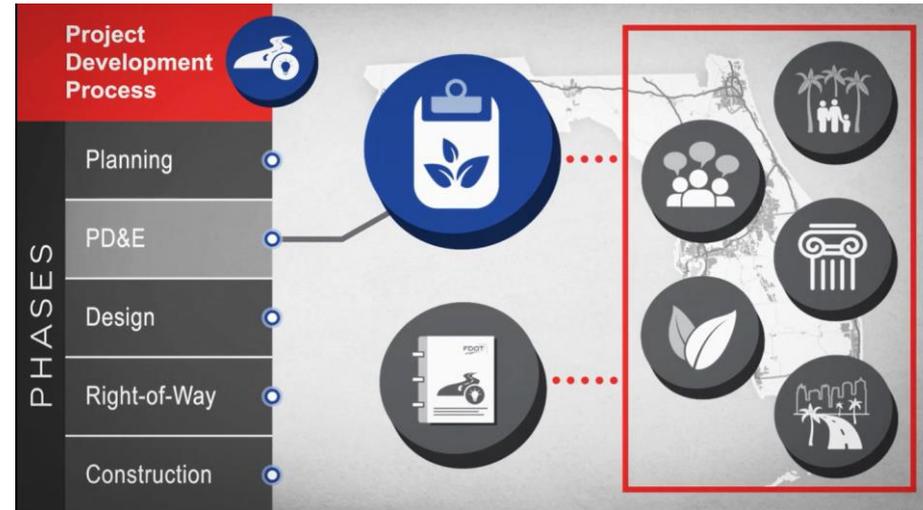


Environmental Training for Florida Turnpike Enterprise

Traffic Analysis



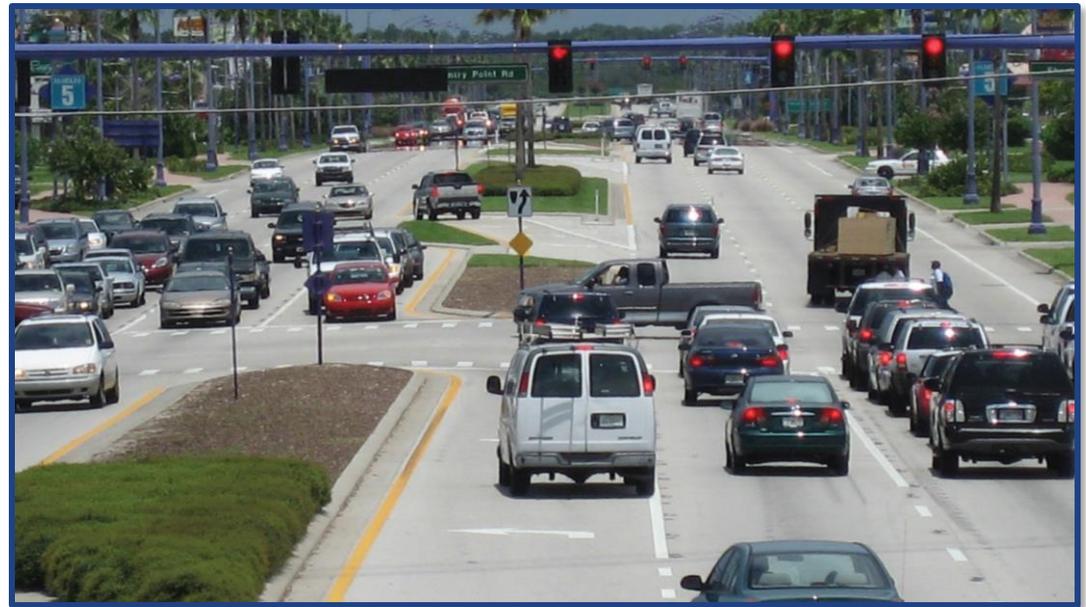
August 2020

The environmental review, consultation, and other actions required by applicable federal environmental laws described in this training are carried out by FDOT pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated December 14, 2016 executed by FHWA and FDOT.

Overview of Part 2, Chapter 2 Traffic Analysis

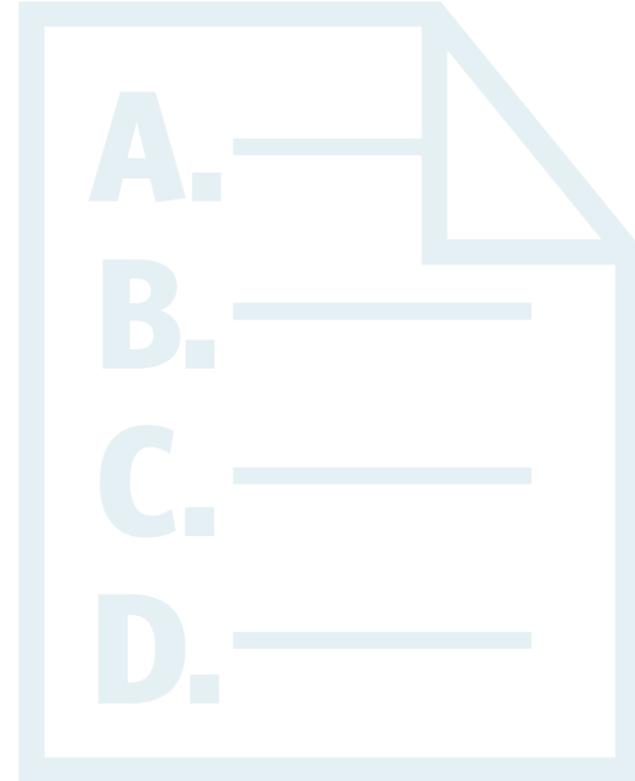
Provide guidance for preparing traffic analysis for Project Development and Environment (PD&E) studies.

- Scoping
- Data requirements
- Methodology
- Analysis
- Documentation



Traffic Analysis Definition

- Traffic analysis is an evaluation of the interaction between demand and supply of a transportation facility
 - Demand is the amount of traffic load that intends to use the facility
 - Supply is the capacity of the facility to handle the demand
- The traffic analysis is one of the critical activities for a PD&E which forms the basis for developing and evaluating project alternatives



Traffic Analysis for PD&E Includes

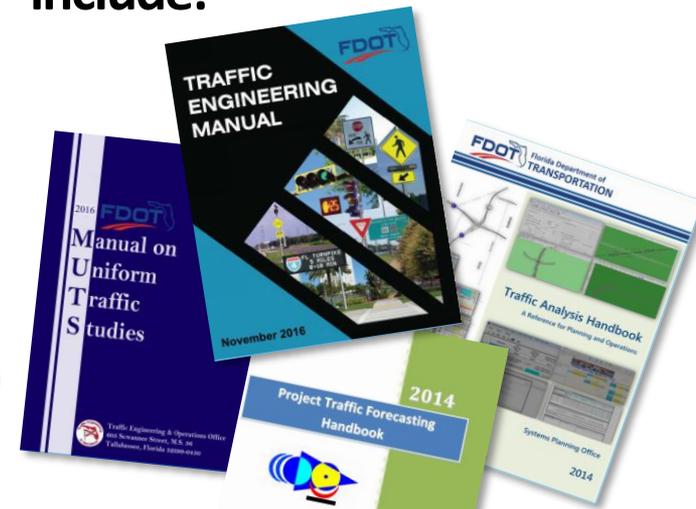


1. Develop traffic analysis objectives
2. Select performance measures
3. Determine analysis approach and select analysis tools
4. Identify data needed for the analyses
5. Specify collection methods and documentation
6. Perform traffic operational analysis and safety analysis
7. Document analysis results and assumptions

Resources

FDOT resources that are referenced in this chapter include:

- FDOT Traffic Analysis Handbook
- FDOT Project Traffic Forecasting Handbook
- FDOT Traffic Engineering Manual (TEM)
- FDOT Manual of Uniform Traffic Studies (MUTS)



FDOT guidance references national guidance such as:

- Highway Capacity Manual (HCM)
- FHWA's Traffic Analysis Toolbox



Traffic Analysis Objectives



1. _____
2. _____
3. _____
4. _____

- The objectives of the traffic analysis should:
 - Reflect the purpose and need for the project and be measurable
 - Identify the performance problem or goal which the analysis seeks to answer
 - Identify the intended use and decision-makers of the traffic analysis results

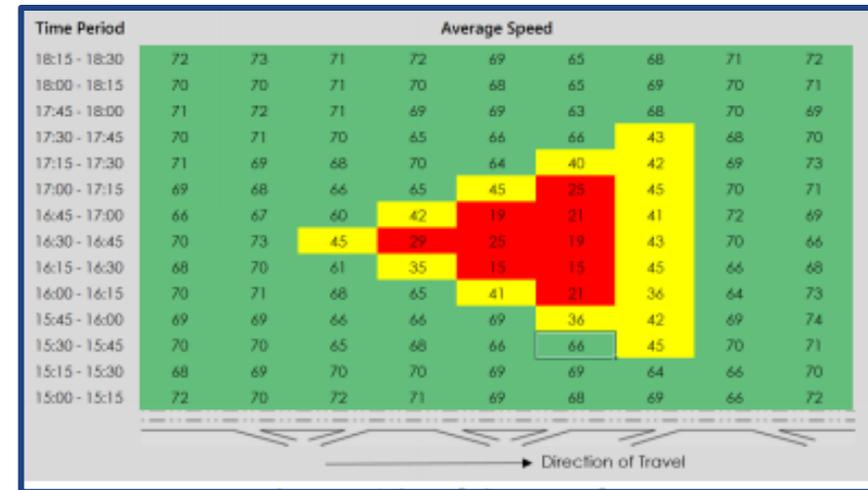
Scoping Traffic Analysis

- Items that inform traffic analysis scope
 - Traffic study limits
 - Design years
 - Other analyses requirements such as economic, air quality and noise analyses
 - Special needs such as multimodal
- Review and consider previously completed traffic analyses

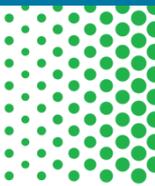


Performance Methods of Effectiveness (MOE)

- Develop the Traffic Analysis Methodology
- Traffic Analysis MOEs
 - Throughput
 - Vehicle miles of travel
 - Volume/capacity ratio
 - Travel time
 - Travel speed
 - Total delay at intersections
 - Queue length
 - Number of stops
 - Density
- Travel time variance
- Travel time reliability
- Hours of congestion
- Level of Service (LOS)



Common Performance MOEs



Safety Analysis MOEs

- Actual crash rate
- Number of fatalities
- Crash severity level
- Economic loss

Environmental / Economic Analysis MOEs

- Vehicle miles of travel
- Vehicle hours of delay
- Vehicle hours of travel
- Travel speed
- Emissions
- Number of crashes
- Travel time savings

Example MOEs					
	Network Performance (V/C)	System Deficiency (% of roadway segments over capacity)	Network Vehicle Travel Time Reduction (daily vehicle hours of travel)	Corridor Volume Across the St. Johns River** (AADT)	Annual Cost of Traffic Congestion (\$ millions)
Black	0.822	27.58%	328,041	72,600	\$5,153
Purple	0.824	26.69%	358,199	74,200	\$5,000
Brown 1 and 2	0.819	26.59%	331,900	63,900	\$5,172

Selecting the Right Traffic Analysis Tool

Select the right analysis tools based on:

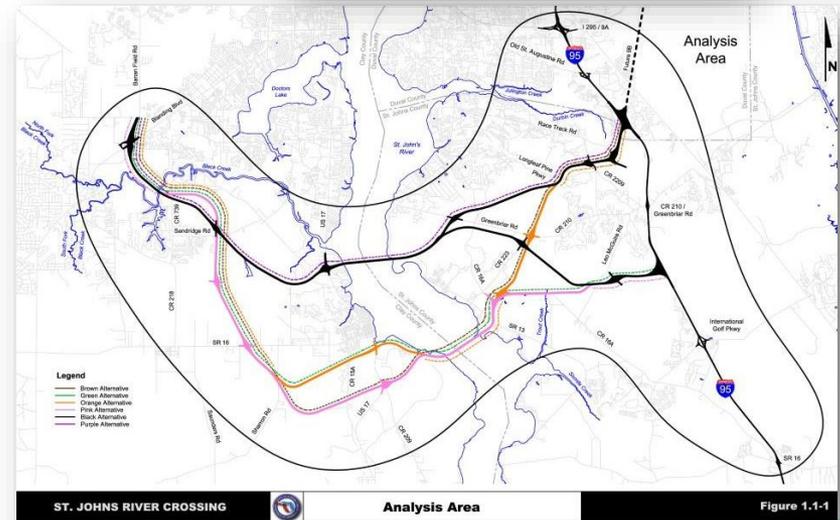
- Complexity of the project
- Magnitude of the traffic problem
- Performance measures
- Limitations of the tool

Traffic Analysis Handbook contains guidance for selecting proper tools

Analysis Type	Level of Detail	Level of Analysis	Analysis Tool
Sketch Planning	Analyzing system elements to obtain general order-of-magnitude estimates of performance based capacity constraints and operational control	Generalized Planning	GSVT, LOSPLAN, HCM/HCS
Deterministic	Analyzing broad criteria and system performance based on geometric and physical capacity constraints; operational systems such traffic control and land use	Conceptual Planning & Preliminary Engineering; Design; Operation	LOSPLAN, HCM/HCS, Synchro, SIDRA
Travel Demand Modeling	Analyzing regional travel demand patterns, land use impacts and long range plans. Outputs of demand models are applied in analytical and microscopic analysis	Conceptual Planning	Cube Voyager
Microscopic Simulation	Analyzing system performance based on detailed individual user interactions; geometry and operational elements	Preliminary Engineering; Design; Operation	CORSIM, VISSIM, SimTraffic

Determining Data Needs

- Consider project context project limits, study area, influence area, analysis method, and performance MOEs
- Obtain available data from prior studies
- Conduct field reviews to determine sufficiency of available data
- Collect data for all modes that exist or planned in the project area

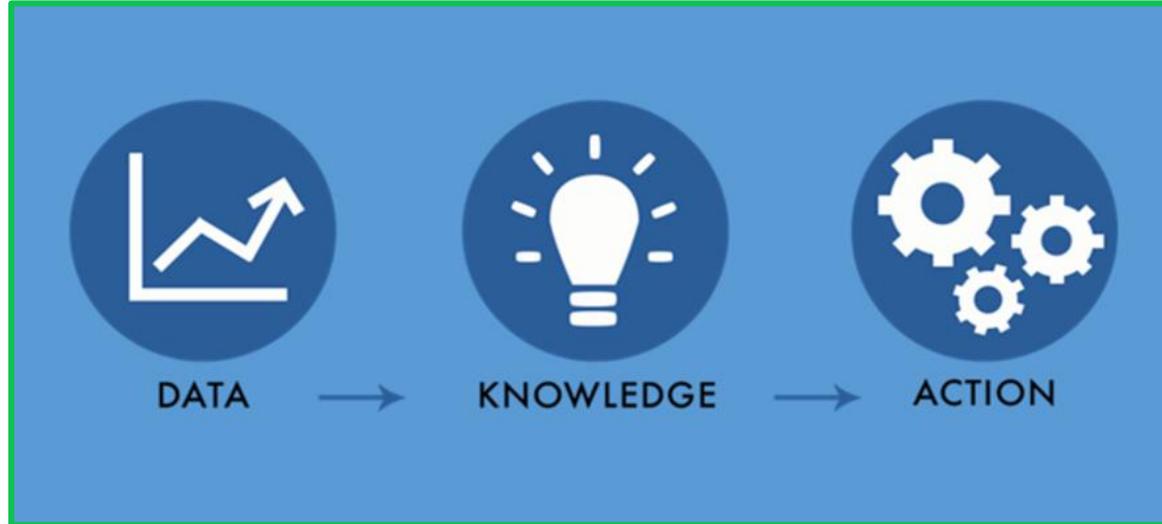


Types of Data

Data collection effort is divided into three categories:

- Roadway characteristics
- Multimodal characteristics
- Operations and safety characteristics

Type of the traffic analysis will determine required data.



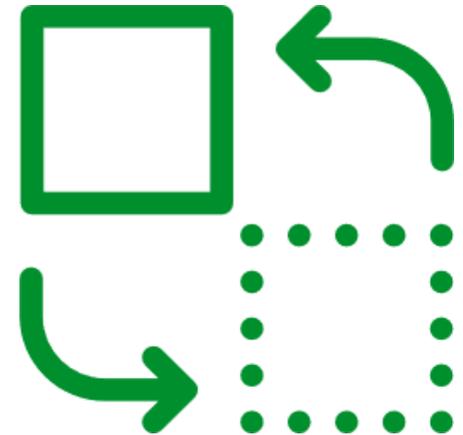
Project Traffic Forecasting

- A process of estimating the future year traffic demand for a given project
- Forecast years
 - Opening Year
 - Interim Year
 - Planning horizon/design year
- Two options for forecasting
 - With a travel demand model
 - Without travel demand model



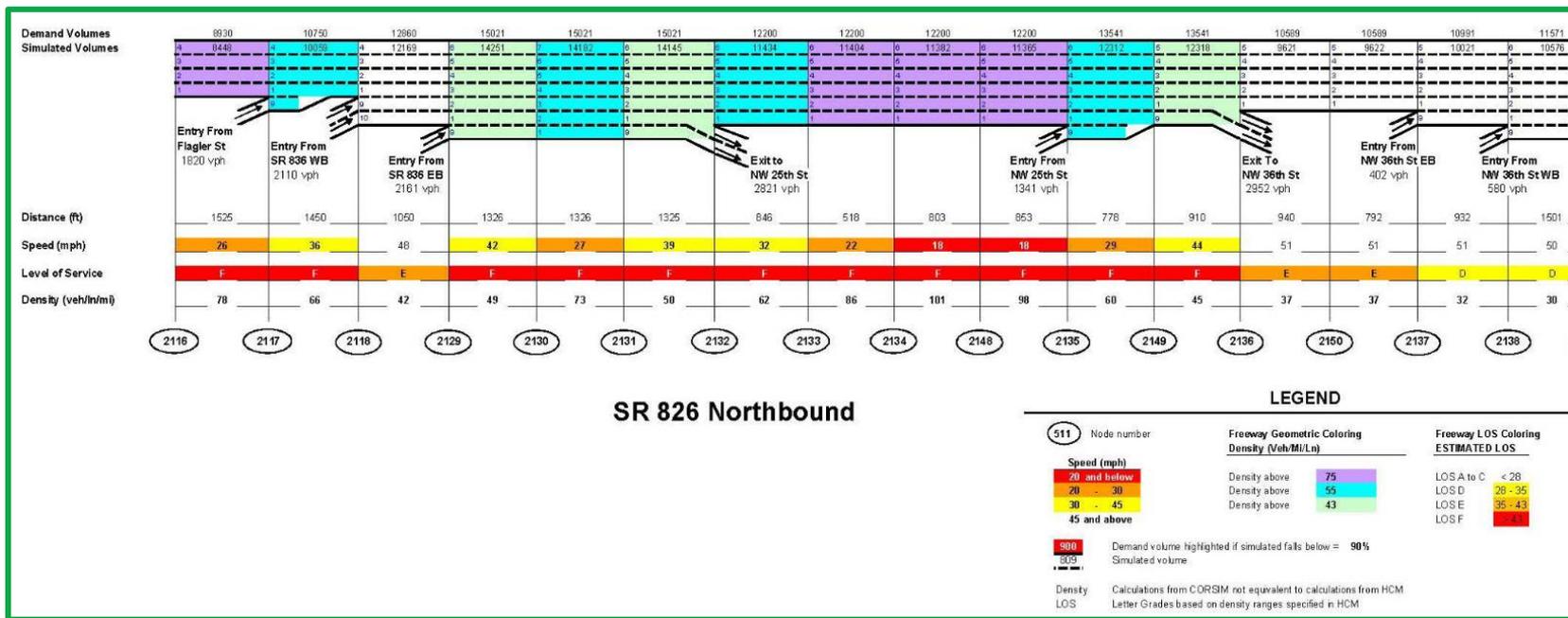
Reevaluating Traffic Analysis

- For projects which require a reevaluation of PD&E
- Verify validity of traffic forecast by assess whether there have there been changes in
 - Economy and driving habits
 - Land use or growth
 - Scope of work
 - Transportation network
 - Adopted regional travel demand model
- If there is a substantial change in the traffic forecast, coordinate with OEM to address the need for re-evaluating project traffic



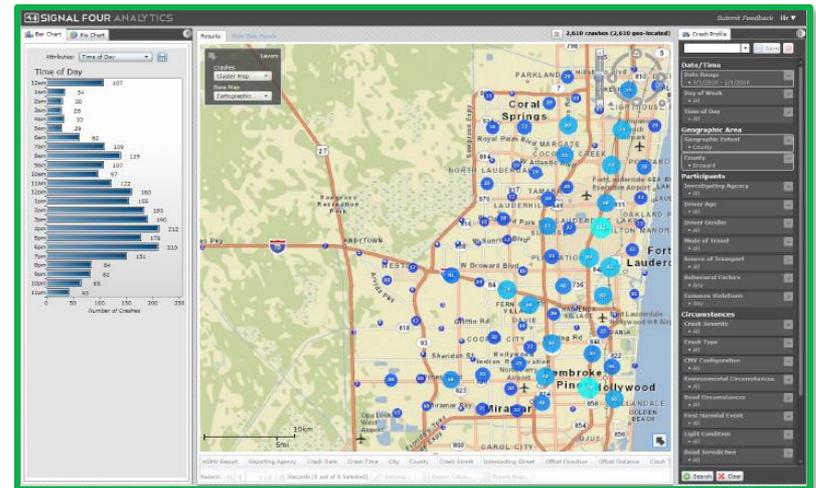
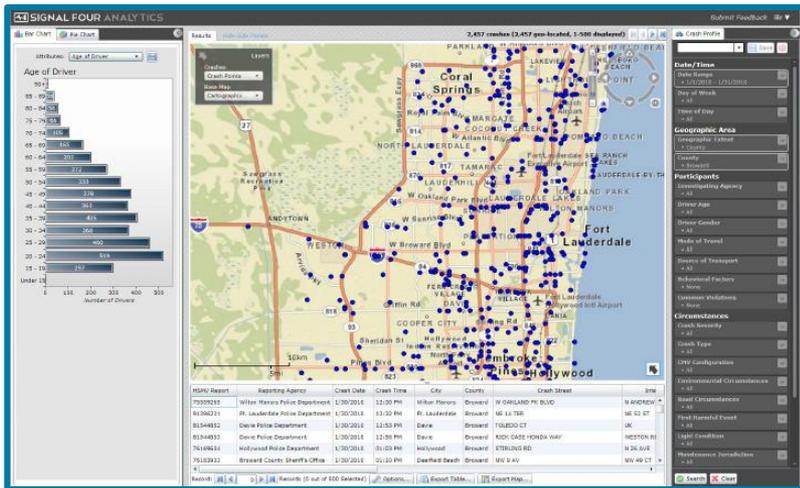
Operational Analysis

- Includes capacity and operational analysis to determine how well the project alternatives meet the purpose and need
- Only performed on viable or feasible project alternatives
- Use consistent tools and assumptions for each alternative evaluated



Safety Analysis

- Analyzing crash history (5 yrs)
- Predicting crashes using HSM methods and tools



Project Traffic Analysis Report (PTAR)

- Documents the results of the traffic analysis
- Summarizes methodology, findings and conclusions
- Supports decisions regarding project actions



1. Title Page
2. Executive Summary
3. Table of Contents
 - A. List of Figures
 - B. List of Tables
4. Introduction
 - A. Description of the proposed project
 - B. Analysis objective and project scope
 - C. Project location map
5. Analysis Methodology
 - A. Analysis methodology and assumptions
 - B. Analysis (temporal and spatial) boundary limits
 - C. Analysis tool(s)
6. Data Requirements
 - A. Data requirements and data sources
 - B. Data collection methodology
 - C. Summary of data collection and field observations
7. Baseline Analysis (Existing Conditions Analysis)
 - A. Operational analysis of the existing conditions
 - B. Safety analysis based on crash data and HSM procedure as appropriate
 - C. Multimodal evaluation

Simulation Approach

 - A. Base model development
 - B. Model verification/error checking
 - C. Model calibration
 - D. Model validation
8. Alternatives Analysis
 - A. No-Build alternative
 - i. Future year demand forecasts
 - ii. No-Build analysis (operational and safety)
 - B. Preliminary alternatives
 - i. Development of project concepts
 - ii. Screening of concepts
 - C. Build alternatives
 - i. Alternatives considered
 - ii. Traffic volume forecasts, trip pattern/circulation routes & assumptions
 - iii. Design considerations
 - iv. Model development (simulation approach only)
 - v. Operational analysis
 - vi. Safety analysis
 - D. Alternative evaluation matrix and description of success/failure of alternatives
9. Conclusions and Recommendations
10. References
11. Appendices

Project Traffic Analysis Assumptions

Traffic Forecasting Assumptions

Traffic forecast for the project was developed using:	
<input type="checkbox"/> Travel Demand Model	<input type="checkbox"/> Growth Rates
Type of Travel Demand Model Used: <input type="checkbox"/> Metropolitan Planning Model <input type="checkbox"/> Other Model	Refer to appropriate section of Project Traffic Analysis Report that discusses growth rates
Is the travel demand model based on the latest adopted Long Range Transportation Plan?	
<input type="checkbox"/> YES	<input type="checkbox"/> NO
_____ Date when MPO adopted the latest Long Range Transportation Plan	Explain why?
_____ Base Year of Travel Demand Model	
_____ Horizon Year of Travel Demand Model	
Long Range Transportation Plan documentation is available at (provide web address): _____	
Traffic Data and Factors	
Standard K = _____	Traffic Counts Collection Year = _____
D Factor = _____	Opening _____ Year = _____
T _{Daily} = _____	Interim _____ Year = _____
	Design _____ Year = _____
Discuss any changes in land use, economics, population and employment data since the model was built	

Traffic (operational and safety) Analysis Assumptions

- Study Area
- Key input parameters
- Calibration and validation parameters
- Analysis method and/or tools
- Performance MOEs

Table 7-10 Model Calibration Reviewer's Checklist

Financial Project ID: _____ Federal Aid Number: _____		
Project Name: _____		
State Road Number: _____ Co./Sec./Sub. : _____ Project MP: _____		
Item to Check	Description	Check
Model errors	<input type="checkbox"/> Simulation model contains no errors	<input type="checkbox"/>
	<input type="checkbox"/> Simulation model was accurately verified	<input type="checkbox"/>
	<input type="checkbox"/> All calibration MOEs are listed	<input type="checkbox"/>
MOEs	<input type="checkbox"/> Calibration targets/goals have been outlined	<input type="checkbox"/>
	<input type="checkbox"/> Calibration and validation data is sufficient to meet the targets	<input type="checkbox"/>
	<input type="checkbox"/> Calibration areas are clearly identified	<input type="checkbox"/>
Calibration process	<input type="checkbox"/> Calibration process is documented with all relevant calibration data, assumptions, and include a history of base model development	<input type="checkbox"/>
	<input type="checkbox"/> Calibration effort cover both AM and PM peak periods	<input type="checkbox"/>
	<input type="checkbox"/> Default calibration parameters were changed and documented	<input type="checkbox"/>
	<input type="checkbox"/> Model animation matches expected driver behavior and conditions observed in the field	<input type="checkbox"/>
Calibration targets	<input type="checkbox"/> Model replicates real-world bottleneck(s) and lane utilization	<input type="checkbox"/>
	<input type="checkbox"/> Calibration results are based on at least 10 simulation runs with different random seeds	<input type="checkbox"/>
	<input type="checkbox"/> Model output volumes satisfy volume calibration requirements	<input type="checkbox"/>
	<input type="checkbox"/> Model link capacities satisfy capacity calibration requirements	<input type="checkbox"/>
	<input type="checkbox"/> Model link speeds meet speed calibration requirements	<input type="checkbox"/>
	<input type="checkbox"/> Model link travel time meet calibration requirements	<input type="checkbox"/>
	<input type="checkbox"/> Model intersection delay results meet calibration requirements	<input type="checkbox"/>
<input type="checkbox"/> Model queuing replicates real-world conditions	<input type="checkbox"/>	
	<input type="checkbox"/> Calibrated model is validated with an independent data set	<input type="checkbox"/>
Comments:		

Project Traffic Analysis Report Outline

- Technical Report Cover
- Executive Summary
- Traffic Analysis Assumptions
- Introduction
- Traffic Analysis Method
- Existing Conditions Analysis
- Development of Future Year Traffic Forecast
- Alternatives Analysis
- Summary of Analysis Results
- Appendix (Raw data used as inputs)

Florida Department of Transportation

District X

Project Title

Limits of Project

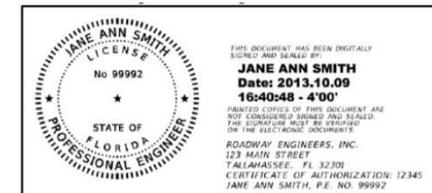
County, Florida

Financial Management Number: XXXXX-X

ETDM Number: XXXXXX

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Environmental Training for Florida Turnpike Enterprise

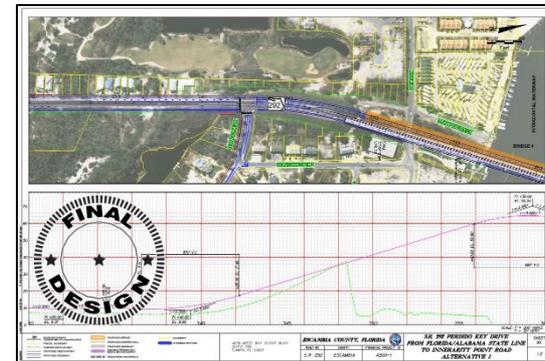
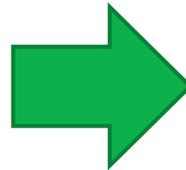
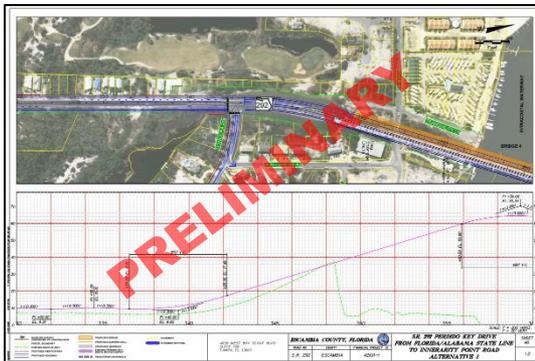
Engineering Analysis



8/28/2020

Purpose of Engineering Analysis

- Support the development of project location and design concepts
- Identify project features
- Balance project needs with costs and environmental impacts
- Support the progression from conceptual and preliminary design to final design



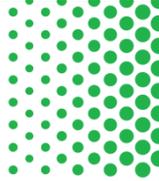
Engineering Analysis Process in PD&E



- Understand project needs
- Data collection
- Design controls and criteria
- Existing conditions analysis
- Development of alternatives and analysis of impacts
- Comparative analysis of alternatives
- Selection of the preferred alternative

Level of Analysis

- Depends on the size and complexity of the project
- Depends on the Class of Action
- Analysis must be performed to a level of detail sufficient to assess effects on the social, economic, natural, cultural, and physical environment.
- Must ensure all alternatives are developed to the same level of detail



Coordination Required

District Engineering and Environmental Staff

- Appropriate staff to ensure commitments are viable and are approved by the appropriate offices. (See **Part 2, Chapter 22 Commitments**)

Resource Agencies

- Resource agencies identify potentially significant environmental issues to be avoided or minimized through the ETDM process.
- If permits are scheduled during the PD&E phase, additional engineering may be required. See **Part 1, Chapter 12 Environmental Permits**

Other District Offices

- Planning
- Traffic Operations
- Modal (Transit)
- Roadway Design
- Structures
- Drainage
- Freight/Port
- Aviation
- Scenic Highways
- Right-of-Way
- Landscape
- Permits



United States Coast Guard
U.S. Department of Homeland Security

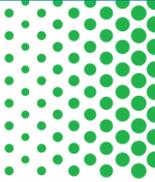


Alternatives to be Considered

1. No-Action Alternative, or No-Build Alternative
2. Transportation Systems Management and Operations (TSM&O) Alternative
3. Multimodal Alternative
4. Build Alternative(s)

Project Manager reviews planning studies previously completed for the project, and document the alternatives that have already been considered, screened, and eliminated through a planning process.

No Action, or No Build, Alternative



- The alternative in which the proposed project does not take place.
- Serves as the baseline for comparison with the environmental effects of the Build Alternatives
- Must be analyzed to the same level of detail as the Build Alternatives
- Analysis must include impacts to surrounding areas
- Documentation must include the advantages and disadvantages
- Remains under consideration throughout the PD&E Study, including the public hearing

Transportation Systems Management & Operations Alternative (TSM&O)



- Improvements that extend the acceptable service life of the facility by optimizing the performance and utilization of the existing infrastructure while minimizing the environmental impacts
- Must demonstrate that maximization of the existing system through various TSM&O strategies will not meet the purpose and need for the project prior to evaluating Build Alternatives
- Documentation of the TSM&O alternative evaluation must include a description of the strategies considered and, if the TSM&O alternative does not meet Purpose and Need, explain why
- Applies to rural areas as well as urban areas

Multimodal Alternatives

- Considered when consistent with the Project Purpose and Need
- Non-motorized facilities required to meet purpose and need include facilities that are planned in the Local Government Comprehensive Plans (LGCP)
- Include cost factors (monetary and environmental) required to meet the local needs



Build Alternatives

Build Alternatives are construction alternatives proposed to address the project's purpose and need. Each Build Alternative should have the following characteristics:

- Must address the transportation problem
- Must be reasonable
- Must avoid or minimize impacts to the environment
- Must have logical termini
- Must have independent utility or independent significance.
- May incorporate TSM&O strategies and/or multimodal options with the Build Alternative (hybrid alternative)

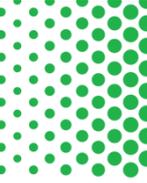
Design detail should be commensurate with the information needed to define and evaluate environmental impacts or define right-of-way

Number of Build Alternatives to be Considered



Environmental Document	Minimum Number of Alternatives	Comment
Type 2 Categorical Exclusion or State Environmental Impact Report	One Build Alternative and a No Action Alternative	Number depends on complexity, environmental controversy, results from planning studies, and public input.
Environmental Assessment	One Build Alternative and a No Action Alternative	EA does not need to evaluate in detail all reasonable alternatives. Any alternative considered but eliminated prior to preparing the EA should be documented.
Environmental Impact Statement	Reasonable alternatives or a “reasonable range” of alternatives and a No Action Alternative	“Reasonable” is defined as those technically and economically feasible project alternatives that would satisfy the primary objectives of the project defined in the project purpose and need

Elimination of Alternatives



Basis for Eliminating Alternatives

- Fails to meet the project purpose and need
- Not economically or technically feasible (determined through analysis)

Documenting the Elimination of Alternatives

- Include a section discussing the alternatives (including TSM&O) considered but eliminated in the PER/Project Design Documentation and Environmental Document.
- Summarize the rationale for eliminating alternatives
- Document why the alternatives were eliminated
- Identify the criteria used to eliminate alternatives and who was involved in establishing the criteria
- Specify when, in the process, alternatives were eliminated

Interchanges on Interstates

- The approved interchange alternative must be included as one of the PD&E study alternatives.
- Safety, Operational and Engineering (SO&E) acceptability should be obtained before the NEPA document approval
- Traffic, safety and conceptual design analysis support both the Interchange Access Request and PD&E study
- Preliminary engineering analysis for PD&E study satisfies the old FHWA policy requirements.
- If preferred alternative is different from the approved alternative than the IAR must be re-evaluated.
- PM coordinate with the District Interchange Review Coordinator (DIRC)

Comparative Evaluation

- Objectively compare and contrast the performance of each alternative, including the No-Action, in meeting evaluation criteria
- A number of metrics should be used for comparison
- Always assess ability to meet purpose and need and quantify environmental impacts
- Multimodal projects should include measures such as increased ridership, connectivity and accessibility, etc.
- Freight-focused project should have freight related performance measures (travel-time savings, reduction in trips, etc.)
- Comparison presented in a matrix format tailored to the individual project

Suggested Metrics for Comparison of Alternatives

Project Cost

- Design
- Construction
- Construction Engineering Inspection
- Wetland Mitigation
- Utility Relocation
- Operations and Maintenance

Social Environment

- Number of parcels (business and residential)
- Number of relocations (business and residential)
- Parks, recreation areas
- Churches, Synagogues, Mosques, etc.
- Cemeteries
- Schools
- Hospitals, Medical Centers

Cultural Environment

- Historic Cemeteries
- Archaeological Sites
- Native American Lands
- Historic Bridges
- Historic Properties

Natural Environment

- Wetlands
- Endangered Species Habitat
- Farmlands
- Wellfield Protection Areas

Physical Environment

- Contamination/Hazardous Waste Sites
- Number of Impacted Noise Receptors
- Water Quality and Quantity
- Air Quality
- Utilities

Traffic Operations and Safety

- Level of Service
- Throughput
- Delay
- Travel Time
- Safety
- Vehicle Hours Traveled/Vehicle Miles Traveled
- Travel Time Reliability

Value Engineering (VE)

- VE studies are required for projects having an estimated cost of \$25,000,000 or more
- A minimum of one VE study must be conducted during either PD&E or Preliminary Engineering Design
- If conducted during PD&E, it must occur after the alternative analysis but before the public hearing
- Project Manager coordinates with the District Value Engineer to schedule the VE Study and provides the draft Environmental Document, PER/Project Design Documentation, Public Involvement Summary, and other technical documents for review by the VE team
- All VE issues/recommendations should be resolved prior to scheduling the public hearing
- VE study recommendations are incorporated into the comparative alternatives evaluation and documented in the PER/Project Design Documentation.
- D/B Projects and projects waived by the Director of Transportation Development are exempt from a VE Study

Preferred Alternative

- Identification of the Preferred Alternative is based on the analysis of project costs, environmental impacts, engineering analysis, and public input
- PER should discuss in detail the preliminary design features of the preferred alternative.



Documenting the Preferred Alternative

- After public hearing:
 - Appropriate section of the Environmental document are updated to include information received from the public hearing process
 - PER is updated to include preliminary design details associated with the preferred alternative.

Design Elements of Preferred Alternative in PER

- Typical Section(s) (TPS)
- Project Traffic Volumes
- Horizontal and Vertical Geometry
- Intersection/Interchange Concepts and Signal Analysis
- Bridge Analysis
- Access Management
- Variations and Exceptions
- Right of Way
- Utilities
- Transportation Management Plan
- Bicycle and Pedestrian Accommodations
- Preliminary Drainage Analysis
- Floodplain Analysis
- Special Features
- Cost Estimates
- Schedule
- Construction Impacts
- Landscape and Beautification

Engineering Documentation

Preliminary Engineering Report – required for a Type 2 CE, EA, EIS

PRELIMINARY ENGINEERING REPORT

Florida Department of Transportation

District X

Project Title

Limits of Project

County, Florida

Financial Management Number: XXXXX-X

ETDM Number: XXXXXX

Date

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by FDOT pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated December 14, 2016, and executed by FHWA and FDOT.



THIS ITEM HAS BEEN DIGITALLY
SIGNED AND SEALED BY
Lan B. Sklo
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ON THE DATE ADJACENT TO THE SEAL
PRINTED COPIES OF THIS DOCUMENT ARE
NOT CONSIDERED SIGNED AND SEALED
AND THE SIGNATURE MUST BE VERIFIED
ON ANY ELECTRONIC COPIES.

ROADWAY ENGINEERS, INC.
120 MAIN STREET
TALLAHASSEE, FL 32301
LAN B. SKLO, P.E. NO. 99994

PER Contents

Cover Page (signed and sealed by a Florida registered professional engineer)

Project Summary

Existing Conditions

Future Conditions

Design Controls and Criteria

Alternatives Analysis

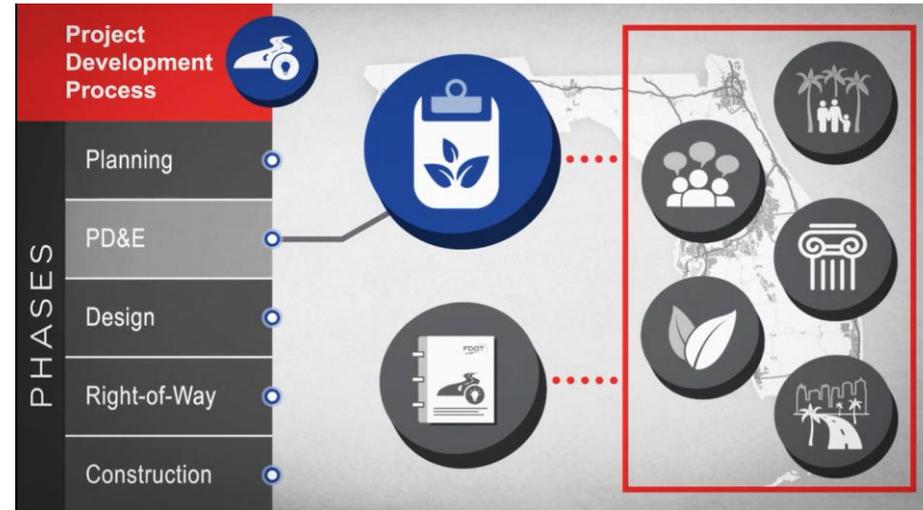
Public Involvement/Project Coordination

Preferred Alternative

Conclusion

- A successful PD&E Study requires orderly and continuous coordination between planning, engineering, environmental, public involvement and other staff from various FDOT offices throughout the study
- The existing conditions analysis identifies the design and operational deficiencies of existing roadways and structures in the study area and supports the purpose and need
- Alternatives must be developed to the same level of detail in order to perform a meaningful comparative evaluation
- Unreasonable or nonviable alternatives must be summarized in the engineering and environmental documentation
- The development, analysis , and evaluation of alternatives must be presented in sufficient detail so that the reader can understand the selection of the preferred alternative

Environmental Training for Florida Turnpike Enterprise Traffic Noise



August 2020

The environmental review, consultation, and other actions required by applicable federal environmental laws described in this training are carried out by FDOT pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated December 14, 2016 executed by FHWA and FDOT.

Background

- ***Title 23 of the Code of Federal Regulations (CFR) Part 772*** and applicable state laws. For projects which require a reevaluation of PD&E
- Effective control of traffic noise requires:
 - ◆ the control of land use planning next to highways, and
 - ◆ reasonable and feasible abatement associated with highway projects.

Definitions

- **Benefited Receptor** – the recipient of an abatement measure that receives a noise reduction at or above the minimum threshold of 5 dB(A)
- **Date of Public Knowledge** – the approval date of the environmental document
- **Noise Reduction Design Goal** – the optimum desired dB(A) noise reduction (insertion loss) determined from calculating the difference between future build noise levels with abatement to future build noise levels without abatement. The FDOT has selected 7 dB(A) as the Noise Reduction Design Goal for one (1) or more benefited receptors.
- **Statement of Likelihood** - A statement provided in both the Noise Study Report (NSR) and Environmental Document based on the feasibility and reasonableness analysis completed at the time the Environmental Document is being approved.

Applicability



- Type I:
 - ◆ A highway construction project (new location or physical alteration of existing highway) which substantially changes horizontal and vertical alignment, profile or adds number of through lanes (adds capacity).
- Type II:
 - ◆ A federal, federal-aid, or state funded highway project for noise abatement on an existing highway. Type II projects are commonly referred to as retrofit projects and are allowed (but not mandatory) under 23 CFR Part 772. **(Florida doesn't have a Type II program.)**
- Type III:
 - ◆ A project that does not meet the classifications of a Type I or Type II. Type III projects do not require a noise analysis.
- All FDOT highway projects, regardless of funding source, shall be developed in conformance with federal standards for noise abatement as contained in 23 CFR Part 772.

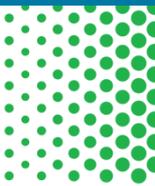


Procedure

- A preliminary review of potential noise impacts associated with a project is conducted during ETDM screening and prior to the PD&E phase.
 - Determine if noise sensitive receptors are or may be located within the project area
 - Possibility of impact
 - Includes assessment of land use plans, field reviews, aerials, modeling
- PM coordinates with the District Noise Specialist

Traffic Noise Impacts

- Occur when the modeled future highway traffic noise levels for the worse case noise condition (usually LOS C) approach or exceeds the NAC
 - ◆ Noise Abatement Criteria (NAC) established by 23 CFR 772
- FDOT has determined that the NAC is approached when it is within 1 dB(A) of the appropriate NAC and substantial increase occurs when the increase over existing conditions is 15 dB(A) or greater.
- If one or more noise sensitive receptors are impacted, then abatement measures must be considered.



Traffic Noise Prediction

- Traffic noise analysis shall be completed for the alternative(s) under detailed study and for each Activity Category of the NAC shown in Figure 18-1 (of the PD&E Manual) present in the study area
- Noise level predictions are required for the following project alternatives and study years:

Alternative	Year
No-Build	Existing and design year
Build	Design year only

- Traffic Noise Model (*FWHA TNM*)



Noise Descriptor

- Level Equivalent (Leq)
 - ◆ The noise level descriptor used by FDOT
 - ◆ Equivalent steady-state sound level which in a stated period of time contains the same acoustic energy as the time-varying sound level during the same time period
- Leq(h) – hourly value of Leq
 - ◆ L10(h) in metric
 - ◆ FDOT uses the Leq(h) metric

Noise Abatement Evaluation

- When traffic noise impacts are identified, noise abatement shall be considered and evaluated for feasibility and reasonableness.
- FDOT shall determine and analyze alternative noise abatement measures to abate identified impacts by giving weight to the benefits and costs of abatement and the overall social, economic, and environmental effects by using feasible and reasonable noise abatement measures for decision-making.
- FDOT gives primary consideration to exterior areas where frequent human use occurs.
- At a minimum, FDOT considers noise abatement in the form of a noise barrier when a traffic noise impact is identified

Feasibility

- Involve noise reduction and engineering considerations
- Ability of the noise barrier to provide a reduction of at least 5 dB(A) to impacted receptors
- Cost, visual impact and other factors are not unreasonable
- Receptor is not considered benefited if a minimum of 5 dB(A) reduction cannot be achieved
- Number of impacted receptors required to achieve a 5 dB(A) reduction or greater for a barrier to be considered feasible will be 2 or greater.
- Design, construction, safety, access, ROW, drainage, utilities
- Additional cost solely to accommodate construction of a noise barrier should be included in the cost reasonableness evaluation

Safety Factors

- Primary consideration is given to safety
 - ◆ Ex.: Sight distance at an intersection or driveway
- Maximum Heights
 - ◆ Ground mounted noise barriers: 22 ft
 - ◆ On bridge and retaining wall structures: 8 ft.
 - ◆ Ground mounted Traffic Railing/Noise Barrier combinations: 14 ft.

Reasonableness Factors

- Determined once the abatement measure is determined to be feasible
- Reasonableness:
 - Consideration of the viewpoints of the benefitted property owners and residents
 - ◆ During a noise abatement workshop
 - Cost effectiveness of the traffic noise abatement measure
 - Achievement of the FDOT noise reduction design goal

Cost Effectiveness

- 1,400 SF of noise barrier / benefitted receptor at a reasonable cost
- Unit cost: \$30 / SF
- Reasonable cost: \$42,000 per benefitted receptor
- Only include benefitted receptors
- Calculation of the cost effectiveness considers:
 1. Cost of materials and labor
 2. Cost of additional ROW
 3. Cost of new or upgraded drainage structures
 4. Relocation of utilities outside of FDOT ROW (not included in the cost effectiveness calculations for the noise barrier)
- Determined during the PD&E study
- Make a statement of likelihood in the environmental document to pursue in the design phase.
- Subject to a detailed review in design and subsequent re-evaluations.

Noise Study Report (NSR)

- Documents the results of the noise analysis
- Summarized in the Environmental Document
- Coordination / communications summarized
- When the Environmental Document is approved, send copies of the NSR to local government officials within whose jurisdiction the project is located
- After the Date of Public Knowledge:
 - ◆ FDOT is no longer responsible for providing noise abatement to new development which occurs adjacent to the proposed highway project

Documentation in the PD&E Phase

- Identify:
 - ◆ Statement of Likelihood for feasible and reasonable measures of abatement
 - ◆ Noise impacts for which no noise abatement measures are feasible and reasonable
- Noise abatement is analyzed during the PD&E phase and during final design, prior to Plans, Specifications and Estimates (PS&E)

Statements in the Environmental Document



- No impacted receptors:
 - *Based on the noise analyses performed to date, there appear to be no impacted areas within the project that require abatement consideration.*
- Noise impacted areas requiring abatement consideration, in accordance with 23 CFR Part 772:
 - *“The FDOT is committed to the construction of feasible and reasonable noise abatement measures at the noise-impacted locations identified in (reference to table or figure) contingent upon the following conditions...”*
- No feasible or reasonable abatement is identified:
 - *Based on the noise analyses performed to date, there are no feasible solutions available to mitigate the noise impacts at the locations identified in (insert a table or figure which shows proposed location and physical description of noise abatement measures determined not feasible or reasonable).*



Documentation in the Design Phase

- Noise abatement locations, noise barrier types, lengths and height are determined
- Final noise abatement commitments are documented in the re-evaluation and the NSR Addendum prior to construction advertisement
- Design PM collects all PD&E noise abatement commitments and NSR