

Final Design Guideline

April, 2019



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Table of Contents

<i>Purpose</i>	1
<i>Introduction</i>	1
<i>FD Support</i>	1
<i>Roadway and Structural</i>	2
<i>Agreement</i>	3
Utility Agreement.....	3
Jurisdictional Agreement	3
<i>Railroad</i>	4
<i>Environmental</i>	4
Reforestation	4
Wetlands	4
Soil Erosion.....	4
Cultural Resources Mitigation.....	5
Site Contamination	5
Environmental Permits	5
<i>Access & Right of Way</i>	5
<i>Green Acres</i>	6
<i>FD Plan Support</i>	7
<i>Submission and Approval</i>	7

Purpose

The purpose of this document is to provide relationship guidance on the work performed in the Final Design (FD) Phase of the New Jersey Department of Transportation (NJDOT) Project Delivery Process. This guide is primarily intended for Division of Project Management Project Managers, Division of Highway and Traffic Design staff, Division of Bridge Engineering and Infrastructure Management staff, Division of Capital Program Support staff, Division of Right of Way and Access Management staff and NJDOT Subject Matter Experts (SMEs) and other stakeholders involved in the project delivery process. The following documents can be referenced for additional information:

- Final Design Network Diagram
- Final Design Activity Descriptions
- Final Design Work Breakdown Structure (WBS) Dictionary

The primary objectives of the FD Phase are to complete the project design, acquire the environmental permits and obtain any necessary right of way (ROW).

Introduction

This guide is divided into sections reflecting the major areas of the work of the FD phase. The sections are: FD Support, Roadway and Structural, Agreement, Railroad, Environmental, Access & Right of Way, Green Acres, FD Plan Support and Submission and Approval.

The content and format of the guidelines for each phase of the Project Delivery Process (PDP) are slightly different. Because of the complex and coinciding work paths in FD, this guideline is intended to provide the reader with a better understanding of how all of the work in FD is connected and accomplished. For ease of use, FD activity names and numbers are referenced. The activity number appears in parenthesis after the referenced activity. An example of this is below:

The first work performed in the FD Phase is to *Initiate FD* (4010). This work involves a kickoff meeting and a review of the approved PE documents.

FD Support

The FD Support work consists of activities *Prepare Financial Plan (Major Projects)* (4785), *Update Project Management Plan (Major Projects)* (4790), and *Execute Final Design Public Involvement Action Plan* (4795). A Major Project is defined as a project receiving Federal financial assistance that is estimated to have a total cost of \$500,000,000 or more. Annual updates to the Financial Plan are required for Major Projects, as well as any project that receives Federal financial assistance over \$100,000,000, until the project has completed construction. The work for updating the Project Management (PM) Plan for Major Projects is needed if significant changes have occurred to the project scope or management approach since the PM Plan for Major Projects was approved in Preliminary Engineering.

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Every phase of the PDP has public involvement. The work effort to *Execute Final Design Public Involvement Action Plan (PIAP)* may include public information centers and public meetings, as well as work sessions/focus groups with local officials.

Roadway and Structural

The initial roadway and structural work in FD includes the *Prepare ITS Facilities Layout Plans (4250)* activity to aid in the development of activities, *Develop Alternatives of Accommodation (4050)*, *Complete Horizontal/Vertical Geometry (4210)* and *Conduct Supplemental Surveys (4215)* for any areas not addressed in previous surveys. Next, work can begin to *Develop Landscape Architectural Design (4260)* based on the Approved Project Plan and *Complete Landscape Architectural Design (4265)* based on the conceptual landscape architectural plans.

This roadway work culminates in the activity *Prepare Final Roadway Plans (4220)*. The final roadway plans are prepared in accordance with the NJDOT Sample Plans. The work needed to complete the final roadway plans is performed in *Complete Lighting Design (4230)*, *Complete Traffic Signal, Signing and Striping Plans (4240)*, *Complete Drainage Design (4270)*, and *Complete ITS Facilities Plans (4255)*. Once the ITS Facilities Plans are produced, work can begin to *Complete Final Design Systems Engineering Review Form (4235)*. The final roadway plans and FD Systems Engineering Review Form are part of the product from activity *Prepare Final Design Submission Package (4290)*.

The initial structural work in FD includes *Submit Draft Final Noise Study (4140)*, *Obtain Noise Mitigation Community Support (4145)* from local officials and the community and *Submit Final Noise Study (4150)* for approval. The Final Noise Study documents the location, height and aesthetics of proposed noise barriers or other sound attenuation measures. With approval of the Study, noise related structures can be designed. This work is accomplished in the *Prepare Noise Barrier Details (4175)* activity. The noise barrier details are included within the Final Roadway Plans and Final Structures Documents

While the noise work is occurring, structural work can proceed with the *Develop Subsurface Exploration Program (4300)* activity to evaluate foundation support, settlement, slope stability and ground water condition and the *Gather Subsurface Information (4305)* activity to conduct drilling, sampling and in-situ testing under the supervision of the Designer who classifies the samples. Initial structural work in FD also includes *Complete Hydrologic & Hydraulic Analysis (4310)* for all projects proposing a change to the bridge opening, roadway profile, or any activity within the 100-year floodplain of a stream with a drainage area over 50 acres to the point of interest. The *Complete Final Bridge Analysis (4315)* work includes performing scour calculations and incorporates countermeasures, if needed, in the structural design.

Once the subsurface and final bridge analysis work is complete, work can begin to *Conduct Geotechnical Foundation, Roadway and Rock Slope Design (4320)*. The final structural work is *Prepare Final Structures Documents (4160)*. These documents are part of the FD Submission package.

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Agreement

The Agreement work consists of two unique FD support agreements: Utility Agreement and Jurisdictional Agreement.

Utility Agreement

The utility agreement work can consist of either master utility agreements or individual utility engineering or construction agreements (UECAs). The first step in the master utility agreements process is to *Determine Utility Master Agreement Applicability (4035)*. If a master agreement is to be used, work needs to be done to *Prepare Utility Master Agreement Change Order (4040)*. The change order is submitted to the Utility Management Unit for approval. The next work is to *Execute Utility Master Agreement Change Order (4045)*.

If UECAs are used, the first step is to *Develop Alternatives of Accommodation (4050)* with each utility company. The alternatives show the different possibilities for addressing the utility relocation work. If necessary and approved by the Project Manager, the Designer may *Conduct Supplemental Subsurface Utility Engineering (4085)*. The next work is to *Prepare Utility Owner Design Authorization Checklist (4055)*. Each utility checklist shows the existing and proposed utilities and is agreed to by the utility company. Upon receipt of approved checklists, work can begin to *Prepare Utility Agreement Plans, Specifications and Estimates (4060)*. A utility agreement plan provides an overview of the existing and proposed utility location and is attached to each corresponding utility agreement modification. The next sequential activity in this process is *Approve Utility Agreement Plans, Specifications and Estimates (4065)*. Once approved, the final utility accommodations are shown on the roadway plans during the *Incorporate Utility Design in Contract Documents (4090)* work.

The following utility support work is needed to complete the individual utility agreement process. The first step is to *Prepare Utility Agreement Modifications (4070)*. The existing utility agreement needs to be modified to reflect the utility construction work. The modification includes a detailed cost estimate and any relevant documents for execution. The next work is to obtain the *Utility Environmental Reevaluation (4075)* for utility modification approval and for any project that requires an authorization of utility work for advance utility relocations. The final step is *Authorize Utility Work (4080)*, which includes Executing the Utility Agreement Modifications or Master Agreement Change Order. Federally funded construction projects require a Utility Clearance Letter.

Jurisdictional Agreement

The Jurisdictional Agreement work begins with the *Prepare Jurisdictional Limit Maps and Agreements (4100)* activity. The maps are attachments showing jurisdictional responsibilities for the project and the agreement are the legal documents for those responsibilities. The next work is *Execute Jurisdictional Agreements (4105)*. The agreements and map attachments are officially agreed upon by the respective Agencies and the Department.

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Railroad

The FD railroad work begins with *Preparing Railroad 60% submission (4110)*. This work includes submitting the roadway or bridge plans to the railroad company at the 60% point of design. Next is *Address Railroad 60% Comments (4115)*. During this effort, the railroad company provides a force account estimate that includes material, labor and equipment for railroad construction work. Also, a Railroad Construction Agreement is prepared based on the estimate. If the NJDOT Diagnostic Team Leader (DTL) determines that the design of the roadway has been altered significantly after the initial Diagnostic Team Meeting was held or strong public opposition or comments are presented, the next work is to *Revisit Railroad Diagnostic Team Meeting (4130)*. The last work efforts of the FD railroad process are to *Prepare Railroad 100% submission (4120)* and to *Review Railroad 100% submission (4125)*.

Environmental

The major work efforts of FD environmental may include reforestation, soil erosion, wetlands, cultural resources mitigation, site contamination and environmental permits. Most of these work efforts progress simultaneously, and they all support and result in the Department receiving environmental permits.

Reforestation

The reforestation environmental work in FD begins with *Submit Reforestation Application (4440)*. The application is prepared using New Jersey Department of Environmental Protection (NJDEP) No Net Loss Reforestation Act Program Guidelines. Next, the *NJDEP Reviews Reforestation application (4450)*. The application is reviewed by the NJDEP Division of Parks and Forestry and the Community Forestry Council.

Wetlands

The wetland environmental work in FD begins with *Delineate Wetlands (4360)*. The wetlands are delineated to determine the extent of the wetland area. After delineation, work can commence on *Prepare Conceptual Wetlands Mitigation Plans (4350)*. The conceptual wetlands mitigation plans are developed while the drainage design is being completed. The subsequent work is to *Prepare Final Wetlands Mitigation Plans (4375)*. The plans and specifications contain the wetland mitigation grading, landscaping, hydrologic/hydraulic and erosion control requirements. Finally, the *NJDEP Approves Final Wetland Mitigation Plans (4380)*. The plans are reviewed by NJDEP during a 60-calendar day review period. The approved Final Wetland Mitigation Plans are included in the contract documents. For certain projects, a wetlands monitoring plan may be a permit approval condition to monitor newly constructed wetlands to determine if they are successful. The planning work is accomplished within the *Prepare Wetlands Monitoring Plan (4355)* effort.

Soil Erosion

After the wetlands are delineated, work can begin to *Prepare Soil Erosion and Sediment Control Report and Plans (4410)*. The Soil Erosion and Sediment Control (SESC) Report identifies the areas

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requiring temporary and permanent erosion control and identifies the type of controls. The SESC Plans are based on the engineering/design need incorporating the controls and features identified in the SESC report. The next work effort is to *Review Soil Erosion and Sediment Control Report and Plans (4430)*. The SESC Report and Plans should be in conformance with the NJDOT SESC Manual.

Cultural Resources Mitigation

Based on the cultural resources commitments, work can commence to *Develop Cultural Resources Mitigation Measures (4550)*. This work may include cultural resources mitigation reports (e.g., Historic American Engineering Record).

Site Contamination

Based on the findings from the hazardous waste screening prepared for the environmental document, an investigation is conducted at all sites with contamination concerns to determine the presence of contamination. This is done in *Conduct Contamination Site Investigation (Initial Sampling) (4520)*. The investigation will include the development and implementation of a sampling plan to assess the presence of contamination at all sites of concern. Depending on the findings of the Site Investigation Report, work may need to be done to *Conduct Remedial Investigation (Delineation Sampling) (4540)*, which will include a detailed sampling plan at sites with additional contamination concerns. If the Site Investigation or Remedial Investigation identifies contaminated material (i.e., soil, groundwater) within the proposed project limits, the next step is to *Prepare Material Management Plan (4570)* to provide a set of procedures to be employed when contaminated soil and/or groundwater are encountered during construction activities. The Material Management Plan is submitted to BLAES for review and acceptance.

Environmental Permits

The first work effort in obtaining environmental permits is to *Prepare Permit Application (4385)*. Included with the permit application is supporting information, including required plans, engineering analysis and environmental reports. The next work is to *Review & Submit Permit Application (4390)*. The Bureau of Landscape Architecture and Environmental Solutions (BLAES), the Regional Maintenance Engineer and the Hydrology and Hydraulics Unit (if applicable) review the draft permit application before submitting the application to the applicable permitting agency. The approved permits are secured during the *Secure Permits (4395)* effort.

After reforestation, soil erosion, wetlands and site contamination is completed; work can begin to *Complete Environmental plans (4585)*. The environmental plan sheets incorporate environmental constraints, impacts, mitigation, commitments and permit conditions into the contract documents.

Access & Right of Way

The first step in the Access & Right of Way process is to *Conduct Title Search (4600)*. The title search only needs to be done once Right of Way (ROW) parcels are identified. There is no need to do a title search on parcels where we are not acquiring ROW. After the title search, work can begin on

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the access effort. The work efforts include *Prepare Access Cut-Outs (4705)*, *Review Access Cut-Outs (4710)*, and *Administering Access Alterations (4715)*.

The right of way (ROW) work begins with *Prepare ROW Plans and Documents (4605)*, which includes the Entire Tract Maps (ETM), General Property Parcel Maps (GPPM), descriptions of each parcel and the Individual Parcel Maps (IPM). Individual units within the Division of Right of Way (ROW) and Access Management review the ROW Plans and Documents during the *Review ROW Plans and Documents (4610)* activity. The next steps are to *Prepare Pre-Final ROW Submission (4615)* and *Review Pre-Final ROW Submission (4620)*.

The ROW Engineering Unit reviews the Pre-Final ROW Submission and approves the Comment Resolution Summary (CRS). The ROW Engineering Unit prepares a comment memorandum and sends to the Project Manager who forwards to the Designer.

While the Pre-Final ROW Submission review is occurring, work can begin to *Hold ROW Acquisition Kickoff Meeting (4635)*. During the meeting, the Project Manager and the Designer present the project's scope and discuss the details of ROW acquisitions. Utilizing comments from the ROW Acquisition Kickoff Meeting, the next work is to *Prepare Final ROW Submission (4625)*. The next step is to *Process Final ROW Submission (4630)* per the ROW Design Guideline and ROW Engineering Manual.

A ROW Environmental Reevaluation is required for projects where federal ROW authorization is requested. The work is accomplished during the *Obtain ROW Environmental Reevaluation (4645)* work effort. Utilizing the updated ROW cost estimate and the ROW Environmental Reevaluation, the next step is to *Authorize ROW (4650)*. The ROW is authorized by FHWA for federally funded projects.

The longest ROW work effort in FD is *Acquire ROW (4670)*. It begins after the ROW is authorized. In general, this activity duration will be at least 14 months for a project with no relocations and at least 18 months where relocations are required. Projects involving complex relocations or a high number of acquisitions may take longer.

Based upon the data obtained in the *Site Investigation (4520)* and *Remedial Investigation (4540)* for each ROW parcel, the next step is to *Prepare Property Acquisition Environmental Cost Estimate (PAECE) Report (4590)*. The PAECE Report includes all of NJDOT's investigative and remedial costs.

Part of the ROW process includes *Prepare Riparian License Application (4655)* and *Secure Riparian License (4660)*. A license is required if property to be acquired is now or formerly tidal. If property to be acquired contains a structure that is to be demolished, work needs to be done to *Perform Asbestos Survey (4665)*.

Green Acres

When the NJDOT needs to acquire property that was obtained using Green Acres funds, they must do so utilizing the guidelines set for in the NJDEP Green Acres Program. The first NJDOT step is to *Prepare Green Acres Pre-Application (4720)*. The applicant is typically either a municipality or

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county, unless the diversion land is owned by the State. Requirements for the Green Acres Pre-Application can be found in the Pre-Application Checklist listed at www.nj.gov/dep/greenacres. After the Pre-application is prepared, the owner can *Submit Green Acres Pre-Application (4725)*, and the work to *Obtain Green Acres Compensation Appraisal (4780)* can begin. The appraisal indicates the compensation value of the property to be acquired and is used in preparing the Green Acres Final Application. If the property to be acquired is owned by a governing body (e.g., municipality or county), the next work is to *Obtain Resolution of Support for Green Acres Pre-Application (4730)*. Once submitted, the *NJDEP Reviews Green Acres Pre-Application (4735)*. The NJDEP Green Acres Program must approve the pre-application before granting approval to submit the final application. After all NJDEP pre-application comments are addressed, work can begin to *Prepare Green Acres Final Application (4740)*. Once prepared, the *Owner Submits Green Acres Final Application (4745)* to the NJDEP Green Acres Program.

Public and legislative involvements are big parts of the Green Acres process. The first public involvement work is to *Hold Green Acres Public Hearing (4750)*. Advance notice of the hearing is published within local newspapers, and a sign is posted on the affected Green Acres parcel. Written hearing comments and the public hearing transcript are part of the final application supplemental information. The next steps are to *Obtain Resolution of Support for Green Acres Final Application (4755)* and *Submit Green Acres Final Application Supplemental Information (4760)*. The Resolution of Support and Supplemental Information complete the final application.

With all of the required information, the *NJDEP Reviews the Green Acres Final Application (4765)* before recommending it for approval to the State House Commission. The legislative approval portion of the process is accomplished during the *Obtain State House Commission Approval (4770)* work. After the receipt of State House Commission approval, work can begin to *Acquire Green Acres Parcels (4775)*.

FD Plan Support

The FD plan support work consists of *Develop Construction Cost Estimate (4275)* utilizing the Construction Cost Estimating Guide, *Develop Specifications (4280)* utilizing guidance provided by the latest Baseline Document Changes and Standard Specifications, and *Develop Construction Schedule (4285)* utilizing Primavera and the Scheduling Manual for Design Projects. Included in the Special Provisions of the Specification should be the appropriate language if dredge material will be used on the project.

Submission and Approval

All capital projects are required to have a Final Design Submission (FDS) and a Plans, Specifications and Estimates (PS&E) submission for the Department's review and approval.

The content of the FDS and PS&E are project-specific and will vary from project to project depending upon the design issues involved. The Project Manager (PM), Subject Matter Experts

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(SMEs), and the FHWA, when required, shall review the information that the designer has developed which will determine the submission's final content.

All Final Design Submissions shall be reviewed by the Bureau of Quality Management Services in the Division of Capital Program Support. This multi-disciplined team reviews high risk elements of the project. In addition, Construction Management shall receive the Final Design Submission for its review of the construction cost estimate and schedule.

Interim submissions of key project deliverables are done on a case-by-case basis. It is the Designer's responsibility to maintain an open dialog with the NJDOT throughout the design process. Continuous communication and coordination is essential between the Designer, the PM and all SMEs. Review, input and approvals should be solicited from the Department's SMEs as the design progresses.

During the design of the project, it is critical that the Designer, PM and SMEs engage in Interactive Communications to reach consensus on the development of Design Elements. This consensus shall be documented within the Design Communications Report (DCR). The DCR will be submitted as part of the FDS.

The submission work begins with the *Prepare Final Design Submission Package (4290)* activity. The package consists of the work products discussed above. Next is *Review Final Design Submission (4810)* by the Project Manager, Bureau of Construction Management (CM), Quality Management Services (QMS) and appropriate SMEs. For PoDI projects, *FHWA Reviews Final Design Submission (4805)*.

While the FDS package is being reviewed, work can begin to *Certify Soil Erosion & Sediment Control (4850)*. The FDS package is certified to the Soil Conservation Districts that FDS plans and specifications are in conformity with the NJDOT Soil Erosion and Sediment Control standards. During this time, work can also begin to *Obtain Construction Environmental Reevaluation (4860)*. A reevaluation is needed when Federal construction authorization is requested. Work can also begin to *Execute Consultant Agreement Addendum (4865)*. A Consultant Agreement Addendum (CAA) is needed if the FD Designer is to be retained to provide engineering services during construction.

For projects costing over \$10M, work is performed to *Finalize Specifications for Comptroller Approval (Projects over \$10M) (4815)*. The specifications are forwarded to the Office of the State Comptroller for approval. If the specifications are found to be acceptable, the *Comptroller Approves Specifications (Projects over \$10M) (4825)*.

After addressing any comments on the FDS package, work can begin to *Prepare Preliminary Plans, Specifications and Estimate (Pre-PS&E) Package (4835)* for PoDI projects. The package reflects any comment revisions received during the FDS review. The Pre-PS&E Package is submitted to FHWA and the *FHWA Reviews Pre-PS&E (4845)* and returns comments. The Comments are addressed during the *Resolve Final Design Submission Comments (4830)* work effort. FDS comments will be addressed in the project's DCR. Comments will not be addressed using a Comment Resolution Summary (CRS). Once comments have been addressed, the next step is to *Submit PS&E Package (4840)*. The package is mainly comprised of project plans, specifications and estimate, construction schedule, certifications and clearance letters. Following the submission of the PS&E Package, work can begin to *Prepare Advertising Authorization Package (4875)*. The advertising authorization

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package includes the Construction Authorization Request, Construction Engineering Authorization Request and Construction Inspection Authorization Request. For state funded construction projects, an advertising authorization package is not needed.

Once the advertising authorization package work is completed, the *PS&E Certified (4880)* milestone is reached and the Department can recommend a construction *Authorization Request Date (4890)*. *To Receive Authorization to Advertise (4885)*, the Department submits the Advertising Authorization Package to FHWA for approval for Federally funded construction projects. The final step in the FD process is to *Complete FD Closeout (4895)*.

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