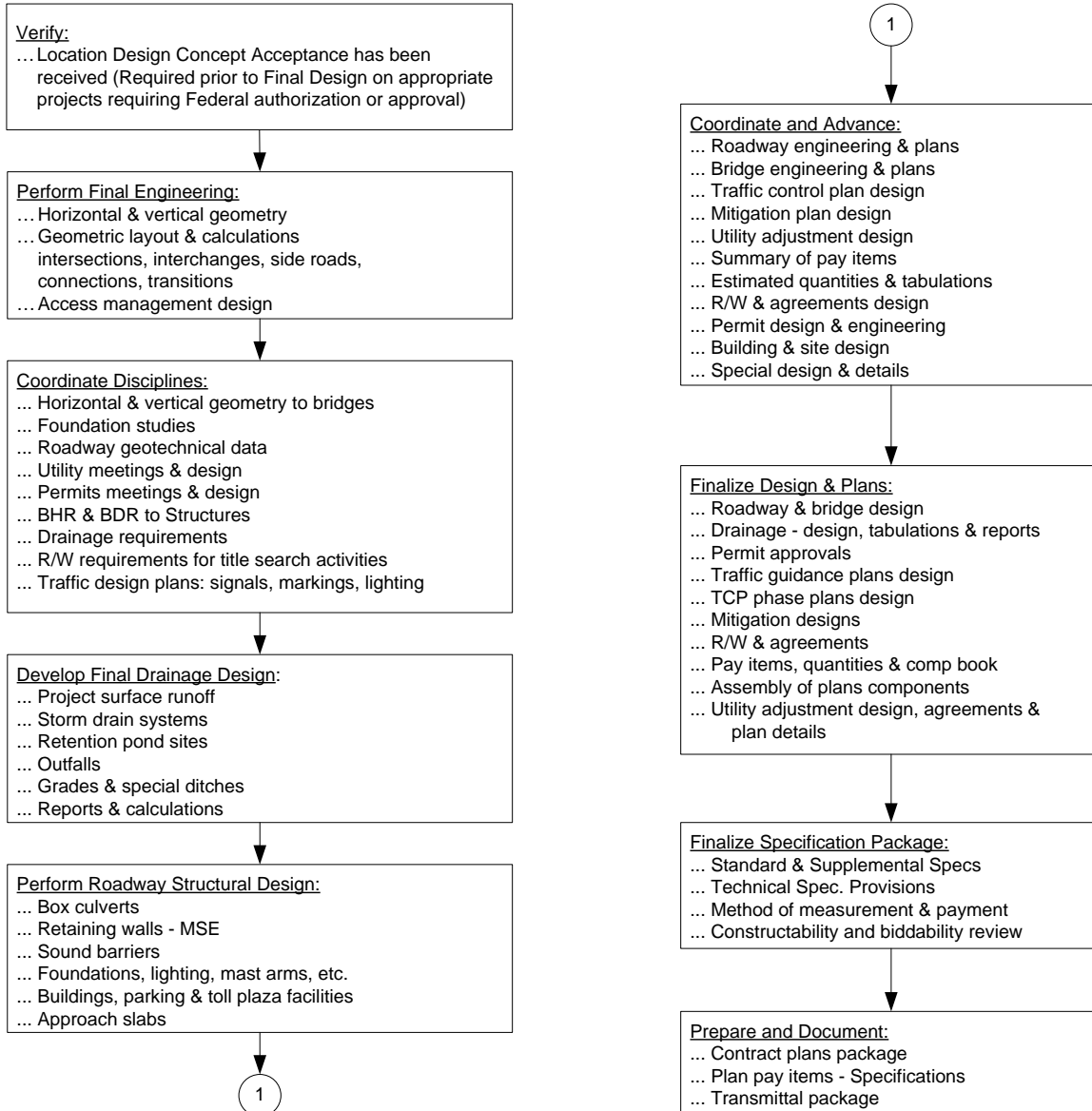


Chapter 14

Final Engineering Design Process

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Exhibit 14-A Major Activities – Final Engineering Design Process



Chapter 14

Final Engineering Design Process

14.1 General

The final engineering design process follows the initial engineering design process and review (see **Chapters 13** and **16** of this volume). The final engineering design phase should be roughly 50% of the total effort. The primary objective of the final engineering design phase is to prepare contract plans and specifications that can be used to bid and construct the project with a minimum of field changes, delays, and cost overruns.

On projects requiring Federal authorization where the Design Phase and the PD&E Phase overlap, the Department must receive Location Design Concept Acceptance (LDCA), prior to acceptance of the Phase II submittal (prior to advancing into Final Design). The Design Project Manager must coordinate with the PD&E Project Manager, or the District Environmental Management Office to insure that that the Department has received LDCA for the project. The Project Manager will need to convey this information to the district federal aid staff in the District Work Program Office. (See the **Project Management Handbook, Part 2, Chapter 3** for further information).

14.2 Final Engineering Design

The Engineer and Project Manager must coordinate all activities to ensure that the quality, accuracy, and appropriate decisions go into the performance of each step. The project quality control should include a plan-do-check routine for each set of activities or operations.

The major design activities include, but are not limited to, the following:

1. Pavement design
2. Drainage design
3. Structural (bridge) design
4. Structural (roadway) design
5. Roadway design including access management, earthwork, geometrics, ADA, etc.
6. Traffic plans design including signing, marking, signals, lighting, etc.
7. Utility adjustment design
8. Permit preparation design including ponds, mitigation, etc.

9. Traffic control plans (work zone) design
10. R/W requirements design
11. Building and site design including landscaping, ADA, transit, etc.
12. Estimates and computation book preparation
13. Specifications and special provisions
14. Landscaping design
15. Sound barrier design

Project stationing information is to be checked and entered into the Work Program Administration (WPA) system during final engineering design. This information is important for tying construction records, such as material coring, sampling and testing to other databases. The information is entered by stations, which are related to roadway mile post for later information retrieval.

The project designer is responsible for finalizing the project stationing. The District Design Engineer should designate an individual to be responsible for coordinating the input of stationing information into the WPA system.

The begin/end stations and station equations are entered into the WP50 computer screen under FM on the FDOT CL/SUPERSESSSION Main Menu for each WPA location. After logging onto SUPERSESS, the WP50 designees enter on FM (Financial Management System). On the FM Main Menu, press ENTER: 3 for WPA (Work Program Administration). On WPA Main Menu, press ENTER: 25 for WP50 (Station Definition).

Update access to WP50 screen is granted through the Work Program Development Office in Tallahassee. Listed below are the important edit and browse features:

1. Only enter FM Item_Segment number on the top line.
2. The RDWYLOC sequence number displays on the top line of the screen and on the first line of the header information. It's entered on the top line to retrieve a particular location.
3. The transaction type "00" is entered on the top line to browse all station equation information for that RDWYLOC. The transaction type "02" is entered on the top line to update all station equation information for that RDWYLOC. The transaction type "99" is entered on the top line to erase all station equation information for that RDWYLOC.
4. Press the F8 key will forward from one RDWYLOC to the next RDWYLOC on the same Item_Segment number. Press ENTER key to update or delete data on the screen depending on the transaction type but will not page forward.
5. Press F3 key will take the user to the FM main menu while press F15 key will take the user back to the SUPERSESS main menu.

After entering the station information, it is important to check to see if the milepost limits in WPA are still accurate. This can be accomplished by reviewing the WP50 computer screen.

If the project length has changed, the District Work Program Office should be advised to correct the mileposts.

This information will become increasingly important as Geographic Information Systems increase in use and project locations are automatically mapped based on milepost limits.

14.3 Contract Plans Preparation

The outcomes of the engineering design activities are component sets of contract plans developed using CADD. The major component sets may include:

1. Roadway
2. Signing and Pavement Marking
3. Signalization
4. Intelligent Transportation Systems (ITS)
5. Lighting
6. Landscape
7. Architectural Plans
8. Structures Plans

Utility Work by Highway Contractor Agreement Plans have a separate Financial Project ID and are placed in the back of the contract plans set.

These component sets, the specifications package, and the TRNS*PORT pay item listing and quantities are assembled and packaged as the construction contract letting documents.

14.4 Specifications

The Engineer of Record must develop engineering designs that can be constructed, controlled, measured and paid for under the current **FDOT Specifications**. In the event the work required is not covered by the standard specifications or the supplements and special provisions thereto, the Engineer must develop Technical Special Provisions to be made part of the contract for this project. The Engineer can obtain Department procedural guidance to assist with the preparation.

14.5 Pay Items and Summaries of Quantities

As the engineering plans and specifications are prepared, the quantities are calculated, tabulated, and summarized by Pay Item (of work) as stipulated by specifications and the ***Basis of Estimates Manual***. The summary of pay items is updated as quantities are determined and summarized.

14.6 Assemble Contract Plans Package

The completed plans, specifications, and District estimate are transmitted to the central office for letting or they are assembled and held in the district for district advertisement and letting. ***Chapter 20*** of this volume provides further guidance on the contents of the transmittal.