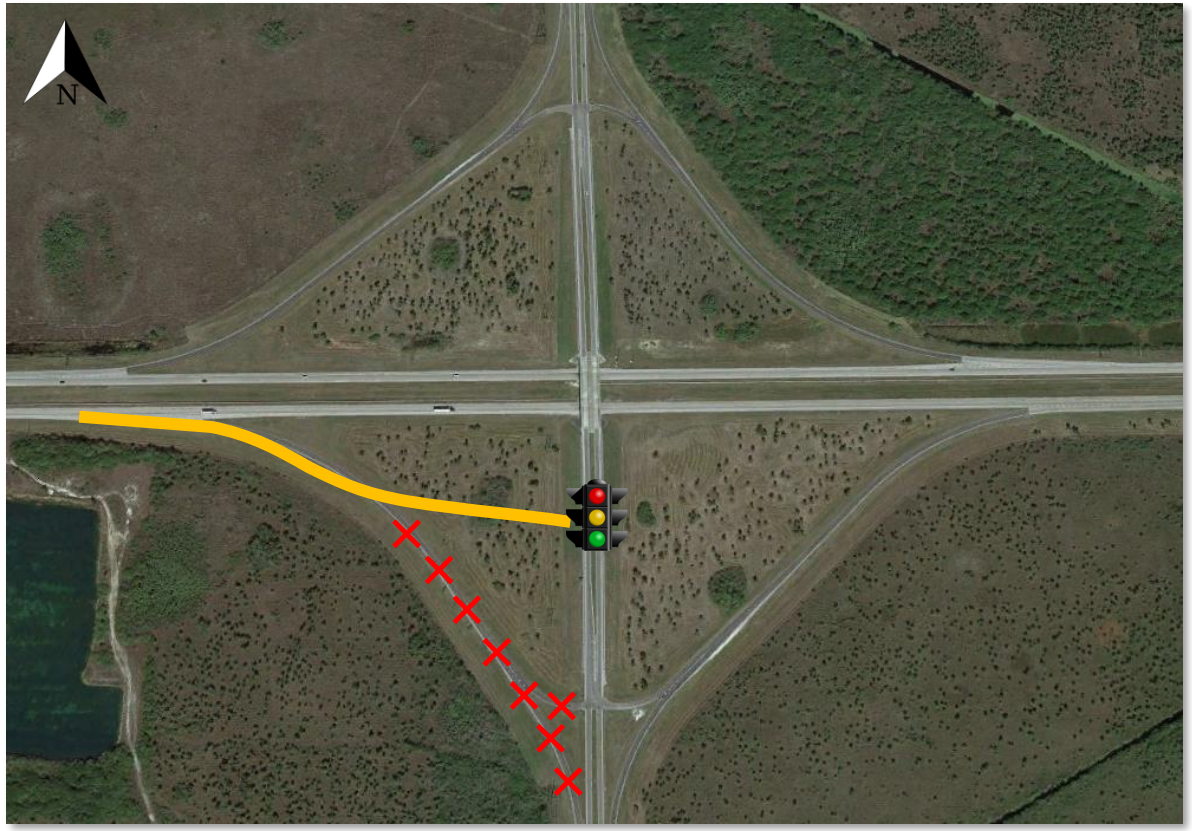
Types of IARs and Documentation

- When to prepare an IOAR
  - Addition of a lane (or lanes) to an existing on-ramp while maintaining existing lanes at gore point.

I-75 at NW 138th Street

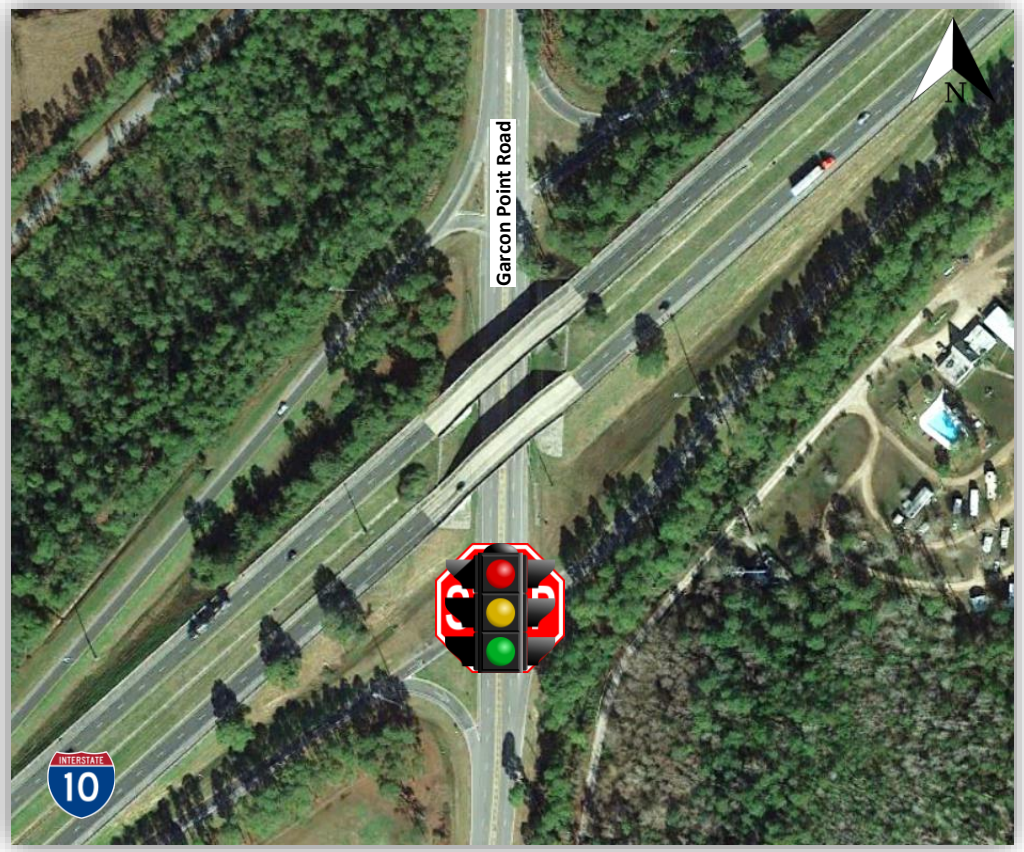
Types of IARs and Documentation

- When to prepare an IOAR
  - Any proposal that results in the shortening of an off-ramp.



Types of IARs and Documentation

- **When to prepare an IOAR**
  - Replacement of an unsignalized free-flow, right-turn lane on an off ramp with a signalized right turn
  - Installation of a signal to a stop-controlled ramp terminal intersection
  - Installation of a roundabout to a stop-controlled ramp terminal intersection



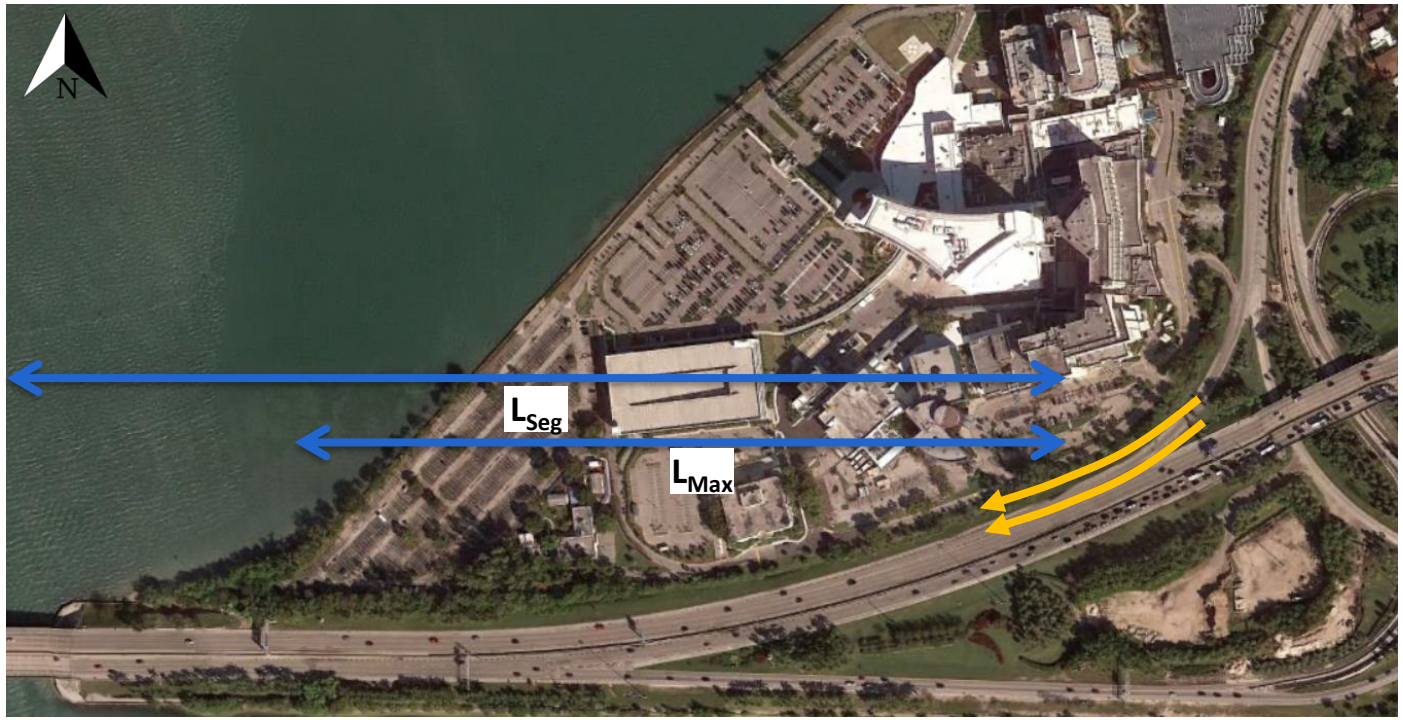
I-10 at Garcon Point Road

Types of IARs and Documentation

HCM Methodology

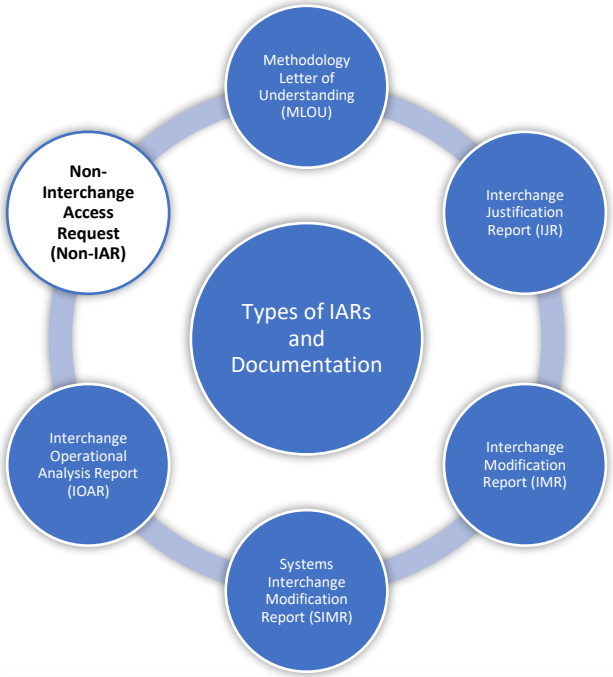
$L_{Seg} < L_{Max}$	Analyze as a weaving segment
$L_{Seg} \geq L_{Max}$	Analyze the merge and diverge junctions as separate segments

- When to prepare an IOAR
  - Any changes that result in an increase in the number of lanes at the gore point of an on-ramp outside the weaving area as determined by the HCM weaving methodology.



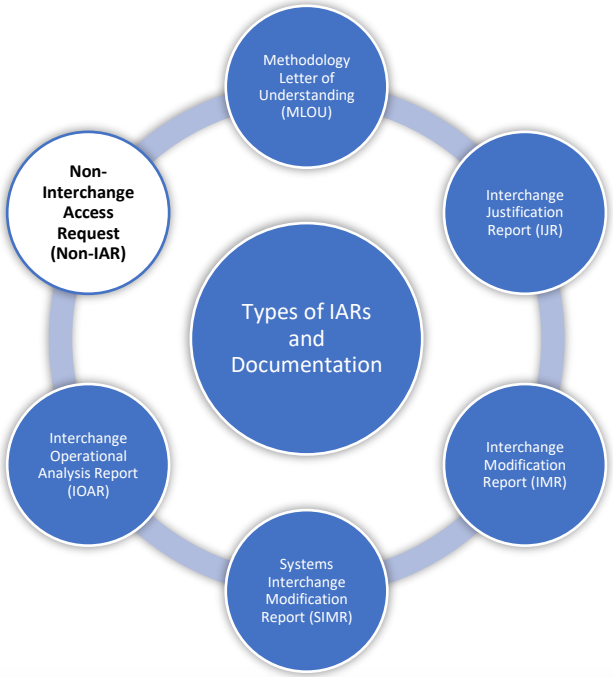
I-195 at Alton Road

Types of IARs and Documentation



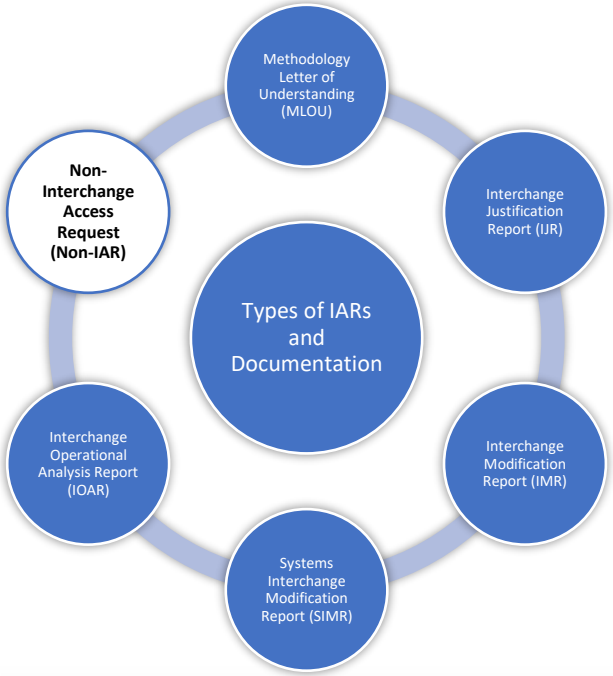
- **Non-IAR**
  - Non-IARs are improvements that **do not require** an access request
  - Coordination with the FHWA Florida Division Office is required for information purposes
  - Responsibility of the District IRC to ensure operational analyses for the non-IAR improvements are conducted and documented
  - Traffic and safety analysis may not be required on:
    - Construction of new signing, striping and/or resurfacing of an interstate
    - Installation of roadside guardrail and concrete barriers
    - "In-kind" bridge replacement/modification without changing laneage

Types of IARs and Documentation



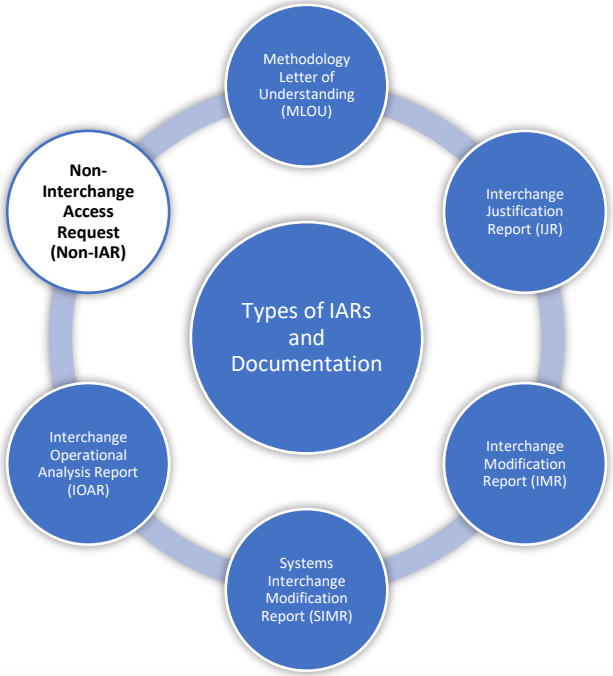
- **Non-IAR**
  - Non-IAR examples
    - Addition of storage lanes at the terminus of existing off-ramps with the crossroad.
    - Relocation or shifting of the ramp termini (i.e., moving the ramp end that connects with the crossroad) along the same roadway, which does not result in a shortening of an off-ramp.
    - Extension of an acceleration lane, deceleration lane or recovery lane at the interstate connection point not within the weaving area of an adjacent interchange.
    - Extension of an on-ramp as an auxiliary lane extending to downstream interchange.

Types of IARs and Documentation



- **Non-IAR**
  - Non-IAR examples
    - Access (slip ramps) between express lanes and general use lanes on the interstate highway. The operations and safety of the access points shall be evaluated and documented in a Corridor Traffic Analysis Report (CTAR) in lieu of the IAR.
    - Implementation of ramp metering or other active control of vehicles entering the interstate highway.
    - Construction of new signing, striping and/or resurfacing of an interstate on-ramp or off-ramp, where geometric features are not changed.
    - Installation of a roadside guardrail and concrete barriers (such as for resurfacing and safety projects).

Types of IARs and Documentation



- **Non-IAR**
  - Non-IAR examples
    - Addition of through lane(s) on a crossroad at a ramp terminal.
    - Widening of an existing off-ramp to add lane(s) at the diverge point from the mainline.
    - “In-kind” bridge replacement/modification without changing laneage.
    - Construction of overpasses or grade-separated structures without ramps along interstate facilities.
    - Interchanges that are proposed within a new limited access facility and do not connect to an existing limited access.
    - Implementation of transit services such as Bus Rapid Transit along the arterial.

Non-Vehicular Access

- **Examples of non-vehicular access include:**
  - New sidewalks or bike lanes on a roadway
  - Construction of an access connection sidewalk between a major and minor street

- **A general use permit needs to be submitted to the District Office of Maintenance if**
  - Upgrades are made within the limited access right of way
  - Upgrades require a break in limited access of the existing interchange

- **The District Office of Maintenance is responsible for coordinating with all the relevant agencies for review and approval of non-vehicular access requests**
  - Including coordination with DIRC

Non-Vehicular Access

- An IAR is not needed if the proposed changes do not impact the operations of the interchange
- An IAR may be required if the non-vehicular access proposal requires any changes to the interchange geometry or signal timings
- The need and type of the IAR shall be determined in coordination with the DIRC and SIRC

Locked Gate Access

- All locked gate access requests require a general use permit.
- Requests for access shall satisfy FHWA's policy points.
- Factors used to make a recommendation for a locked gate access include (but are not limited to):
  - Purpose and need
  - Review of possible access alternatives
  - Number, type, duration and frequency of vehicles proposed to use the locked gate
  - Ownership and lessee of the property contiguous to the locked gate
- FDOT Maintenance Office establishes satisfaction of need and purpose for the locked gate access

Interchange Access Request Process and Types

QUIZ

Florida Interchange Access Request Process

Training

Webinar

Module 3 Programmatic Agreement & Acceptance Authorities

- Programmatic Agreement
- Transportation Management Areas (TMAs)
- Acceptance Authorities
- IAR Review Process
- IAR Review Time
- Performance Management of Programmatic IAR
- Quiz

Programmatic Agreement

Formally known as:

"PROGRAMMATIC AGREEMENT BETWEEN THE FEDERAL HIGHWAY ADMINISTRATION FLORIDA DIVISION AND THE FLORIDA STATE DEPARTMENT OF TRANSPORTATION REGARDING THE REVIEW AND APPROVAL OF SPECIFIC TYPES OF CHANGES IN INTERSTATE-SYSTEM ACCESS"

IN PLACE APRIL 24, 2020

Programmatic Agreement

- **Map 21 & Programmatic Agreement (PA)**
  - MAP 21 - Moving Ahead for Progress in 21st Century
    - Strives to create a streamlined and performance-based surface transportation program
    - Builds on many of the highway programs and policies established in 1991
  - Section 1318 (d) - Programmatic Agreement (PA)
    - Allows FHWA to delegate to FDOT the review and safety, operational and engineering (SO&E) acceptability of certain IAR documents
    - Applies to projects that qualify for delegated approval
    - No changes to required documentation
    - NEPA must still be completed for final approval

Programmatic Agreement

U.S. Department of Transportation

Federal Highway Administration

FDOT

KEY POINTS OF PA

- FDOT has more control on the IAR process
- Streamlines and expedites the review and approval of IARs
- The FDOT Chief Engineer has the authority to determine SO&E acceptability of certain IARs
- FHWA provides final approval (affirmative determination) after completion of PD&E

Programmatic Agreement

Roll of Central Office

- Meet requirements set forth by the PA
- Develop a Training Plan to educate individuals working on IARs
- Develop and upkeep an Interchange Handbook, Procedure and Policy
- Provide an annual reporting of expected interchange actions
- Perform conflict resolution protocol

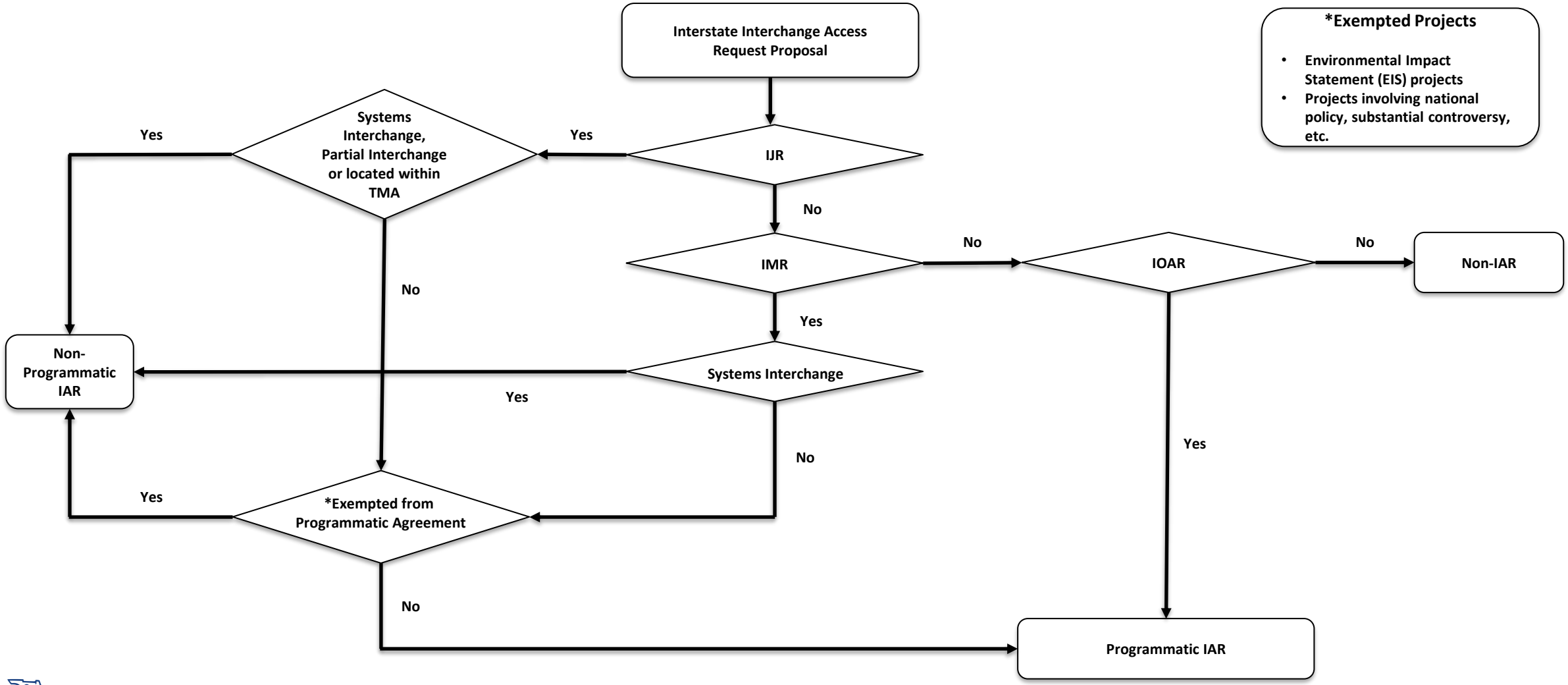
Programmatic Agreement

- PA Eligibility

Programmatic	Non-Programmatic
• New service interchanges outside of Transportation Management Areas (TMAs) • Modifications to existing service interchanges • Completion of basic movements at existing partial interchanges • All IOARs	• New or modified freeway-to-freeway (system) interchanges • New service interchanges inside of TMAs • New partial interchanges • Closure of individual access points that result in partial interchanges or closure of entire interchanges • Locked gate access

- When determining if the IAR is Programmatic or Non-Programmatic, please refer to the IARUG Figure 1-2 (next slide)

Determination of Programmatic versus Non-Programmatic IAR



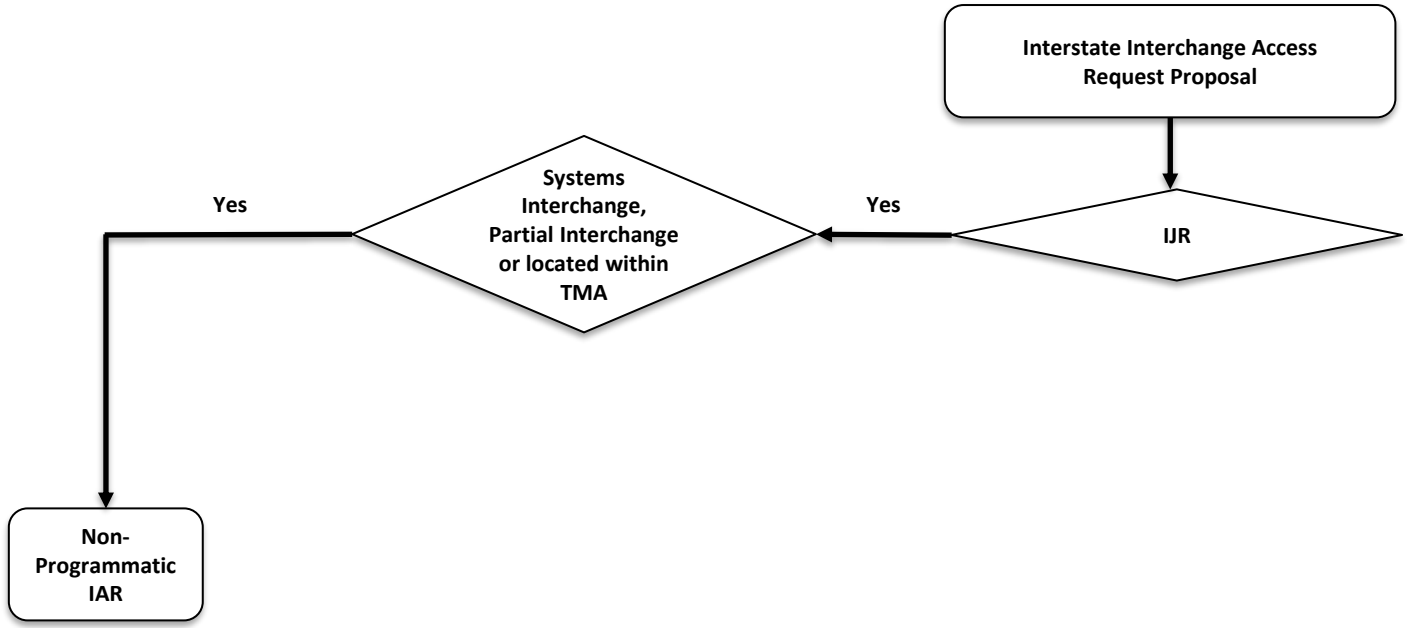
Programmatic Agreement

- **Example 1: Programmatic vs. Non-Programmatic IAR**
  - A new interchange is being proposed along I-10 in the Pensacola TMA. The arterial currently crosses over the interstate. Is this IAR Programmatic or Non-Programmatic?

A Programmatic

B Non-Programmatic

Determination of Programmatic versus Non-Programmatic IAR – Example 1



***Exempted Projects**

- Environmental Impact Statement (EIS) projects
- Projects involving national policy, substantial controversy, etc.

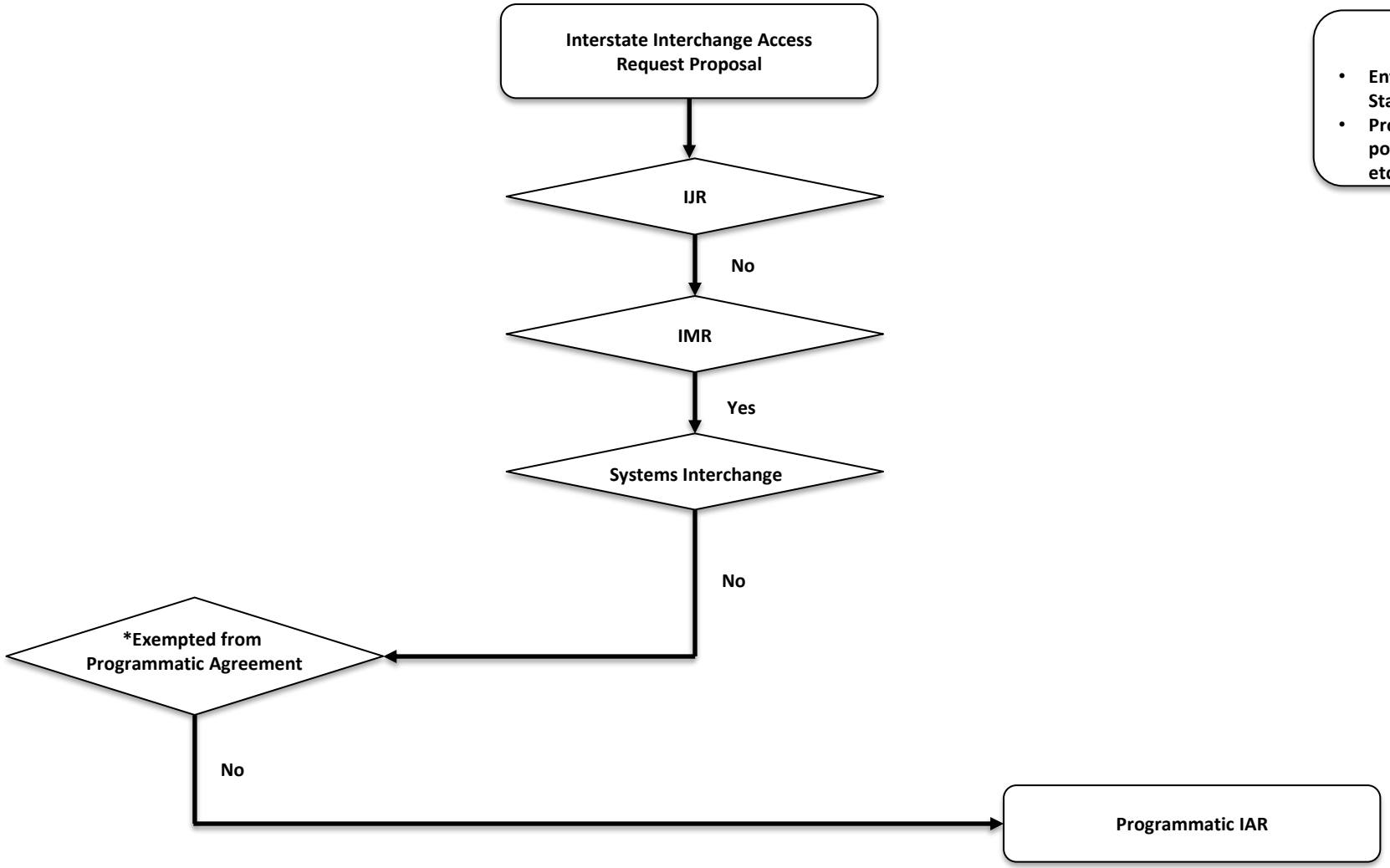
Programmatic Agreement

- **Example 2: Programmatic vs. Non-Programmatic IAR**
  - Major modifications are being recommended at the I-95 and Woolbright service interchange in Palm Beach County that requires preparation of an IMR. Is this IAR Programmatic or Non-Programmatic?

A Programmatic

B Non-Programmatic

Determination of Programmatic versus Non-Programmatic IAR – Example 2



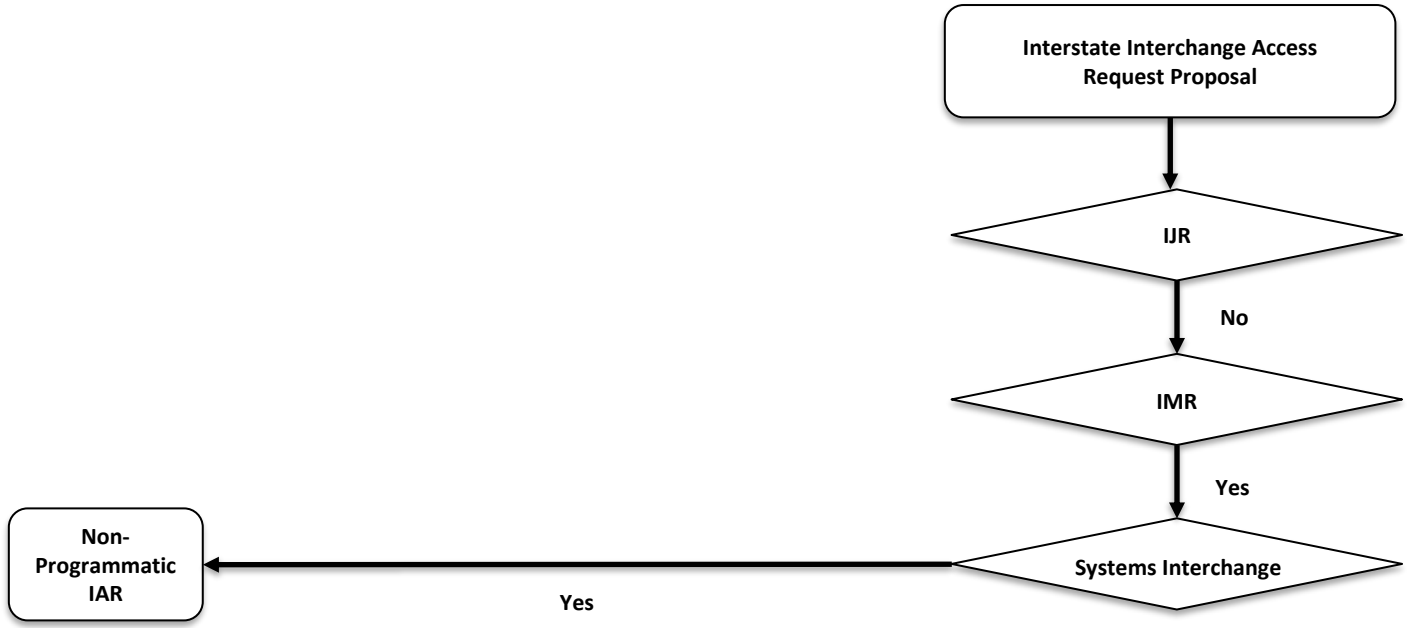
Programmatic Agreement

- **Example 3: Programmatic vs. Non-Programmatic IAR**
  - An IAR is being initiated for a system-to-system interchange. Major modifications at the interchange are expected to alleviate existing congestion. Is this IAR Programmatic or Non-Programmatic?

A Programmatic

B Non-Programmatic

Determination of Programmatic versus Non-Programmatic IAR – Example 3



***Exempted Projects**

- **Environmental Impact Statement (EIS) projects**
- **Projects involving national policy, substantial controversy, etc.**

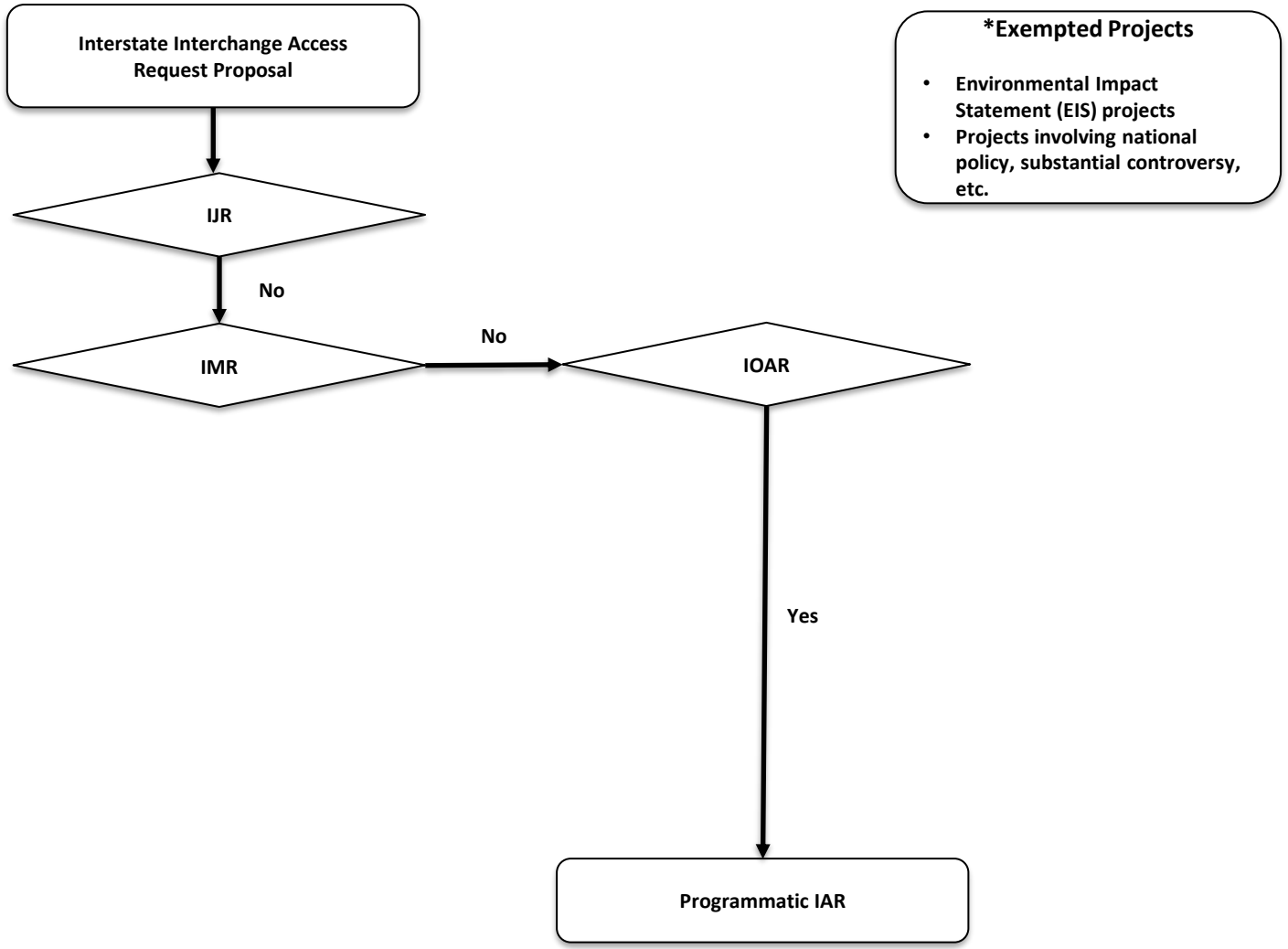
Programmatic Agreement

- **Example 4: Programmatic vs. Non-Programmatic IAR**
  - An IAR is being initiated for an interchange. The IAR is recommending the unsignalized ramp terminals be converted to signalized ramp terminals. Is this IAR Programmatic or Non-Programmatic?

A Programmatic

B Non-Programmatic

Determination of Programmatic versus Non-Programmatic IAR – Example 4



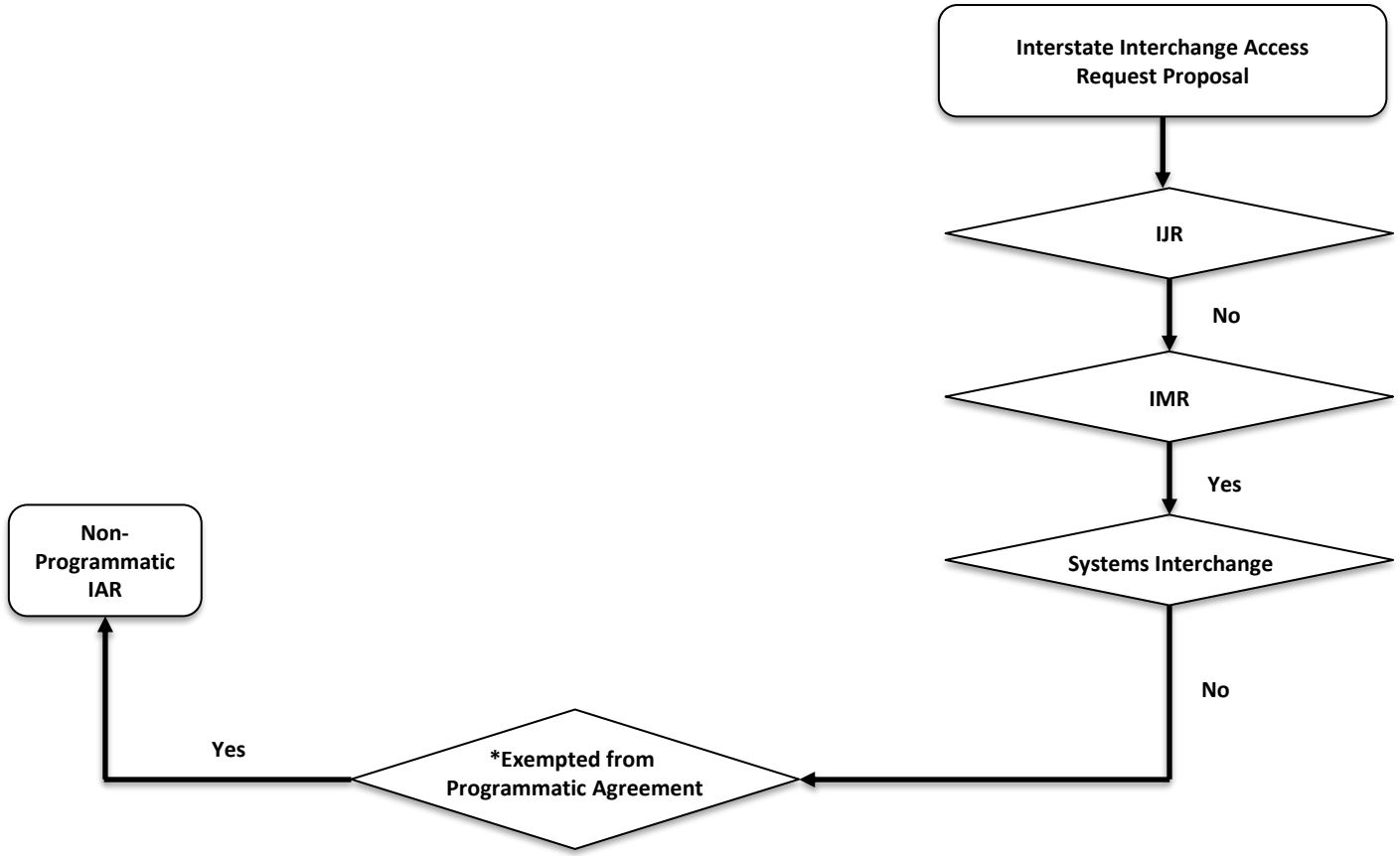
Programmatic Agreement

- **Example 5: Programmatic vs. Non-Programmatic IAR**
  - An IAR is being initiated as a result of a new development for an existing interchange at the arterial. The IAR is recommending an interchange reconfiguration. This project has drawn substantial controversy from the beginning of the project. Is this IAR Programmatic or Non-Programmatic?

A Programmatic

B Non-Programmatic

Determination of Programmatic versus Non-Programmatic IAR – Example 5



***Exempted Projects**

- Environmental Impact Statement (EIS) projects
- Projects involving national policy, substantial controversy, etc.

Transportation Management Areas (TMAs)

- Urbanized area > 50,000 population
- TMA – subset of Urbanized areas with ≥ 200,000 population
- Updated TMAs

Area Name	Population 2010
Miami, FL	5502379
Tampa--St. Petersburg, FL	2441770
Orlando, FL	1510516
Jacksonville, FL	1065219
Sarasota--Bradenton, FL	643260
Cape Coral, FL	530290
Palm Bay--Melbourne, FL	452791
Port St. Lucie, FL	376047
Palm Coast--Daytona Beach--Port Orange, FL	349064
Pensacola, FL--AL	340067
Kissimmee, FL	314071
Bonita Springs, FL	310298
Lakeland, FL	262596
Tallahassee, FL	240223
Winter Haven, FL	201289
Fort Walton Beach--Navarre--Wright, FL	191917
Gainesville, FL	187781
Deltona, FL	182169
North Port--Port Charlotte, FL	169541
Ocala, FL	156909
Sebastian--Vero Beach South--Florida Ridge, FL	149422
Spring Hill, FL	148220
Panama City, FL	143280
Leesburg--Eustis--Tavares, FL	131337
Lady Lake--The Villages, FL	112991
Homosassa Springs--Beverly Hills--Citrus Springs, FL	80962
St. Augustine, FL	69173
Zephyrhills, FL	66609
Sebring--Avon Park, FL	61625
Titusville, FL	54386

≥200,000 population, TMA

<200,000 population (Urbanized Area, but not TMA)
Still requires MPO

Acceptance Authorities

- DIRC has the primary responsibility for all IAR coordination
- If IAR affects more than one District, all affected DIRCs should be involved
- IARs developed by the toll authorities must involve the local FDOT District
- The following factors determine the approval authorities
  - Programmatic vs. Non-Programmatic
  - Document Type (MLOU or IAR)
  - IAR Type (IJR, IMR or IOAR)
  - Interstate, Non-Interstate or Non-Interstate Toll Facility

Approval Authority		MLOU			IAR		
		IJR	IMR	IOAR[1]	IJR	IMR	IOAR
Requestor		✓	✓	✓	✓	✓	✓
DIRC		✓	✓	✓	✓	✓	✓
Central Office	Systems Management Administrator	✓	✓	✓	✓	✓	✓
	Chief Engineer (or Delegate)				✓	✓	✓
	Assistant Secretary for Strategic Development (or Delegate)				✓		
FHWA					•	•	•

Note: ✓ Review and approve the document
1 For an IOAR, the DIRC will determine the need for an MLOU in consultation with SIRC
• Concurs with FDOT Chief Engineer's determination of safety, operational and engineering acceptability, as agreed upon in the PA and grants Affirmative Determination after completion of the second step. FHWA Transportation Engineers should be involved when developing the MLOU.

Approval Authority	MLOU		Interchange Access Request Interstate	
	IJR	IMR	IJR	IMR
Requestor	✓	✓	✓	✓
DIRC	✓	✓	✓	✓
Systems Management Administrator	✓	✓	✓	✓
Assistant Secretary Strategic Development			✓	
FHWA	✓	✓	✓	✓

Note: ✓ Review and approve the document

Approval Authority	MLOU			Interchange Access Request Non-Interstate		
	IJR	IMR	IOAR[1]	IJR	IMR	IOAR
Requestor	✓	✓	✓	✓	✓	✓
DIRC	✓	✓	✓	✓	✓	✓
Systems Management Administrator	✓	✓	✓	✓	✓	✓
District Secretary				✓	✓	✓

Note: ✓ Review and approve the document
1 The DIRC will determine the need for an MLOU in consultation with SIRC.

Approval Authority	Florida's Turnpike			Other Expressway Authorities		
	IJR*	IMR*	IOAR	IJR*	IMR*	IOAR
Requestor	✓	✓	✓	✓	✓	✓
Turnpike DIRC	✓	✓	✓			
DIRC	✓	✓		✓	✓	
Systems Management Administrator	✓			✓		

Note: ✓ Review and approve the document
* DIRC acceptance will not be needed for IJRs, IMRs not on the state highway system or IJRs, IMRs not affecting state highways. This determination will be made in coordination with DIRC and SIRC during the project.

Acceptance Authorities

- Programmatic IAR Approval Authorities

Approval Authority		MLOU			IAR		
		IJR	IMR	IOAR[1]	IJR	IMR	IOAR
Requestor		✓	✓	✓	✓	✓	✓
DIRC		✓	✓	✓	✓	✓	✓
Central Office	Systems Management Administrator	✓	✓	✓	✓	✓	✓
	Chief Engineer (or Delegate)				✓	✓	✓
	Assistant Secretary for Strategic Development (or Delegate)				✓		
FHWA					●	●	●

Note: ✓ Review and approve the document

1 For an IOAR, the DIRC will determine the need for an MLOU in consultation with SIRC

● Concurs with FDOT Chief Engineer's determination of safety, operational and engineering acceptability, as agreed upon in the PA and grants Affirmative Determination after completion of the second step. FHWA Transportation Engineers should be involved when developing the MLOU.

Acceptance Authorities

- Non-Programmatic IAR Approval Authorities

Approval Authority	MLOU		Interchange Access Request	
			Interstate	
	IJR	IMR	IJR	IMR
Requestor	✓	✓	✓	✓
DIRC	✓	✓	✓	✓
Systems Management Administrator	✓	✓	✓	✓
Assistant Secretary Strategic Development			✓	
FHWA	✓	✓	✓	✓

Note: ✓ Review and approve the document

Acceptance Authorities

- Non-Interstate IAR Approval Authorities

Approval Authority	MLOU			Interchange Access Request		
				Non-Interstate		
	IJR	IMR	IOAR[1]	IJR	IMR	IOAR
Requestor	✓	✓	✓	✓	✓	✓
DIRC	✓	✓	✓	✓	✓	✓
Systems Management Administrator	✓	✓	✓	✓	✓	✓
District Secretary				✓	✓	✓

Note: ✓ Review and approve the document
1 The DIRC will determine the need for an MLOU in consultation with SIRC.

Acceptance Authorities

- Non-Interstate Toll Facility IAR Approval Authorities

Approval Authority	Florida's Turnpike			Other Expressway Authorities		
	IJR*	IMR*	IOAR	IJR*	IMR*	IOAR
Requestor	✓	✓	✓	✓	✓	✓
Turnpike DIRC	✓	✓	✓			
DIRC	✓	✓		✓	✓	
Systems Management Administrator	✓			✓		

Note: ✓ Review and approve the document

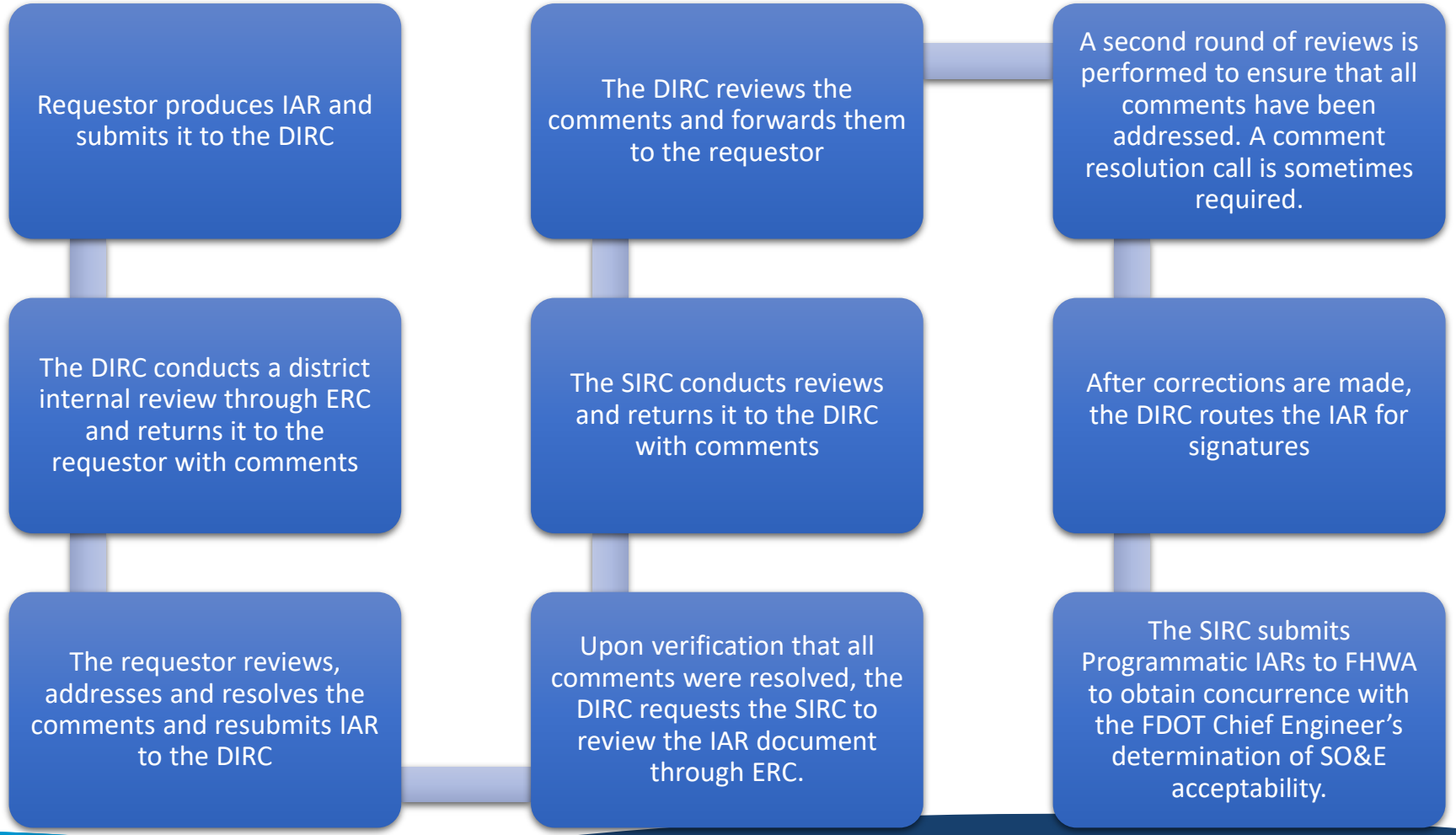
* DIRC acceptance will not be needed for IJRs, IMRs not on the state highway system or IJRs, IMRs not affecting state highways. This determination will be made in coordination with DIRC and SIRC during the project.

IAR Review Process

- Review of IAR deliverables is necessary to ensure appropriate quality
- For IARs that involve complex projects
  - Interim reviews of technical documents is recommended
    - e.g. model calibration reports and future traffic forecast reports
- IAR submittals must be reviewed through the Electronic Review and Comment (ERC) system
- The review process for Programmatic and Non-Programmatic IARs varies

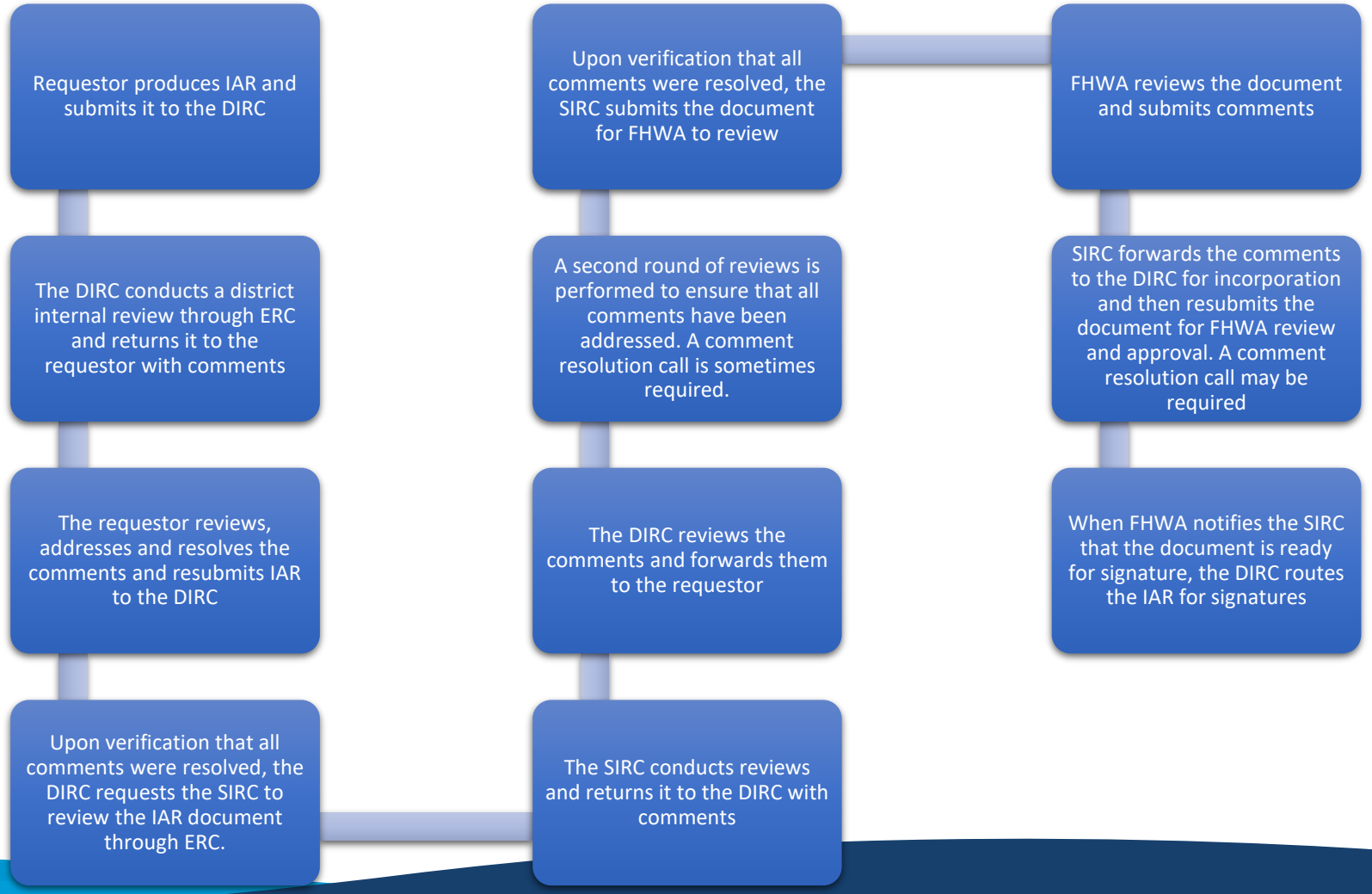
IAR Review Process – Programmatic

- Review process



IAR Review Process – Non-Programmatic

- Review process



IAR Review Time

- The following review time frames apply to all IARs:

SIRC First Round of Review

- The SIRC shall review and submit comments on the IAR within 10 business days

SIRC Second Round of Review

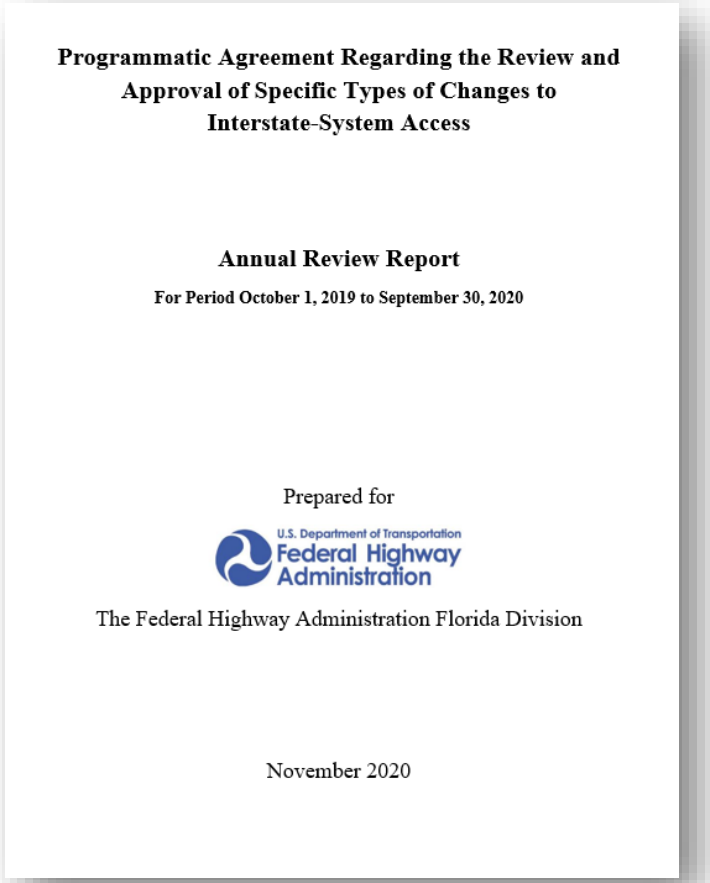
- The SIRC shall perform the second round of review within 5 business days

FHWA Review for non-PA IARs

- FHWA Florida Division shall review and submit comments within 20 business days for non-PA IARs

Performance Management of Programmatic IAR

- **Per the requirements of the PA, FDOT**
  - Conducts annual reviews of the performance of the IAR process
  - Submits a report to FHWA consisting of:
    - A summary of the results of all IARs that were processed and approved under the PA
    - Verification that the IARs were processed and complied with the PA
    - An identification and implementation plan for IAR process improvements
    - A summary of potential IARs in the coming year



Programmatic Agreement Regarding the Review and Approval of Specific Types of Changes to Interstate-System Access

Annual Review Report

For Period October 1, 2019 to September 30, 2020

Prepared for

U.S. Department of Transportation Federal Highway Administration

The Federal Highway Administration Florida Division

November 2020

Programmatic Agreement & Acceptance Authorities

QUIZ

Florida Interchange Access Request Process

Training

Webinar

Module 4 Methodology Letter of Understanding (MLOU)

- Methodology Meetings
- Determination of the Need for MLOU and Type of IAR
- Contents of MLOU
- Review and Acceptance of MLOU
- MLOU Qualifying Provisions
- MLOU Template
- Quiz

Methodology Meetings

- Methodology meetings shall be conducted to
  - Discuss various aspects of the access proposal
  - Reach an agreement regarding the contents of the MLOU

- Meetings ensure proper project coordination

- Meeting notes should be documented

- Requestor and DIRC may start drafting the MLOU once project need is determined

Methodology Meetings

- MLOU Objective
  - To reach consensus among stakeholders on the process and analysis to be followed in developing the IAR
- It is not the purpose of the MLOU to arrive at a predetermined concept
- The MLOU shall be signed by all parties to demonstrate agreement
- Fatal flaws shall be identified and resolved prior to execution of the MLOU
- The MLOU does not serve as scope of work
  - Any work done prior to signing the MLOU is at the risk

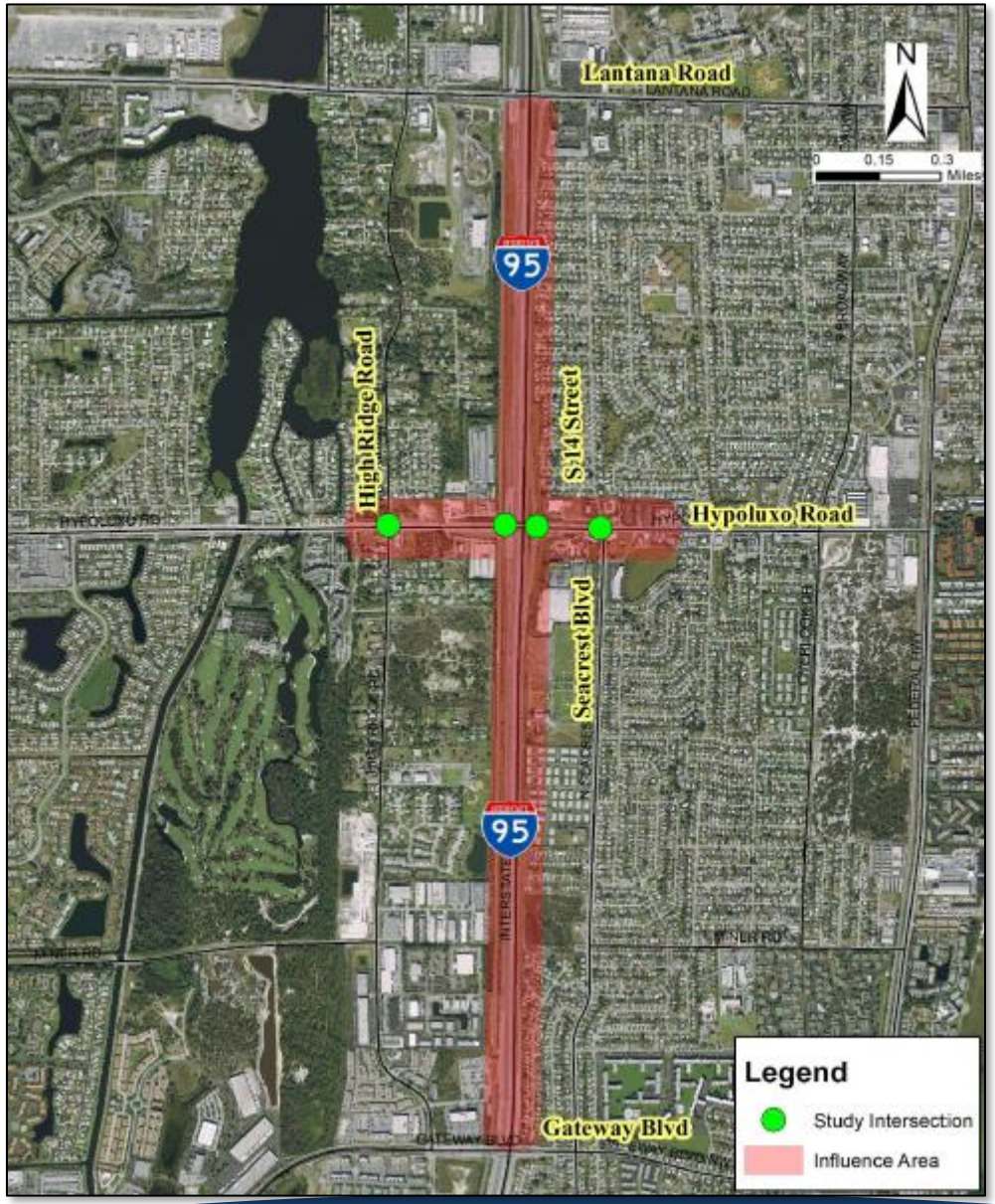
Contents of MLOU

- Project Purpose and Need

Purpose	Need
• Identifies primary goals of the project • Guides the range of alternatives to be developed • Should be broad enough to encompass a range of alternatives	• Arises from deficiencies, issues and/or concerns that currently exist or expected to occur • Serves as foundation for the proposed project • Consists of factual, objective description of transportation problems

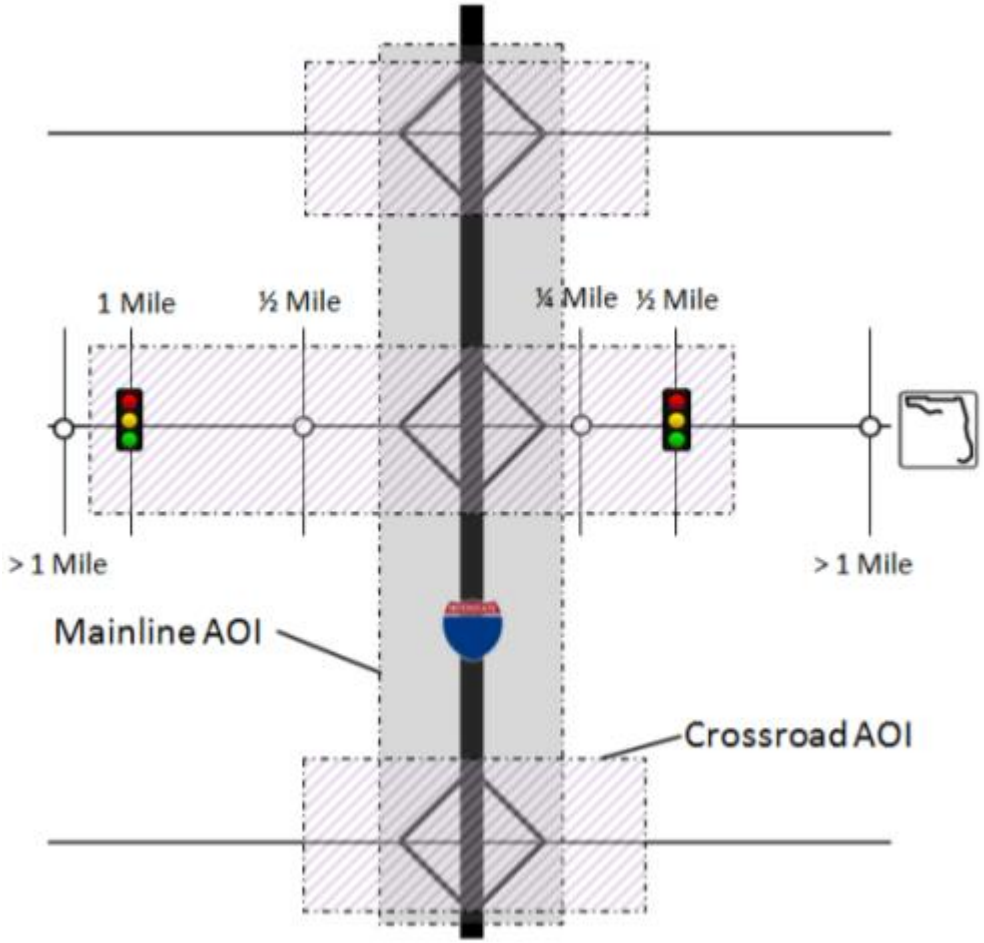
Contents of MLOU

- **Area of Influence (AOI)**
  - Defined as the area that is anticipated to experience significant changes in traffic operating characteristics
  - The AOI reflects current and anticipated operational and safety conditions
  - The AOI is determined by the IRC during the MLOU



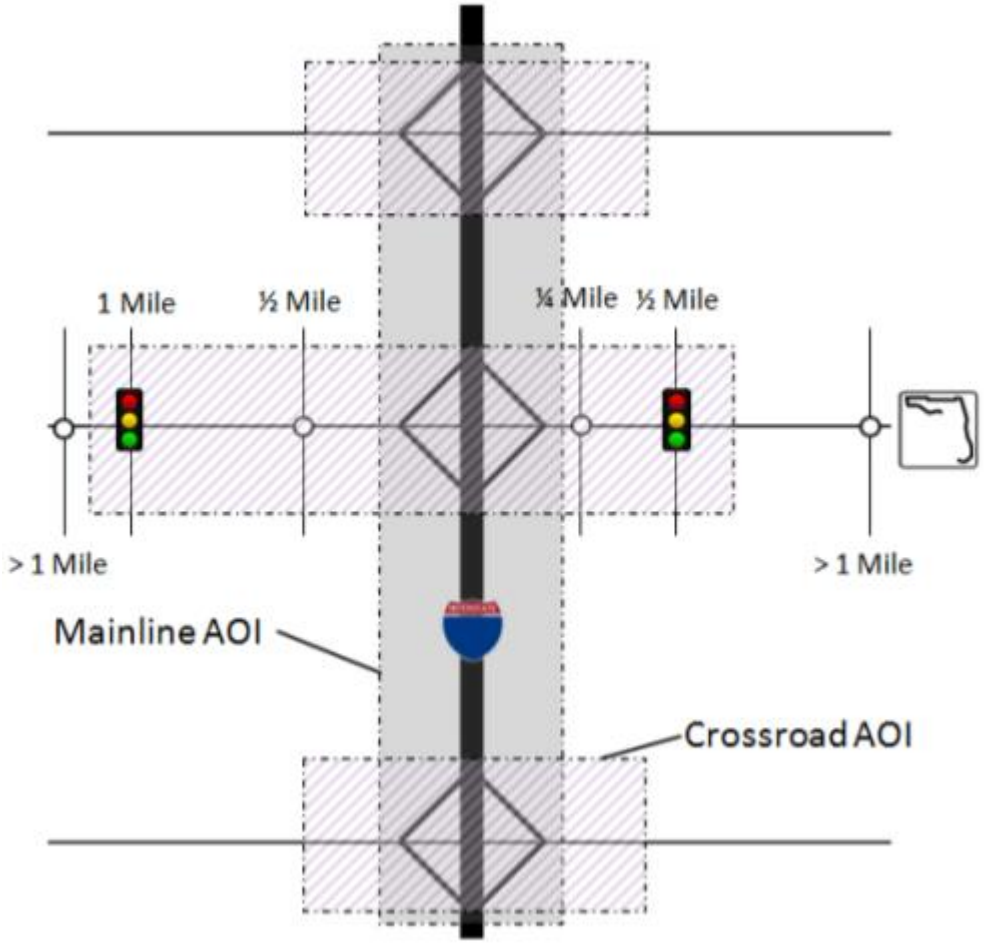
Contents of MLOU

- **Area of Influence (AOI) Guidelines**
  - Limited Access Mainline
    - For IJRs, the AOI includes at least the first adjacent interchange on either side of the proposed access
    - For IMRs, the AOI extends only to the on and off-ramp gore points of the adjacent interchanges
    - In rural areas, the proposed access could be isolated so, no adjacent interchanges may be necessary



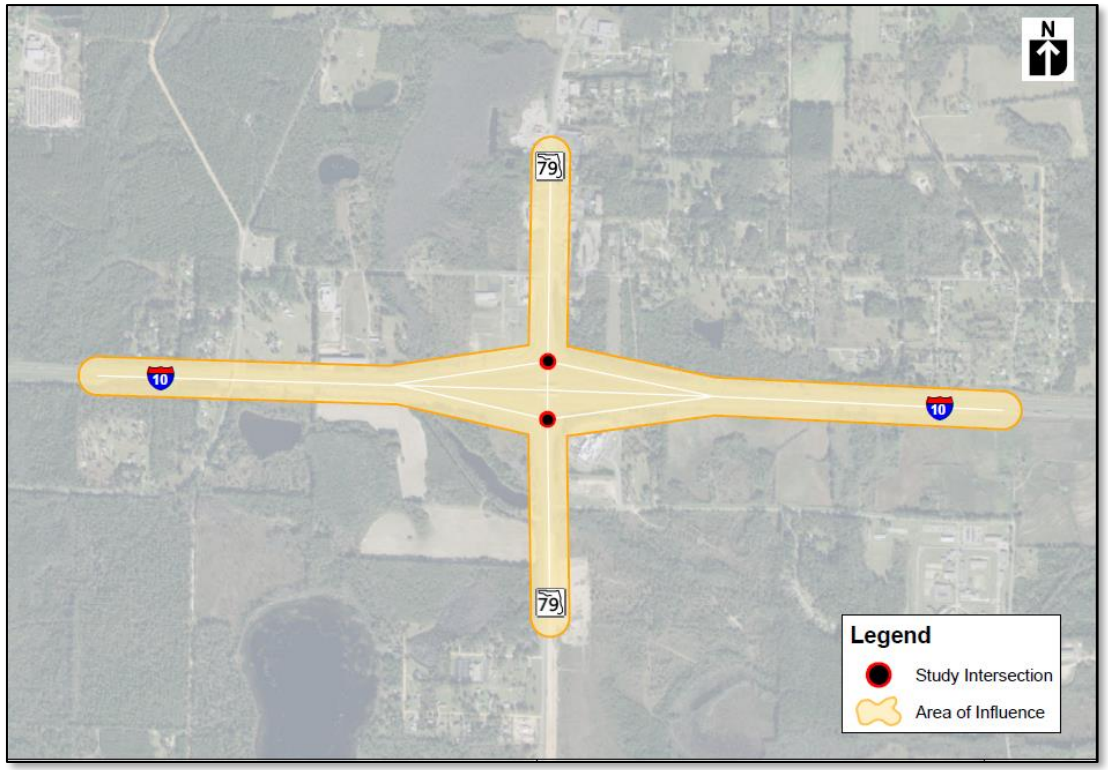
Contents of MLOU

- **Area of Influence (AOI) Guidelines**
  - Crossroad
    - Extends at a minimum, up to one half-mile in either direction of the proposed access change
    - If there are signalized intersections, the AOI shall extend beyond the half-mile to include at least one signalized intersection in either direction (depends on project conditions)



Contents of MLOU

- **Area of Influence (AOI) Guidelines**
  - IOARs
    - The study interchange ramp terminals and adjacent signalized intersections are included in the AOI
    - Adjacent interchanges on and off ramps could be included in the AOI
    - The diverge and merge points of the study interchange could be included (depending on the modification)
  - The AOI is determined based on the known operational and safety concerns



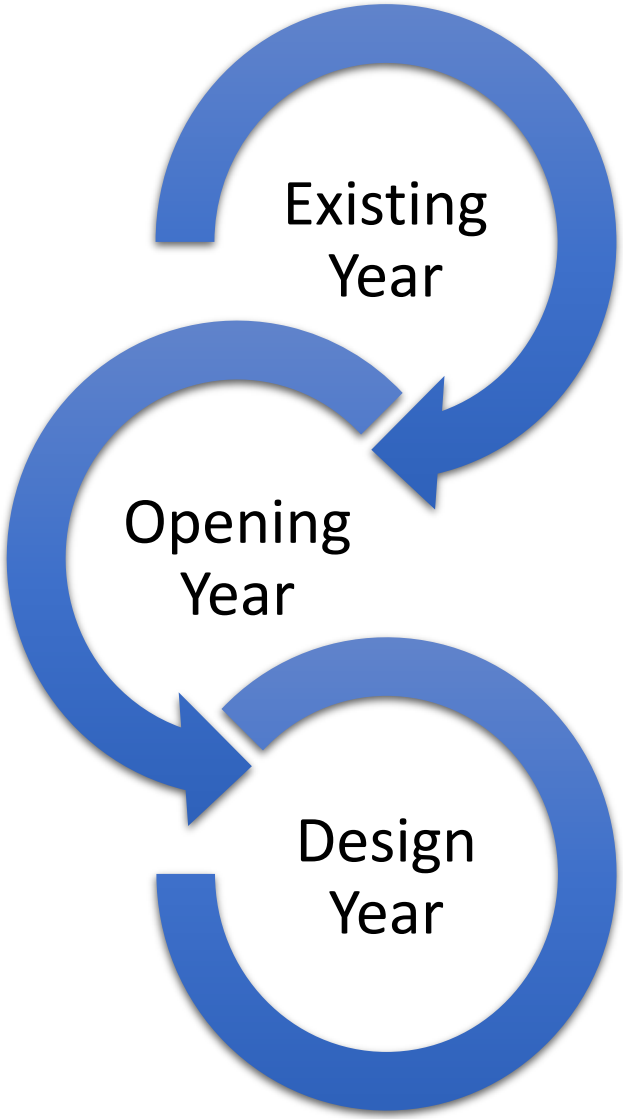
Contents of MLOU

- **Analysis Years**
  - All IARs shall include the following traffic analysis years:

  - In addition, an interim year may be required in projects with
    - Phased construction or
    - Projects that fail prior to the design year
  - Must analyze build and no-build alternatives for all analysis years

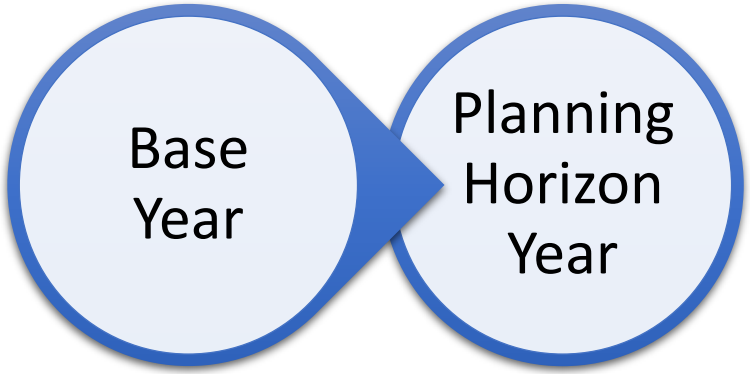
Contents of MLOU

- **Analysis Years**
  - Existing Year
    - Year the IAR is prepared or a prior year where acceptable data is available
  - Opening Year
    - The first year in which the proposed improvements will be opened to traffic
    - For phased improvements, the opening year is the year the first phase of the project will be opened to traffic
  - Design Year
    - Typically, 20 years after the opening year
  - An interim year analysis may be required in some IARs



Contents of MLOU

- **Analysis Years**
  - Two additional analysis years are considered for travel demand forecasting:



  - Base Year
    - Year for which the selected travel demand forecasting model was calibrated
  - Planning Horizon Year
    - Approved forecast or horizon year of the selected travel demand forecasting model
  - Techniques of interpolation and extrapolation shall be documented in the MLOU

Contents of MLOU

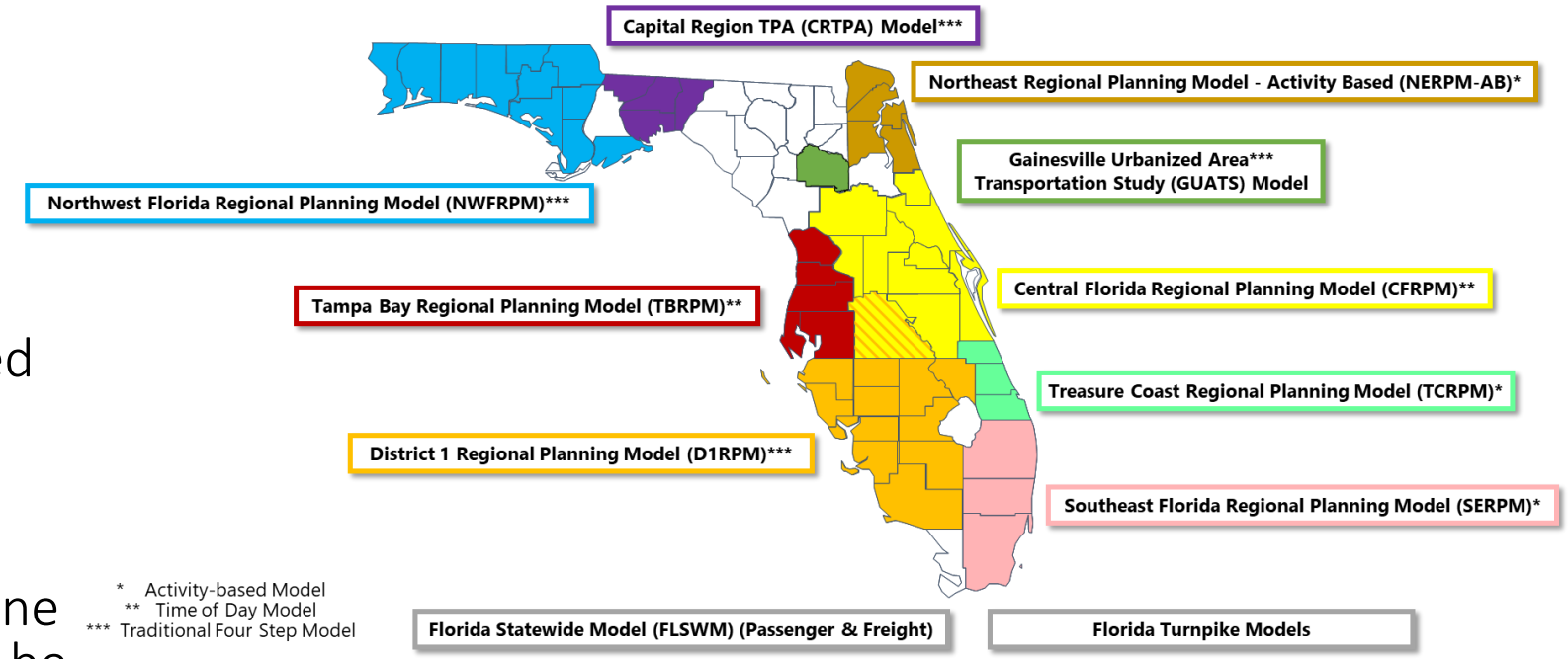
- **Coordination**
  - Coordination with other agencies is part of the IAR process
  - Avoids conflicts with other new or proposed changes
  - Coordination also could lead to design adjustments to meet permitting requirements
  - The MLOU shall identify all coordination efforts

Contents of MLOU

- **Data Collection**
  - Collected data includes:
    - Roadway geometrics
    - Travel demand
    - Safety and
    - Traffic control
  - Existing traffic data includes:
    - Turning movement counts
    - Origin-destination data
    - Heavy vehicle data, speed and travel times, traffic control data, transit data, crash data and information on bicycles and pedestrians
  - Use existing databases and studies when possible, but ensure accuracy
    - FDOT Florida Traffic Online

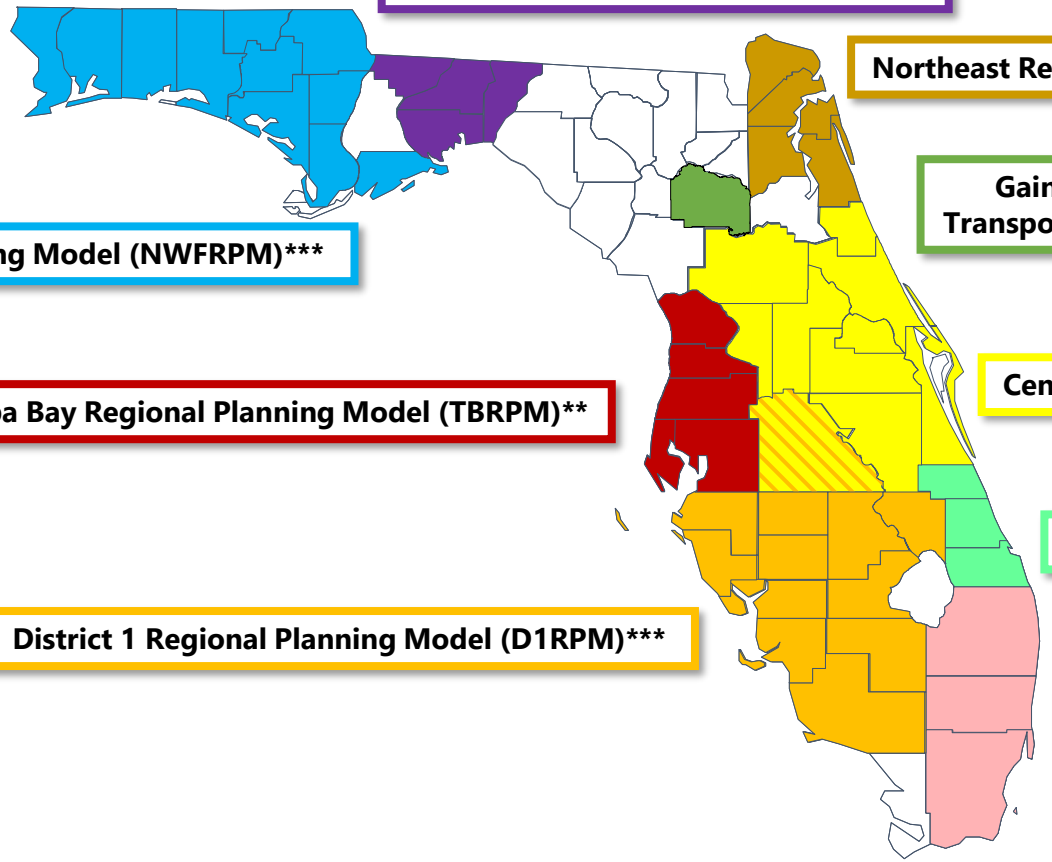
Contents of MLOU

- **Travel Demand Model Selection and Forecasting**
  - Use the adopted regional travel demand model
  - Any deviation from the district and MPO's approved model shall include justification
  - All assumptions to determine future traffic demand shall be identified



* Activity-based Model
** Time of Day Model
*** Traditional Four Step Model

Travel Demand Models in Florida



Capital Region TPA (CRTPA) Model***

Northeast Regional Planning Model - Activity Based (NERPM-AB)*

Gainesville Urbanized Area*** Transportation Study (GUATS) Model

Northwest Florida Regional Planning Model (NWFRPM)***

Central Florida Regional Planning Model (CFRPM)**

Tampa Bay Regional Planning Model (TBRPM)**

Treasure Coast Regional Planning Model (TCRPM)*

District 1 Regional Planning Model (D1RPM)***

Southeast Florida Regional Planning Model (SERPM)*

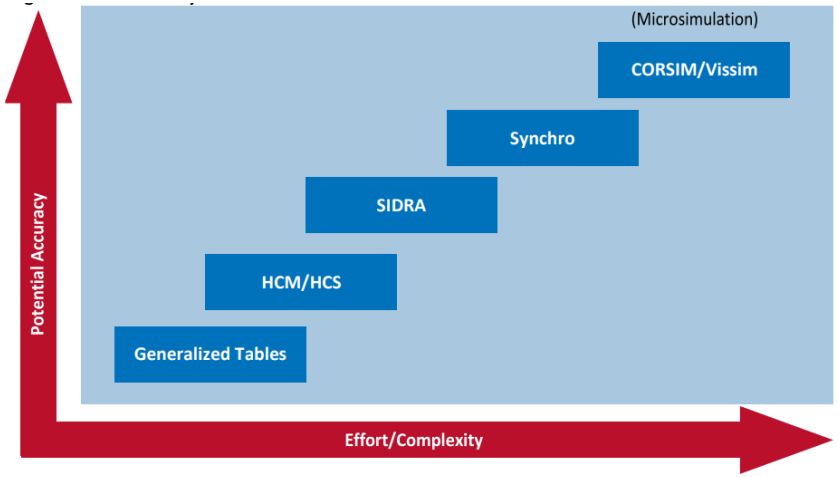
* Activity-based Model
** Time of Day Model
*** Traditional Four Step Model

Florida Statewide Model (FLSWM) (Passenger & Freight)

Florida Turnpike Models

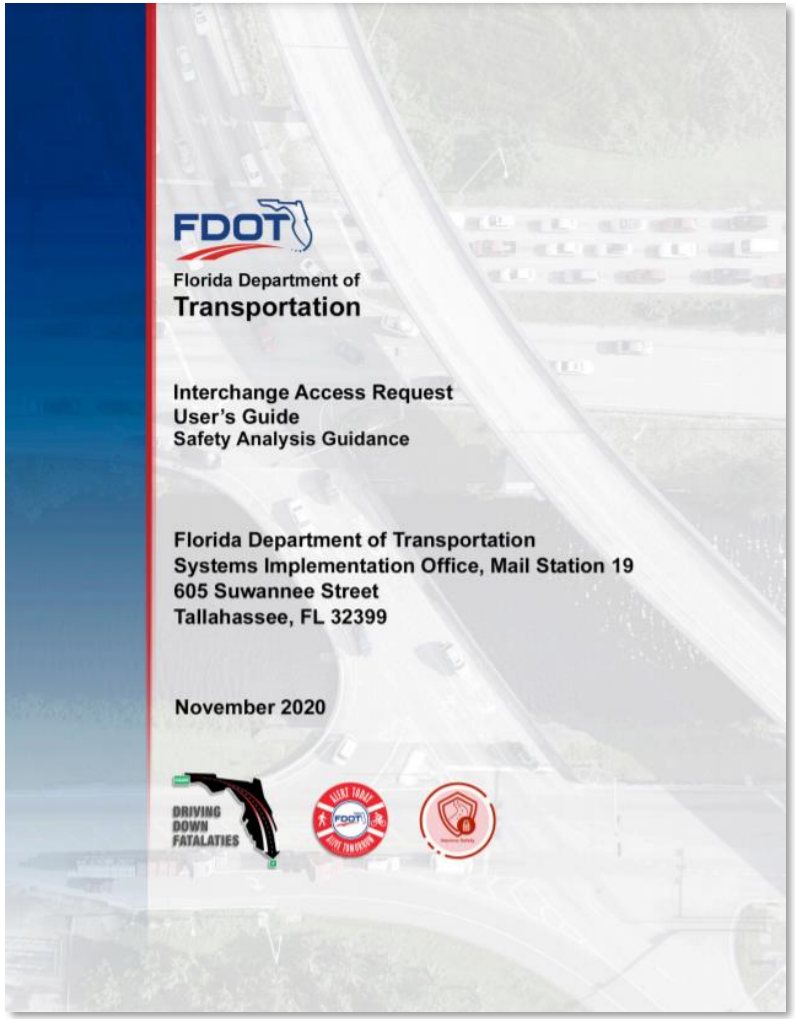
Contents of MLOU

- **Traffic Operational Analysis**
  - Defining the scope of traffic operational analysis is part of the MLOU
  - Determine area type
    - Rural
    - Transitioning into urban areas
    - Urbanized areas
  - Knowledge of existing operational conditions is essential
  - Proper selection of traffic analysis tool and approach
  - Analysis efforts should correlate to the magnitude of the problem
  - Further guidance for tool selection is provided in the FDOT Traffic Analysis Handbook



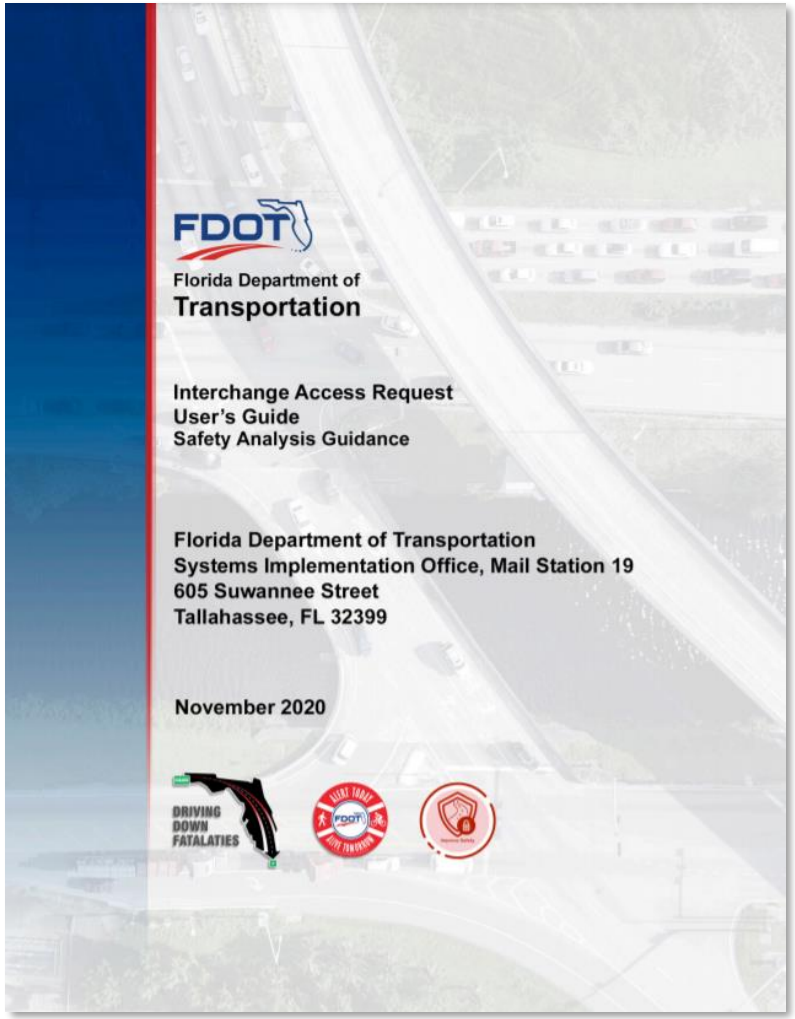
Contents of MLOU

- **Safety Analysis**
  - Safety analysis methodology shall be documented and agreed to in the MLOU
  - Safety analysis methodology should follow the procedures discussed in the IARUG Safety Analysis Guidance
  - Discussion in the MLOU should be consistent with the MLOU template
  - The following information is required in the MLOU
    - Safety analysis years
    - Historic crash data sources



Contents of MLOU

- **Safety Analysis**
  - Safety analysis should be performed using
    - Latest five years of historic data available at MLOU stage
  - MLOU shall document an understanding that
    - Existing and quantitative safety analysis will be performed
  - If a known deviation from the safety guidance is expected during the MLOU stage
    - It should be documented in the MLOU



Contents of MLOU

- **Performance Measures**
  - MOEs are used to evaluate performance of the IAR alternatives
  - MOEs must be selected to meet the purpose and need
  - Common MOEs

Freeway	Study Intersection	Network-wide
• Travel Speed • Traffic Volume • Density • Level of Service • Travel Time • Demand versus Simulated Volumes • Volume to Capacity Ratio	• Intersection Delay • Level of Service • 95th Percentile Queue Lengths (Synchro) • Average/Max Queue Lengths (Microsimulation)	• Average Network Speed • Total Network Delay • Latent Delay • Latent Demand • Total Travel Time • Number of Stops

Contents of MLOU

- **Environmental Conditions**
  - Known or potential environmental issues shall be documented
  - Any environmental fatal flaws shall be identified as early as possible
  - The MLOU should identify a status and schedule of the PD&E study

Contents of MLOU

- **Design Exceptions and Variations**
  - The MLOU shall identify any anticipated exceptions and variations to FDOT or FHWA design standards.
  - When developing the MLOU, the requestor shall take the following into consideration:

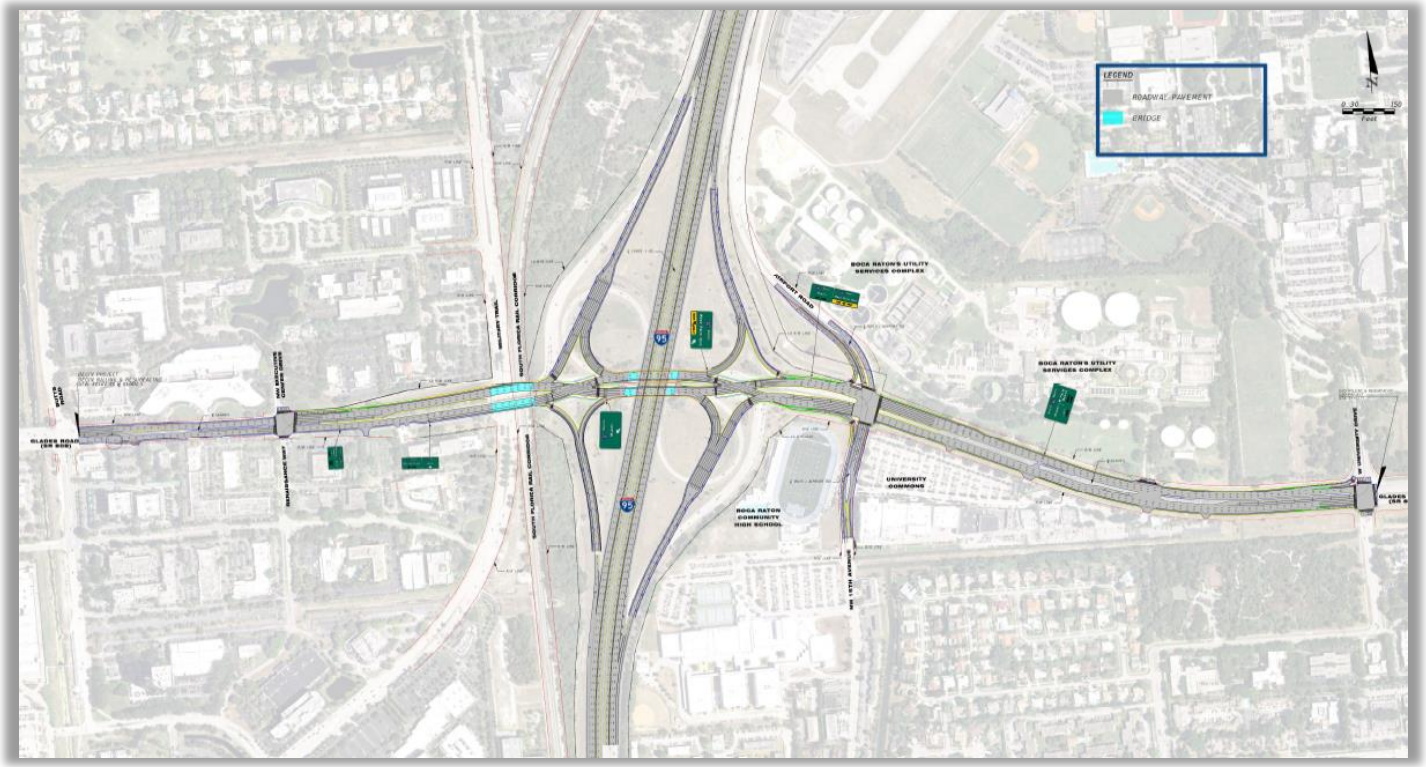
For all new construction; reconstruction; and resurfacing, restoration and rehabilitation (3R) projects on the SHS, FDOT design standards apply.

For design standards not listed in FDOT manuals, American Association of State Highway and Transportation Officials (AASHTO) design standards shall apply.

When it becomes necessary to deviate from the department's criteria and standards, early documentation and approval are required.

Contents of MLOU

- **Conceptual Signing Plan**
  - The MLOU shall contain a requestor's commitment to prepare a conceptual signing plan intended for planning purposes
  - Adequate signing is not a replacement for sound geometry design
  - The Manual on Uniform Traffic Control Devices (MUTCD) serves as guidance for the signing plan
    - https://mutcd.fhwa.dot.gov/pdfs/2009r1r2/pdf_index.htm



Contents of MLOU

- **FHWA's Policy Points**
  - The MLOU shall include a commitment to meet FHWA's two policy points
    - https://www.fhwa.dot.gov/design/interstate/170522.cfm

Review and Acceptance of MLOU

- Review and consideration for acceptance of the MLOU is performed according to FDOT Procedure 525-030-160
- Proposals impacting more than one district should have affected IRCs be part of the MLOU
- The MLOU must clarify any review time frame expectations
- Stakeholders shall accept and sign the MLOU after they concur with the MLOU requirements and need

Review and Acceptance of MLOU

- Work performed by the requestor prior to the acceptance is at “at risk”
- If a change to the agreed methodology is proposed, then an amendment to the approved MLOU shall be required
- Requestor shall prepare amendments and submit them for approval
- All parties must approve the amendment

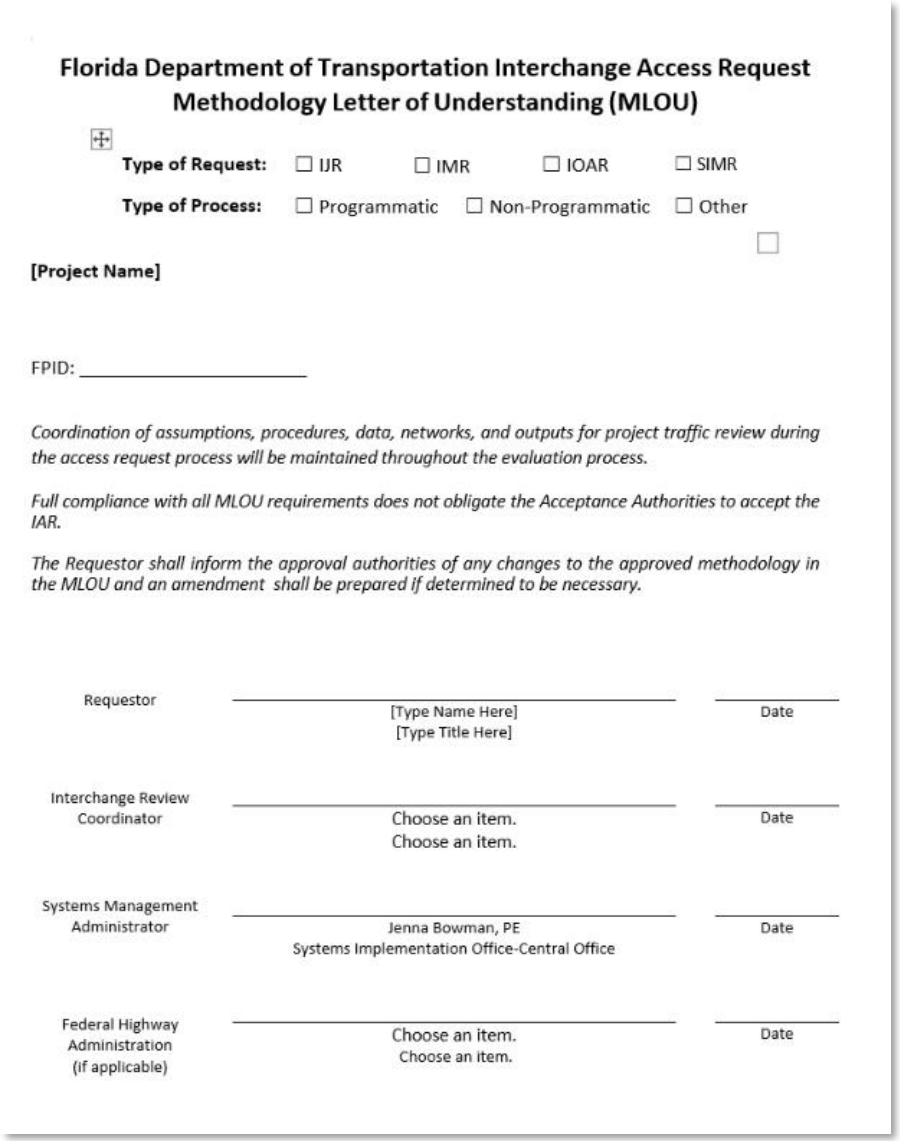
MLOU Qualifying Provisions

- The following qualifying provisions shall be stated in each MLOU:

Qualifying Provisions		
Coordination of assumptions, procedures, data, networks and outputs for project traffic review during the access request process will be maintained throughout the evaluation process.	Full compliance with all MLOU requirements does not obligate the acceptance authorities to accept the IAR.	The Requestor shall inform the approval authorities of any changes to the approved methodology in the MLOU and an amendment shall be prepared if determined to be necessary

MLOU Template

- The MLOU template is available on FDOT SharePoint



Florida Department of Transportation Interchange Access Request Methodology Letter of Understanding (MLOU)

Type of Request: ☐ IJR ☐ IMR ☐ IOAR ☐ SIMR

Type of Process: ☐ Programmatic ☐ Non-Programmatic ☐ Other

[Project Name]

FPID: _____

Coordination of assumptions, procedures, data, networks, and outputs for project traffic review during the access request process will be maintained throughout the evaluation process.

Full compliance with all MLOU requirements does not obligate the Acceptance Authorities to accept the IAR.

The Requestor shall inform the approval authorities of any changes to the approved methodology in the MLOU and an amendment shall be prepared if determined to be necessary.

Requestor	[Type Name Here] [Type Title Here]	Date
Interchange Review Coordinator	Choose an item. Choose an item.	Date
Systems Management Administrator	Jenna Bowman, PE Systems Implementation Office-Central Office	Date
Federal Highway Administration (if applicable)	Choose an item. Choose an item.	Date

Methodology Letter of Understanding (MLOU)

QUIZ

Florida Interchange Access Request Process

Training

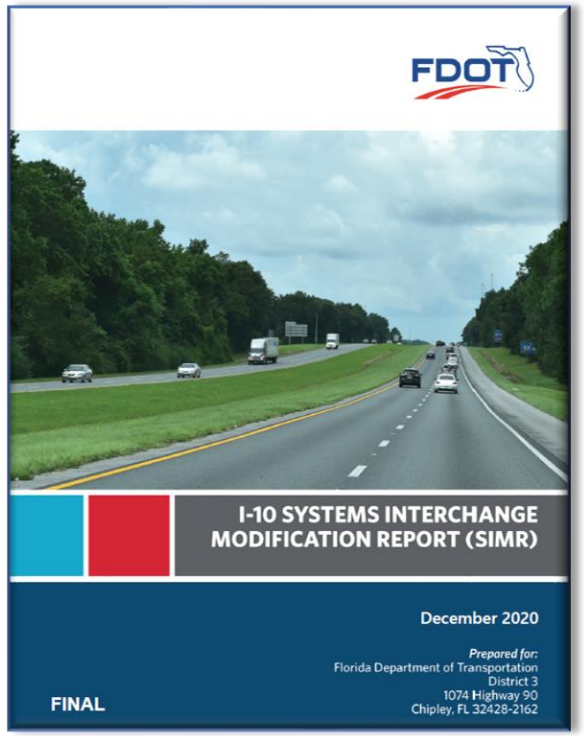
Webinar

Module 5 Interchange Access Reports

- Interchange Access Reports
- Documentation Requirements
- Quiz

Interchange Access Reports

- Developed as a stand-alone document consistent with the MLOU
- If other reports available, relevant information should be summarized
- Understandable to the unfamiliar reader
- Determines the safety, operational and engineering (SO&E) acceptability of the IAR
- *The report must address the FHWA's two policy points*

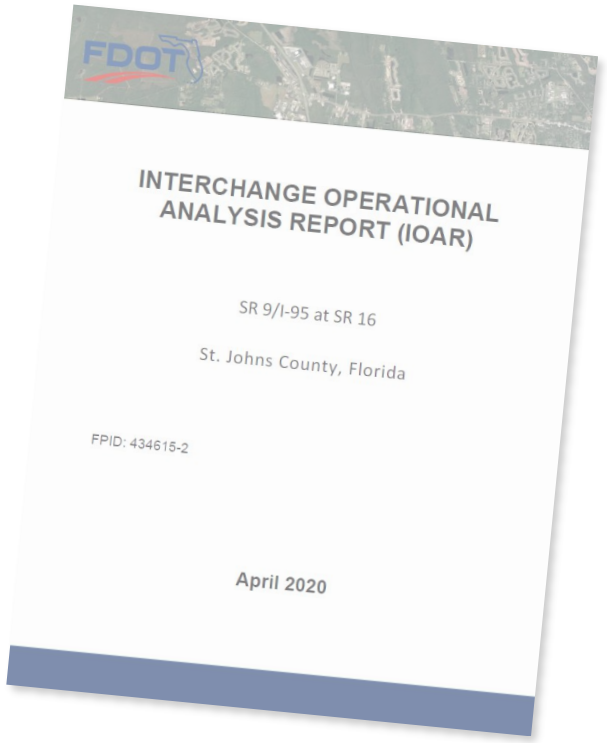


Documentation Requirements

Required documentation should be determined by the DIRC during the MLOU development phase.

Documentation Requirements

- **Executive Summary**
  - Summarize purpose, need, analysis results and recommendation
  - Include responses to FHWA 2 Policy Points



Documentation Requirements

- Purpose and Need

Purpose

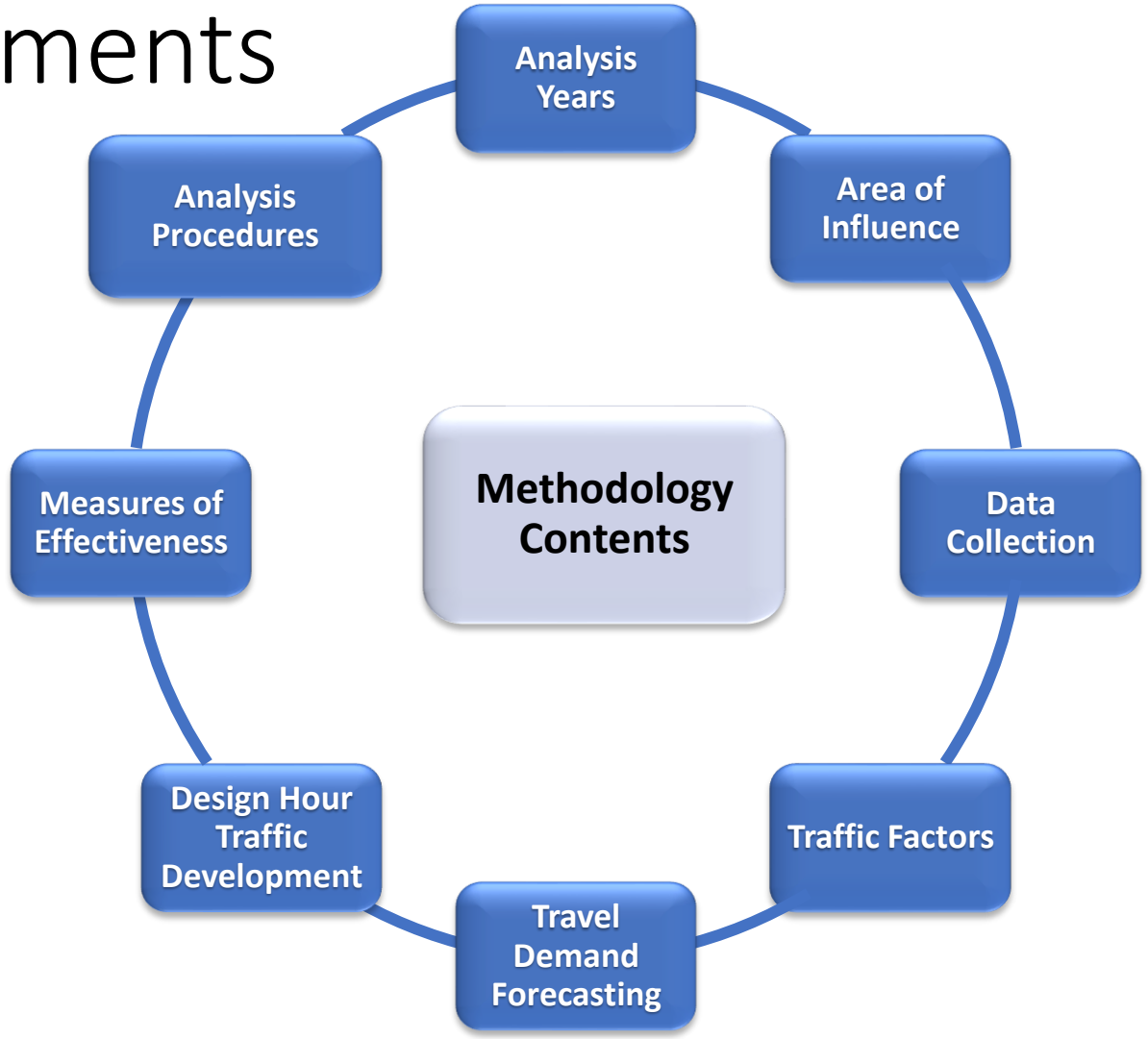
- Document purpose of the project
  - Technical documentation for obtaining FDOT and FHWA approval

Need

- Discuss need for improvements
  - List existing traffic, operational and safety deficiencies
  - Any other known issues within the area of influence

Documentation Requirements

- **Methodology**
  - Methodology section of the IAR should be consistent with the MLOU
  - The contents of the methodology section are shown on this slide

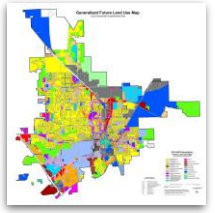


Documentation Requirements

- **Analysis of Existing Conditions**
  - Existing conditions should include:
    - Traffic volumes
    - Multimodal mobility
    - Land use
    - Safety
    - Roadway characteristics
  - All IARs must include an existing year analysis
  - Supports the need for the project
  - Provides baseline operational characteristics
  - Identifies any known environmental or cultural impacts

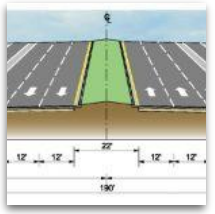
Traffic Volumes

Multimodal Mobility



Land Use

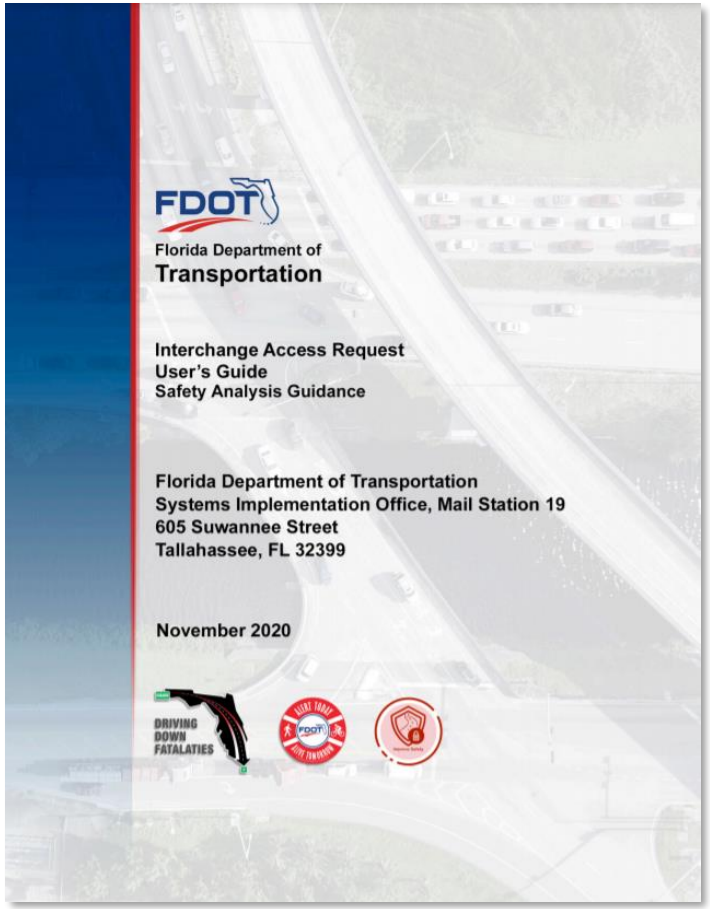
Safety



Roadway Characteristics

Documentation Requirements

- **Safety Analysis**
  - Purpose
    - To understand how geometric designs will impact safety
  - IARs should include
    - Existing safety analysis
    - Future safety analysis
  - Safety analysis should be consistent with the IARUG Safety Analysis Guidance
  - Safety analysis methodology is discussed in Module 6

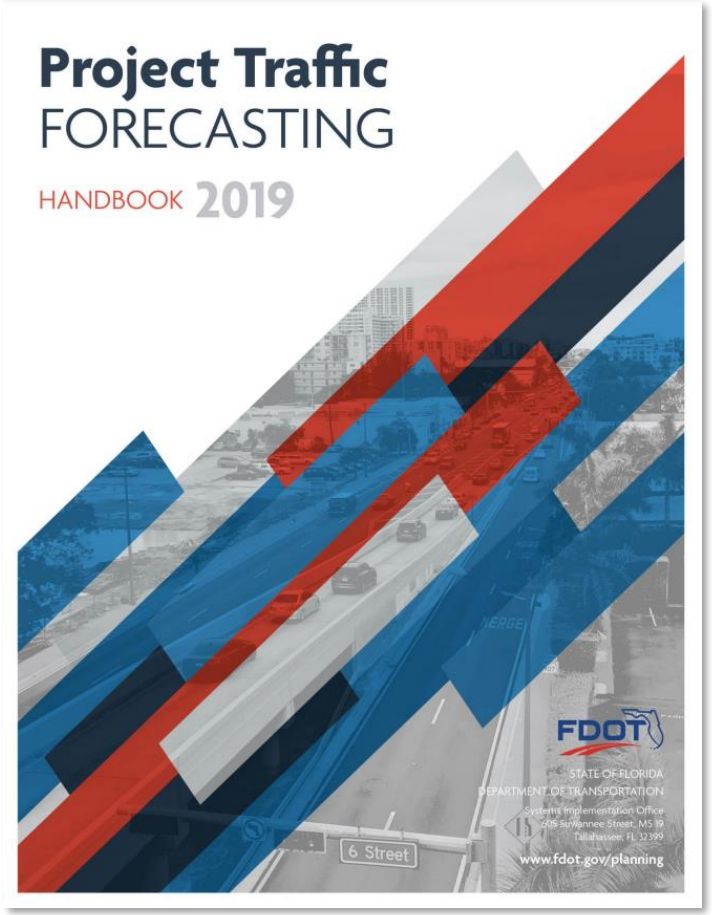


Documentation Requirements

- **Analysis of Future Conditions**
  - Future analysis should be performed for the No-Build and all Build alternatives
  - Document future year traffic development for all alternatives
  - Discuss analysis results
    - Freeway operations
    - Individual element operational analysis
    - Microsimulation
  - Identify deficiencies and improvements

Documentation Requirements

- **Travel Demand Forecasting**
  - Documentation should include
    - Methodology techniques and model refinement
    - Travel-demand forecasts for all alternatives and analysis years
    - Historical traffic data (trend analysis)
    - Summary of modifications to land use and networks
    - Model output smoothing techniques
    - Post-processing of travel demand model volumes
    - Traffic factors agreed to in the MLOU



Documentation Requirements

- Considered Alternatives
  - The alternatives to be considered and analysis years required are identified below:

Considered Alternatives		Year of Analysis		
		Opening Year	Interim Year	Design Year
No-Build Alternative		✓	*	✓
Build	Preferred Alternative	✓	*	✓
	Other Alternatives	✓	*	✓
TSM&O Alternative**		✓	*	N/A

✓ Required
* May be required as determined by DIRC and acceptance authorities
N/A Not applicable
** Does not apply to D-B and P3 projects, need determined by DIRC

Documentation Requirements

- **Considered Alternatives**
  - Existing and No-Build conditions are known
    - The requestor develops concepts that address the purpose and need
  - Requestor should meet with DIRC to discuss considered alternatives
  - The IAR report should contain
    - Strategies providing new access or modifying existing access
    - Details for all reasonable alternatives
  - The alternatives shall be agreed upon by the stakeholders

Existing

No-Build

Build

Documentation Requirements

- **Considered Alternatives**
  - No-Build alternative = existing conditions plus committed projects
  - Transportation Systems Management and Operation (TSM&O)
    - TSM&O strategies are low-cost approaches
    - TSM&O strategies should be incorporated in the Build alternative

Existing

No-Build

Build

Documentation Requirements

- **Evaluation of Alternatives**
  - Compare the performance of alternative improvements
  - Traffic analysis should follow guidelines and thresholds provided in
    - FDOT Traffic Analysis Handbook
  - Measures of Effectiveness (MOEs) are used to compare alternatives
  - MOEs should address:
    - Safety
    - Operational and engineering performance
  - Evaluation of alternatives should be documented

Safety

Operational and Engineering Performance

Environmental Considerations

Documentation Requirements

- **Evaluation of Alternatives**
  - Each project calls for a different approach to traffic development and analysis
  - Evaluation of alternatives must be consistent with the MLOU
  - The build alternative shall not have adverse impact on SO&E
  - If phased-construction, the analysis must demonstrate independence in each phase

Freeway Elements – Highway Capacity Software (HCS)

- Basic Segment
- Merge/Diverge
- Simple Weaving

Intersection Analysis

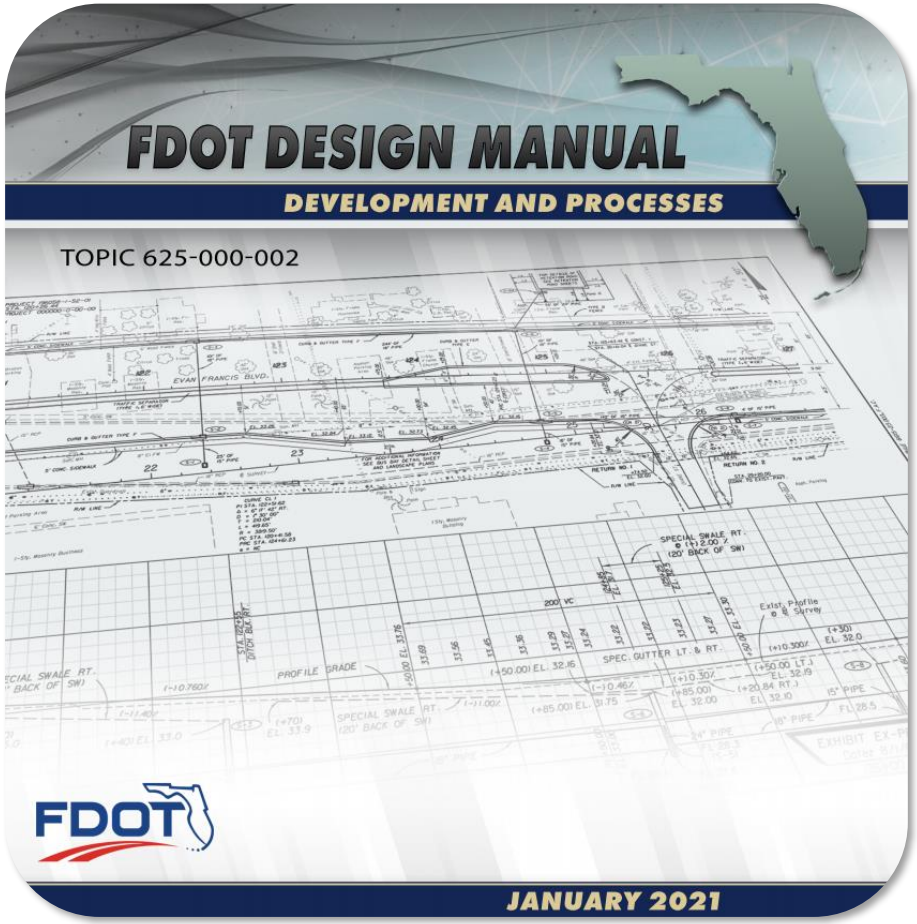
- Signalized
- Unsignalized
- Roundabout

Microsimulation

- Innovative Designs
- Complex or Multiple Lane Weaving
- Heavy Congested Area

Documentation Requirements

- **Design Exceptions and Variations**
  - Request for design exceptions or variations must be submitted in accordance with FDM
  - Approval of an exception or variation does not ensure acceptance of the IAR



Documentation Requirements

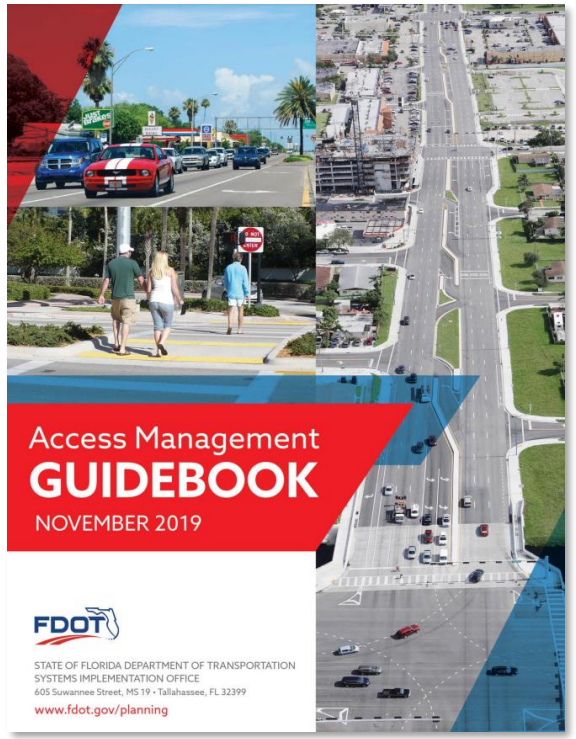
- **Local Transportation Plans and Planning Studies**
  - IAR shall be consistent with the adopted statewide and local transportation plans
  - Interchange master plan or planning study is recommended prior to the IAR
  - If the access proposal is not contained in the current local transportation plan,
    - It will be required to be included in the local transportation plan

Documentation Requirements

- **Funding Plan**
  - A commitment of funding is required for determination of the SO&E acceptability
  - If included in the FDOT 5-Year Work Program or MPO Transportation Improvement Plan (TIP), all phases must be funded
  - For developer projects, include a financial plan showing source of all funds

Documentation Requirements

- **Access Management Agreement for the Interchange Cross Streets**
  - The requestor may be required to develop an access management agreement
  - The access management plan shall provide reasonable access to the public road system
  - Access shall conform to
    - Rule 14-96, F.A.C. State Highway System Connection Permits
    - Rule 14-97, F.A.C. State Highway System Access Control Classification System and Access Management Standards
    - FDOT Access Management Handbook.
  - Failure to execute the agreement may result in
    - FDOT stopping the IAR review process and/or
    - Denying the IAR



Documentation Requirements

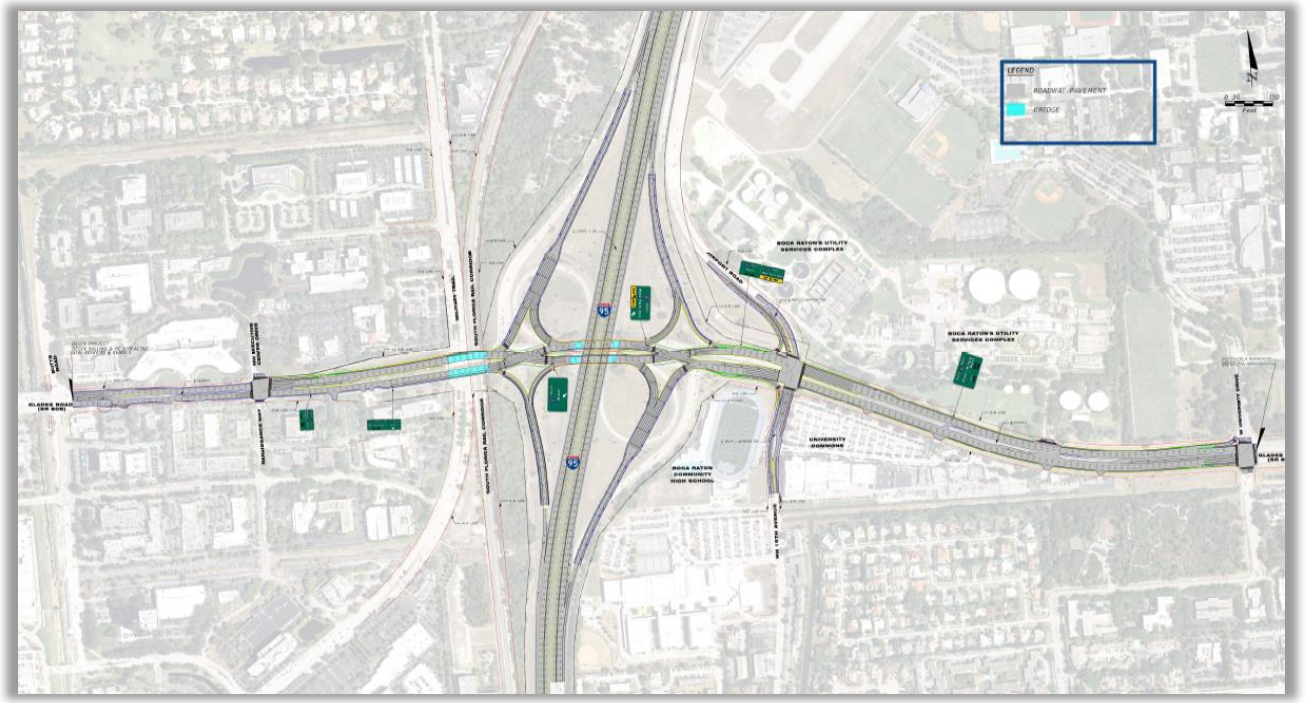
- **Intergovernmental Coordination**
  - Coordination with stakeholders shall be documented
  - DIRC shall determine the level of coordination required with federal, state, regional and local agencies
  - Areas where intergovernmental coordination may be needed include
    - Local policies
    - Data sources
    - Environmental information
    - Methodology development
    - Infrastructure and IAR funding commitments
    - Proposal review
    - Consistency with local land-use and transportation plans
    - Access management and land use
    - Signal progression and timing
    - Public-involvement information

Documentation Requirements

- **Environment Considerations**
  - Environmental documentation in an IAR should be kept to a minimum
    - Limited to any fatal and known environmental impacts used to compare build alternatives
  - Environmental discussion should be brief, because it be discussed in detail in the PD&E document

Documentation Requirements

- **Signing Plan**
  - The IAR shall contain a conceptual signing plan
  - The conceptual signing plan in IARs is intended for planning purposes only
  - The MUTCD serves as guidance for preparing the signing plan



Interchange Access Reports

QUIZ

Florida Interchange Access Request Process

Training

Webinar

Module 6
IARUG Safety Analysis Guidance

- Introduction
- Purpose
- MLOU
- IAR Safety Analysis Process
- Analysis of Existing Safety Conditions
- Future Safety Analysis
- Documentation
- Quiz

Introduction

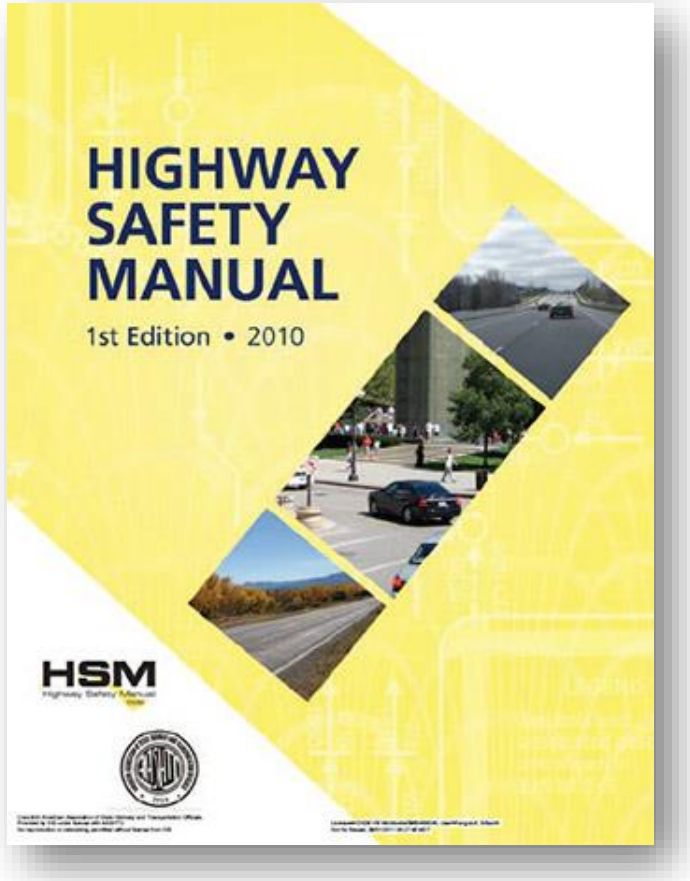
- IARUG Safety Analysis Guidance released in November 2020
  - Supplements the Interchange Access Request User's Guide (IARUG)
- Objective of safety analysis
  - Examine the effects of the proposed modifications on the safety performance of the interchange
- Safety analysis should proactively aim at reducing potential safety concerns
- Safety Guidance to be updated soon

Introduction

- Appropriate safety analysis methodology must be selected to analyze the modifications

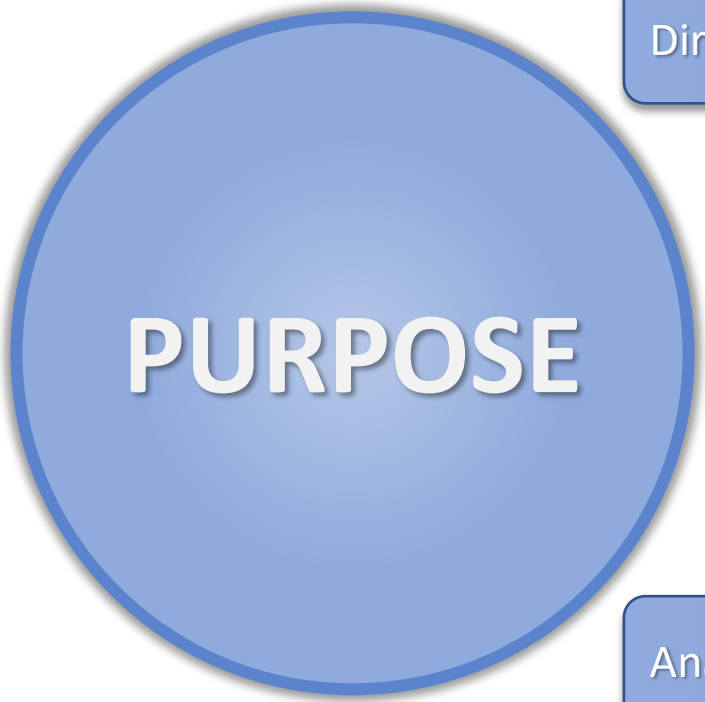
- Common methods to perform the future safety analysis:
  - Countermeasure Crash Modification Factors (CMFs)
  - Highway Safety Manual (HSM) Part C Methodology

- Methodologies are based on the guidelines set by the Highway Safety Manual (HSM)



Purpose

- Purpose of the IARUG Safety Analysis Guidance is to provide



Direction for performing existing and future safety analysis.

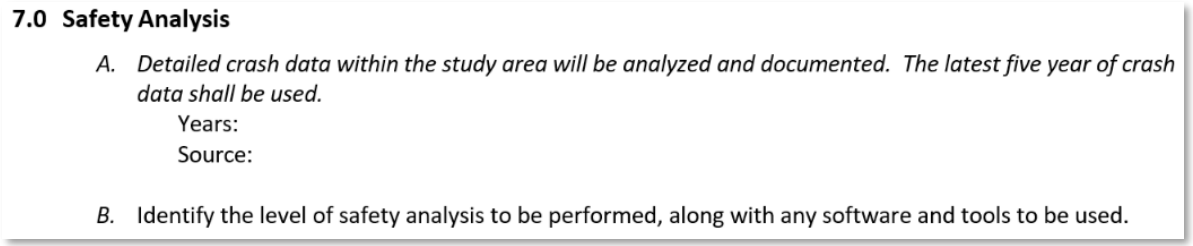
Guidance on application of the future safety analysis methodologies.

Consistent approach for completing safety analyses.

Analysis examples to demonstrate the safety analysis methods.

MLOU

- Safety analysis discussion should be consistent with the MLOU template
- MLOU shall document an understanding that the safety analysis will be consistent with the IARUG safety guidance
- The following information is required in the safety section of the MLOU
  - Safety analysis years
  - Historic crash data sources



7.0 Safety Analysis

A. *Detailed crash data within the study area will be analyzed and documented. The latest five year of crash data shall be used.*
   Years:
   Source:

B. Identify the level of safety analysis to be performed, along with any software and tools to be used.

MLOU

- **Safety analysis years**
  - Safety analysis performed using the latest five years of historic data available
    - If five years of data is not available, three years may be used
  - Crash data is updated daily with newly verified crashes
- **Crash data sources**

CAR Online

- Crash Analysis Reporting System

SSOGis

- State Safety Office Geographic Information System

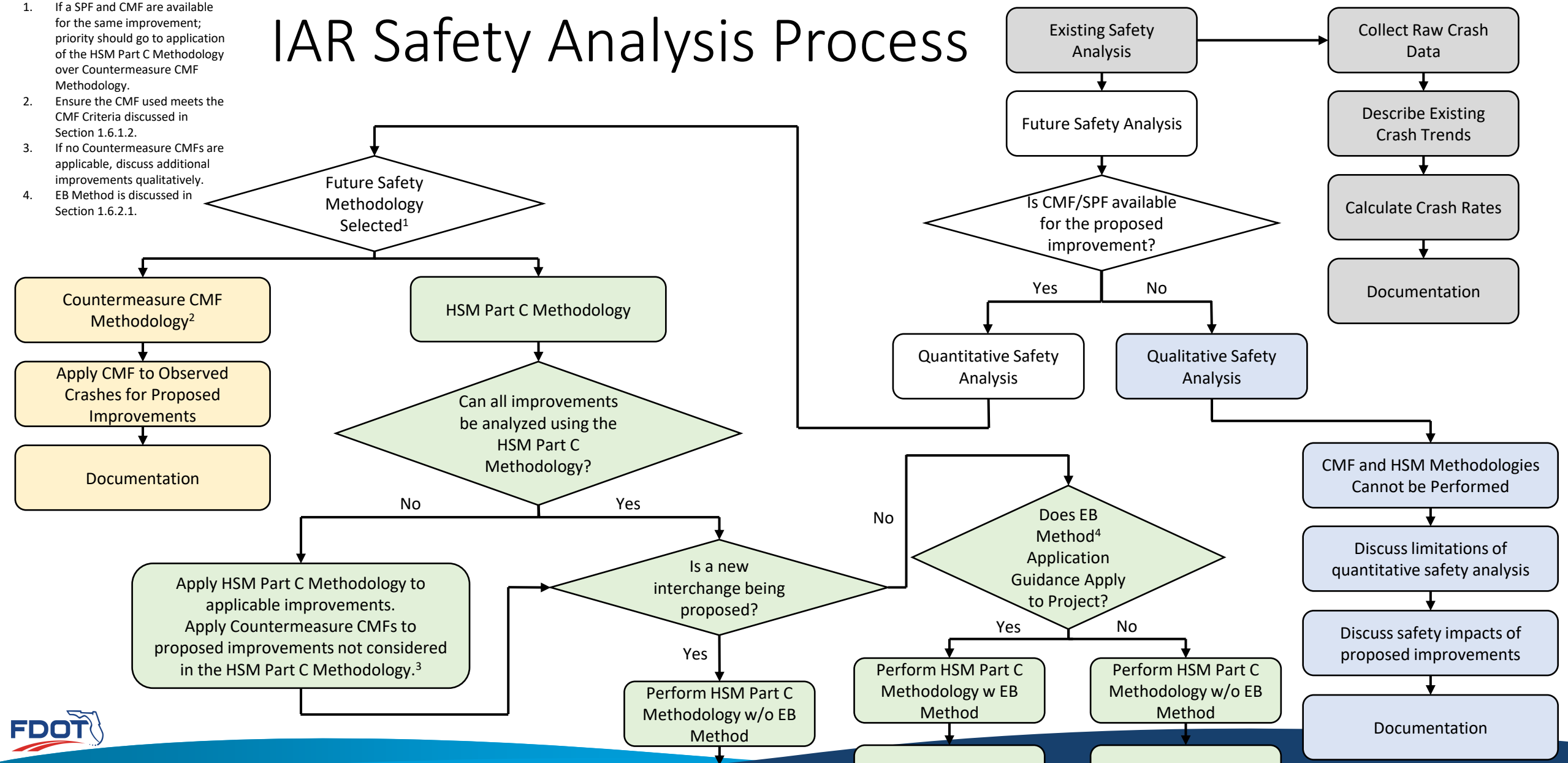
Signal Four Analytics

- University of Florida's Signal Four Analytics Tool

IAR Safety Analysis Process

Notes

1. If a SPF and CMF are available for the same improvement; priority should go to application of the HSM Part C Methodology over Countermeasure CMF Methodology.
2. Ensure the CMF used meets the CMF Criteria discussed in Section 1.6.1.2.
3. If no Countermeasure CMFs are applicable, discuss additional improvements qualitatively.
4. EB Method is discussed in Section 1.6.2.1.



Existing Safety Analysis

- **Existing safety analysis helps**
  - Identify areas where safety issues may exist
  - Develop the purpose and need for the project

- **The study limits of the existing safety analysis are the same as the operational analyses**

- **Three sources of crash data available**

Sources of Crash Data

CAR Online

- Crash Analysis Reporting System

SSOGis

- State Safety Office Geographic Information System

Signal Four Analytics

- University of Florida's Signal Four Analytics Tool

Existing Safety Analysis

- **CAR Online**
  - Data can be
    - Requested from District or State Safety Office
    - Accessed from the FDOT mainframe
  - Includes crashes on all public roads
  - Crash data in SSOGis is up-to-date and can be used

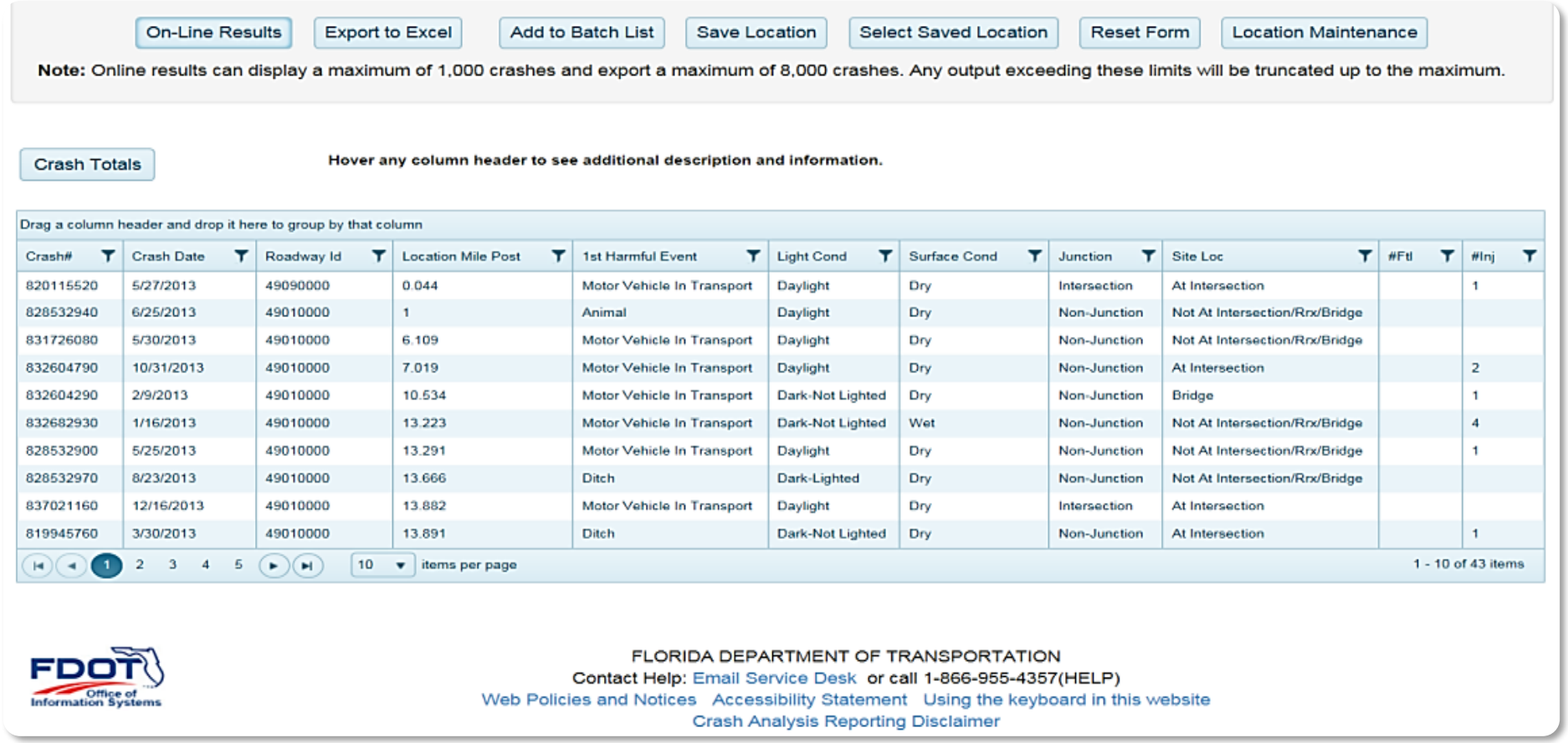
CAR Online
- Crash Analysis Reporting System

SSOGis
- State Safety Office Geographic Information System

Signal Four Analytics
- University of Florida's Signal Four Analytics Tool

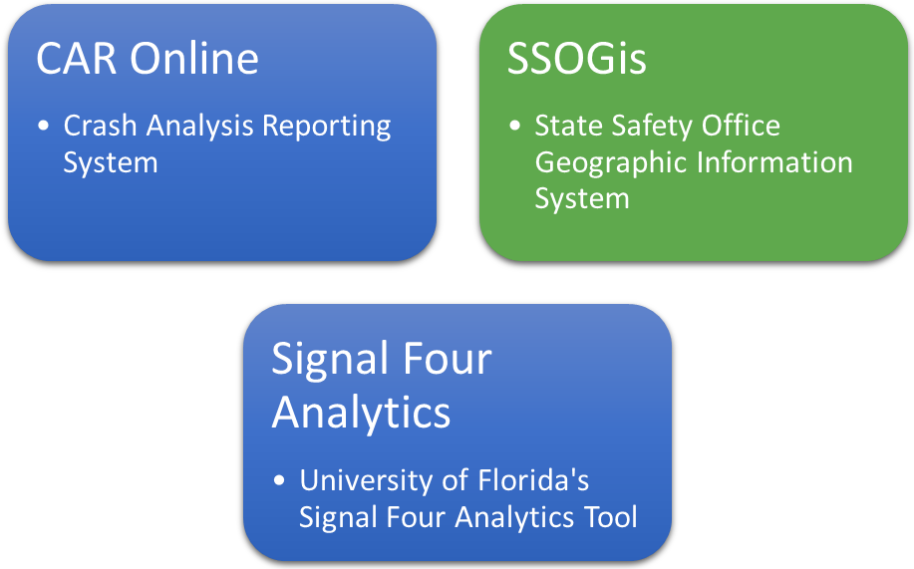
Existing Safety Analysis

- CAR Online



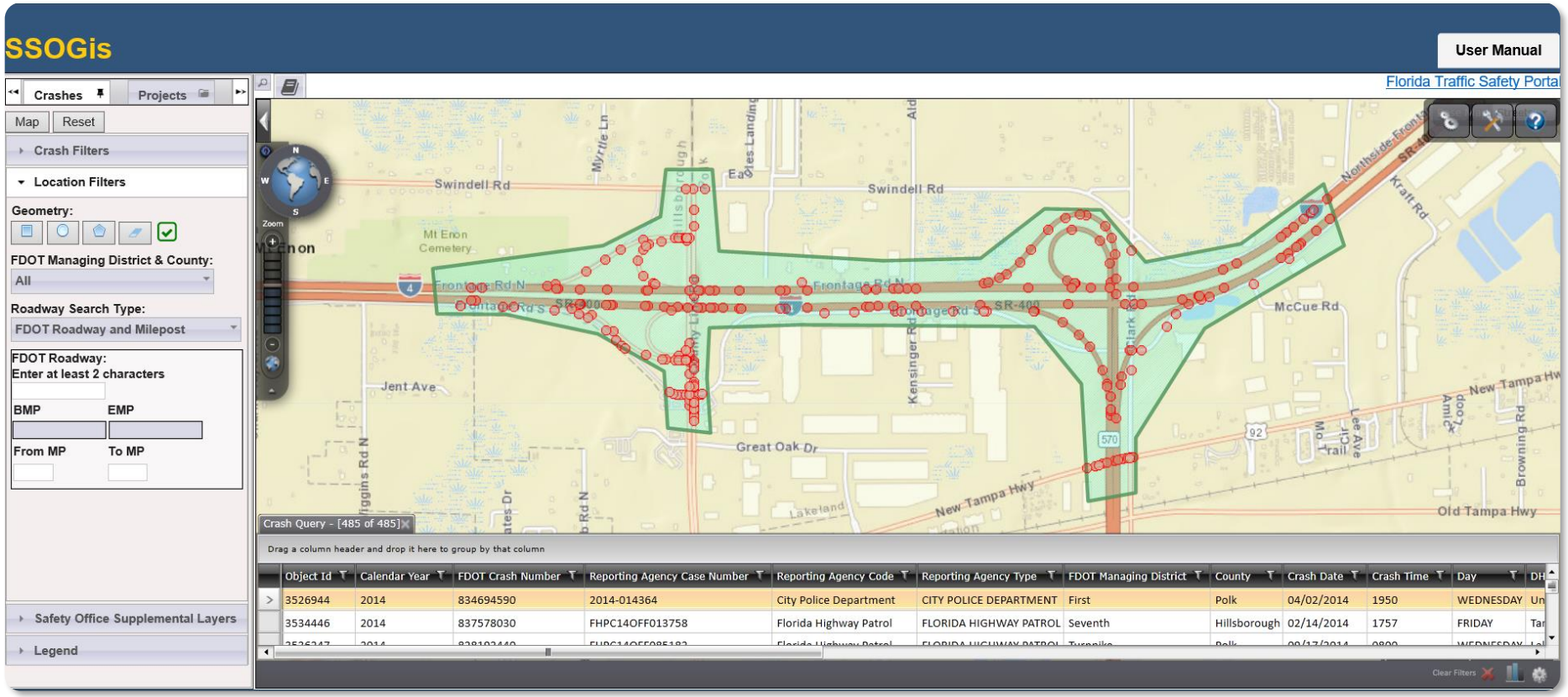
Existing Safety Analysis

- SSOGis
  - Publicly available crash database
    - https://fdotewp1.dot.state.fl.us/SSOGis/Home.aspx
  - Covers state highways and local roadways
  - Crash data in SSOGis is up-to-date and can be used



Existing Safety Analysis

- SSOGis



Existing Safety Analysis

- **Signal Four Analytics**
  - Web-based geospatial crash analytical tool
    - https://fdotewp1.dot.state.fl.us/SSOGis/Home.aspx
  - Good source of crash data for non-state arterials
  - Crash data is up-to-date
    - Limitation: Locations and crash are not subject to the same scrutiny as CAR Online or SSOGis

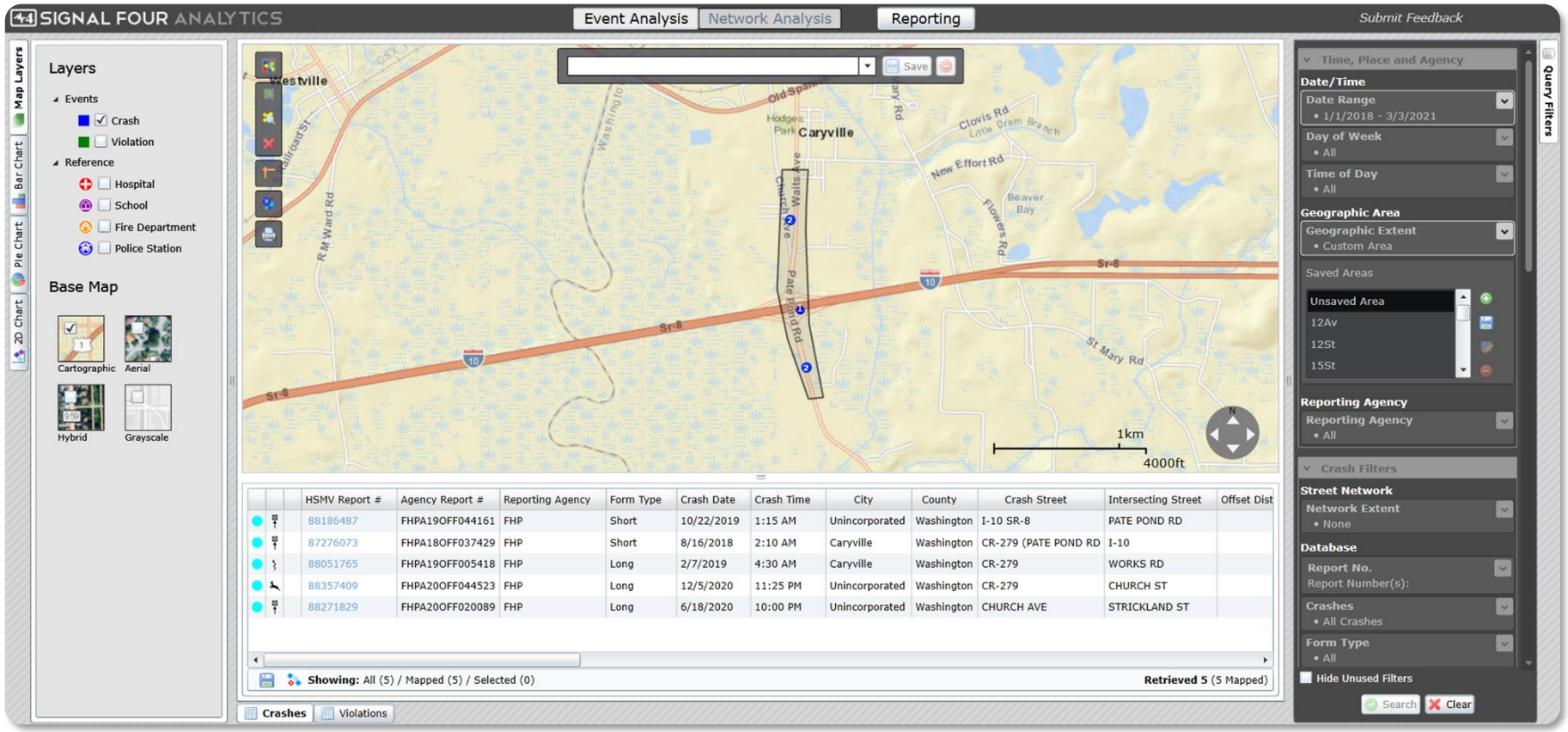
CAR Online
- Crash Analysis Reporting System

SSOGis
- State Safety Office Geographic Information System

Signal Four Analytics
- University of Florida's Signal Four Analytics Tool

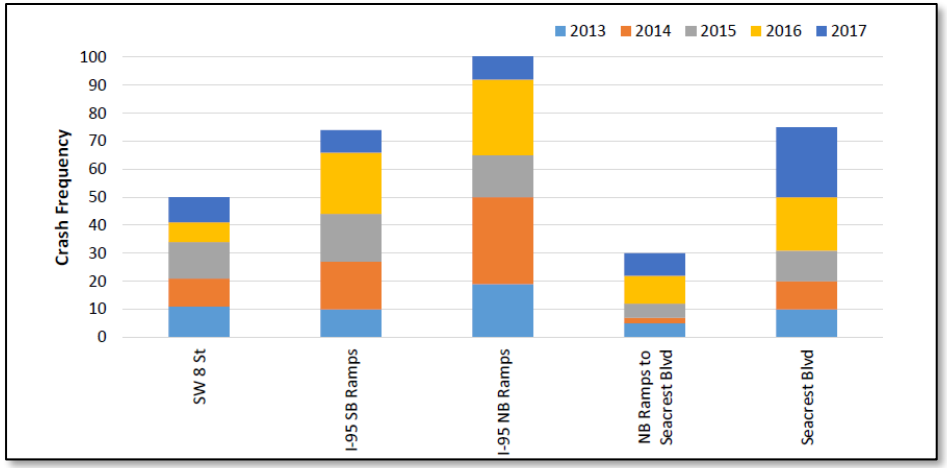
Existing Safety Analysis

- Signal Four Analytics



Existing Safety Analysis

- **Crash Data Sources**
  - CAR Online or SSOGis should be used as sources of crash data
  - If data is missing for a local road, Signal Four Analytics can be used to supplement the other sources
  - Crash data from multiple sources must be for the same time period
  - Do not mix data sources to meet the five years of safety data requirement



Existing Safety Analysis

- **Crash Data Sources**
  - Check and validate crash data when using multiple sources
    - Ensures that crashes are not double-counted
  - Minimum historic crash data to be collected
    - Crash type
    - Prevalence of crash types
    - Crash patterns and contributing factors
    - Crash severity
  - Existing safety analysis content should include
    - Description of existing crash trends
    - Crash tables and diagrams
    - Calculation of crash rates
    - Documentation

Crashes		Number of Crashes by Year					Total Crashes	Average	Percentage (%)
		2011	2012	2013	2014	2015			
Crash Type	Rear End	2	2	2	4	5	15	3	48.4%
	Right Turn	0	0	0	1	0	1	0	3.2%
	Sideswipe	1	1	1	2	2	7	1	22.6%
	Curb	0	0	1	0	0	1	0	3.2%
	Tree (Standing)	2	0	1	0	0	3	1	9.7%
	Other Post, Pole	0	2	0	0	0	2	0	6.5%
	Overturn/Rollover	0	0	0	1	0	1	0	3.2%
	Total Crashes	**5**	**5**	**5**	**8**	**8**	**31**	**6**	**100.0%**
Severity	PDO Crashes	3	4	3	5	5	20	4	64.5%
	Fatal Crashes	0	0	0	0	0	0	0	0.0%
	Injury Crashes	2	1	2	3	3	11	2	35.5%
Lighting	Daylight	3	1	4	7	7	22	4	71.0%
	Dark	2	4	1	1	1	9	2	29.0%
Surface Conditions	Dry	4	3	3	8	7	25	5	80.6%
	Wet	1	2	2	0	1	6	1	19.4%

Existing Safety Analysis

- **Description of Existing Crash Trends**
  - A written description of the existing safety analysis, is required.
  - The descriptions must provide the following:
    - Crash frequency
    - Common crash types
    - Common crash causes
    - Severity of crashes
    - Pedestrian and bicycle crashes

Example of Written Description

There were 354 reported crashes along the interstate within the study area during the five-year period; 66 occurred in 2014, 94 in 2015, 109 in 2016, 55 in 2017 and 30 in 2018. Based on crash severity, of the 354 reported crashes, 250 (70.6%) were property-damage-only crashes, 99 (28.0%) were injury-type crashes and five (1.4%) were fatal crashes. There were 95 (26.8%) night/dusk/dawn crashes reported, which is lower than the statewide average for all roadways of 30 percent, and 72 (20.3%) of the total crashes occurred under wet/slippery pavement conditions, which is higher than the statewide average for all roadways of 18 percent. Among the contributing causes documented in the crash data, work zone-related (95–27%), careless driving (90–25%) and improper lane change/passing (55–16%) were among the highest. There were no pedestrian or bicycle reported crashes. Rear end (139–39%), sideswipe (109–31%) and fixed object (52–15%) crash types had the highest frequencies.

Existing Safety Analysis

- Crash Tables and Diagrams

Crash Segment	Crash Type											Total
	Rear End	Head On	Sideswipe	Roll Over	Angle	Left Turn	Right Turn	Off Road	Pedestrian & Bicycle	Animal	Other	
I-75 SB Merge from SR 82	4	0	1	0	0	0	0	7	0	0	3	15
I-75 SB between SR 82 & SR 884	3	0	2	0	0	0	0	2	0	0	3	10
I-75 SB Diverge to SR 884	4	0	3	0	0	0	0	3	0	0	3	13
I-75 & SR 884 SB Off-Ramp	9	0	4	0	1	0	0	1	0	0	1	16
I-75 NB On-Ramp from WB SR 884	0	0	3	2	0	0	0	1	0	0	1	7
I-75 NB Merge from WB SR 884	2	0	4	0	0	0	0	5	0	0	3	14
I-75 NB between SR 884 & SR 82	1	0	0	0	0	0	0	2	0	0	0	3
I-75 NB Diverge to SR 82	2	0	1	0	0	0	0	2	0	0	2	7
Total	**25**	**0**	**18**	**2**	**1**	**0**	**0**	**23**	**0**	**0**	**16**	**85**
Percentage of Total	**29.4%**	**0.0%**	**21.2%**	**2.4%**	**1.2%**	**0.0%**	**0.0%**	**27.1%**	**0.0%**	**0.0%**	**18.8%**	**100%**

Crash Type by Segment

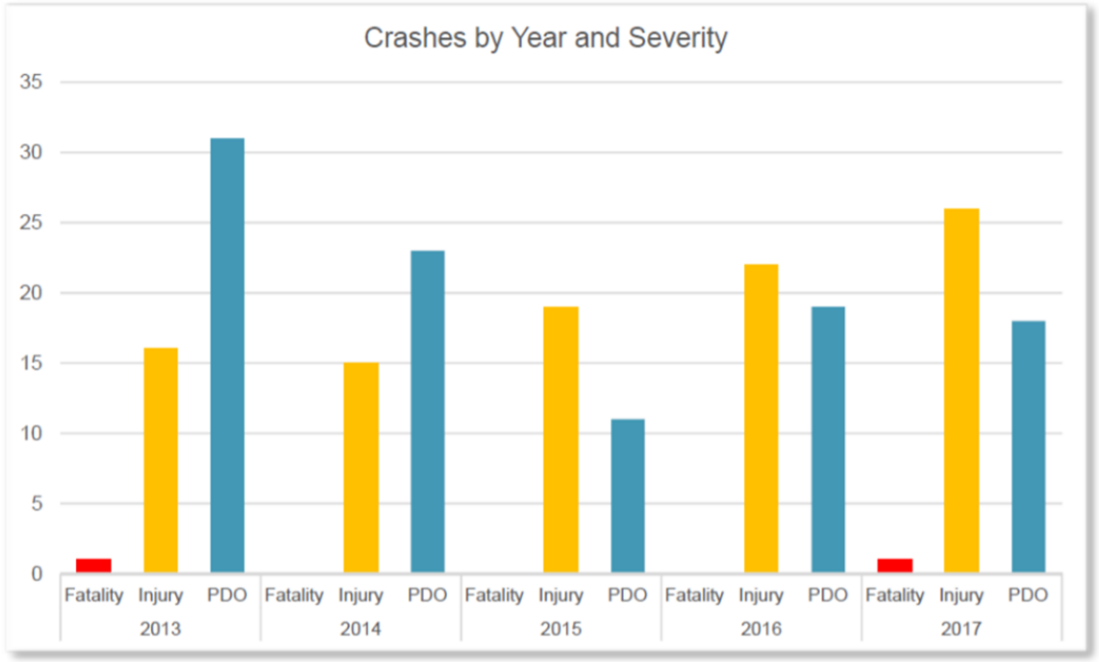
Crash Segment	Crash Frequency & Rate					
	Severity	No. of Crashes	Daily Volume*	Segment Length (miles)	No. of Crashes Per Year	Total Crash Rate
I-75 between SR 884 & SR 82	Total	**13**	93,500	0.46	2.60	0.16
	FI	3				
	PDO	10				
I-75 SB Merge from SR 82	Total	**15**	46,750	0.29	3.00	0.62
	FI	2				
	PDO	13				
I-75 SB Diverge to SR 884	Total	**13**	46,750	0.29	2.60	0.53
	FI	3				
	PDO	10				
I-75 & SR 884 SB Off-Ramp	Total	**16**	11,500	0.22	3.20	3.48
	FI	6				
	PDO	10				
I-75 NB On-Ramp from WB SR 884	Total	**7**	2,200	0.36	1.40	4.88
	FI	1				
	PDO	6				
I-75 NB Merge from WB SR 884	Total	**14**	46,750	0.29	2.80	0.58
	FI	3				
	PDO	11				
I-75 NB Diverge to SR 82	Total	**7**	46,750	0.29	1.40	0.29
	FI	3				
	PDO	4				

*Note: *Daily volume is 2018 AADT from the Florida Traffic Online (FTO) Website*

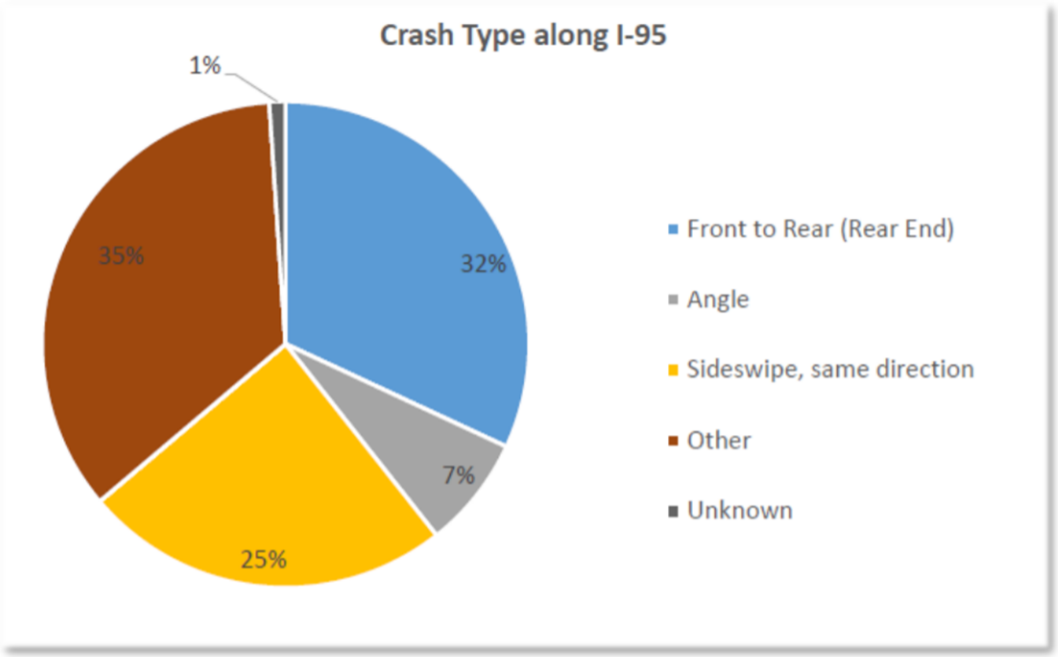
Crash Frequency and Rate by Segment

Existing Safety Analysis

- Crash Tables and Diagrams



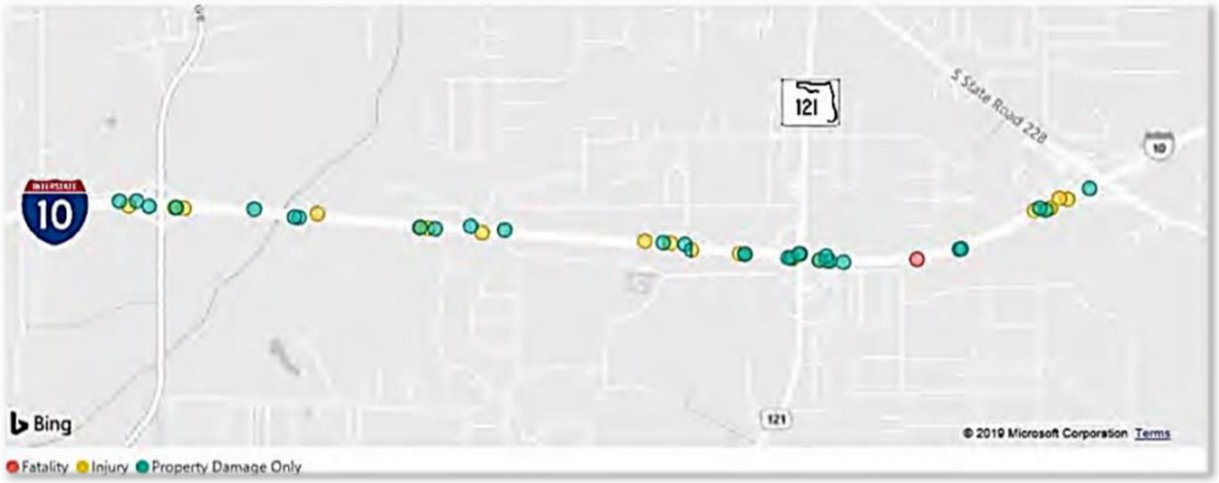
Crashes by Year and Severity Bar Chart



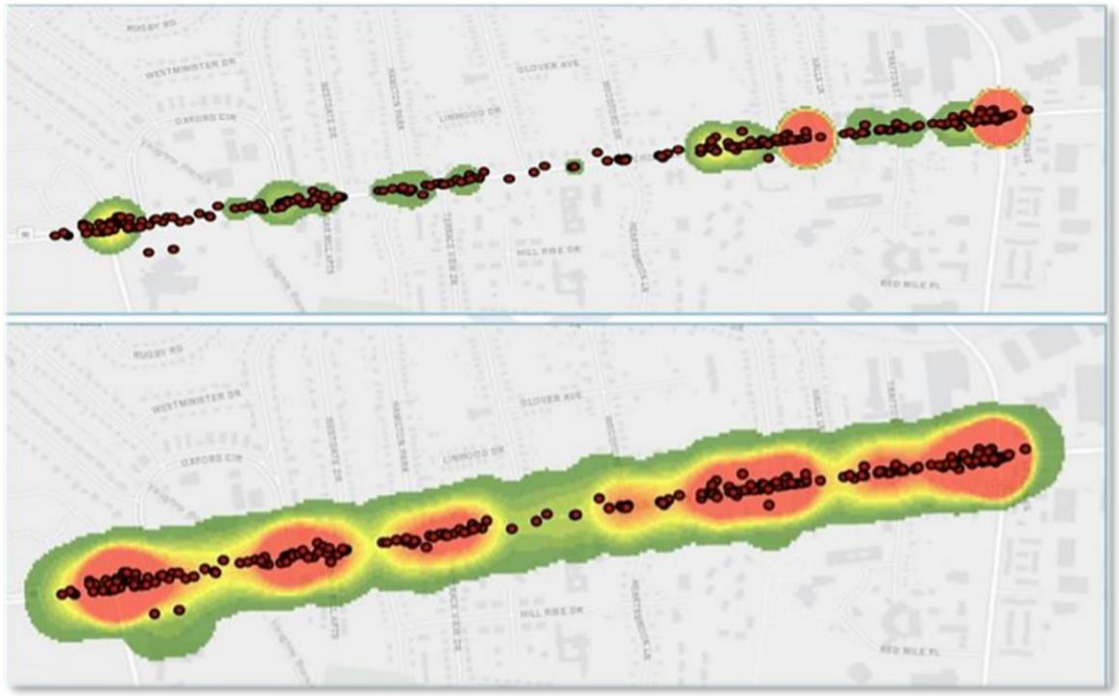
Crash Type Pie Chart

Existing Safety Analysis

- Crash Tables and Diagrams



Crash Locations by Severity Level Map



Crash Frequency and Heat Map

Existing Safety Analysis

- Calculation of Crash Rates

$$Segment\ Crash\ Rate = \frac{Total\ Number\ of\ Crashes \times 1{,}000{,}000}{Segment\ Length \times AADT \times (Number\ of\ Years\ \times 365)}$$

$$Intersection\ Crash\ Rate = \frac{Total\ Number\ of\ Crashes \times 1{,}000{,}000}{Total\ Intersection\ Entering\ AADT \times (Number\ of\ Years\ \times 365)}$$

Existing Safety Analysis

- **Calculation of Crash Rates**
  - Actual crash rates are compared to statewide average crash rates to determine high crash locations

$$\underline{\textbf{\textit{High Crash Location}}}$$

$$\textit{Actual Crash Rate} > \textit{Statewide Average Crash Rate}$$

  - Crash rates should be included in the existing safety analysis
    - Roadway Segment
    - Intersection

Existing Safety Analysis

- **Example 1: Calculation of Crash Rates**

  An IAR is being performed along a 1.5-mile, six-lane urban interstate corridor. A review of the historic crash data shows 200 crashes have been reported between 2013 and 2017. The freeway segment has an AADT of 85,000. What is the segment's actual crash rate?

A. 313.725
B. 0.860
C. 1.862
D. 4.298

Existing Safety Analysis

- **Example: Calculation of Crash Rates**

  An IAR is being performed along a 1.5-mile, six-lane urban interstate corridor. A review of the historic crash data shows 200 crashes have been reported between 2013 and 2017. The freeway segment has an AADT of 85,000. What is the segment's actual crash rate?

$$Segment\ Crash\ Rate = \frac{Total\ Number\ of\ Crashes \times 1{,}000{,}000}{Segment\ Length \times AADT \times (Number\ of\ Years\ \times 365)}$$

$$Segment\ Crash\ Rate = \frac{200 \times 1{,}000{,}000}{1.5 \times 85{,}000 \times ((2017 - 2013) \times 365)}$$

$$Segment\ Crash\ Rate = 0.860$$

Existing Safety Analysis

- Documentation

Existing safety summarized using

- Crash rates
- Crash types
- Crash trends
- High crash locations

Discussion should include

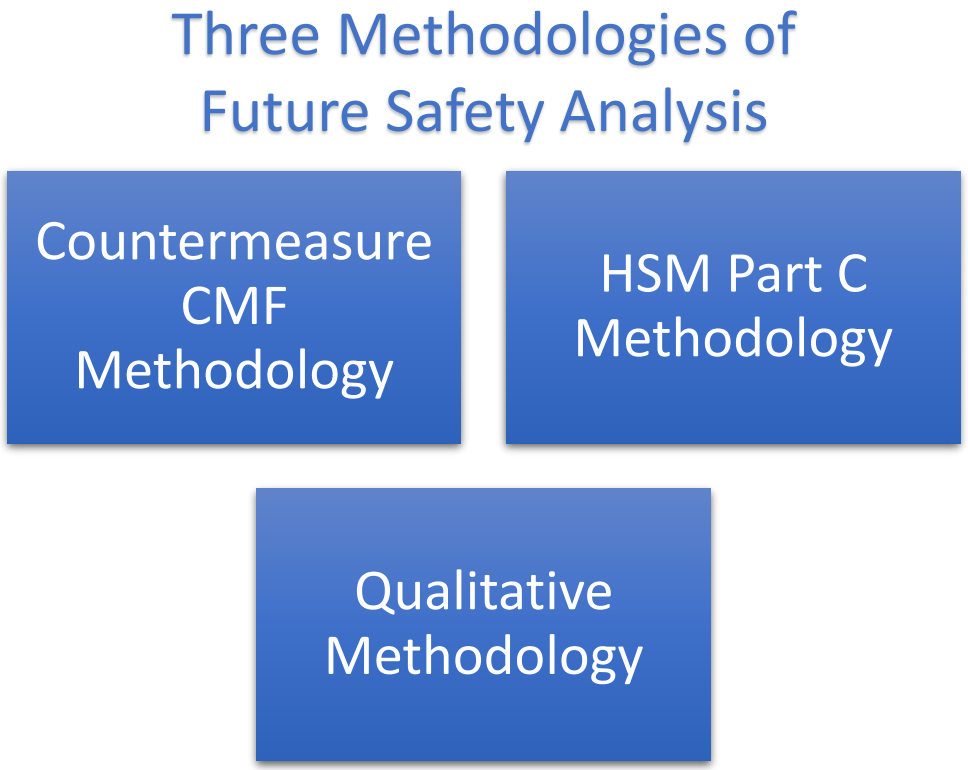
- Any fatal crashes and/or high-crash locations
- Critical crashes involving pedestrians and cyclists

It is not common in Florida to perform HSM Part C analysis for existing conditions

Future Safety Analysis

- Helps evaluate and compare potential safety impacts

- The three methodologies can be applied in isolation or in combination
  - Depends on the proposed modifications



Future Safety Analysis

- Future Safety Analysis Approach Examples

Project	Modification	Future Analysis Approach
1	Diamond Interchange to DDI	Countermeasure CMF Methodology
2	Interstate Widened from Four to Six Lanes	HSM Part C Methodology
3	Diamond Interchange to DDI and Interstate Widened from Four to Six Lanes	Combination of Countermeasure CMF and HSM Part C Methodologies
4	Convert Single Point Urban Interchange to a Diverging Diamond Interchange	Qualitative Methodology

Future Safety Analysis

- **Crash Modification Factors (CMFs)**
  - CMF: a multiplicative factor used to compute the expected number of crashes after implementing a given countermeasure
  - CMFs are applied to the existing crashes observed to compute the expected crashes
  - The CMF value indicates how effective or ineffective a proposed modification could be
  - Another way to represent the reduction in crashes is the Crash Reduction Factor (CRF).
    - $CRF = 100 \times (1 - CMF)$

CMF = 1

- Modification has no effect on number of crashes

CMF < 1

- Modification will decrease the number of crashes

CMF > 1

- Modification will increase the number of crashes

Future Safety Analysis

- **Types of CMFs**
  - Two types of CMFs:
    - Countermeasure CMFs and HSM Part C CMFs

Countermeasure CMFs

- Used when performing Countermeasure CMF Methodology
- Estimate how an improvement will affect crashes
- Developed using multiple sites, studies and statistical methods

HSM Part C CMFs

- Used in predictive models as adjustment factors for SPFs
- CMFs are used to account for varying geometric designs
- Each SPF has unique HSM Part C CMFs
- $N_{predicted} = N_{SPF} \times (CMF_1 \times CMF_2 \times CMF_n)$

Future Safety Analysis

- **Types of CMFs**
  - Countermeasure CMF example

Recommended countermeasure: A deceleration lane on the off-ramp is being extended from 150 feet to 350 feet.

Step 1: Research CMFs

Step 2: Select applicable CMF

For this recommended modification, the following CMF from the FHWA Clearinghouse is recommended:

Countermeasure: Change length of deceleration lane from 201-300 ft. to 601-700 ft.

Compare	CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
☐	0.155	84.47	★★★☆☆	All	All	Not specified	CHEN, ZHOU, AND LIN, 2012	

Future Safety Analysis

- **Types of CMFs**
  - HSM Part C CMF example

Recommended modification: An off-ramp at the study interchange is being widened from one lane to two lanes.

Step 1: Select SPF equation — HSM Equation 19-20 (for multiple vehicle crashes):

$$N_{SPF\_Ramp} = L_r \times \exp\left(a + b \times \ln(c \times AADT_r) + d(c \times AADT_r)\right)$$

Step 2: Determine initial number of crashes under base geometric design and traffic features using SPF equation in Step 1

Step 3: Calculate all HSM Part C CMFs applicable to this ramp segment SPF from HSM Chapter 19.7

Step 4: Apply CMFs to the base SPF calculation to determine the number of crashes for project location, accounting for its unique geometric design and traffic features:

$$N_{predicted} = N_{SPF\_Ramp} \times (CMF_1 \times CMF_2 \times CMF_n)$$

Future Safety Analysis

- **Countermeasure CMF Methodology**
  - Countermeasure CMF Sources

Crash Modification Factors Clearinghouse

- Central, web-based repository of CMFs
- CMF Clearinghouse is regularly updated with new CMFs
- http://www.cmfclearinghouse.org/

Future Safety Analysis

- **Countermeasure CMF Methodology**
  - Countermeasure CMF Sources

HSM Part D

- HSM Part D includes some of the highest quality and most common CMFs
- HSM Part D CMFs are available on the CMF Clearinghouse

Future Safety Analysis

- **Countermeasure CMF Methodology**
  - Countermeasure CMF Sources

FDOT CRFs

- In April 2005, Florida began producing state=specific CRFs
- List of FDOT CRFs was updated in 2014
- https://www.fdot.gov/docs/default-source/roadway/qa/tools/CRF.pdf

Future Safety Analysis

- **Countermeasure CMF Methodology**
  - CMF Selection Criteria
    - Many CMFs and CRFs have been developed; however, not all should be used
    - It is important when selecting a CMF or CRF that the following criteria are followed:

Crash Modification Factors Clearinghouse

- Quality of CMF is based on a one to five-star rating
- Five-star rating indicates a greater level of confidence
- **CMFs with a star rating of three or higher should be used in IARs**

FDOT CRFs

- FDOT CRFs are based on studies performed within Florida
- **FDOT CRFs based on five or more studies should be used in IARs**

Future Safety Analysis

- **Countermeasure CMF Methodology**
  - Example 1: CMF Selection Criteria

In downtown Jacksonville, a diamond interchange is being converted to a Diverging Diamond Interchange (DDI). Which CMF from the CMF Clearinghouse should be used?

A Option 1 (Top)

B Option 2 (Bottom)

Countermeasure: Convert diamond interchange to Diverging Diamond Interchange (DDI) or Double Crossover Diamond (DCD)

Compare	CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
☐	0.54	46	★☆☆☆☆	All	All	Urban	CHILUKURI ET AL., 2011	The authors computed the CMF ... [*READ MORE*]

Countermeasure: Convert diamond interchange to Diverging Diamond Interchange (DDI) or Double Crossover Diamond (DCD)

Compare	CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
☐	0.625	37.5	★★★☆☆	All	All	Urban	CLAROS ET AL., 2017	This CMF applies to the ... [*READ MORE*]

Future Safety Analysis

- **Countermeasure CMF Methodology**
  - Example 2: CMF Selection Criteria

True or False: A left turn is being added to a T-intersection. Based on the information provided below, FDOT CRF 20 can be used for the predictive safety analysis.

A True

B False

ID	Modification	Number of Projects	CRF
20	Add LT (T-intersection)	3	42

Future Safety Analysis

- **Countermeasure CMF Methodology**
  - Application of Countermeasure CMF
    - Ensure the CMFs conditions closely match the study area conditions
    - The analyst must consider the CMF's project contexts:
      - Roadway characteristics
      - Surrounding environment
      - Traffic control
      - Traffic volume

Crash Type:	All
Crash Severity:	All
Roadway Types:	Not Specified
Number of Lanes:	1 to 2
Speed Limit:	15-35 mph
Area Type:	Urban and suburban
Time of Day:	All
If countermeasure is intersection-based	
Intersection Type:	Roadway/roadway (not interchange related)
Intersection Geometry:	3-leg,4-leg
Traffic Control:	Roundabout
Major Road Traffic Volume:	Minimum of 5300 to Maximum of 52500 Average Daily Traffic (ADT)

Future Safety Analysis

- **Countermeasure CMF Methodology**
  - Example 1: Application of Countermeasure CMF

A diamond interchange in downtown Jacksonville has a crash frequency of 30 crashes/year. It is recommended the diamond interchange be converted to a DDI. How many crashes are expected after the proposed modification?

A. 18.75 crashes/year

B. 20.10 crashes/year

C. 11.90 crashes/year

D. 37.86 crashes/year

CMF: 8258

Compare	CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
☐	0.67	33	★★★☆☆	All	All	Suburban	HUMMER ET AL., 2016	The volume here is the ... [READ MORE]

CMF: 9107

Compare	CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
☐	0.625	37.5	★★★☆☆	All	All	Urban	CLAROS ET AL., 2017	This CMF applies to the ... [READ MORE]

Future Safety Analysis

- **Countermeasure CMF Methodology**
  - Example 1: Application of Countermeasure CMF Solution

Step 1: Determine applicable CMFs

CMF: 8258

Compare	CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
☐	0.67	33	★★★☆☆	All	All	Suburban	HUMMER ET AL., 2016	The volume here is the ... [*READ MORE*]

CMF: 9107

Compare	CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
☐	0.625	37.5	★★★☆☆	All	All	Urban	CLAROS ET AL., 2017	This CMF applies to the ... [*READ MORE*]

Future Safety Analysis

- **Countermeasure CMF Methodology**
  - Example 1: Application of Countermeasure CMF Solution

Step 2: Check the CMF area type:

CMF: 8258

Compare	CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
☐	0.67	33	★★★☆☆	All	All	Suburban	HUMMER ET AL., 2016	The volume here is the ... [READ MORE]

CMF: 9107

Compare	CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
☐	0.625	37.5	★★★☆☆	All	All	Urban	CLAROS ET AL., 2017	This CMF applies to the ... [READ MORE]

Future Safety Analysis

- **Countermeasure CMF Methodology**
  - Example 1: Application of Countermeasure CMF Solution

Step 3: Select appropriate CMF based on area type:

CMF: 9107

Compare	CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
☐	0.625	37.5	★★★☆☆	All	All	Urban	CLAROS ET AL., 2017	This CMF applies to the ... [*READ MORE*]

Future Safety Analysis

- **Countermeasure CMF Methodology**
  - Example 1: Application of Countermeasure CMF Solution

Step 4: Calculate the predicted number of crashes

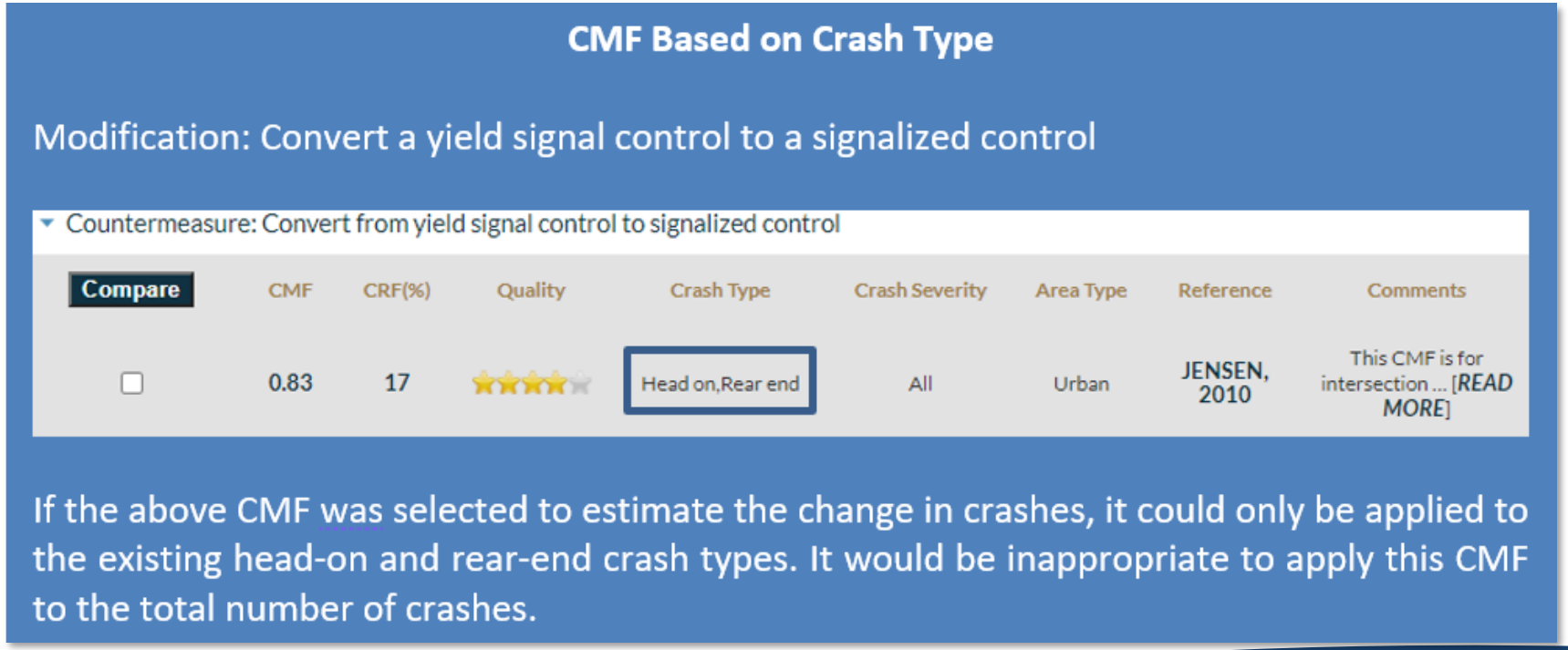
$$Predicted\ Number\ of\ Crashes = Crash\ Frequency \times CMF$$

$$Predicted\ Number\ of\ Crashes = 30\ crashes/year \times 0.625$$

$$Predicted\ Number\ of\ Crashes = 18.75\ crashes/year$$

Future Safety Analysis

- **Countermeasure CMF Methodology**
  - Application of Countermeasure CMF
    - In addition to project context, crash type should be considered



Future Safety Analysis

- **Countermeasure CMF Methodology**
  - Example 2: Application of Countermeasure CMF

A diamond interchange in suburban Tampa has a total crash frequency of 30 crashes/year. Of the 30 crashes/year, 10 crashes/year are rear-end crashes. It is recommended the diamond interchange be converted to a DDI. How many rear-end crashes are expected after the proposed modification?

A. 6.70 crashes/year

B. 12.19 crashes/year

C. 5.49 crashes/year

D. 3.68 crashes/year

CMF: 8258

Compare	CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
☐	0.67	33	★★★☆☆	All	All	Suburban	HUMMER ET AL., 2016	The volume here is the ... [*READ MORE*]

CMF: 10141

Compare	CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
☐	0.549	45.1	★★★☆☆	Rear end	All	Not specified	NYE ET AL., 2019	

Future Safety Analysis

- **Countermeasure CMF Methodology**
  - Example 2: Application of Countermeasure CMF Solution

Step 1: Determine applicable CMFs

CMF: 8258

Compare	CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
☐	0.67	33	★★★☆☆	All	All	Suburban	HUMMER ET AL., 2016	The volume here is the ... [*READ MORE*]

CMF: 10141

Compare	CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
☐	0.549	45.1	★★★☆☆	Rear end	All	Not specified	NYE ET AL., 2019	

Future Safety Analysis

- **Countermeasure CMF Methodology**
  - Example 2: Application of Countermeasure CMF Solution

Step 2: Check the CMF crash type:

CMF: 8258

Compare	CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
☐	0.67	33	★★★☆☆	All	All	Suburban	HUMMER ET AL., 2016	The volume here is the ... [READ MORE]

CMF: 10141

Compare	CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
☐	0.549	45.1	★★★☆☆	Rear end	All	Not specified	NYE ET AL., 2019	

Future Safety Analysis

- **Countermeasure CMF Methodology**
  - Example 2: Application of Countermeasure CMF Solution

Step 3: Select appropriate CMF based on area type:

CMF: 10141

Compare	CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
☐	0.549	45.1	★★★☆☆	Rear end	All	Not specified	NYE ET AL., 2019	

Future Safety Analysis

- **Countermeasure CMF Methodology**
  - Example 2: Application of Countermeasure CMF Solution

Step 4: Calculate the predicted number of rear-end crashes

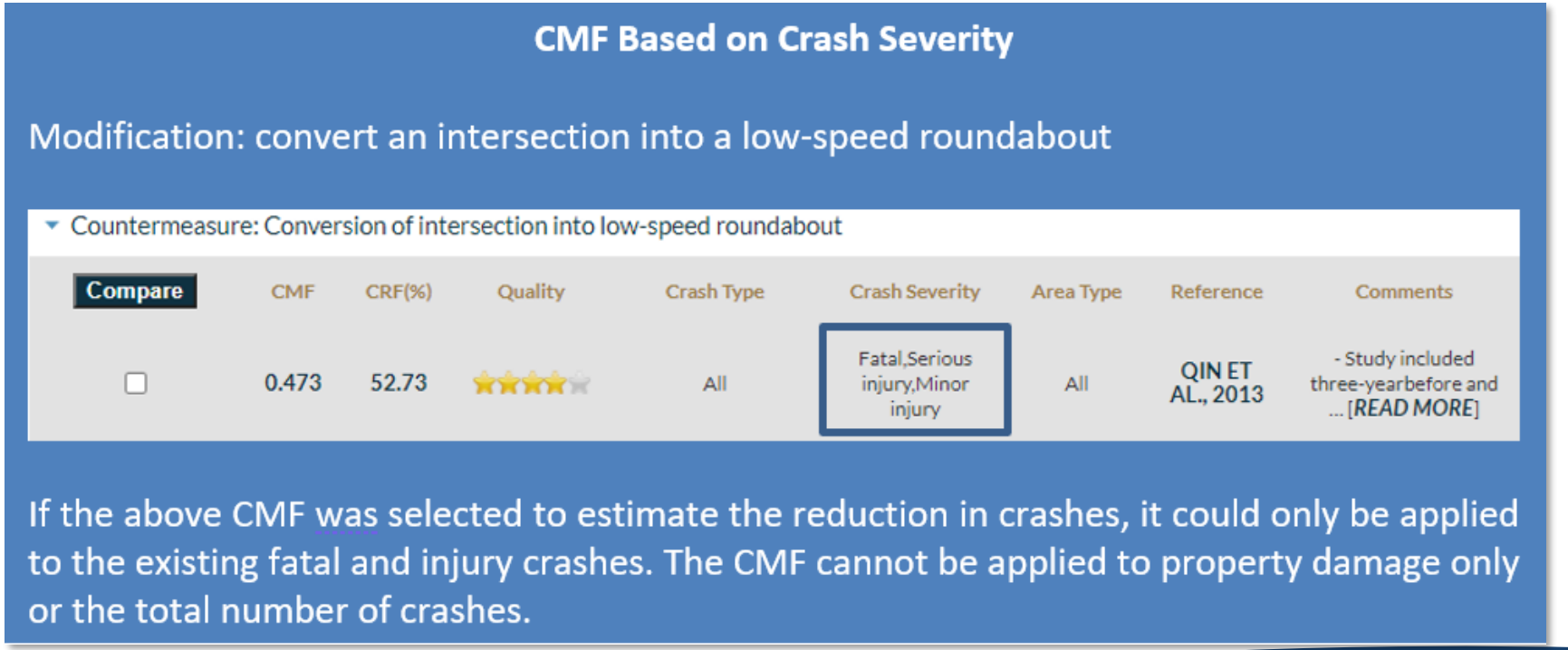
$$Predicted\ Number\ of\ Crashes = Crash\ Frequency \times CMF$$

$$Predicted\ Number\ of\ Crashes = 10\ crashes/year \times 0.549$$

$$Predicted\ Number\ of\ Crashes = 5.49\ crashes/year$$

Future Safety Analysis

- **Countermeasure CMF Methodology**
  - Application of Countermeasure CMF
    - In addition to project context, crash severity should be considered



CMF Based on Crash Severity

Modification: convert an intersection into a low-speed roundabout

Countermeasure: Conversion of intersection into low-speed roundabout

Compare	CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
☐	0.473	52.73	★★★★☆	All	Fatal,Serious injury,Minor injury	All	QIN ET AL., 2013	- Study included three-yearbefore and ... [*READ MORE*]

If the above CMF was selected to estimate the reduction in crashes, it could only be applied to the existing fatal and injury crashes. The CMF cannot be applied to property damage only or the total number of crashes.

Future Safety Analysis

- **Countermeasure CMF Methodology**
  - Example 3: Application of Countermeasure CMF

A diamond interchange in Miami has a total crash frequency of 30 crashes/year. Of the 30 crashes/year, 15 crashes/year are property damage only (PDO) crashes. It is recommended the diamond interchange be converted to a DDI. How many PDO crashes are expected after the proposed modification?

A. 20.34 crashes/year

B. 6.89 crashes/year

C. 10.05 crashes/year

D. 10.29 crashes/year

CMF: 8258

Compare	CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
☐	0.67	33	★★★☆☆	All	All	Suburban	HUMMER ET AL., 2016	The volume here is the ... [*READ MORE*]

CMF: 9106

Compare	CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
☐	0.686	31.4	★★★☆☆	All	O (property damage only)	Urban	CLAROS ET AL., 2017	This CMF applies to the ... [*READ MORE*]

Future Safety Analysis

- **Countermeasure CMF Methodology**
  - Example 3: Application of Countermeasure CMF Solution

Step 1: Determine applicable CMFs

CMF: 8258

Compare	CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
☐	0.67	33	★★★☆☆	All	All	Suburban	HUMMER ET AL., 2016	The volume here is the ... [*READ MORE*]

CMF: 9106

Compare	CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
☐	0.686	31.4	★★★☆☆	All	O (property damage only)	Urban	CLAROS ET AL., 2017	This CMF applies to the ... [*READ MORE*]

Future Safety Analysis

- **Countermeasure CMF Methodology**
  - Example 3: Application of Countermeasure CMF Solution

Step 2: Check the CMF crash severity:

CMF: 8258

Compare	CMF	CRF(%)	Quality	Crash Type	Crash Type	Area Type	Reference	Comments
☐	0.67	33	★★★☆☆	All	All	Suburban	HUMMER ET AL., 2016	The volume here is the ... [READ MORE]

CMF: 9106

Compare	CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
☐	0.686	31.4	★★★☆☆	All	O (property damage only)	Urban	CLAROS ET AL., 2017	This CMF applies to the ... [READ MORE]

Future Safety Analysis

- **Countermeasure CMF Methodology**
  - Example 3: Application of Countermeasure CMF Solution

Step 3: Select appropriate CMF based on area type:

CMF: 9106

Compare	CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
☐	0.686	31.4	★★★☆☆	All	O (property damage only)	Urban	CLAROS ET AL., 2017	This CMF applies to the ... [*READ MORE*]

Future Safety Analysis

- **Countermeasure CMF Methodology**
  - Example 3: Application of Countermeasure CMF Solution

Step 4: Calculate the predicted number of property damage only crashes

$$Predicted\ Number\ of\ Crashes = Crash\ Frequency \times CMF$$

$$Predicted\ Number\ of\ Crashes = 15\ crashes/year \times 0.686$$

$$Predicted\ Number\ of\ Crashes = 10.29\ crashes/year$$

Future Safety Analysis

- **Countermeasure CMF Methodology**
  - When multiple CMFs are applied in a project, the recommended HSM practice is to assume that CMFs are multiplicative
    - CMFs are assumed to be independent
  - Because there are limitations and uncertainties in combining multiple CMFs, no more than **three** CMFs should be used

$$Number\ of\ Crashes = Crash\ frequency \times (CMF_1 \times CMF_2 \times CMF_3)$$

Future Safety Analysis

- Countermeasure CMF Methodology

Common examples evaluated using the Countermeasure CMF Methodology

- Convert an unsignalized ramp terminal to a roundabout ramp terminal
- Yield to signalized right-turn movements from an off-ramp to the arterial
- Add additional left- and/or right-turn lanes at adjacent arterial intersections
- Modify an adjacent arterial intersection
- Convert a diamond interchange to a diverging diamond interchange (DDI)
- Increase the storage lane
- Complete list of examples is provided in the Safety Guidance

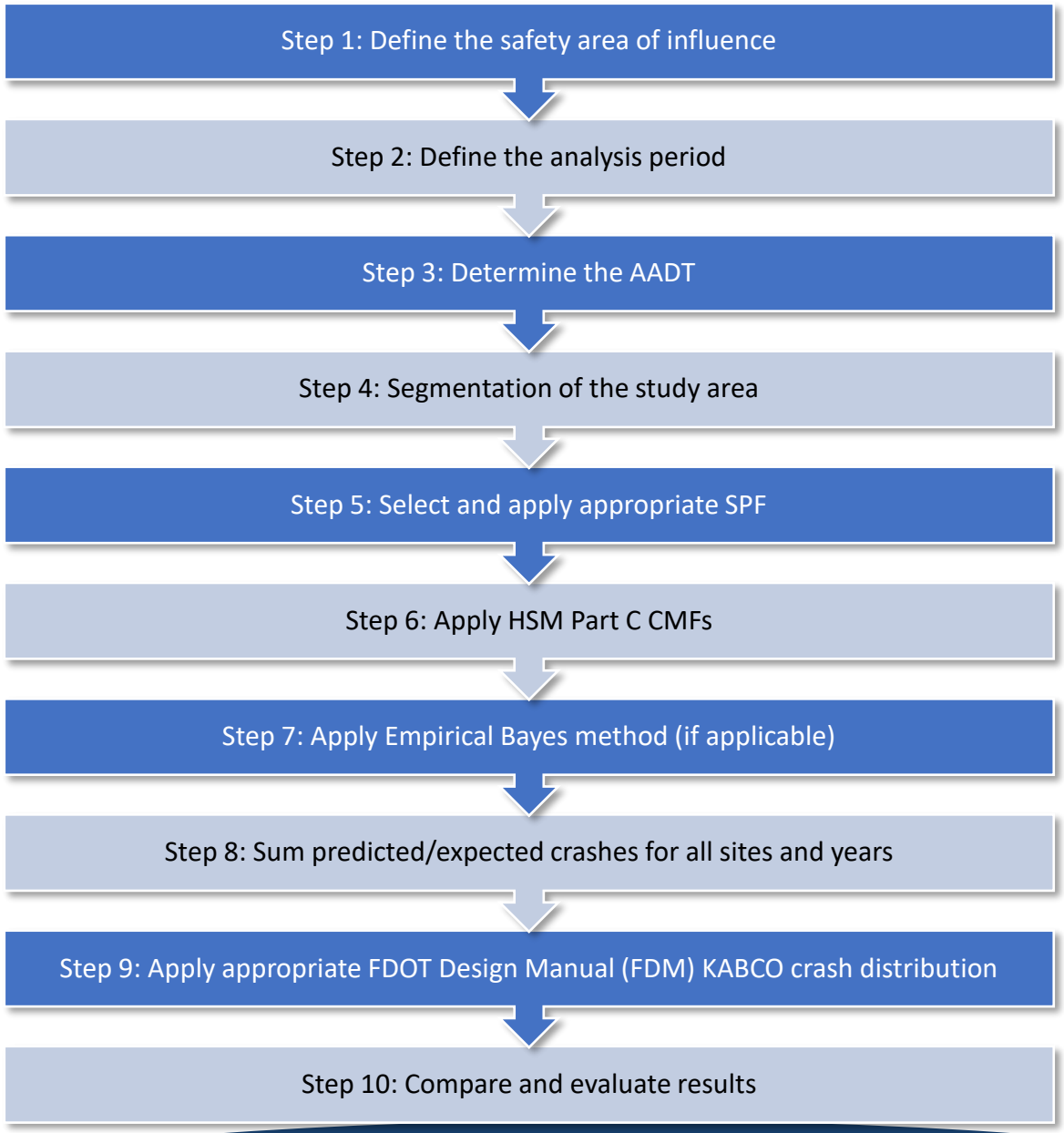
Future Safety Analysis

- **HSM Part C Methodology**
  - The HSM Part C provides a predictive method for estimating the expected average crash frequency of
    - Freeway segments
    - Merge/diverge segments
    - Weaving segments
    - Ramp segments
    - Ramp terminals
    - Arterial segments
    - Arterial intersections

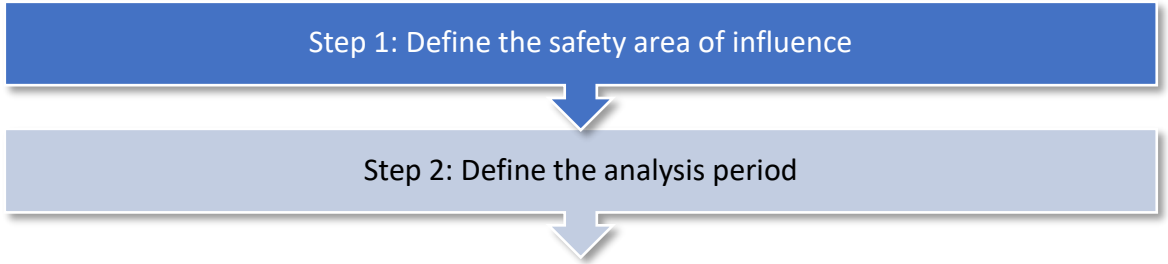
  - The predictive method is based on the Safety Performance Functions (SPFs)
  - SPFs predict the crash frequency by facility type as a function of roadway characteristics and traffic volume

Future Safety Analysis

- **HSM Part C Methodology**
  - The application of SPFs should be consistent with the HSM Part C
  - The SPF methodology for IARs can be summarized in 10 steps



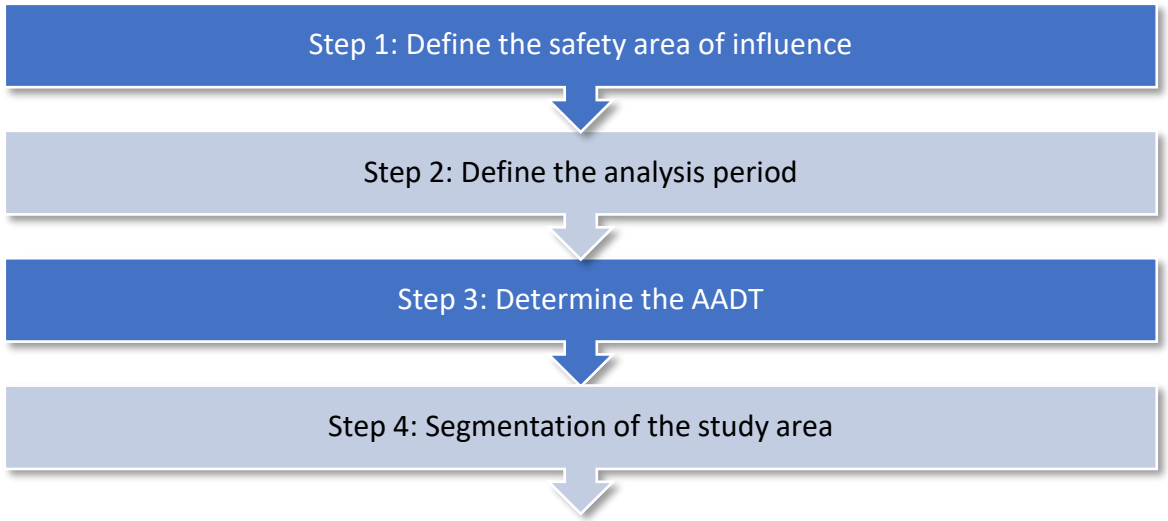
Future Safety Analysis



- **HSM Part C Methodology**
  - Step 1: Define the Safety Study Area of Influence
    - Future safety analysis needs to be performed only for elements within the area of influence that are anticipated to be affected by the proposed modifications
  - Step 2: Define the Analysis Period
    - Future predictive safety analysis should be performed between the opening and design year
    - It is not recommended to extrapolate the total crashes

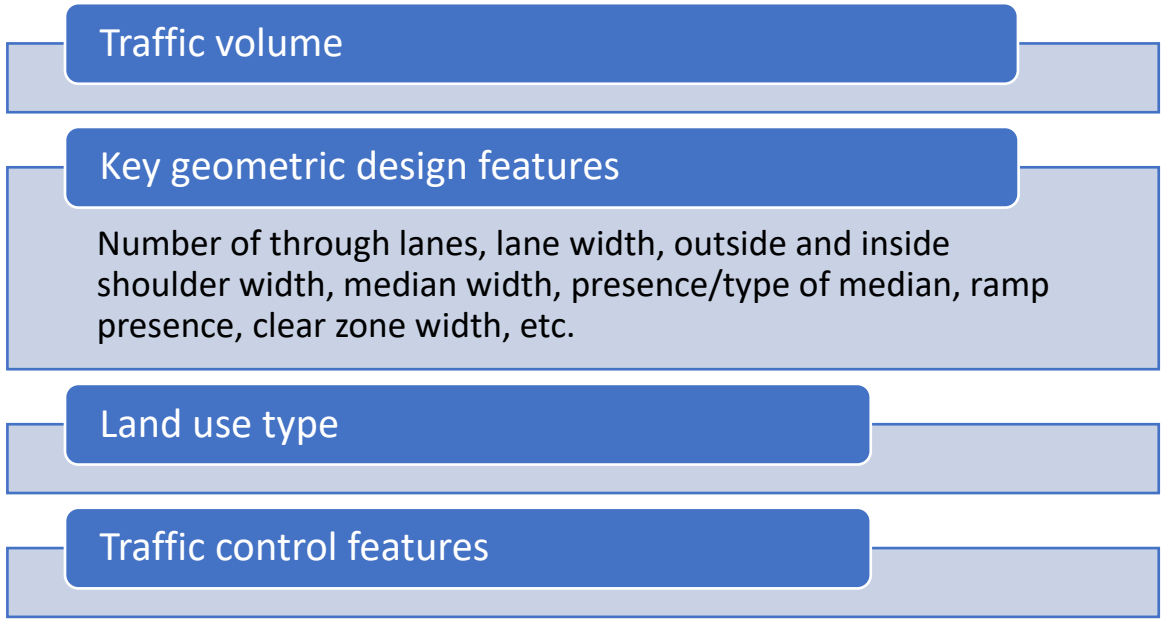
Future Safety Analysis

- **HSM Part C Methodology**
  - Step 3: Determine AADT
    - AADT is a major input in SPF equations
    - AADT for each year in the evaluation period should be determined
  - Step 4: Segmentation of the Study Area
    - The segmentation should follow the recommended procedures outlined in the HSM
    - For IAR documents, the segmentation only needs to occur for the areas where the proposed modifications are being implemented



Future Safety Analysis

- **HSM Part C Methodology**
  - Step 4: Segmentation of the Study Area
    - Roadway segment segmentation:
      - HSM recommends that segment lengths be between 0.1 and 1.0 miles
    - Intersection and ramp terminal segmentation:
      - Crashes within 250 feet are assigned

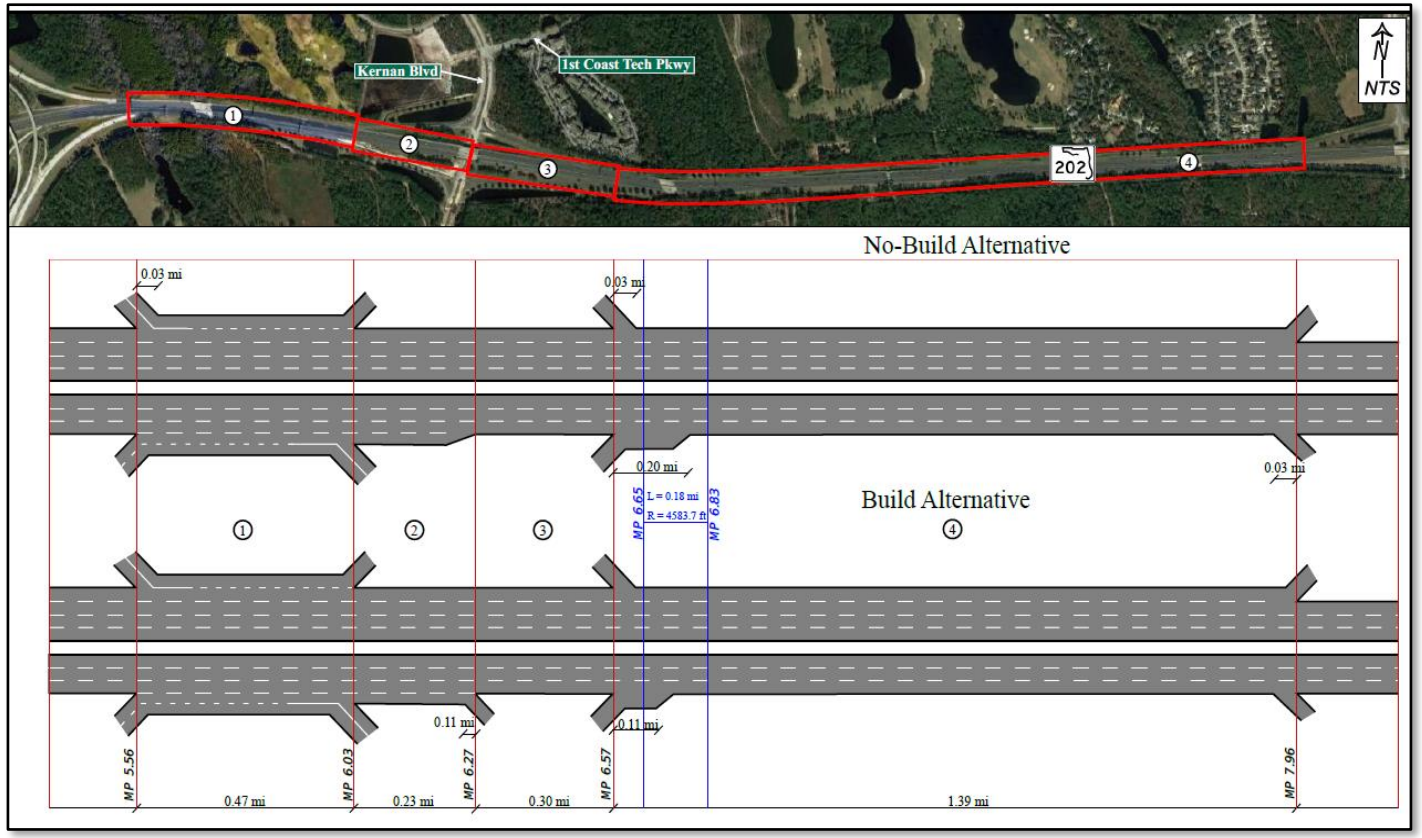


Future Safety Analysis

- **HSM Part C Methodology**
  - Step 4: Segmentation of the Study Area
    - Segmentation Example for an Arterial

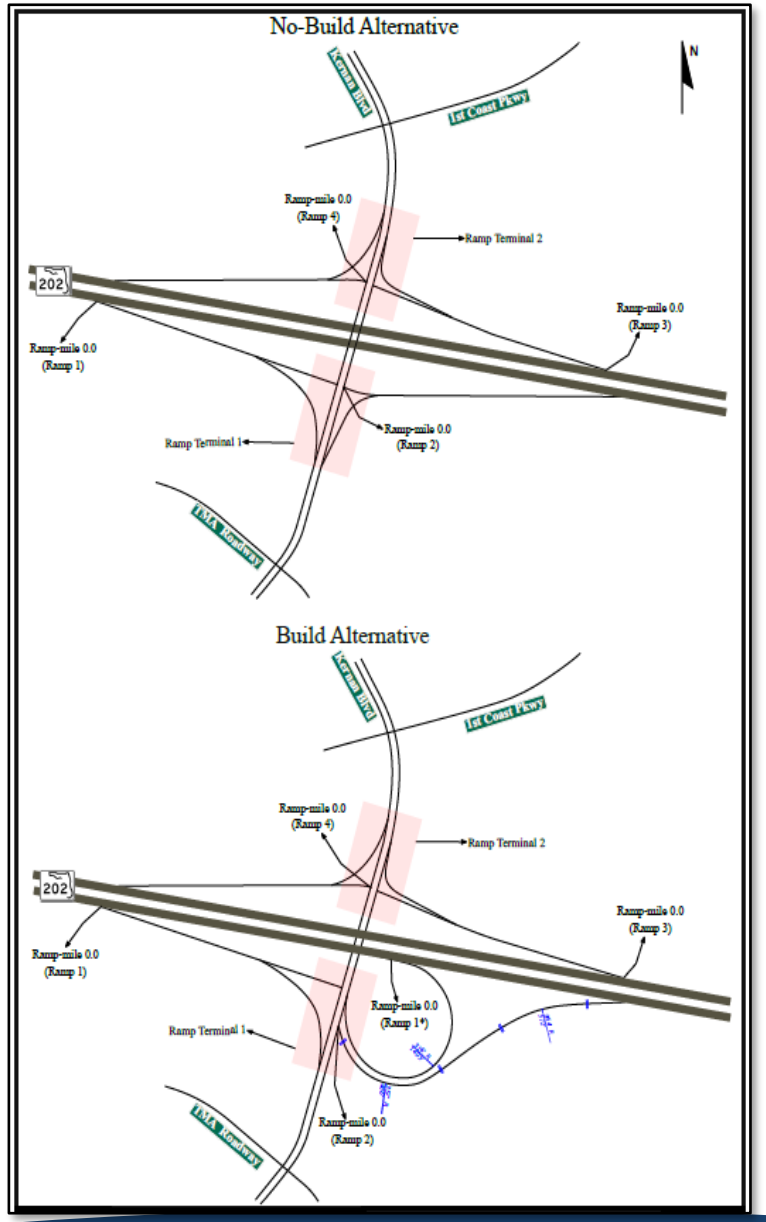
Future Safety Analysis

- **HSM Part C Methodology**
  - Step 4: Segmentation of the Study Area
    - Segmentation Example for a Freeway



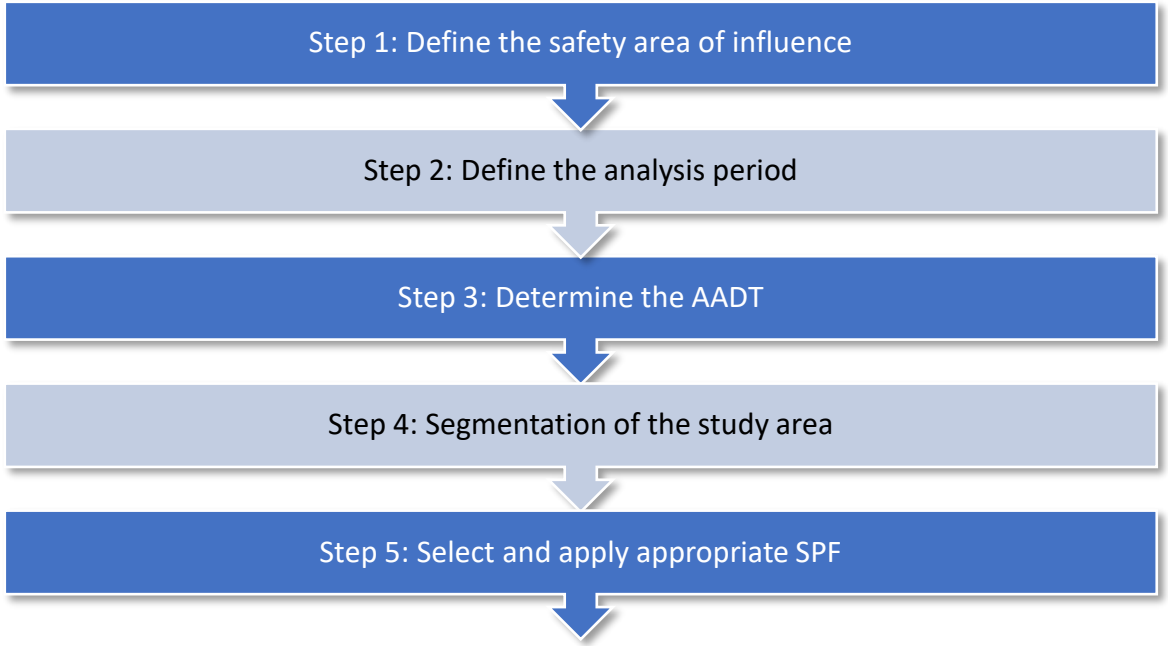
Future Safety Analysis

- **HSM Part C Methodology**
  - Step 4: Segmentation of the Study Area
    - Segmentation Example for Interchange Ramps



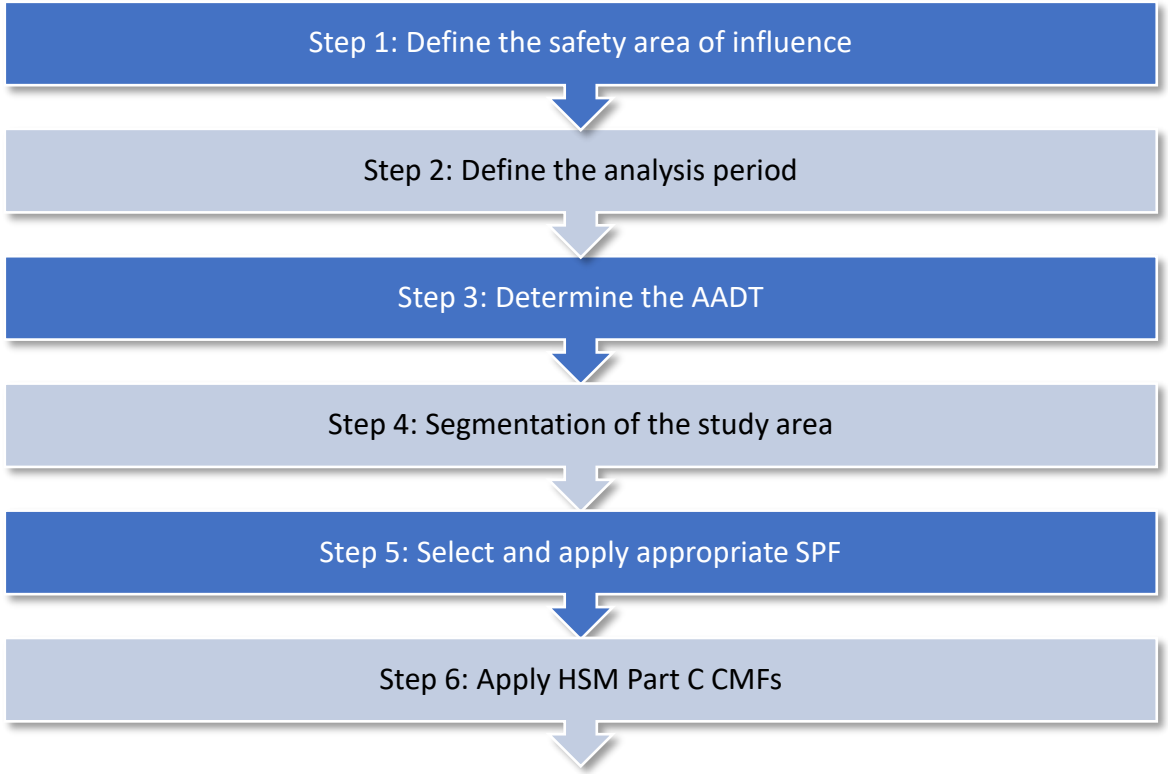
Future Safety Analysis

- **HSM Part C Methodology**
  - Step 5: Select and Apply the Appropriate SPF
    - HSM has multiple SPFs based on different site conditions
    - Arterial intersection SPF analysis should not be applied to ramp terminals or vice versa
    - Review the site conditions being analyzed to ensure the appropriate SPF is used



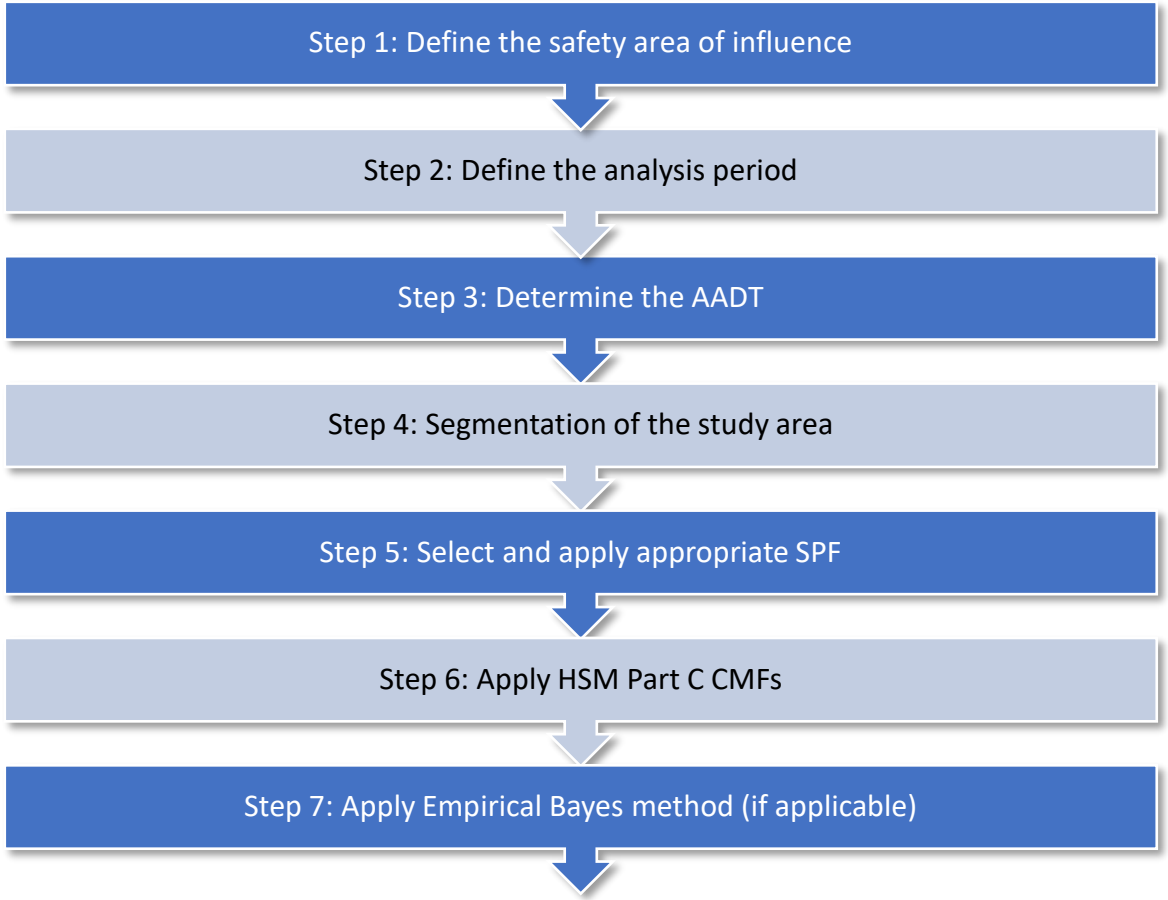
Future Safety Analysis

- **HSM Part C Methodology**
  - Step 6: Apply the HSM Part C CMFs
    - Apply HSM Part C CMFs to SPF equations
    - CMFs are based on specific geometric and traffic characteristics
    - Tools that perform HSM Part C safety analysis should include the CMFs
    - It is not recommended to apply calibration factors
      - At this time, FDOT has not developed calibration factors for interstates



Future Safety Analysis

- **HSM Part C Methodology**
  - Step 7: Apply the Empirical Bayes Method
    - Combines the observed and predicted crashes to determine the expected number of crashes
    - Can only be applied to proposed conditions that are not substantially different from the existing conditions
    - Use engineering judgement



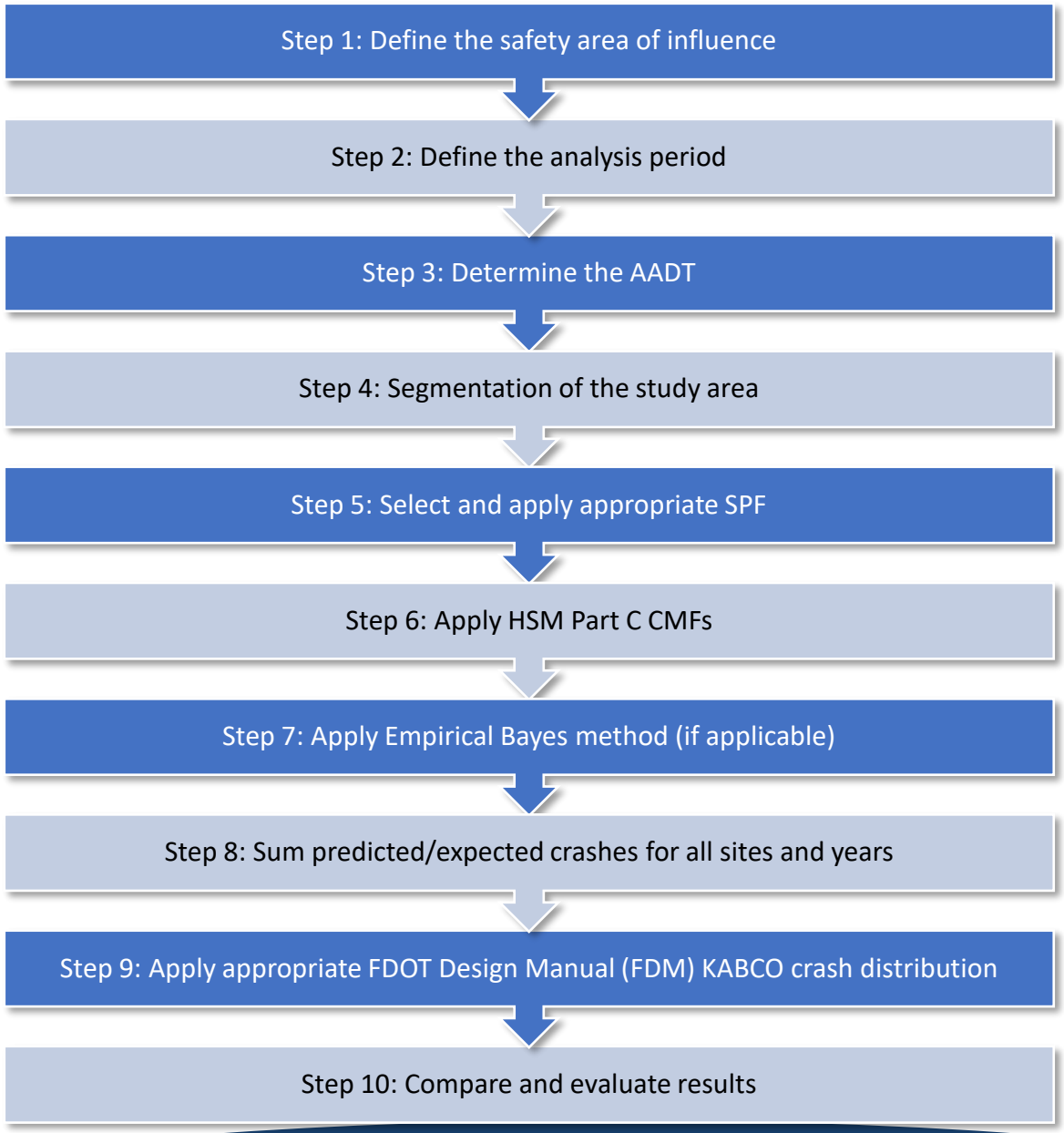
Future Safety Analysis

- HSM Part C Methodology
  - Step 7: Apply the Empirical Bayes Method

Apply Empirical Bayes	Do Not Apply Empirical Bayes
• The roadway geometrics and traffic control are not being changed • The roadway cross-section is modified but the basic number of through lanes remains the same • Minor changes in alignment are made	• A new alignment is developed • A new interchange is proposed • Intersections at which the basic number of legs is changed • Widening of a roadway

Future Safety Analysis

- **HSM Part C Methodology**
  - Step 8: Sum Predicted/Expected Crashes for All Sites and Years
  - Step 9: Apply Appropriate FDM KABCO Crash Distribution
  - Step 10: Compare and Evaluate Results
    - Safety-based benefit-cost analysis is not required in IARs



Future Safety Analysis

- **HSM Part C Methodology**
  - FDOT Design Manual (FDM) KABCO Crash Distribution
    - Various KABCO scales have been prepared
    - Analysis tools (such as ISATe) will apply a default KABCO scale
    - For IAR projects, HSM Crash Distribution for Florida must be applied
      - Available in the FDM Chapter 122 (updated annually)

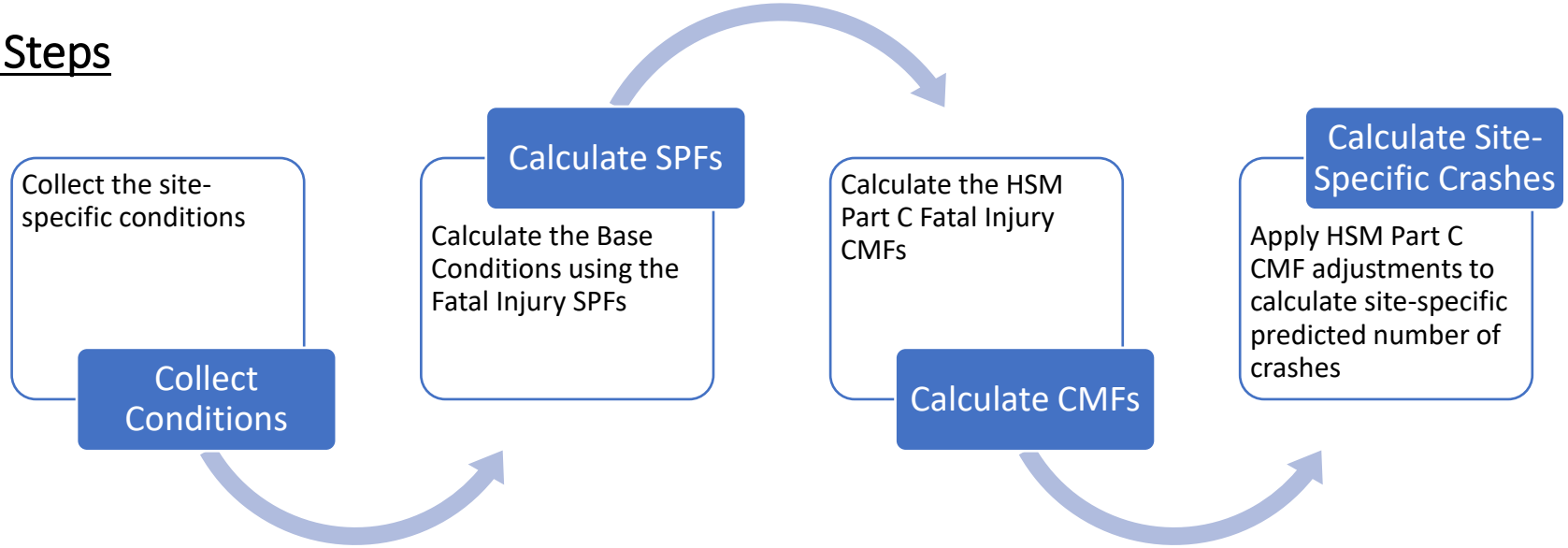
Injury Severity	Abbreviation	Definition
Fatal Injury (within 30 days)	K	Any injury that results in death within 30 days after the crash occurred.
Incapacitating Injury	A	Disabling injuries, such as broken bones, severed limbs, etc. These injuries usually require hospitalization and transport to a medical facility
Non-Incapacitating Evident Injury	B	Non-disabling injuries, such as lacerations, scrapes, bruises, etc.
Possible Injury	C	
No Injury	O	Also known as property damage only (PDO)

Future Safety Analysis

- **HSM Part C Methodology Calculation Example**

Question: How many fatal injury crashes are predicted along the 2-lane urban off-ramp based on the site-specific conditions?

Calculation Steps



Future Safety Analysis

- **HSM Part C Calculation Example**
  - Collect the site-specific conditions

Ramp Segment Conditions	
Ramp Type	Diverge
Length of Segment	0.2 miles
Ramp AADT	12,000
Horizontal Curve	No
Lane Width	14 feet
Right Shoulder Width	12 feet
Left Shoulder Width	10 feet
Right and Left Side Barrier	Not Present
Ramp Speed Change Lane	No
Lane Add or Drop	No

Future Safety Analysis

- **HSM Part C Calculation Example**
  - Calculate the Base Conditions Fatal Injury SPFs

$$N_{multiple\ vehicle} = L_r \times \exp(a + b \times \ln[c \times AADT_r] + d[c \times AADT_r]) \qquad HSM\ Part\ C\ equation\ 19-20$$

$$N_{single\ vehicle} = L_r \times \exp(a + b \times ln[c \times AADT_r]) \qquad HSM\ Part\ C\ equation\ 19-24$$

$$N_{total} = N_{multiple\ vehicle} + N_{single\ vehilce}$$

$N_{multiple\ vehicle}$	
L_r	0.2 miles
$AADT_r$	12,000
a	-4.489 (Table 19-5)
b	0.524 (Table 19-5)
c	0.001 (Table 19-5)
d	0.0699 (Table 19-5)

$N_{single\ vehicle}$	
L_r	0.2 miles
$AADT_r$	12,000
a	-1.678 (Table 19-5)
b	0.718 (Table 19-5)
c	0.001 (Table 19-5)

Future Safety Analysis

- **HSM Part C Calculation Example**
  - Calculate the Base Conditions Fatal Injury SPFs

$$N_{multiple\ vehicle} = 0.2\ miles \times \exp(-4.489 + 0.524 \times \ln[0.001 \times 12{,}000] + 0.0699[0.001 \times 12{,}000]) = 0.019\ crashes$$

$$N_{single\ vehicle} = 0.2\ miles \times \exp(-1.678 + 0.718 \times ln[0.001 \times 12{,}000]) = 0.222\ crashes$$

$$N_{total} = 0.019 + 0.222 = 0.241\ crashes$$

$N_{multiple\ vehicle}$	
L_r	0.2 miles
$AADT_r$	12,000
a	-4.489 (Table 19-5)
b	0.524 (Table 19-5)
c	0.001 (Table 19-5)
d	0.0699 (Table 19-5)

$N_{single\ vehicle}$	
L_r	0.2 miles
$AADT_r$	12,000
a	-1.678 (Table 19-5)
b	0.718 (Table 19-5)
c	0.001 (Table 19-5)

Future Safety Analysis

- **HSM Part C Calculation Example**
  - Calculate HSM Part C Fatal Injury CMFs

CMF	Fatal Injury CMFs	
	Multiple Vehicle	Single Vehicle
Horizontal Curve	1.000	1.000
Lane Width	1.000	1.000
Right Shoulder Width	0.806	0.806
Left Shoulder Width	0.724	0.724
Right Side Barrier	1.00	1.00
Left Side Barrier	1.00	1.00
Lane Add or Drop	1.00	1.00
Ramp Speed-Change Lane	1.00	

Future Safety Analysis

- **HSM Part C Calculation Example**
  - Apply HSM Part C CMF adjustments to calculate site-specific predicted number of crashes

$$N_{multiple\ vehicle\_adj} = N_{multiple\ vehicle} \times (CMF_1 \times CMF_2 \times CMF_n)$$

$$N_{single\ vehicle\_adj} = N_{single\ vehicle} \times (CMF_1 \times CMF_2 \times CMF_n)$$

$$N_{total\_adj} = N_{multiple\ vehicle\_adj} + N_{single\ vehilce\_adj}$$

$$N_{multiple\ vehicle\_adj} = 0.019 \times (1.000 \times 1.000 \times 0.806 \times 0.724 \times 1.000 \times 1.000 \times 1.000 \times 1.000) = 0.011\ crashes$$

$$N_{single\ vehicle\_adj} = 0.222 \times (1.000 \times 1.000 \times 0.806 \times 0.724 \times 1.000 \times 1.000 \times 1.000) = 0.141\ crashes$$

$$N_{total\_adj} = 0.011 + 0.130 = 0.141\ crashes$$

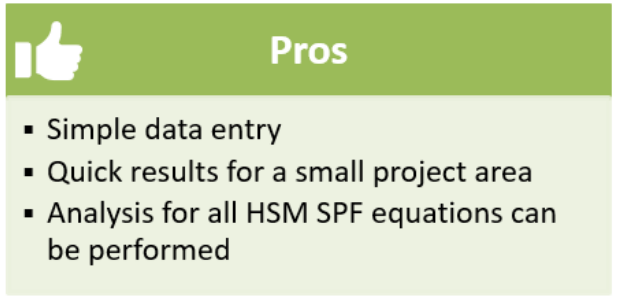
Future Safety Analysis

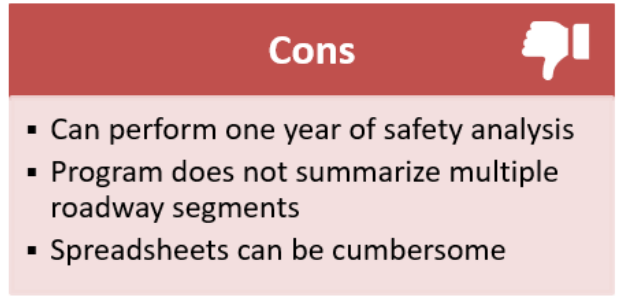
- **HSM Part C Methodology Analysis Tools**
  - Manual application of HSM Part C methodology is cumbersome
  - Three tools are used to perform predicative safety analysis using SPFs

1. HSM spreadsheets
2. Enhanced Interchange Safety Analysis Tool
   - ISATe
3. Interactive Highway Safety Design Model
   - IHSDM

Future Safety Analysis

- **HSM Part C Methodology Analysis Tools**
  - HSM Spreadsheets
    - Numerus spreadsheets have been developed to implement the HSM predictive method
    - HSM spreadsheets must be consistent with the methodology presented in the HSM Part C
    - HSM Spreadsheets are available at http://www.highwaysafetymanual.org/Pages/Tools.aspx





Future Safety Analysis

- **HSM Part C Methodology Analysis Tools**
  - Enhanced Interchange Safety Analysis Tool (ISATe)
    - Applies the HSM Part C methodology to
      - Freeway segments
      - Interchanges
    - ISATe cannot be used to evaluate arterial segments outside the interchange area
    - ISATe is available at: http://www.highwaysafetymanual.org/Documents/ISATe_Documents.zip

Pros

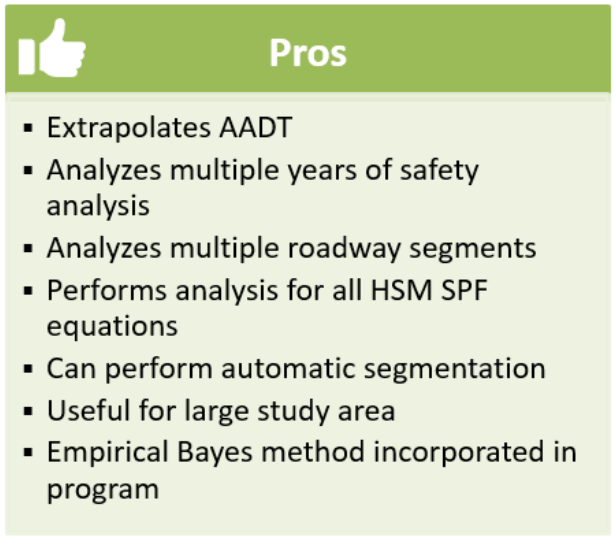
- Validated safety analysis tool
- Extrapolates AADT
- Analyzes multiple years of safety analysis
- Analyzes multiple freeway segments
- Summarizes freeway segments
- Useful for small interchange projects
- Empirical Bayes method incorporated in program
- Provides user-friendly data entry and output sheets

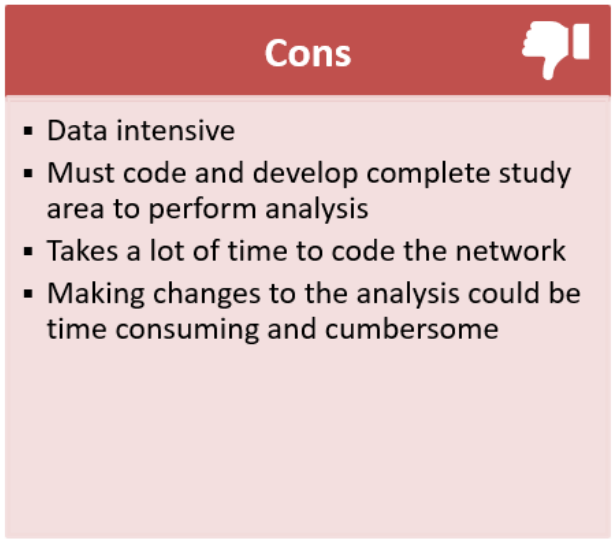
Cons

- Does not perform arterial segment or arterial intersection predictive safety analysis
- Can analyze a maximum of 24 consecutive years
- Does not perform automatic segmentation
- Can cause difficulties for large project areas

Future Safety Analysis

- **HSM Part C Methodology Analysis Tools**
  - Interactive Highway Safety Design Model (IHSDM)
    - Applies the HSM Part C methodology to
      - Freeway segments
      - Interchanges
      - Arterials
      - Intersections
    - Data input can be intensive and time consuming
    - IHSDM is available at: https://www.ihsdm.org/wiki/Welcome





Future Safety Analysis

- **HSM Part C Methodology Limitations**
  - HSM provides several predictive models, however, it does have the following limitations

It does not account for traffic variability, because the HSM analysis uses AADT volumes.

The HSM assumes the independence of geometric and traffic control features on crash occurrences.

It does not account for the influence of freeways with eleven or more through lanes in urban areas.

It does not account for the influence of freeways with nine or more through lanes in rural areas.

It does not perform a safety analysis for freeways with high-occupancy vehicle lanes, toll plazas, reversible lanes, hard shoulders, ramp metering and managed lanes.

Future Safety Analysis

- HSM Part C Methodology Limitations continued…

It does not account for a ramp or collector-distributor roads with two or more lanes in rural areas or three or more lanes in urban areas.

It does not account for the influence of unique or innovative intersection or roadway designs (e.g., DDI, continuous flow intersection, Texas U-turns, etc.).

It does not account for the influence of a crossroad ramp terminal with three or more left-turn lanes on a crossroad approach.

It does not account for the influence of a crossroad ramp terminal that provides one-way travel or when the ramp terminal is a single-point urban interchange (SPUI) or roundabout.

Future Safety Analysis

- **Qualitative Methodology**
  - Only performed if quantitative safety analysis cannot be performed
  - Should include a discussion about the limitations of the quantitative safety analysis techniques

Qualitative Discussion Example

The I-95 at Glades Road IMR Re-Evaluation recommended that a partial cloverleaf interchange be converted to a diverging diamond interchange (DDI). This modification cannot be performed using CMFs or SPFs.

"Since no other tools can account for the DDI configuration, the safety benefits of converting a partial cloverleaf interchange to DDI was based on previous researches that are summarized below:

- The key safety benefits of the DDI configuration include:
  - Reduction of conflict points (14 conflict points and 2 crossing points, compared to the 26 conflict points found in the conventional diamond interchange) and improved sight distance at the turns.
  - Reduction in crash severity due to lower design speeds compared to other interchange designs.
  - Traffic calming effect that reduces vehicular speed (while maintaining the capacity) due to the small geometric deflection introduced by the DDI for through traffic.
  - Elimination of the wrong-way movements into ramps from the DDI interchange design.
  - Crash reduction associated with the elimination of loop ramps, where applicable."

Documentation

- Sufficient documentation must be provided for each step of the IAR safety analysis

- Qualitative safety analysis should include
  - Discussion of quantitative safety analysis limitations
  - Anticipated safety impacts of the proposed modifications

- Countermeasure CMF Methodology should include
  - CMFs considered and selected for each proposed modification
  - CMF characteristics (e.g., base conditions and CMF criteria)
  - Summary and values of CMFs
  - Justification for selected CMFs
  - Source of the selected CMFs

Documentation

- **HSM Part C Methodology should include**
  - Discussion of the modifications, analysis years and tool used in the analysis
  - Explanation of assumptions needed to perform the analysis
  - Discussion of the segmentation process
  - Presentation, explanation and comparison of the results

Documentation

- Safety Analysis Types and Work Estimate

Analysis Type	Safety Analysis Process							Time Estimate
HSM Part C Methodology	Calculation of Crash Rates	Crash Diagrams	Description of Existing Crash Trends	Safety Performance Functions	Empirical Bayes Method (if applicable)	Crash Reduction Estimation (CMFs/CRFs)	Documentation	80 - 160 Hours* (Including Existing Conditions)
Countermeasure CMF Methodology	Calculation of Crash Rates	Crash Diagrams	Description of Existing Crash Trends	→		Crash Reduction Estimation (CMFs/CRFs)	Documentation	30 - 60 Hours (Including Existing Conditions)
Existing Conditions	Calculation of Crash Rates	Crash Diagrams	Description of Existing Crash Trends	→			Documentation	20-40 Hours

*Hours will vary based on multiple factors such as analysis area, application of Empirical Bayes Method, etc.

IARUG Safety Analysis Guidance

QUIZ

Florida Interchange Access Request Process

Training

Webinar

Module 7 Interchange Access Report Review Process

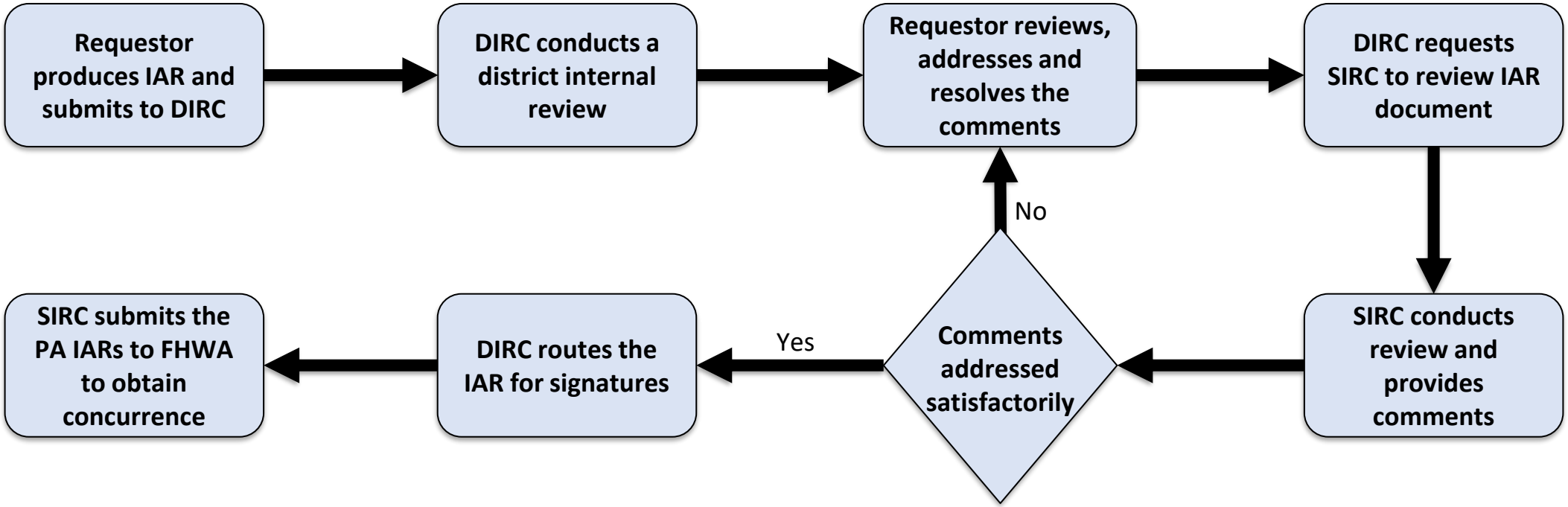
- Processing for Review and Acceptance
- IAR Review Process
- Quality Control and Quality Assurance
- ERC System
- Quiz

Processing for Review and Acceptance

- The IAR is reviewed to ensure
  - Compliance with FHWA policy points
  - Consistency with MLOU
  - Sufficiency, completeness and consistency
- Safety, Operational and Engineering (SO&E) acceptability determined by
  - FDOT Chief Engineer
  - FHWA
- IAR is reviewed per the authority tables
- IAR submittals reviewed in the Electronic Review and Comments (ERC) System

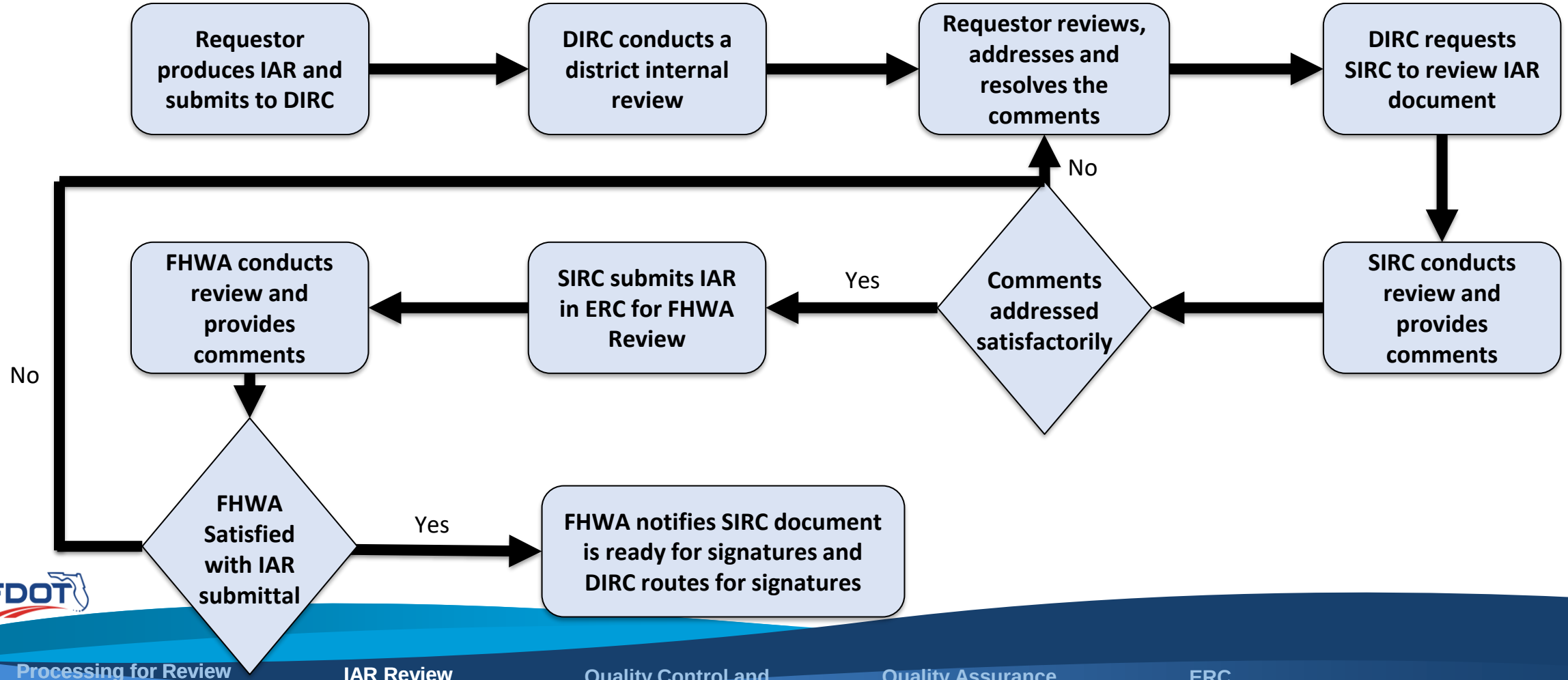
IAR Review Process

- Review Process for Programmatic IARs



IAR Review Process

- Review Process for Non-Programmatic IARs



IAR Review Process

- **IAR Review Time Frame**
  - FDOT review time frames for non-PA and PA IARs:

SIRC First Round of Review

- The SIRC shall review and submit comments on the IAR within 10 business days

SIRC Second Round of Review

- The SIRC shall perform the second round of review within 5 business days

  - FHWA review time frame

FHWA Review

- For **non-PA IARs**, FHWA Florida Division shall review and submit comments within 20 business days
- For **PA IARs**, FHWA provides concurrence within five business days

Quality Control and Quality Assurance

- FDOT requires Quality Control (QC) and Quality Assurance (QA) be employed for the deliverables.
- QA/QC ensures FDOT and FHWA procedures are followed
- QA/QC shall be followed, regardless of schedule
- QC shall be performed by the DIRC
- QA shall be performed by Central Office Systems Implementation Office (SIO)
- A record of all QA/QC activities shall be kept and provided upon request

Quality Control and Quality Assurance

- Rolls and Responsibilities of DIRC and Central Office (SIO) for QA/QC

Quality Control Performed by DIRC

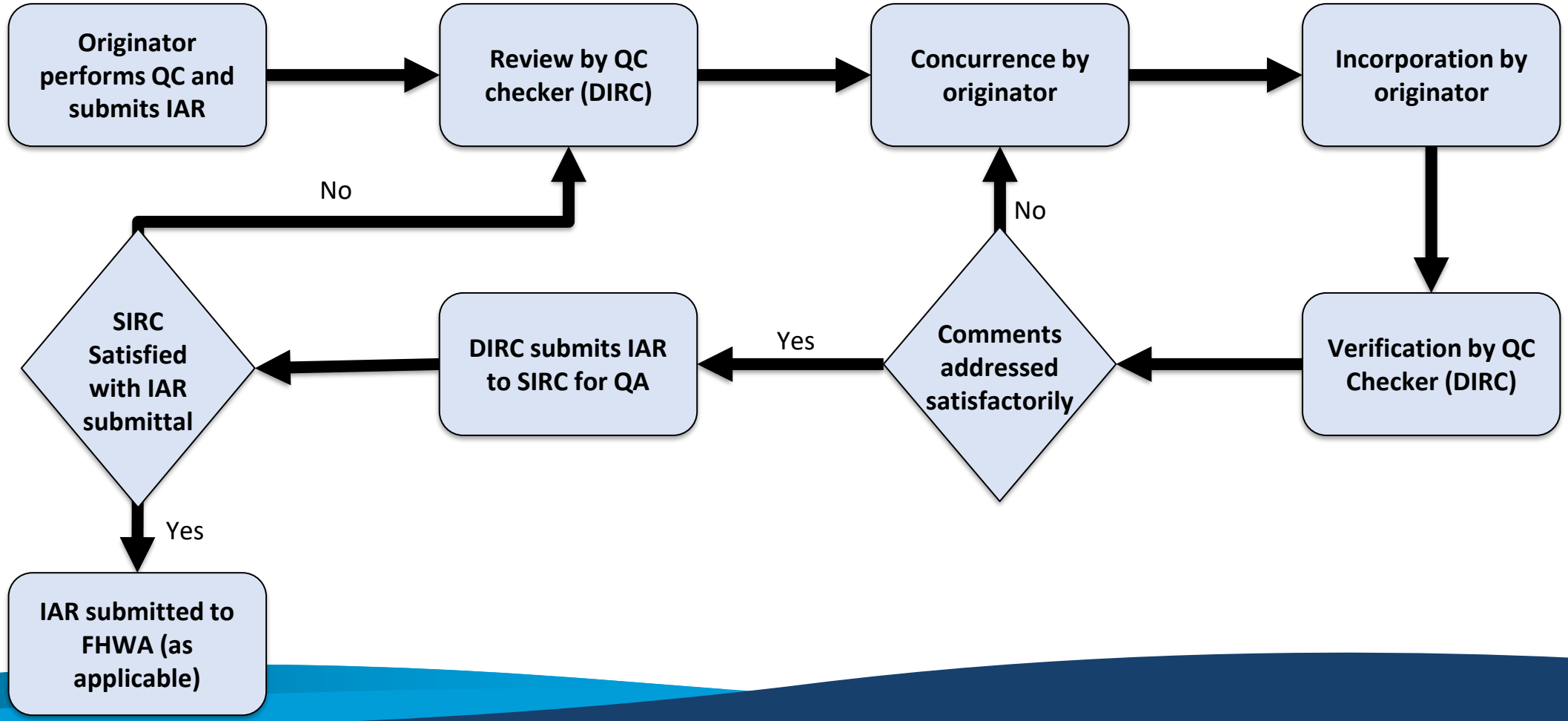
- To ensure the originator's QA/QC plan is being followed
- To review project deliverables to ensure quality and conform to FDOT standards and procedures and FHWA policy points

Quality Assurance Performed by SIO

- Overall review and confirmation of the quality control process to ensure a quality product

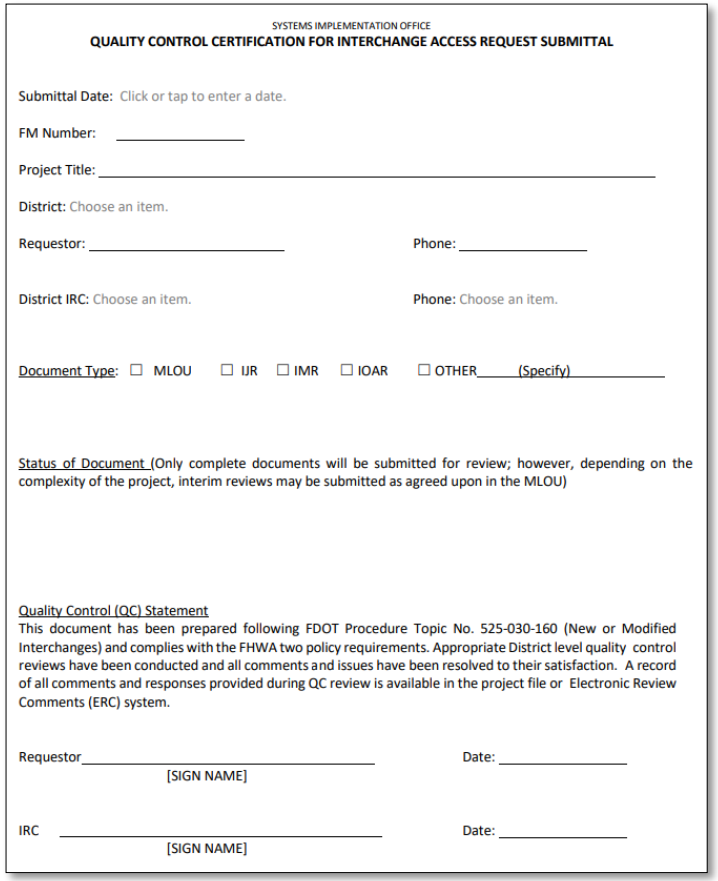
Quality Control and Quality Assurance

- QA/QC Process Flowchart



Quality Control and Quality Assurance

- The DIRC shall submit a written statement of technical review for each IAR report
  - The requirements of FHWA's policy points
  - FDOT's procedure for new or modified interchanges.
- It shall be signed by the Requestor and the DIRC
- An example of the Quality Control Certification is shown here



SYSTEMS IMPLEMENTATION OFFICE

QUALITY CONTROL CERTIFICATION FOR INTERCHANGE ACCESS REQUEST SUBMITTAL

Submittal Date: Click or tap to enter a date.

FM Number: _____

Project Title: _____

District: Choose an item.

Requestor: _____ **Phone:** _____

District IRC: Choose an item. **Phone:** Choose an item.

Document Type: ☐ MLOU ☐ IJR ☐ IMR ☐ IOAR ☐ OTHER_____(Specify)_____

Status of Document (Only complete documents will be submitted for review; however, depending on the complexity of the project, interim reviews may be submitted as agreed upon in the MLOU)

Quality Control (QC) Statement

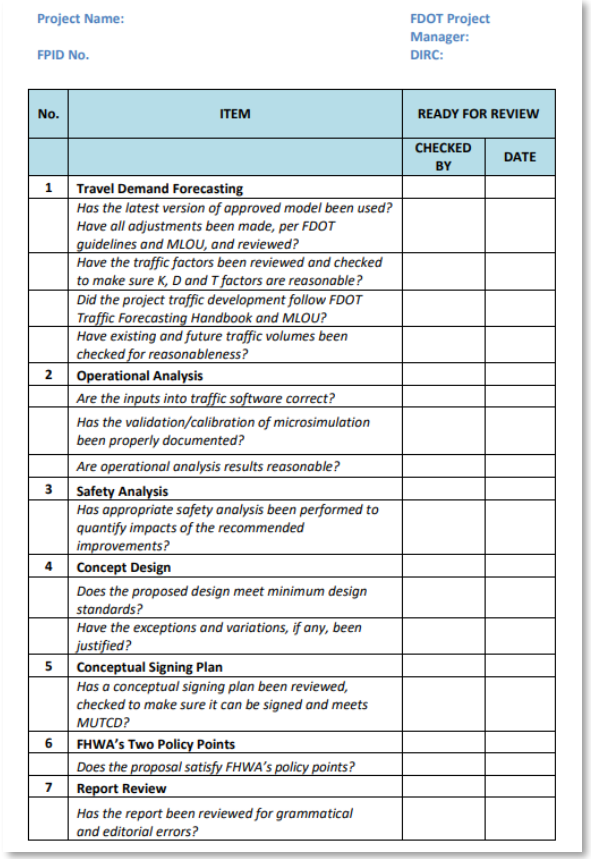
This document has been prepared following FDOT Procedure Topic No. 525-030-160 (New or Modified Interchanges) and complies with the FHWA two policy requirements. Appropriate District level quality control reviews have been conducted and all comments and issues have been resolved to their satisfaction. A record of all comments and responses provided during QC review is available in the project file or Electronic Review Comments (ERC) system.

Requestor_____ Date: _____
[SIGN NAME]

IRC _____ Date: _____
[SIGN NAME]

Quality Control and Quality Assurance

- It is the responsibility of the QC checker to perform a complete review of the IAR prior to submittal
- Additional review items shall be added to the checklist as needed
- Finally, these items must be checked for completion and correctness
- A sample QC checklist is shown here.



Project Name: FDOT Project Manager:

FPID No. DIRC:

No.	ITEM	READY FOR REVIEW	
		CHECKED BY	DATE
1	**Travel Demand Forecasting**		
	Has the latest version of approved model been used? Have all adjustments been made, per FDOT guidelines and MLOU, and reviewed?		
	Have the traffic factors been reviewed and checked to make sure K, D and T factors are reasonable?		
	Did the project traffic development follow FDOT Traffic Forecasting Handbook and MLOU?		
	Have existing and future traffic volumes been checked for reasonableness?		
2	**Operational Analysis**		
	Are the inputs into traffic software correct?		
	Has the validation/calibration of microsimulation been properly documented?		
	Are operational analysis results reasonable?		
3	**Safety Analysis**		
	Has appropriate safety analysis been performed to quantify impacts of the recommended improvements?		
4	**Concept Design**		
	Does the proposed design meet minimum design standards?		
	Have the exceptions and variations, if any, been justified?		
5	**Conceptual Signing Plan**		
	Has a conceptual signing plan been reviewed, checked to make sure it can be signed and meets MUTCD?		
6	**FHWA's Two Policy Points**		
	Does the proposal satisfy FHWA's policy points?		
7	**Report Review**		
	Has the report been reviewed for grammatical and editorial errors?		

Quality Assurance Reviews

- Quality Assurance Reviews (QARs) of the District's IAR process are conducted by Central Office SIO
- The purpose of the QAR
  - To ensure that the Districts follow the procedures and guidelines for the submittal and review of reports
- At a minimum, one District QAR will be done annually
- The QAR satisfies a requirement for the SO&E delegation under the PA

Quality Assurance Reviews

- The District QAR Memorandum is prepared and submitted to:

Chief Planner	District Secretary	Chief Engineer	District Planning & Environmental Management Office (PLEMO) Manager	DIRC

- The DIRC will submit a written response to the SMA within 30 days, if required.
- QARs are valuable tools for identifying areas that need improvement and/or lack training.
- QARs are also an opportunity to learn new ideas or good practices

ERC System

- All IARs should be submitted in Electronic Review & Comment (ERC) for review
  - Comment resolution call if needed

- The ERC system allows users to track comments and response from reviewers at any time during development.

ERC System

- Who can use the ERC System?

FDOT Staff

- Create Submittals
- Comment
- Resolve Comments

FHWA Staff

- Comment

Consultant Staff (e.g. Consultant Project Manager)

- Comment
- Resolve Comments

Interchange Access Report Review Process

QUIZ

Florida Interchange Access Request Process

Training

Webinar

Module 8
IAR
Re-evaluations

- Introduction
- Change in Approved Access Design Concept
- Change in Conditions
- Time Lapse before Construction
- Traffic Validation
- Safety Analysis
- Documentation
- Quiz

Introduction

- Re-evaluations are required for one or more of the following conditions:
  1. Change in an approved IAR design concept
  2. Significant change in conditions
  3. Failure of an IAR to progress to the construction phase within three years of approval (time lapse)

- MLOU shall be prepared for all IAR re-evaluations

- Strongly recommended that requestor coordinate with the DIRC, SIRC and FHWA to determine level of effort

Change in Approved Access Design Concept

- Common reasons for design changes of an approved IAR

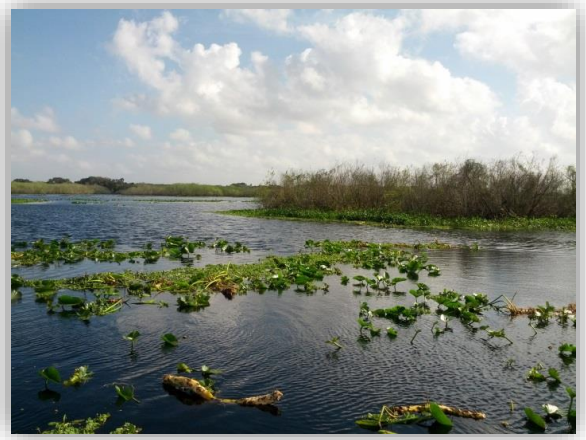
Recommended Concept Change During NEPA or Final Design

Alternative Technical Concept (ATC) or Post-Contract Design Change during Design-Build (D-B)

Public-Private Partnership (P3) in which the Concept is Different from RFP

Change in Approved Access Design Concept

- **Design Changes During NEPA Phase**
  - This type of re-evaluation occurs if the NEPA is initiated following the IAR acceptability
  - New concept shall satisfy the
    - SO&E requirements
    - FHWA policy points
  - The requestor shall confirm the validity of the traffic volumes
  - MLOU shall be prepared and signed by all applicable parties
  - The proposed concept shall be compared with the approved IAR concept
  - Perform quantitative safety analysis

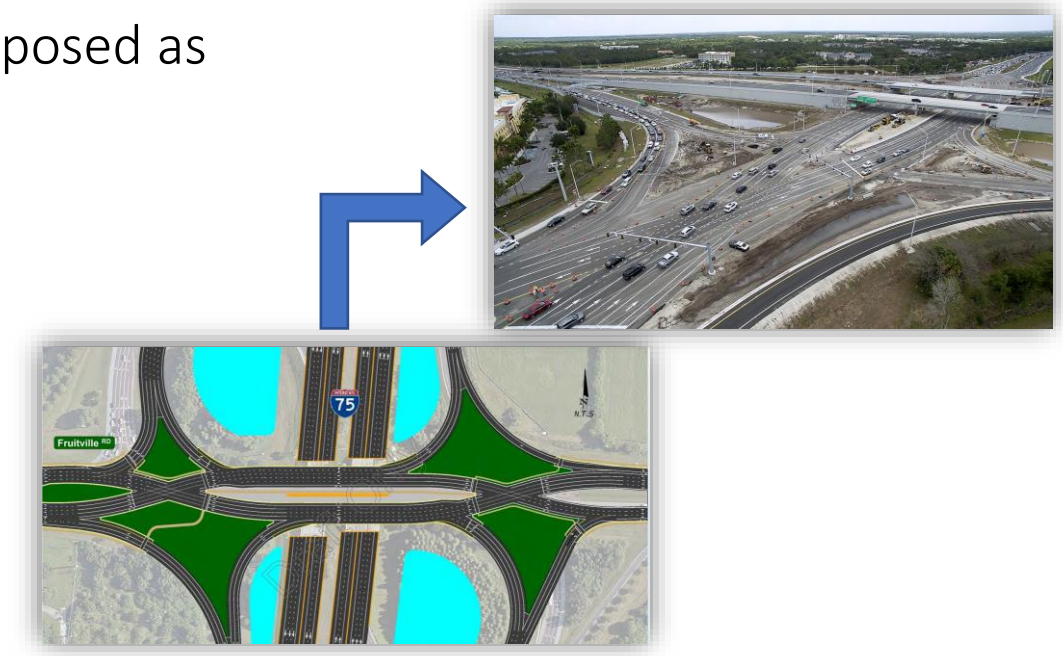


Change in Approved Access Design Concept

- **Design Changes During Design Phase**
  - Re-evaluation occurs when a new concept is proposed as an improvement over the approved IAR concept
  - New concept shall satisfy the
    - SO&E requirements
    - FHWA policy points
  - The requestor shall confirm the validity of the traffic volumes
  - MLOU shall be prepared and signed by all applicable parties
  - New concept must perform equal to or better than the original approved concept
  - Perform quantitative safety analysis

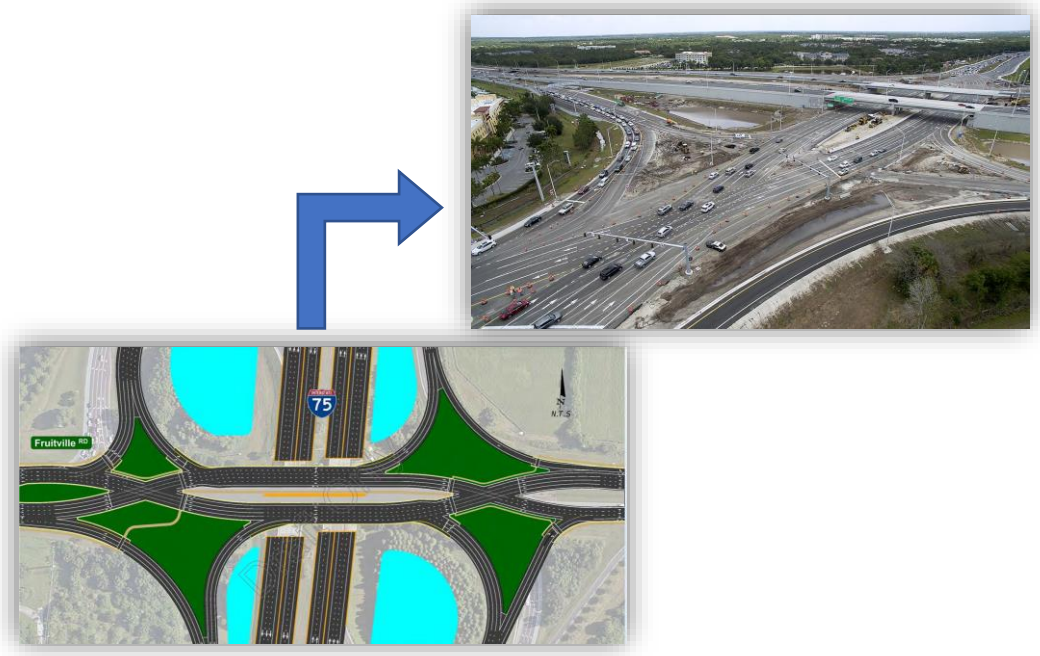
Change in Approved Access Design Concept

- **Design Changes Due to D-B or P3**
  - Re-evaluation occurs when a new concept is proposed as an improvement over the approved IAR concept
  - New concept shall satisfy the
    - SO&E requirements
    - FHWA policy points
  - RFP concept serves as the no-build alternative for comparison purposes
  - D-B or P3 re-evaluation shall operate equal to or better than the original RFP concept



Change in Approved Access Design Concept

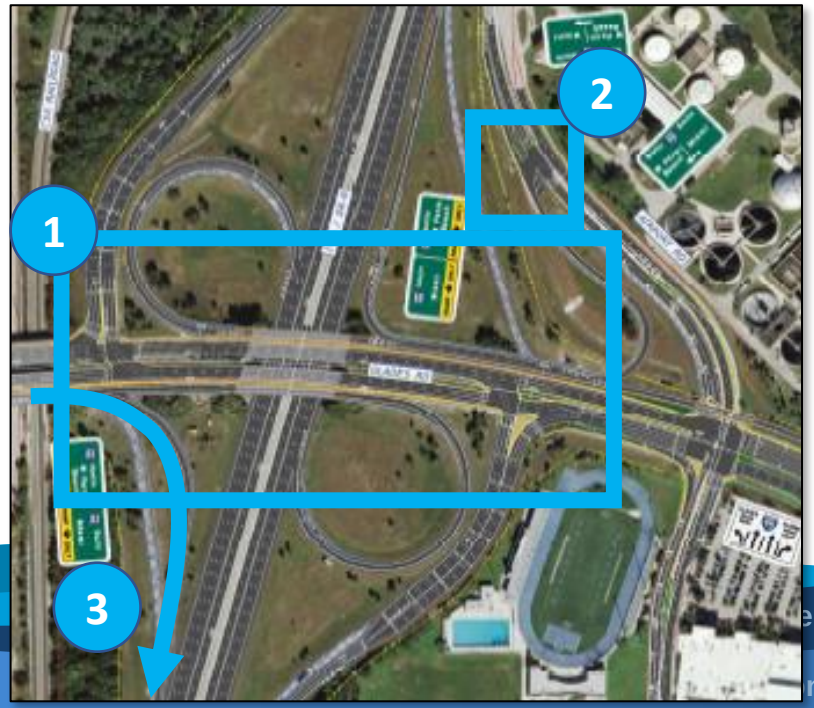
- **Design Changes Due to D-B or P3**
  - The requestor shall confirm the validity of the traffic volumes
  - MLOU shall be prepared and signed by all applicable parties
  - Re-evaluation shall, at a minimum, use the same MOEs that were identified in the RFP evaluation
  - Perform quantitative safety analysis



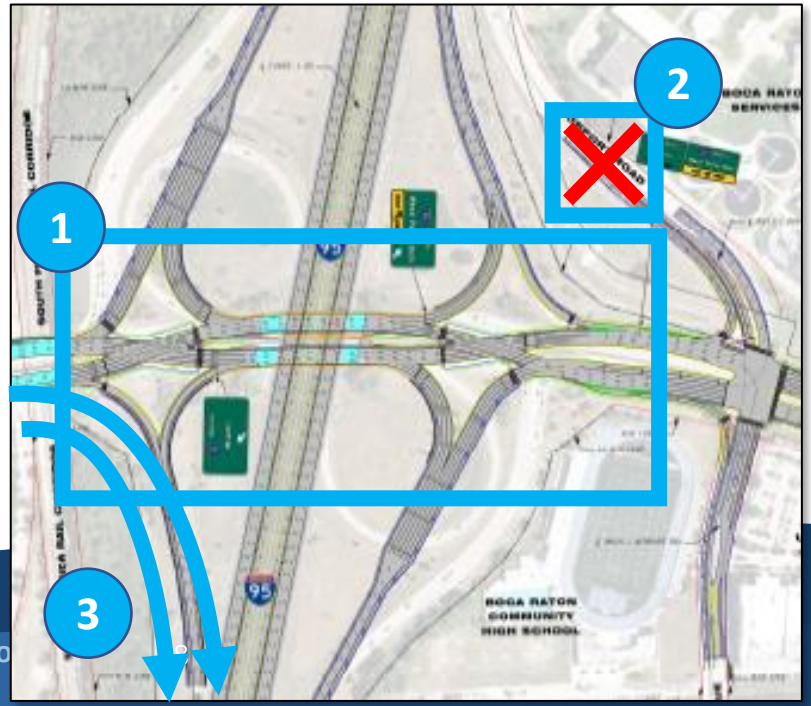
Change in Approved Access Design Concept

- **Example of D-B Concept Change: I-95 at Glades Road IMR Re-Evaluation**
  - Major Modifications
    1. Interchange converted from a partial cloverleaf to a DDI
    2. Elimination of Northbound On-Ramp and intersection at Airport Road
    3. Widening of Southbound On-Ramp from one lane to two lanes

RFP Concept



D-B Concept



Change in Conditions

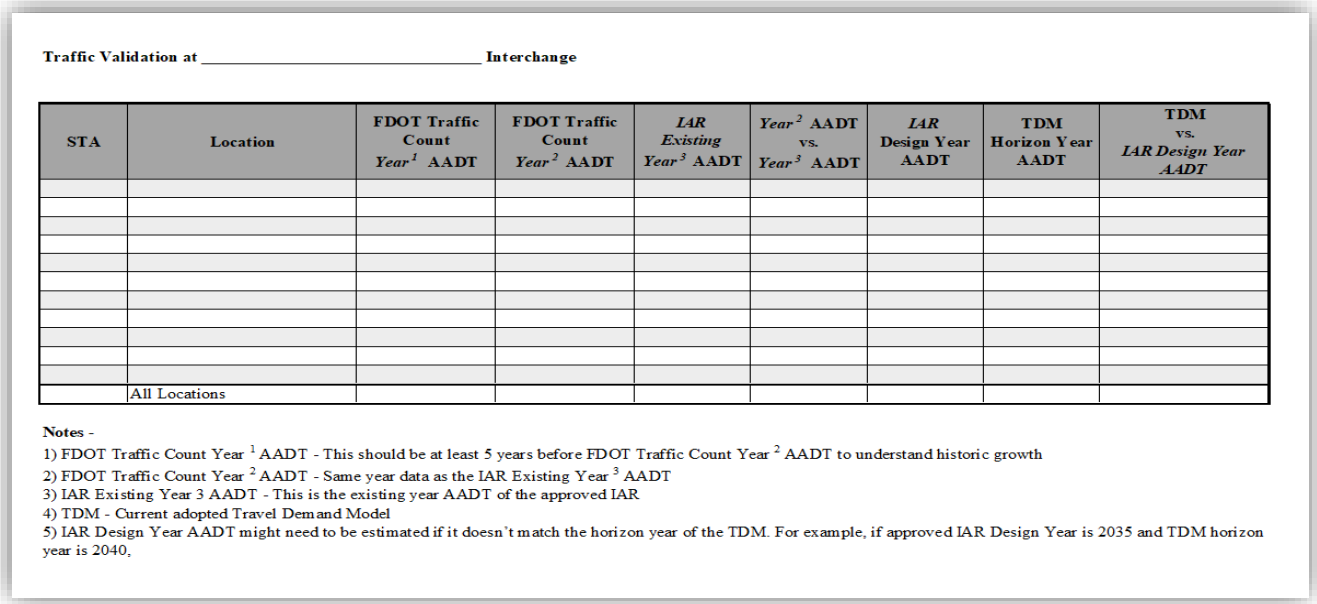
- **Change in Approved Conditions**
  - IAR shall be re-evaluated whenever a significant change in conditions occurs
  - Significant changes in conditions include:
    - Traffic characteristics
    - Land use type
    - Environment
  - A re-evaluation is needed if traffic demand changes due to a
    - A proposed major development
    - Other land use changes
  - MLOU shall be prepared and signed by all applicable parties
  - Satisfactorily address the FHWA Policy Points
  - Perform quantitative safety analysis

Time Lapse before Construction

- **Need for a re-evaluation will be determined if**
  - 3 years have lapsed before IAR has progressed to construction
- **MLOU shall be prepared and signed by all applicable parties**
- **Re-evaluation must**
  - Demonstrate project need is still viable
  - Update traffic, operational analysis and quantitative safety analysis
  - Update funding plan and project schedule
  - Satisfactorily address the FHWA Policy Points
- **Depending on the amount of time lapsed and change in project area conditions, a new IAR could be required in lieu of the re-evaluation**

Traffic Validation

- **Traffic validation is required for all IAR re-evaluations**
  - Existing and future volumes
- **Sources for traffic validation**
  - Historic traffic growth
  - Latest adopted travel demand model
- **If original IAR is not valid a new methodology needs to be developed**
  - The validation results and proposed traffic forecasting methodology should be agreed by the DIRC and SIRC
- **A traffic validation template developed by SIRC is included in the IARUG**



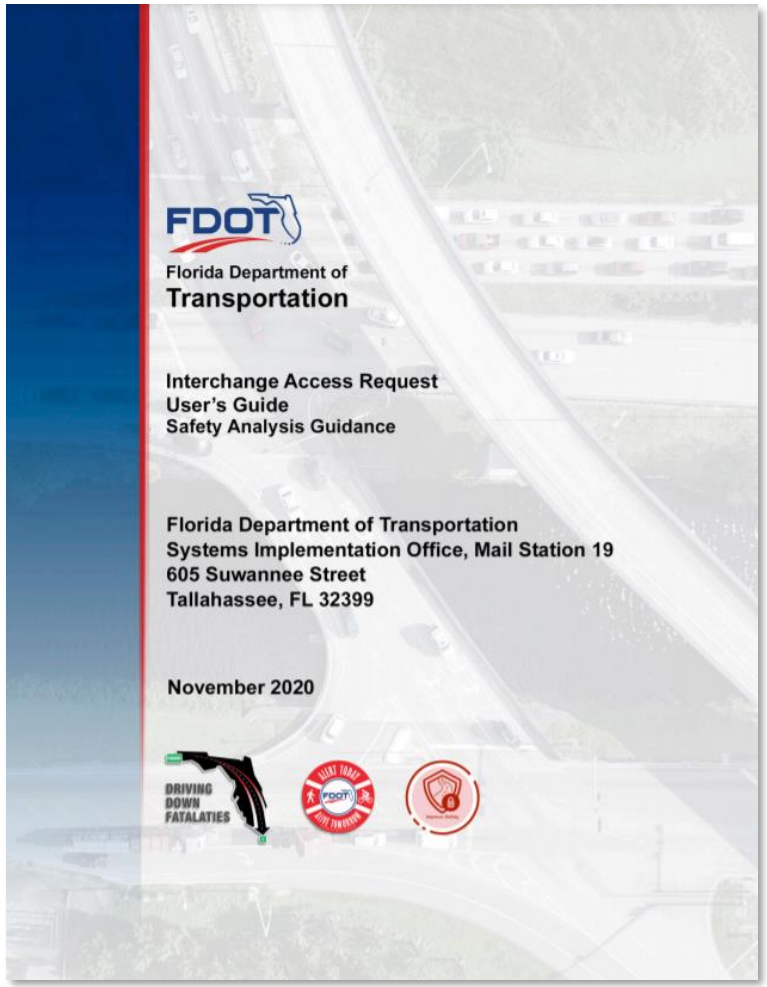
Traffic Validation at _____ Interchange

STA	Location	FDOT Traffic Count *Year*[1] AADT	FDOT Traffic Count *Year*[2] AADT	*IAR Existing Year*[3] AADT	*Year*[2] AADT vs. *Year*[3] AADT	*IAR* Design Year AADT	TDM Horizon Year AADT	TDM vs. *IAR Design Year AADT*
	All Locations							

Notes -
1) FDOT Traffic Count Year [1] AADT - This should be at least 5 years before FDOT Traffic Count Year [2] AADT to understand historic growth
2) FDOT Traffic Count Year [2] AADT - Same year data as the IAR Existing Year [3] AADT
3) IAR Existing Year 3 AADT - This is the existing year AADT of the approved IAR
4) TDM - Current adopted Travel Demand Model
5) IAR Design Year AADT might need to be estimated if it doesn't match the horizon year of the TDM. For example, if approved IAR Design Year is 2035 and TDM horizon year is 2040,

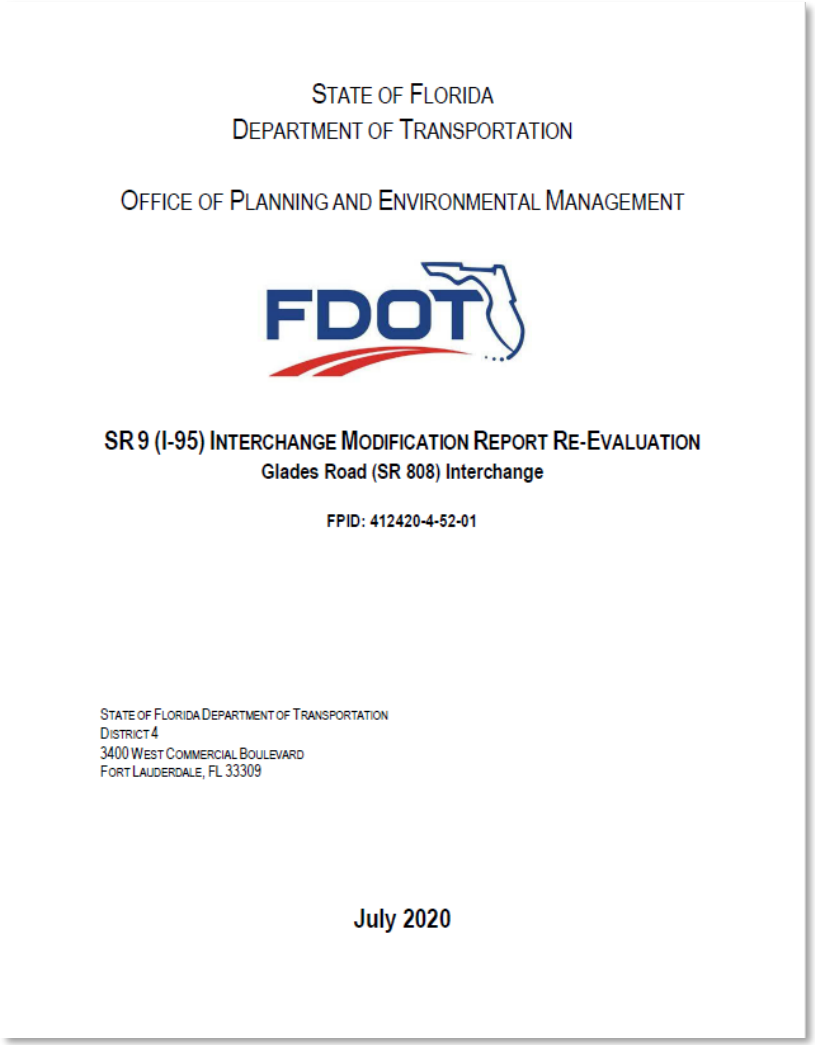
Safety Analysis

- Quantitative safety analysis is required for all IAR re-evaluations
- Compares the original approved concept with the recommended alternative
- If quantitative safety analysis was not performed during the original IAR, then it shall be performed in the re-evaluation
- Quantitative safety analysis for the re-evaluation shall follow the IARUG Safety Guidance



Documentation

- The requestor should contact the DIRC and acceptance authorities to determine whether IAR re-evaluation is required
- If re-evaluation is required,
  - DIRC shall coordinate with acceptance authorities to determine type of re-evaluation
  - DIRC notifies the requestor of the other re-evaluation requirements
- IAR re-evaluations shall follow the outline of the original IAR and conform to the requirements of the IARUG



STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

OFFICE OF PLANNING AND ENVIRONMENTAL MANAGEMENT

FDOT

SR 9 (I-95) INTERCHANGE MODIFICATION REPORT RE-EVALUATION
Glades Road (SR 808) Interchange

FPID: 412420-4-52-01

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
DISTRICT 4
3400 WEST COMMERCIAL BOULEVARD
FORT LAUDERDALE, FL 33309

July 2020

Documentation

- IAR re-evaluation types and requirements summarized in the following table

Re-evaluation type	Primary reason for re-evaluation	MLOU required	Traffic update required*	Quantitative Safety Analysis Required	Basis for comparison	Documentation level	Satisfy FHWA policy points
NEPA	Environmental impacts	Yes	*	Yes	No-build	Update relevant sections in the IAR such as alternatives, analysis, environmental, FHWA policy points	Yes
NEPA or design phase	Modified design	Yes	*	Yes	Approved IAR concept	Revised IAR report	Yes
Design-build or P3	Modified design	Yes	*	Yes	RFP	Revised IAR report	Yes
Change in conditions	Change in traffic	Yes	Yes	Yes	No-build	Revised IAR report	Yes
Time lapse	More than three years since IAR approval	Yes	*	Yes	No-build and previously approved IAR concept	Revised or New IAR report	Yes

* To be determined on a case-by-case basis depending on change in conditions, to be discussed during preparation of the MLOU. If significant changes have occurred since approval of the original IAR (for example, an increase or change in traffic resulting in change in approved design concept), then an updated traffic and analyses shall be required.

IAR Re-evaluations

QUIZ