

CHAPTER 4
PROJECT DEVELOPMENT PROCESS
AND ENGINEERING CONSIDERATIONS

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4. PROJECT DEVELOPMENT PROCESS AND ENGINEERING CONSIDERATIONS

4-1 OVERVIEW

The purpose of this chapter is to define the requirements to successfully complete the Project Development and Environment (PD&E) phase which includes scoping, environmental and engineering evaluations, and documentation.

For projects that qualify for screening in the Environmental Screening Tool (EST), scoping occurs during the planning and programming screening events. The notice to the Environmental Technical Advisory Team (ETAT) for the programming screen begins the Federal Consistency Review (if applicable) and initiates the **National Environmental Policy Act (NEPA)** scoping process. The **Programming Screen Summary Report** provides information to assist the District in developing the project scope by identifying relevant issues raised by the ETAT members for detailed analysis (see **Efficient Transportation Decision Making (ETDM) Planning and Programming Manual, Topic No. 650-000-002**). The **Final Programming Screen Summary Report** includes the project's Class of Action (COA) as determined by the lead agency (see **Part 1 Chapter 2, Environmental Class of Action Determination**, of this manual). ETAT commentary made during the project screening must be addressed during the PD&E phase.

All COA determinations are based upon information known at the time. A COA determination is not mandatory prior to advancing a project. There may be times when the COA is uncertain or in question after the **Preliminary Programming Screen Summary Report** has been published. A District may choose to do additional studies or coordination prior to making the COA determination and submitting it to the lead agency for approval. After COA approval, the **Final Programming Screen Summary Report** is published.

The starting point for developing the scope of a PD&E study should be the **PD&E Standard Scope of Services** available from the FDOT Project Management Office. Advancing the project to PD&E involves a thorough review of the scoping information obtained from the **Programming Screen Summary Report** and the COA if a determination has been made. In developing a scope of services for a project the District should coordinate internally with the appropriate offices (such as Planning, Design, Environmental, and Construction). Based on the scoping information the District should determine the level of engineering (e.g., number of alternatives, traffic needs, etc.) and environmental analysis required to meet the project's purpose and need, address agency concerns and the project's impacts.

The final product will be the Type 2 Categorical Exclusion (Type 2 CE) documentation, State Environmental Impact Report (SEIR), Environmental Assessment (EA) with Finding of No Significant Impact (FONSI), or Final Environmental Impact

Statement (FEIS), often referred to as the Environmental Document or PD&E Study. Other required documents include engineering [e.g., **Typical Section Package**, preliminary design plans, **Preliminary Engineering Report (PER)**] and environmental technical documents and the Public Hearing transcript, if applicable.

Details on submittals of the final documentation to the lead agency are contained in the appropriate **PD&E Manual** chapter for each COA (**Part 1, Chapters 5-10**). It should be noted that Type 1 and Programmatic CEs are processed as outlined in **Part 1, Chapter 2, Environmental Class of Action Determination**, of this manual. Some of these projects as well as some Type 2 CEs evaluated through the Minor Categorical Exclusion (MiCE) process should be addressed on a case by case basis as detailed in **Part 1, Chapter 2, Environmental Class of Action Determination**, of this manual.

4-2 PROCEDURE

4-2.1 Considerations

Project alternatives should satisfy the stated purpose and need and emphasize the preservation and enhancement of the existing landscape, environment and associated ecosystems through the balance of engineering, environmental and economic aspects while considering scoping comments received through the Programming Screen.

Alternatives development may begin during planning and is finalized during the PD&E phase. The consideration of the number of alternatives should be based on the potential effects to the project; what actions are taken to avoid, minimize, or mitigate for project impacts; and the impact of these considerations on the project's alignment. The principles are the same regardless of project phase and the following needs to be considered:

1. The anticipated or approved Class of Action
 - a. Type 2 CEs per **23 CFR 771** are those actions that do not have significant environmental impacts. A Type 2 CE does not typically require screening of multiple build alternatives in ETDM, although there may be situations when impacts to issues/resources may result in the need to consider additional alternatives. This should not preclude a District from considering minor shifts in the alignment during the PD&E study.
 - b. EAs per **23 CFR 771** are those actions in which the significance of the environmental impact is not clearly established. This should not preclude a District from considering minor shifts in the alignment during the PD&E study.

- c. An EA does not typically require screening of multiple build alternatives in ETDM, although there may be situations when impacts to issues/resources may result in the need to consider additional alternatives.
- d. EISs per **23 CFR 771** are those actions that significantly affect the environment. An EIS must analyze all reasonable alternatives derived from a range of alternatives, including mode and other build alternatives. It may require an alternative corridor evaluation to develop the range of alternatives and determine reasonableness.

2. The project's Purpose and Need

Alternatives that do not meet the Purpose and Need as defined should be eliminated from further study.

3. The complexity of the project and context

- a. Existing vs. new alignment
- b. Urban vs. rural

4. Preliminary considerations of environmental impacts

Identify potential impacts early and consider avoidance and minimization.

5. Documentation

All alternatives considered, including those eliminated from further consideration in planning or PD&E, must be documented in the PD&E study.

Alternatives should be compatible with the surrounding area, the safety and security of public spaces and aesthetics in accordance with the appropriate standards included in **Section 4-2.5.2.1**. In addition, alternatives must consider design elements identified in state and/or local government plans, such as pedestrian and bicycle facility plans, greenways plans, landscaping elements, public transportation elements, scenic highway corridor management plans, etc.

During the development of alternatives for capacity projects consideration should be given to tolling, as appropriate, based on project conditions. Additionally, in areas where there is severe congestion consideration may be given to managed lanes as a solution.

"It is the policy of the Department to evaluate the need for public transportation systems, facilities and services in all studies of major urban transportation corridors" (**Policy No. 000-725-010, Major Urban Corridor Studies**). This policy includes, but is

not limited to, those projects in the Department's Five Year Work Program. Modal options that must be considered include, but are not limited to, fixed guideway facilities, delineations of High Occupancy Vehicle (HOV) lanes, and expanded bus service with supporting facilities. Each study must determine if there is justification for continued consideration of public transportation systems, facilities or services in conjunction with the development of the corridor. Delineation of a public transit envelope in a proposed corridor project Right Of Way (ROW) would also be a product of a study on limited access and other facilities. Therefore, for each project analyze the study area for reasonable corridors based on the presence of alternate transportation modes and the feasibility of developing an interconnected multimodal transportation system. This includes possible improvement of alternate existing corridors, and connections to alternate routes. Consider alternate alignments within the corridor that will adequately address multimodal transportation.

4-2.2 Alternative Corridor Evaluation

A corridor evaluation is generally required for EISs to identify reasonable alternatives for **NEPA** analysis from a possible range of alternatives. Corridor evaluation is typically performed as part of the transportation planning efforts that precede the PD&E phase. Many transportation projects located on the existing Strategic Intermodal System (SIS) and Florida Intrastate Highway System (FIHS) facilities will have completed action plans or master plans that may have addressed corridor options. Ideally the evaluation will take place prior to the PD&E study, but in some cases will be part of the PD&E study.

Different corridors are often considered when a new route is needed between two locations. Reasonable corridors can be identified that largely avoid the sensitive areas in the study area and still satisfy the identified purpose and need. Stakeholder comments about the potential project effects for each of the corridor alternatives can be used to refine or eliminate some alternatives. The lead agency must approve the elimination of unreasonable alternatives (**FHWA Corridor Guidance, April 2011**).

The Alternatives section of the **EIS (or some EAs as appropriate)** should summarize the results of any corridor analysis. The corridor evaluations need to be available as part of the supporting documentation of a PD&E study. This summary should describe the rationale for determining the reasonableness of the corridor or corridors and should include an explanation of why an eliminated corridor would not meet the purpose and need or was otherwise unreasonable. For alternatives that are determined to be unreasonable, provide adequate documentation to substantiate this decision and discuss any coordination that assisted in making the determination.

4-2.3 Purpose and Need

A project's purpose and need is based on corridor deficiencies in the identified area and should include the project objectives (i.e., increase capacity, improve drainage, improve safety, etc.). An approved purpose and need is contained in the

Programming Screen Summary Report and should be used as the basis of the PD&E study. The purpose and need evaluation should take into account all issues identified through the public involvement process and the ETDM screening and will be refined throughout the PD&E process. The purpose and need should evaluate the mode of transportation (see **Policy No. 000-725-010, Major Urban Corridor Studies**). Project purpose and needs are further explained in **Part 2, Chapter 5, Purpose of and Need for Action**, of this manual.

4-2.4 Alternatives Analysis

Analysis should begin with the alternative(s) reviewed during the Programming Screen or identified during associated corridor evaluation. New alternatives identified in PD&E can be added as appropriate.

Definitions for terminology associated with alternatives are as follows:

Viable alternatives – Alternatives that address the purpose and need if there is more than one alternative proposed. Consideration should also be given to whether or not the alternative can be implemented/constructed.

Reasonable Alternatives (term used for EIS only) – Alternatives meeting the purpose and need which are practical or feasible from the technical and economic standpoint, rather than simply desirable from the standpoint of the applicant. **Recommended Alternative** – The alternative submitted to FHWA by FDOT and/or project sponsor (if not an FDOT project) as the preferred alternative. This would occur during the environmental studies and is desired when documents are sent to FHWA for review and approval for public availability. The recommended alternative becomes the preferred alternative once it is approved by the lead federal agency (see below).

Preferred Alternative - The preferred alternative for a federal aid project is the alternative that **has been approved by the lead federal agency**. When there is a preferred alternative prior to the public hearing, it must be presented at the public hearing. It must also be identified in the Environmental Document that is available to the public during the public hearing phase.

Selected Alternative - The alternative that receives location and design concept acceptance and is advanced to the next phase of implementation.

All alternatives need to be developed to a comparable level of detail so that their merits can be compared and evaluated. For an EIS the alternatives analyzed are the reasonable alternatives. Reasonable alternatives must be carried forward for detailed study during **NEPA** analysis.

Generally, the following alternatives shall be evaluated:

1. No-Build or No-Action Alternative - The No-Build or No-Action alternative is a valid alternative throughout the PD&E phase including public hearing(s) and the final selection process. All advantages and disadvantages of this option should be considered.
2. Transportation System Management and Operations (TSMO) Alternative - Investigate upgrading the existing facility by means of improving high crash spots and segments, adding turn lanes, improving intersections and signalization, and improving signing and pavement markings, designation of HOV lanes, and park and ride facilities or Intelligent Transportation Systems (ITS) technology. Determine if this is a feasible alternative or if such improvements were previously implemented and possibly need updating.
3. Multimodal Facilities – Develop alternatives to incorporate alternate modes of transportation where need and opportunity exists (see **Policy No. 000-725-010, Major Urban Corridor Studies** in **Section 4.2.1**). For example, if a bus system exists or is proposed within the corridor, then bus stop facilities should be considered as part of the alternative design, and if these are implemented, sidewalks connecting bus stop facilities and local destinations may be needed as outlined in the final federal rule **Transportation for Individuals With Disabilities**.
4. Build Alternatives – These alternatives need to be evaluated for their environmental impacts. The following build alternatives may require the development of separate reports.
 - a. New or Modified Interchanges - If the project includes a new interchange or a modification to an existing interchange, the preferred alternative identified in the **Interchange Justification Report (IJR)** or **Interchange Modification Report (IMR)** (if an **IJR** or **IMR** was required) must be included as a study alternative. If the selected preferred alternative is different from the **IJR / IMR** preferred alternative, the **IJR / IMR** may need to be amended and resubmitted. This should be determined through consultation with the District Interchange Review Committee (DIRC) and FHWA.
 - b. New or Modified Intersections – If the project includes a new or modified intersection, signalized or signed, consideration should be given to the use

of a roundabout as appropriate. (see **NCHRP 672**, and FHWA Guidance, **“Roundabouts: an Informational Guide”, FHWA-RD-00-067**).

- c. Bridge Rehabilitation/Replacement – For projects involving the replacement of a bridge that may include significant environmental impacts, or where the bridge is considered historic, or has substantial community value, the study must include a rehabilitation or repair alternative. The rehabilitation/repair alternative will be considered viable until the lead federal agency has made its determination.
- d. Coastal Bridges – The District Drainage Engineer should review tidal projects to determine if coastal hydraulics play a significant role in a roadway or bridge project’s design. If coastal hydraulics might be significant, a qualified coastal engineer should review the complexity of the tidal conditions to determine the appropriate level of coastal engineering expertise needed in design. Conditions that typically require direct attention by a coastal engineer during the final design phase are as follows:
 1. Hydraulic analysis of interconnected inlet systems
 2. Analysis of inlet or channel instability, either vertically or horizontally
 3. Determination of design wave parameters
 4. Prediction of overwash and channel cutting
 5. Design of countermeasures for inlet instability, wave attack or channel cutting
 6. Prediction of sediment transport or design of countermeasures to control sediment transport
 7. Assessment of wave loading on bridges and other structures

4-2.4.1 Alternative Matrix

After completion of the alternative studies, develop an evaluation matrix to compare alternatives and their effects (including the No-Build alternative). At a minimum, use the following criteria:

1. Construction costs
2. ROW costs and Business Damages

3. Engineering costs [Design and Construction Engineering and Inspection (CEI)]
4. Bicycle and pedestrian facilities
5. Temporary Traffic Control (TTC)/Transportation Management
6. Environmental impacts (natural, physical and cultural) – direct, indirect, and cumulative, as appropriate
7. Social and economic (ROW requirements, relocations, aesthetics, traffic flow improvements, changes to neighborhoods and social gathering areas, etc.)
8. Operational analysis – Evaluate the degree to which each alternative will meet the project objectives or purpose and need statement. This element in the matrix may include such functions as increased level of service (LOS), improved drainage, improved access control, elimination of congestion, establishment of system continuity (SIS or FIHS goals), reduced travel time, or improved safety.
9. Optional- Safety Benefits as determined using *The Highway Safety Manual (HSM) Analysis* in accordance with *NCHRP 17-38*
10. The matrix is a tool used by the lead federal agency and the District to compare alternatives and aid in determining the preferred alternative.

4-2.5 Engineering Analysis

Engineering analysis is required on all reasonable alternatives of an EIS and alternatives developed for analysis of an EA, Type 2 CE, and SEIR as appropriate. At a minimum, the preliminary engineering will include: design traffic, horizontal alignment, typical sections, preliminary stormwater assessment, and any special details needed to address public or ETAT comments received during the ETDM Programming phase and the PD&E phase.

4-2.5.1 Level of Detail

The level of engineering detail provided is project-specific and documented to a level of detail that allows for the analysis of the effects on the social, natural, cultural, and physical environments and for the comparison of these effects leading to decisions.

During PD&E, the Districts may perform specific preliminary design activities after coordination with the lead federal agency. However, until a project is approved as a CE, FONSI, or ROD, no final design activities are allowed to proceed.

Title 23, Section 636.103 Code of Federal Regulations (CFR) (23 CFR 636.103), defines the terms Preliminary Design and Final Design as follows:

Preliminary Design - Defines the general project location and design concepts. It includes, but is not limited to, preliminary engineering and other activities and analysis, such as environmental assessments, topographic surveys, metes and bounds surveys, geotechnical investigations, hydrologic analysis, utility engineering, traffic studies, financial plans, revenue estimates, hazardous materials assessments, general estimates of the types and quantities of materials, and other work needed to establish parameters for the final design.

Final Design - Any design activities following preliminary design and expressly includes the preparation of final construction plans and detailed specifications for the performance of construction work, final plans, final quantities and final engineer's estimate for construction.

FHWA ORDER Classification Code 6640.1A Policy on Permissible Project Related Activities during the NEPA process, dated October 1, 2010 explains the level of preliminary design engineering detail allowed in PD&E studies. The directive aims to reduce project delivery time. However, any engineering work performed on one alternative prior to final **NEPA** approval must be approved by FHWA and not prejudice the objective comparison of all the alternatives or limit alternatives. Comparison of alternatives must be done in a fair and balanced manner.

This directive allows additional preliminary design activities including: development of typical sections, grading plans, geometric alignment (horizontal and vertical) noise wall justifications, bridge type/size/location studies, temporary structure requirements, structural design (substructure and superstructure), retaining wall design, noise wall design, design exceptions, guardrail length/layout, existing property line elevations, ditch designs, intersection design/configuration, interchange design/configuration, pavement design, storm/sanitary sewer design (plan/profile), culvert design, identification of removal items, quantity estimates, pavement details/elevation tables, and preliminary traffic control plans.

The Districts should consider the risks entailed in only advancing preliminary design activities on one alternative, because this may ultimately not be the preferred alternative. There must be agreement with FHWA prior to advancing any additional design activities. The activities may be eligible for Federal-Aid reimbursement once they are approved by FHWA.

4-2.5.2 Preliminary Design Considerations

Design concepts and reports shall be prepared consistent with the current edition of the following publications:

1. **Topic No. 625-000-007, Plans Preparation Manual (PPM), Volume I**

2. ***Topic No. 625-000-008, Plans Preparation Manual, Volume II***
3. ***Topic No. 625-000-015 (Florida Greenbook), Manual of Uniform Minimum Standards for Design, Construction, and Maintenance for Streets and Highways*** (For use on projects not located on the state highway or federal-aid systems)
4. ***Topic No. 750-020-007, Manual on Uniform Traffic Studies (MUTS)***
5. ***Topic No. 625-010-050, Florida Pedestrian and Bicycle Program***
6. ***Topic No. 625-040-002, Drainage Manual***
7. ***Topic No. 625-020-018, Structures Manual***
8. ***Topic No. 710-020-001, Utility Accommodation Manual***
9. ***Topic No. 625-050-001, CADD Manual***
10. ***Topic No. 625-010-003, Design Standards***
11. ***Topic No. 625-020-020, Asbestos on Bridges***
12. ***Procedure No. 650-050-001, Highway Landscape Beautification & Plan Review***
13. ***Topic No. 625-020-015, ADA Compliance Facilities Access for Persons with Disabilities***
14. ***Procedure No. 725-030-003, Transit Corridor Program***
15. ***Topic No. 575-000-000, FDOT Right of Way Manual***
16. ***FDOT Standard Specifications for Road and Bridge Construction***
17. ***FDOT Quality/Level of Service Handbook*** and accompanying software
18. ***NCHRP 17-38, Highway Safety Manual***
19. ***FHWA-RD-00-068, Roundabouts: an Informational Guide***
20. ***Topic No. 650-000-001, Project Development and Environment Manual***

4-2.5.2.1 Design Controls and Standards

Using the references listed in **Section 4-2.5.2**, establish the design controls that apply to the project and all design standards to use in the development of the design alternatives. This will include controls and standards needed to develop typical sections, horizontal and vertical alignments, and other design features such as drainage, aesthetics, landscaping, noise abatement, and multimodal facilities. Design controls and standards may include:

1. Design Controls:
 - a. Functional classification (including SIS and FIHS designations)
 - b. Design speed
 - c. Level of Service
 - d. Basic number of travel lanes
 - e. Design traffic volumes (see **Section 4-2.5.2.4**)
 - f. Pedestrian and bicycle requirements
 - g. Existing ROW constraints
 - h. Type of stormwater management facilities (e.g., closed or open drainage systems)
 - i. Navigational requirements
 - j. Design high water
 - k. Design wave heights for coastal bridges
 - l. Access classification
2. Project Design Standards: If the recommended alternative uses any project design standards that do not meet or exceed the designated design criteria, a design variation or exception must be approved and documented as outlined in **Volume I, Chapter 23, FDOT Plans Preparation Manual (PPM) Topic No. 625-000-007**

Project standards may include:

- a. Design speed

- b. Lane widths
- c. Shoulder widths
- d. Bridge widths
- e. Structural capacity
- f. Vertical clearance
- g. Grades
- h. Cross slopes
- i. Superelevation
- j. Horizontal alignment
- k. Vertical alignment
- l. Horizontal clearance
- m. Stopping sight distance

4-2.5.2.2 Existing Physical Features

For alternatives on existing alignments, collect the following information (if available). When assessing alternatives within a new corridor, the engineer and environmental scientists should determine the appropriate information to collect, (this may include some of the information listed below). Include this information in the **PER**.

1. Typical section - lane configuration and dimensional properties of each cross section element
2. Existing roadway ROW, including extent and type of limited access, and easements
3. Roadway Classification: FIHS, State Highway System (SHS), SIS, Evacuation Routes, etc.
4. Existing property lines and land use, including property owners' names and addresses
5. Horizontal and vertical alignments

6. Pedestrian accommodations- walkways, crosswalks, handicapped provisions, and school routes
7. Bicycle facilities - location, type, width, and designation
8. Lighting - type, condition, spacing, and maintaining agency (include a copy of the maintenance agreement)
9. Intersection layout - lane configuration and operational characteristics
10. Traffic signals - location, phasing, and interconnection
11. Design and posted speeds
12. Railroad crossing - potential for railroad abandonment plans, number of tracks, number of train crossings, speed, type of train (passenger or freight), type of warning devices, time of day crossings occur, railroad ROW, Rail Master Plan, etc.
13. Structural and operational conditions of the pavement
14. Drainage system inventory - drainage areas and flow patterns, stormwater management system, etc.
15. Traffic data - mainline and intersection counts including pedestrians and bicycles
16. Crash data and Safety Analysis – at a minimum provide the number of crashes, crash types and locations, number of fatalities and injuries, property damage, and economic loss. Optional – provide safety analysis in accordance with ***NCHRP 17-38, Highway Safety Manual***
17. Utilities - existing and proposed utilities (overhead and underground), maintaining agency, contact person, and any need for bridge attachments
18. Soils and geotechnical data
19. Other engineering data as needed

In addition to the items listed above, for existing bridges collect the following information:

1. Type of structure - timber, concrete, or steel
2. Condition - obtain structural rating and suitability for widening or retrofitting

3. Horizontal and vertical clearances
4. Span arrangement - number and length of spans
5. Bridge number
6. Facility crossed (river or road)
7. Year structure was built, and/or modified
8. Historical significance [if any, i.e., **National Register of Historic Places (NRHP)** eligibility]
9. General geotechnical information from existing bridge borings, scour reports and maintenance history where available
10. Identify any bridge security issues
11. Determine if bridge is a critical, landmark or signature structure
12. For navigable waterways, add the following information to the items listed above:
 - a. Channel data - alignment, width, depth, and clearance requirements
 - b. On bridges with moveable spans: the average number of times the bridge opens per day, results of boat traffic and mast height surveys, include any special navigation (shipping/boating) requirements that will require accommodation during construction
 - c. Ship impact data
 - d. Normal High Water and Mean High Water (for coastal bridges) in accordance with **Sect. 2.10, Volume 1 PPM, Topic No. 625-000-007 and Section 4.6, Drainage Manual, Topic No. 625-040-002**

4-2.5.2.3 Community Values and Public Input

The identification of community values and public involvement begins in the Planning and Programming phases of the ETDM process. This information is used in the assessment of community impact and development of the Public Involvement Plan (PIP) see **Part 1, Chapter 11, Public Involvement**, of this manual. Public involvement documentation shall be included in the project file, which may be reviewed by FHWA

(upon request), and should be included in the Type 2 CE documentation, EA, EIS, or SEIR.

4-2.5.2.4 Project Traffic, Highway Capacity Analysis and Level of Service Analysis

Traffic volumes and characteristics should be established for the existing year, opening year, interim (mid-design) year (if necessary), and the design year (20 years from opening year). A **Traffic Report** should be prepared and summarized in the Environmental Document and **PER**. Address the following items in the **Traffic Report**.

1. Traffic Factors – Use the Standard K or collect or calculate K (hour factor), D (directional factor), T (truck factor), PHF (peak hour factor), etc. for each year of interest. For details, see **Chapter 1, Volume 1 PPM, Topic No. 625-000-007**.
2. Multimodal Transportation System - Identify all regular public bus services, rail services, railroad crossings, and airports (public and private) with access to the project. Investigate existing and proposed park and ride facilities, HOV designations, including the need and potential use of such facilities.
 - a. Bus service - investigate current and potential use, routes, proposed changes, and the impact the bus services will have on the traffic volumes.
 - b. Railroad crossings - investigate the potential for railroad abandonment and the potential for a railroad overpass, underpass or safety upgrades.
 - c. Ports - investigate the potential traffic generation due to local airports and seaports. Investigate and evaluate the existing and proposed connections and traffic flow as related to the project.
 - d. Investigate other modes of transportation that may adequately address the project needs. Consider systems where connectivity can occur between automobiles and alternate transportation modes, and determine the ability of such a system to address the transportation needs of the area under study.
3. Traffic Analysis - The methodology used for developing the projected traffic factors and volumes shall be in accordance with **Procedure No. 525-030-120, Project Traffic Forecasting**, developed by the Transportation Statistics Office. The development of the design traffic volumes should be coordinated with Planning, Design Traffic, Traffic Operations, and the Environmental (Noise and Air) Specialist.

4. Highway Capacity and Level of Service Analyses Techniques for computing highway capacity LOS at a preliminary engineering level are described in ***FDOT's Quality/Level of Service Handbook*** and accompanying software, LOSPLAN. The LOSPLAN software package, consisting of the programs ARTPLAN, FREEPLAN, and HIGHPLAN, are recommended as the primary analytical tools in project development for the auto mode as well as transit, bicycle, and pedestrian modes. These software programs are preliminary engineering applications of the ***Highway Capacity Manual (HCM)***, as well as the ***Transit Capacity and Quality of Service Manual***, the ***Bicycle Level of Service Model***, and ***Pedestrian Level of Service Model***. As appropriate the LOSPLAN software may be supplemented by the Highway Capacity Software (HCS+) or other more detailed analytical highway capacity and LOS Tools.
5. Interchanges - Projects involving interchange modifications may require additional operational analysis. The District Interchange Review Committee (DIRC) will determine the level of analysis. An operational analysis may be part of an ***Interchange Modification Report (IMR)***, ***Interchange Justification Report (IJR)***, or the ***Interchange Operational Analysis Report (IOAR)***. The ***IMR***, ***IJR***, or ***IOAR*** may be done in conjunction with, or prior to the PD&E phase.
6. Intersections – Projects involving new or modified intersections may require additional operational analysis to determine the best intersection treatment (signed, signal, additional turn lanes, roundabout, etc.).

4-2.5.2.5 Value Engineering

Projects with an estimated cost of \$25,000,000 or more (including cost of design, ROW, and construction), or \$20,000,000 for a bridge on the federal-aid system shall have a minimum of one ***Value Engineering (VE) Study***, in accordance with ***Procedure No. 625-030-002, Value Engineering Program***. The VE study should be conducted during Planning, PD&E, or Initial Engineering Design. For Design-Build Projects, the VE study shall be conducted prior to the release of the ***Request for Proposal (RFP)***. The greatest potential for improvement in a project is during the early phases of development; therefore it is the Department's objective to schedule studies during these phases of project development. In order to achieve maximum results of the VE effort, close coordination should begin between the Project Manager and the District Value Engineer 60 days prior to the first VE team meeting, and continue until final implementation has occurred. The District Value Engineer will provide the technical assistance to conduct the VE Study; however, the Project Manager holds responsibility for various tasks associated with the value engineering function during the PD&E phase. Such tasks will include:

1. Ensuring consultant scopes of service include appropriate language to identify products and support functions required of the consultant to aid the VE team
2. VE is an event oriented function; therefore, schedule the studies when maximum opportunity for value improvement considerations and implementation are possible. Such opportunities will normally be:
 - a. Following the completion of tasks associated with corridor analysis and/or development of concepts
 - b. Prior to completing the draft Environmental Document for public availability before the public hearing
3. Providing complete project data and information relative to the current project status
4. Coordinating consultant activities relative to the support of the VE team
5. Coordinating and participating in the thorough evaluation of the VE team's recommendations
6. Responding to the VE team within 30 days, relating the VE recommendations accepted for implementation and supplying appropriate justification for recommendations not included in future plans
7. Ensure implementation of approved VE recommendations

4-2.6 Coordination

The Project Manager is responsible for timely coordination with other functional areas within the District to ensure proper development and evaluation of the project alternatives. The most important factor is utilizing the expertise of the support personnel in order to perform a comprehensive evaluation based on good design and cost estimations. Coordination will need to take place with the environmental and engineering staff on a continuous basis. The environmental staff shall be involved in the development of alternatives, and be responsible for the determination of environmental impacts. In addition, prior to making commitments, coordinate with appropriate staff to ensure commitments are viable and ensure that they are approved by appropriate staff.

During the development and evaluation of alternatives, the viable alternatives shall be reviewed for situations that would require a design variation or exception. If a variation or exception is needed, the Project Manager shall coordinate with the District Design Engineer to provide proper documentation and receive District or Central Office approval as required.

In addition, if the project has federal involvement, the Project Manager shall coordinate the project development efforts with the lead federal agency on a continuous

basis. Coordination with FHWA's bridge section is required for special bridge structures such as moveable bridges, historic bridges and signature bridges. Coordination with US Coast Guard and Army Corps of Engineers is also required for permitting purposes.

Feasible alternatives should be coordinated with the District Roadway and Structures Design Engineers, and the FHWA Transportation Engineer. Alternatives need to be reviewed for proper application of geometric design elements including design speed, typical section details, superelevation and horizontal and vertical alignment.

Alternatives, including the conceptual Temporary Traffic Control (TTC) Plan/Transportation Management Plan (TMP), should be reviewed by the Construction Office for input on possible constructability issues or solutions (**Part 2, Chapter 19, FDOT Plans Preparation Manual**). If necessary, make and document agreements with local authorities for use of local roadways for detours or special needs of law enforcement, school or emergency vehicles or abandonment of a roadway segment. Retain comments and responses on the preliminary **TMP** in the project files.

The Project Manager shall have the District Structures Design Engineer and/or the FHWA Transportation Engineer and bridge section review and comment on the conceptual location and design recommendations for each bridge alternative and the alternative costs, including any cost-benefit analysis used for selecting or recommending structure alternatives. Consult the District Structures Design Engineer if non-standard signs, lighting, signals or other miscellaneous structures are under consideration.

The District Drainage Engineer should review tidal projects to determine if coastal hydraulics plays a significant role in a roadway or bridge project's design. If so, a qualified coastal engineer should review the project in accordance with **Topic No. 625-040-002, Drainage Manual** revised January 2009.

4-2.7 Typical Section Concurrence

During the development of alternatives, the typical sections under consideration shall be coordinated with the District Design Engineer (DDE). After the Public Hearing is completed and the project alternative approved, a **Typical Section Package** will be finalized in accordance with **Chapter 16, Volume 1, Topic No. 625-000-007** (pavement design will not be included at this stage). A copy of the approved **Typical Section Package** should be included in the **PER** for Type 2 CEs, EA with FONSI, EIS, and SEIRs.

4-2.8 Permits

The scoping of permits for the project starts during the ETDM Programming phase. Representatives from each of the environmental permit agencies are on the ETAT, and should comment on the general project (including potential permits from their agency).

If the submittal of permit applications is scheduled during the PD&E phase, additional engineering analysis may be required. Early coordination with the regulatory agencies is necessary to determine the level of detail required. For more information on the environmental permit process, see **Part 1, Chapter 12, Environmental Permits**, of this manual.

4-2.9 Documentation

Project Development documentation consists of the Environmental Document, as well as the results of any environmental technical studies, engineering studies and reports prepared to support engineering decisions, permits, and preliminary design activities. This section describes the requirements for the **PER** which is prepared to support engineering decisions.

A complete project file must be kept, and include technical reports or memoranda and any other documentation supporting the decisions made. The project file should be available to provide to the lead agency upon request.

4-2.9.1 Preliminary Engineering Report

The purpose of the **PER** is to provide technical engineering information to the Design Project Manager, Design Team, Permit Coordinators and ROW professionals. The **PER** supplement's information provided in the **Environmental Document**. This report should support the decisions made related to the project alternatives. It will include information to be used in the design phase of the project and should be written to an audience of engineers and other technical professionals. A Professional Engineer licensed in the State of Florida shall sign and seal the **PER** following procedures set forth in the **Florida Administrative Code**. The original signed and sealed copy of the **PER** should remain in the project file.

The following is a suggested outline for a **PER**:

1. Cover Page

The cover page should contain the following statement:

“This preliminary engineering report contains detailed engineering information that fulfills the purpose and need for project _____.”

Fill in the blank with the project title as noted on the Environmental Document, the limits of the project, and the date. See **Figure 4.1** for a sample cover page.

2. Summary of Project

a. The summary of the **PER** should include the following statement:

“This preliminary engineering report contains detailed engineering information that fulfills the purpose and need for project _____.”

Fill in the blank with the project title as noted on the Environmental Document, the limits of the project, and the date. This should match what is included on the cover page.

b. Commitments and Recommendations -This section should be exactly the same as in the Environmental Document. Engineering and environmental commitments should be coordinated and documented in the **PER** and the Environmental Document.

c. Description of Proposed Action - Briefly explain the proposed project/preferred alternative. Include the project location and termini, typical section and major intersections and interchanges.

3. Existing Conditions – Include information obtained in accordance with **Section 4-2.5.2.2**

4. Planning Phase/Corridor Analysis - Summarize decisions made during the Planning phase, including alternatives eliminated from further consideration and viable alternatives advanced into PD&E

5. Project Design Standards - List required design standards obtained in accordance with **Section 4-2.5.2.1**

6. Alternative Alignment Analysis

a. No - Build Alternative (advantages and disadvantages should be considered)

b. Transportation Systems Management and Operations (updating existing facility such as adding turn lanes, improving intersection signalization, improve signing, sidewalks, etc.)

c. Multi-Modal Alternatives

d. Alternative Evaluation (for each alternative)

1. Typical Section

2. Horizontal and Vertical Alignment

3. Conceptual Plans

4. ROW

5. Cost Estimates (all ROW and construction costs)
 6. Preliminary Drainage
 7. Utilities
 8. Traffic Control Concepts
 9. Bicycle and Pedestrian Accommodations
 10. Multi-modal Accommodations
 11. Access Management
 12. Engineering Evaluation of Environmental Impacts
 13. Bridge Analysis
 14. Interchange/Intersection Layouts
 15. Design Exceptions/Variations
 16. Safety Analysis in accordance with **NCHRP 17-38, Highway Safety Manual** (optional)
 17. Other details or requirements
- e. Evaluation Matrix – compare all major impacts, at a minimum include:
1. Construction costs
 2. ROW costs
 3. Engineering costs (Design and CEI)
 4. Business damages
 5. Bicycle and pedestrian facilities
 6. Traffic control
 7. Environmental impacts (noise, air, **Section 4(f)**, wetlands, contamination sites, etc.)
 8. Socioeconomic (ROW requirements, relocations, aesthetics, traffic flow improvements, neighborhood and social impacts, etc.)

9. Operational analysis

f. Recommended Alternative - explain which alternative was chosen by the FDOT and/or project sponsor and the rationale

7. Design Details of Recommended Alternative

a. **Typical Section Package**

b. Intersection Concepts and Signal Analysis

c. Design Traffic Volume

d. ROW Needs and Relocation

e. Costs Estimates

f. Schedule

g. Pedestrian and Bicycle Facilities

h. Utility Impacts

i. Temporary Traffic Control Plan

j. Drainage

k. Bridge Analysis

l. Special Features

m. Access Management

8. Conceptual Design Plans

9. List of Technical Reports Completed for the Project

4-2.9.2 Environmental Documents

Each project will have a COA determination upon the completion of the **Final Programming Screen Summary Report**. The project will proceed as a CE, EA or an EIS. Non-federal projects with FDOT involvement will require a SEIR if they qualify for screening in the EST. Type 1 CEs and Programmatic CEs are processed as outlined in **Part 1, Chapter 2, Environmental Class of Action Determination**, of this manual.

Some of these projects as well as some Type 2 CEs evaluated through the MiCE process should be addressed on a case by case basis.

Processing

For federal projects, after completion of the Public Hearing (if required), the Department shall submit the required Environmental Document along with the **Public Hearing Transcript** for the project to the FHWA Division Administrator for Location and Design Concept Acceptance (LDCA). The appropriate planning consistency form (**Figures 4.2 and 4.3**) with attached Long Range Transportation Plan (LRTP), Transportation Improvement Plan (TIP), and State Transportation Improvement Plan (STIP) pages should also be submitted to FHWA. **Figure 4.3** is to be completed for projects with segmented implementation. These checklists are intended to document and demonstrate project plan consistency, which is necessary to receive FHWA approval of the Environmental Document. Depending on the Environmental Document, you may have to upload the drafts **approved** for public availability by the lead agency and subsequently the documents receiving LDCA to the EST. For specific details on submittal requirements for Type 2 CEs refer to **Part 1, Chapter 5, Type 2 Categorical Exclusion**, for EAs and EISs refer to **Part 1, Chapters 7, Finding of No Significant Impact and 9, Final Environmental Impact Statement**, of this manual.

For projects requiring a SEIR, the approval by the District Secretary or designee will be included in the Final SEIR, and the project may advance to the next phase. For details on processing a SEIR, refer to **Part 1, Chapter 10, Non-Federal Projects**, of this manual.

Type 2 Categorical Exclusions

Type 2 CEs are projects with no known significant impacts but which may require more detailed analysis of relevant issues and public involvement. These projects go through a PD&E phase before advancing into the design phase. The document of record for LDCA is the signed **Type 2 Categorical Exclusion Determination Form**. The Type 2 CE documentation consists of this form, the **PER**, and environmental technical studies required to support the project's classification as a CE. The planning consistency form should be submitted with the Type 2 CE documentation when LDCA is requested from FHWA. The processing and documentation of CEs are discussed in **Part 1, Chapter 2, Environmental Class of Action Determination**, of this manual.

Environmental Assessments (EA)

An EA is prepared for actions in which the significance of the environmental impact is not clearly established. Depending on the significance of the impacts, an EA will result in a FONSI where the analysis of the technical studies indicates that no significant environmental impact will result from the proposed project or an EIS if

significant environmental impacts are identified. In either case, these projects will require environmental technical studies to comply with **NEPA**, address Programming phase comments, or to investigate other possible impacts as necessary. The appropriate planning consistency form should be submitted to FHWA with the EA to show the progression to consistency, and with the FONSI when LDCA is requested. The processing, review and approval of an EA and a FONSI are discussed in **Part 1, Chapters 6, Environmental Assessment and 7, Finding of No Significant Impact**, of this manual.

Environmental Impact Statements (EIS)

All projects that are determined to have a significant environmental impact require an EIS and should address environmental issues identified during the Programming and PD&E phases. The appropriate planning consistency form should be submitted to FHWA with the DEIS to show the progression to consistency, and with the FEIS when LDCA is requested. An EIS receives LDCA once the **Record of Decision (ROD)** is approved by the lead federal agency. The processing, review, and approval of the Draft EIS and Final EIS are described in **Part 1, Chapters 8, Draft Environmental Impact Statement and 9, Final Environmental Impact Statement**, of this manual.

State Environmental Impact Reports (SEIR)

Transportation projects qualifying for EST screening with FDOT involvement, and without federal involvement require a SEIR. The processing, review, and approval of a SEIR are described in **Part 1, Chapter 10, Non Federal Projects**, of this manual.

Environmental Technical Studies

Environmental technical studies are prepared and processed according to the appropriate Chapters in **Part 2 of the PD&E Manual**. These studies will be prepared in response to the relevant issues raised during the Programming phase or identified during PD&E. Upload technical studies for review by the appropriate ETAT agencies (at the District's discretion) into the EST. This will allow the District to address ETAT commentary or seek concurrence prior to finalizing the Environmental Document and formal submittal of the Type 2 CE documentation, EA or EIS.

Below is a list of environmental technical studies that may be performed during Project Development:

1. **Wetlands Evaluation Report**
2. **Water Quality Impact Evaluation Checklist**
3. **Endangered Species Biological Assessment** including **Section 7** Consultation

4. **Noise Study Report**
5. **Air Quality Report**
6. **Contamination Screening Evaluation Report**
7. **Asbestos Inspection and Hazard Assessment Report**
 - *Asbestos Abatement Plan* (if required)
8. **Conceptual Stage Relocation Plan**
9. **Section 4(f) Evaluation**
10. **Section 6(f) Screening**
11. **Cultural Resource Assessment Survey Report**
 - **Section 106 Case Report** (if required)
12. **Sociocultural Effects Evaluation Report**
13. **Essential Fish Habitat Assessment**
14. **Location Hydraulics Report**

4-2.9.3 Project Reports and Documentation

The Project Manager is responsible for collecting project documentation. Below is a list of reports and design information the Project Manager should have in the file at the completion of the PD&E phase. Additional environmental and technical reports, which are the basis of PD&E decisions, should also be in the file.

1. **Preliminary Engineering Report**
2. **Traffic Report**
3. Approved Environmental Document (Type 2 CE documentation, FONSI, FEIS, or SEIR)
4. **Typical Section Package**
5. Preliminary stormwater design (including any drainage reports, preliminary drainage design, and/or **Pond Siting Report**)

6. Preliminary plans for preferred alternative with ROW dimensions
7. File correspondence with coordination efforts
8. Utility coordination information
9. Conceptual Temporary Traffic Control (TTC) Plan/Transportation Management Plan (TMP)
10. Preliminary bridge analysis with supporting location and design recommendations for each viable structure alternative (if applicable). For any critical, landmark or signature structure, include potential security issues. For any coastal bridge, include any required analysis.
11. A bridge hydraulic report for the selected alternative (if a bridge over water is included in the project)
12. **Preliminary Scour Analysis** (for bridges over water)
13. **Asbestos Inspection and Hazard Assessment Report** (as appropriate per **Procedure No. 625-020-020 Asbestos on Bridges**)
14. Copy of **DEP Form 62-257.900(1)-Notice of Asbestos Renovation or Demolition** (This form should be added to the project file when completed during PD&E or Design)
15. **Asbestos Abatement Plan** (This form should be added to the project file when completed during PD&E or Design)
16. **Conceptual Access Management Plan**
17. Major Intersection and Interchange Concepts (if applicable)
18. **Value Engineering Study Summary** (conditional)
19. **Interchange Justification or Modification Report** (if applicable)
20. Safety Analysis in accordance with **NCHRP 17-38, Highway Safety Manual** (optional)

4-2.10 Reevaluations

A Reevaluation ensures project compliance with all applicable federal and state laws prior to the advancement of the project to the next major production phase (final design, ROW acquisition, or construction advertisement). Any change in design or environment, or laws which may have come into effect since the approval of the

approved final Environmental Document or any previous reevaluations are addressed. **Part 1, Chapter 13, Reevaluations**, of this manual explains the required reevaluation process for environmental studies and supporting documentation.

4-3 REFERENCES

1. ETDM Planning and Programming Manual, FDOT, Topic No. 650-000-002
www.dot.state.fl.us/emo/
2. FDOT Policy No. 000-725-010, Major Urban Corridor Studies
3. FHWA, Guidance on Using Corridor and Subarea Planning to Inform NEPA, April 5, 2011
4. Transportation for Individuals With Disabilities, Federal Rule, 49 CFR Parts 27, 37, and 38
5. NCHRP 672, Roundabouts: An Informational Guide, Second Edition, 2010
6. FHWA Guidance "Roundabouts: An Informational Guide, FHWA-RD-00-067, June 2000
7. Title 23, CFR, Section 636.103 (23 CFR 636.103)
8. FHWA ORDER Classification Code 6640.1A, Policy on Permissible Project Related Activities during the NEPA Process, October 1, 2010
9. Plans Preparation Manual, Volume I, FDOT Topic No. 625-000-007 and Volume II, FDOT Topic No. 625-000-008 www.dot.state.fl.us/rddesign/PPMManual/PPM.htm
10. Section 4.6, Drainage Manual, Topic No. 625-040-002
11. Project Traffic Forecasting Procedure, Topic No. 525-030-120
12. Rule Chapter 14, Department of Transportation, Florida Administrative Code (FAC)
13. FDOT Quality/Level of Service Handbook: www.dot.state.fl.us/planning/publications/
14. Highway Capacity Manual, TRB, HCM2000
15. Transit Capacity and Quality of Service Manual, TRB, May 16, 2009
16. 28 CFR Part 36 ADA Standards for Accessible Design
17. Value Engineering Procedure, Topic No. 625-03-002

18. FDOT Project Management Handbook:
<http://www.dot.state.fl.us/projectmanagementoffice/PMHandbook/pmhandbookindex.shtml>
19. FHWA Guidance: NEPA Implementation Guidance for Preparing and Processing Environmental and Section 4(f) Documents
20. NCHRP 17-38, Highway Safety Manual
21. FDOT Procedure No. 625-020-020, Asbestos on Bridges

4-4 HISTORY

1/12/2000, 5/20/2008

PRELIMINARY ENGINEERING REPORT

Florida Department of Transportation

ETDM Number
Financial Management Number
Federal-Aid Project Number (if applicable)

This preliminary engineering report contains detailed engineering information that fulfills the purpose and need for project _____.

___ / ___ / ___
Date

Professional Engineer

Seal below

FIGURE 4.1 Preliminary Engineering Report Sample Cover Page

Planning Requirements for Environmental Document Approvals						
Document Information:						
Date:	(Current Date)	Document Type:		EIS/EA/CE II	Document Status:	Draft/Final
Project Name:	(PD&E Project Title)				FM #:	(PD&E FM#)
Project Limits:	(NEPA Logical Termini/PD&E Study Limits)				ETDM #:	
Are the limits consistent with the plans?		Y/N (Limits presented for approval should be consistent with LRTP, TIP/STIP. If no, explain)				
Identify MPO(s) (if applicable):		(Provide MPO(s) Name)		Original PD&E FAP#: (FAP# Assigned to the PD&E if applicable)		
Currently Adopted CFP-LRTP	COMMENTS					
Y/N	(If N, then provide detail on how implementation and fiscal constraint will be achieved)					
PHASE	Currently Approved TIP	Currently Approved STIP	TIP/STIP \$	TIP/STIP FY	COMMENTS	
PE (Final Design)	Y/N	Y/N	\$		(provide comments as appropriate describing status, activities, and implementation steps needed to achieve consistency)	
R/W	Y/N	Y/N	\$		(provide comments as appropriate describing status, activities, and implementation steps needed to achieve consistency)	
Construction	Y/N	Y/N	\$		(provide comments as appropriate describing status, activities, and implementation steps needed to achieve consistency)	
Project Segmented:	N					
FDOT Preparer's Name:				Date:	Phone #	
Preparer's Signature:				Email:		
*Attach: LRTP, TIP, STIP pages						

FIGURE 4.2 Planning Requirements for Environmental Document Approvals

Planning Requirements for Environmental Document Approvals with Segmented Implementation

Document Information:		Date: (Current Date)	Document Type: EIS/EA/CE II	Document Status: Draft/Final
Project Name:	(PD&E Project Title)		FM #: (Original FM#)	
Project Limits:	(NEPA Logical Termini/PD&E Study limits)		ETDM #:	
Are the limits consistent with the plans?		Y/N (Limits presented for approval should be consistent with LRTP, TIP/STIP. If no, explain)		
Identify MPO(s) (if applicable):	(Provide MPO(s) Name)	Original PD&E FAP#	(FAP# Assigned to the PD&E if applicable)	

Segment Information: (Add additional tables as needed to describe all segments within the logical termini limits. Clearly identify segment representing the next funded phase)					
Segment Limits:			Segment FM #:		
Currently Adopted CFP-LRTP	COMMENTS				
Y/N	(If N, then provide detail on how implementation and fiscal constraint will be achieved)				
PHASE	Currently Approved TIP	Currently Approved STIP	TIP/STIP \$	TIP/STIP FY	COMMENTS
PE (Final Design)	Y/N	Y/N	\$		(provide comments as appropriate describing status, activities, and implementation steps needed to achieve consistency)
R/W	Y/N	Y/N	\$		(provide comments as appropriate describing status, activities, and implementation steps needed to achieve consistency)
Construction	Y/N	Y/N	\$		(provide comments as appropriate describing status, activities, and implementation steps needed to achieve consistency)

Segment Information: (Add additional tables as needed to describe all segments within the logical termini limits. Clearly identify segment representing the next funded phase)					
Segment Limits:			Segment FM #:		
Currently Adopted CFP-LRTP	COMMENTS				
Y/N	(If N, then provide detail on how implementation and fiscal constraint will be achieved)				
PHASE	Currently Approved TIP	Currently Approved STIP	TIP/STIP \$	TIP/STIP FY	COMMENTS
PE (Final Design)	Y/N	Y/N	\$		(provide comments as appropriate describing status, activities, and implementation steps needed to achieve consistency)
R/W	Y/N	Y/N	\$		(provide comments as appropriate describing status, activities, and implementation steps needed to achieve consistency)
Construction	Y/N	Y/N	\$		(provide comments as appropriate describing status, activities, and implementation steps needed to achieve consistency)

FDOT Preparer's Name:		Date:		Phone #:	
Preparer's Signature:		Email:			
*Attach: LRTP, TIP, STIP pages					

FIGURE 4.3 Planning Requirements for Environmental Document Approvals with Segmented Implementation