1401 Design Review Process

1401.1 Introduction

ODOT's Project Development Process (PDP) is a team-oriented approach to developing a transportation project from concept to completion. This section of the **Location and Design Manual** focuses on design involvement in the PDP with emphasis on design review submittals. It provides a general overview of plan development and identifies the information which is to be included in each design review submission. It does not detail design standards nor provide guidance on how to evaluate any particular design component or environmental issue. Design and environmental requirements are provided in various technical manuals and policies as listed in **Figure 1402-1**. An overview of the entire PDP is contained in the **Project Development Process Manual**.

1401.2 Project Classification

The PDP classifies transportation projects into three groups: Major, Minor and Minimal. The PDP steps involved for each type of project are outlined in **Figures 1401-1, 1401-2 and 1401-3**, respectively. These figures show the design review submissions in each step.

Major Projects are defined as transportation improvements where the anticipated end product of the improvement is expected to have a significant impact to the highway's public access, level of service, traffic flow, mobility patterns, mode shares, require substantial Right of Way acquisition, or is expected to have a high degree of public controversy. Additionally, this classification applies to those highway transportation improvements that will require a substantial financial investment to complete all aspects of project development. These projects will typically involve one or more of the following conditions: making significant alterations to the existing highway (e.g., lane addition), relocating a major portion of a highway (e.g., significant change to horizontal and/or vertical alignment), developing a completely new highway alignment (e.g., bypass), and the construction of a new or significant modification to an existing interchange.

From a design perspective Major Projects are those in which new highway alignments or significant alterations to existing highway alignments will result in the examination of multiple alternatives as a necessary and systematic progression to selecting the preferred alternative. In some instances where it appears the project is Minor in nature based on environmental impacts and there are only a few viable alternative solutions to be studied, but, the project is expected to be controversial, it may be advantageous to follow Steps 5-7 of the PDP for Major Projects (**Figure 1401-1**) relative to the preliminary engineering components to allow for a graduated progression of plan developing activities through several steps of the PDP rather than covering all the preliminary engineering work in a single step under Step 3 of the PDP for Minor Projects (**Figure 1401-2)** to avoid unnecessary plan rework

Minor Projects are defined as transportation improvements that generally are located on the existing alignment. Small adjustments to the existing alignment to improve geometric conditions may be involved. Substantial relocations of non-interstate roadways that do not result in significant environmental impacts can also qualify as a Minor Project. Minor Projects may have environmental impacts but can be approved following the Categorical Exclusion (CE) Process. Examples and thresholds for environmental impacts are included in the **Office of Environmental Services Categorical Exclusion Confirmation Handbook**. Minor Projects can involve Right of Way acquisition, utility relocations, altering the highway's cross section and raising/lowering the roadway profile. Some examples of Minor Projects include bridge replacement and rehabilitation, culvert replacement, pavement widening and rehabilitation, geometric realignment, and intersection upgrades, including the addition of turn lanes.

Minimal Projects are defined as transportation improvements that are generated by the traditional maintenance and preventive maintenance program as they relate to the development of the District Work Plan. These projects do not alter the basic highway cross section or geometry, require no additional Right of Way, have minimal impacts on existing utilities, have no impacts to environmental resources, require no environmental agency coordination, are considered "exempt" from NEPA studies as defined in ODOT's-**Office of Environmental Services Categorical Exclusion Confirmation** and are likely to require only very minor public involvement, if any.

Examples of Minimal Projects include:

- Guardrail replacement where roadway ditches and backslopes will not be relocated.
- The replacement of traffic signals provided no work takes place within any historic district and there is no likelihood of encountering contaminated materials.
- Traffic signal maintenance.
- Pavement Drop Off repair.
- Pavement Markings.
- Mowing or brush removal/trimming.
- Herbicidal spraying.
- Installation or maintenance of signs, pavement markings/raised pavement markers/sensors and/or replacement of fencing.
- Bridge deck overlays, bridge deck replacements, super structure replacement and other maintenance activities, including bridge painting projects provided the project doesn't involve any work within streams, rivers, scenic river corridors or historic properties.
- General highway maintenance including filling pot holes, crack sealing, mill and resurfacing, joint repair, shoulder reconstruction, minimal bank stabilization.

1401.3 Staged Review Process

The Staged Review Process consists of a series of review submissions at various stages of the design process. Required review submissions are detailed in the following sections. The activities and products for each of these review submissions are detailed in **Section 1403**.

1401.3.1 Major Project Staged Review Process

Major Projects will normally require the following design review submittals:

1. Red Flag Summary (**Section 1403.2**)

2. Conceptual Alternatives Study (**Section 1403.3**)

3. Assessment of Feasible Alternatives (**Section 1403.4**)

4. Preferred Alternative Verification (**Section 1403.5**)

5. Stage 1 Detailed Design (**Section 1403.7**)

6. Preliminary Right of Way (**Section 1403.8**)

7. Stage 2 Detailed Design (**Section 1403.9**)

8. Final Right of Way (**Section 1403.10**)

9. Final Right of Way Tracings (**Section 1403.11**)

10. Stage 3 Detailed Design (**Section 1403.12**)

11. Final Tracings (**Section 1403.13**)

Preliminary Right of Way, Final Right of Way and Final Right of Way Tracing Submissions are omitted if no temporary or permanent right of way is to be acquired.

1401.3.2 Minor Project Staged Review Process

Minor Projects will normally require the following design review submittals:

1. Red Flag Summary (**Section 1403.2**)

2. Minor Project Preliminary Engineering Study (**Section 1403.6**)

3. Stage 1 Detailed Design (**Section 1403.7**)

4. Preliminary Right of Way (**Section 1403.8**)

5. Stage 2 Detailed Design (**Section 1403.9**)

6. Final Right of Way (**Section 1403.10**)

7. Final Right of Way Tracings (**Section 1403.11**)

8. Stage 3 Detailed Design (**Section 1403.12**)

9. Final Tracings (**Section 1403.13)**

Preliminary Right of Way, Final Right of Way and Final Right of Way Tracing Submissions are omitted if no additional temporary or permanent right of way is to be acquired.

1401.3.3 Minimal Project Staged Review Process

Minimal Projects will normally require the following design review submittals:

1. Red Flag Summary (**Section 1403.2**) Red flags should be identified as part of the scoping process. A written Red Flag Summary is optional.

2. Stage 3 Detailed Design (**Section 1403.12**)

3. Final Tracings (**Section 1403.13**)

1401.4 Limited Review Process

For Minor Projects with a well-defined scope of services for the proposed design work and limited utility involvement and environmental impacts, a limited review process may be applied. Except for the Minor Project Preliminary Engineering Study and Final Right of Way Plans, ODOT **will not** review the plans for accuracy and adherence to design and plan preparation requirements.

The Limited Review Process cannot be applied to projects that require Federal oversight as per **Section 1402.2**.

Limited Review Projects normally require the following design review submittals:

1. Red Flag Summary (**Section 1403.2**)

2. Minor Project Preliminary Engineering Study (**Section 1403.6**)

3. Final Right of Way (**Section 1403.10**)

4. Final Right of Way Tracings (**Section 1403.11**)

5. Final Tracings (**Section 1403.13**)

Review submittals for Stage 1 Detailed Design, Preliminary Right of Way, Stage 2 Detailed Design and Stage 3 Detailed Design are omitted. The design activities associated with these submittals must be performed. Final Right of Way and Right of Way Tracing Submissions are omitted if no temporary or permanent right of way is to be acquired.

External agency approvals (e.g., FAA Notification/Clearance, Waterway Permits, LD-33 County Engineer Approval and Railroad Agreements) and Central Office approvals (e.g., Design Exceptions, Maintenance of Traffic Exceptions Committee, and Waterway Permit determination) must be obtained.

The District must approve any major design decisions that occur after the Minor Project Preliminary Engineering Study. The designer must notify the District with a description of each alternative and an assessment of the impacts of each alternative on project cost, traffic operation, right of way cost, utility relocations, environmental impacts and any other associated impacts.

1401.5 Design-Build Review Process

Design-Build Projects combine the detailed design and construction of a project into a single contract. The design firm and construction contractor form a team, working concurrently on the design and construction phases of a project; expediting project delivery. Design-Build Projects should be selected based on the following criteria:

1. Projects which due to physical conditions demand an expedited schedule and can be completed earlier using design-build.

2. Projects that require no Right-of-Way acquisition and minimal utility relocation.

3. Projects which are environmentally exempt or qualify for a Level 1 Categorical Exclusion.

4. Projects that do not have complicated geotechnical problems (e.g., slide repairs, rock cuts, mine remediation).

5. Projects that can have a clearly defined Scope of Services and design basis.

6. Ideally, projects should be scheduled for sale between August and September so the Design-Build Team can work on the design during the winter.

7. Projects that have room for innovation in the design and/or construction effort.

8. Projects that require expertise that is not available in-house.

9. Projects that have limited or no railway involvement.

10. Projects that are classified as Minor or Minimal under the Project Development Process (PDP).

11. Projects with limited impacts to "Waters of the United States" that can be authorized by 404 Nationwide Permits and do not require an Individual 404 Permit, 401 Water Quality Certification or Individual Isolated Wetland Permit. Some Nationwide Permits require preconstruction notification to the U.S. Army Corps of Engineers. When preconstruction notification is required, certain aspects of design work may need to be moved forward from Stage 1 which is completed after construction contract award. These tasks are moved into Minor Project Preliminary Engineering which is used as a basis for the bid documents. This will allow for permit requirements and processing times.

ODOT will normally prepare the Design Red Flag Summary and Minor Project Preliminary Engineering Study. The information from these studies will be used to determine if the project is a candidate for further development as a Design-Build Project.

For Minor Projects, the project is bid during Step 4 of the PDP; after environmental clearance is granted but before Stage 1 design development has begun. The Design-Build team will submit Stage 1 Detailed Design and Stage 2 Detailed Design for review and approval. The Design-Build team may design and submit Stage 1 and Stage 2 information in phases consisting of buildable units (i.e. earthwork, pavement replacement, etc.) for review. The scope and design shall be coordinated with the District and authorization must be granted prior to submitting various plan components for review.

Preliminary Right of Way, Final Right of Way, Right of Way Tracings and Stage 3 Detailed Design are not required. As-built Final Tracings are submitted after construction is completed.

For Minimal Projects, the project is bid during Step 1 of the PDP. The Design-Build team will submit Stage 3 Detailed Design Plans (without quantities) for review and approval. Other reviews are not normally required.

All external agency approvals (e.g., FAA Notification/Clearance, Waterway Permits, LD-33 County Engineer Approval and Railroad Agreements) and Central Office approvals (e.g., Waterway Permit Determinations, Design Exceptions, Maintenance of Traffic Exceptions Committee) must be obtained. Additional information on Design-Build Projects is contained in the **Design-Build Scope of Services Manual**.

1401.6 Local-Let Local Public Agency (LPA) Projects

LPA Projects are transportation improvement projects or enhancement projects that are funded primarily with Federal or state monies and, if required, matched with local resources. Traditional LPA projects are those that are administered by ODOT whereas local-let LPA projects are those in which the LPA assumes project administration duties.

To the extent practical and feasible, ODOT will minimize its direct involvement in the design and delivery of projects that are funded with local and Federal monies, or local and state monies, which do not directly involve routes on the National Highway System. As set forth in ODOT's **Development Process Policy for Locally-Administered Transportation Projects (#25-001(P))**, Local Public Agencies may voluntarily assume project management tasks as determined and in coordination with the ODOT District Office. For these Local-Let LPA projects, review submittals shall be as detailed in the **Locally Administered Transportation Projects Manual of Procedures**. ODOT-Let LPA Projects will follow the Major, Minor or Minimal Staged Review Process as selected by the Department.

1401.7 Review Process Determination

The District Office will classify a project as Major, Minor or Minimal and determine whether the project will follow the Staged Review, Limited Review, Design-Build, or Local-Let Development Process and tailor the required review submittals to be compatible with the project.

Irrespective of the number or detail of submittals required, the designer is responsible for plan accuracy and adherence to all design and plan preparation requirements.

1401.8 Customization of Review Requirements

While many ODOT projects will use the review processes and review submissions exactly as described in this manual, a number of projects may benefit from the use of a customized review process. The Staged Review Process may be customized by combining review submissions and/or modifying the content of individual review submissions.

Customizations of the Staged Review Process must be listed in the scope of services document. These customizations should be evaluated on a case by case basis by ODOT personnel prior to scoping. Consultants are encouraged to submit suggestions for modifications during scoping that would allow for more effective use of resources while still providing adequate evaluation of design and environmental issues. Significant deviations must be justified in the project file.

Section 1401.8.1 Combined Reviews

The use of combined submissions should be evaluated for relatively straightforward projects. Elements from each involved submission must be included in the combined submission. It is not acceptable to disregard early review (e.g., Minor Project Preliminary Engineering) elements and focus only on elements from the later review (e.g., Stage 1 Detailed Design).

An example of a project with a combined review submission would be a simple bridge replacement project. This type of project can be adequately reviewed using a combined Minor Project Preliminary Engineering and Stage 1 Detailed Design Review Submission and possibly a combined Stage 2 and Stage 3 Review Submission.

Section 1401.8.2 Modifications to Design Review Content

Individual review submission design activities may be modified to occur earlier or later in the Staged Review Process. Some design activities may be moved to a later phase in the development process. This is justified when these activities add significant cost to the design as a result of performing the task on multiple alternatives, and when their postponement to a later phase (when the number of alternatives has been reduced) does not diminish the designers ability to evaluate alternatives or to adequately determine the project's scope, schedule and budget for the project. Conversely, review elements should be moved forward in the process when these elements can be obtained at relatively low costs and would add greatly to the designer's ability to evaluate alternatives or to adequately determine scope, schedule and budget.

An example of moving elements to a later phase in the Staged Review Process would involve a realignment project with multiple culverts; none of which is likely to affect the profile or other significant factors. For this type of project, culvert sizing could be deferred from the Assessment of Alternatives roadway until the Preferred Alternative Verification.

An example of moving elements forward in the process would be a widening project which has a significant number of drives for which access management is an issue. On this type of project it may be prudent to move deed and title research and property line location determinations from Stage 1 forward into Minor Project Preliminary Engineering. This will allow better evaluation of drives and service roads prior to establishing construction limits for environmental clearances.

When Federal funds are used for design work, any proposed increase in the level of design performed prior to the approval of the environmental document beyond Major Step 8 or Minor Step 4 shall be coordinated with the FHWA prior to approval of scope of services. Any increase needs to be justified on a project-by-project basis to ensure the integrity of the NEPA decision.

1401.9 Scheduling

Gantt chart schedules as described in the **Project Development Process Manual** are used to coordinate the various tasks associated with project development. Consultants are required to submit updated gantt chart schedules each month. These schedules must include baseline, actual and current finish dates. When developing schedules, particular attention must be paid to items that fall on the critical path (e.g., right of way acquisition, utility relocation, individual 404/401 permits, etc.) and items that must be completed at a particular time of year (e.g., aerial mapping, ecological studies, etc.).

Projects which are behind schedule must include a recovery plan. The Project Manager must approve any modification to the schedule which alters commitment dates.

1402 Review Agencies

1402.1 Ohio Department of Transportation

Unless otherwise indicated in the design scope of services, all review submittals are made directly to the District Office. The District Project Manager is the first point of contact for all review questions. Most submissions, especially those prior to Stage 1, should be reviewed by the District Production, District Planning, and District Real Estate offices.

Specialty areas within each District office may need to be involved. For example, when Right of Way is to be acquired for a project, the District Real Estate Section should (at a minimum) review the Preferred Alternative Verification Study, the Minor Project Preliminary Engineering, Preliminary Right of Way, Final Right of Way and Final Right of Way Tracings. It is the responsibility of the District project manager to coordinate the appropriate and timely execution of reviews not only within the District but Central Office as well. **Figure 1402-1** lists ODOT Central Office Technical Specialty Areas. At the District's request, these offices/specialty sections will assist in the design and review of unique or complex items. For some projects, or portions of projects, a Central Office Review is mandatory. See the **Project Development Process Manual (PDP), Appendix B – Review Matrices** for a list of these reviews. In addition, Central Office may review any project in accordance with the **Quality Assurance Review Policy (#220-001(P))**. Projects designed by ODOT staff should follow the review requirements outlined in Section 1400. Reviews must be conducted by someone other than the project designer.

1402.2 Federal Highway Administration

The **Federal Highway Administration (FHWA)** is accountable for ensuring that all Federal-aid Highway Programs are delivered consistent with established requirements. The **Federal-Aid Highway Program Stewardship and Oversight Agreement** outlines the respective roles and responsibilities of ODOT and

FHWA in administering the Federal-aid Program. **Figure 1402-8** outlines the Federal Oversight determination process.

At the time of programming, the District will determine the level of oversight required on a project and enter into Ellis. On Projects subject to Federal Oversight, FHWA and ODOT should discuss which submissions should be sent to FHWA. For Federal oversight projects, a copy of all required review submittals must be furnished directly to FHWA by the preparing agency or local government. Due to fluctuations in workloads, the FHWA may request Federal Oversight on a project that would normally be state administered.

1402.3 Local Governments

When the design agency is working for a local government, the local government may either have review materials processed through its office or have the preparing agency make submittals directly to the District Office. In either case, ODOT will assume the submittal reflects the intent and desires of the local government, unless otherwise notified.

1402.4 Other Governmental Agencies

Approval from the **Federal Aviation Administration (FAA)**, **U.S. Army Corps of Engineers (USACE), Federal Emergency Management Agency (FEMA), U.S. Coast Guard, U.S. Fish and Wildlife Service, Ohio Department of Natural Resources (ODNR), State Historic Preservation Office (SHPO)** and **Ohio Environmental Protection Agency (OEPA)** may be required. Approvals that require design details are shown in the **Project Development Process Manual (PDP), Appendix B – Review Matrices**. Other required environmental approvals and agency coordination are detailed in various manuals and handbooks published by the **Office of Environmental Services**.

1402.5 External Review Agencies

An external agency may be contracted to perform some of ODOT's review responsibilities. If this is the case, the designer shall be so notified at the design scope of services meeting or as soon as the external assignment becomes effective.

1402.6 Railroad Involvement

Railroad/Railway companies must be informed at an early stage of plan development whenever their facilities may be affected in any manner. When railroad property falls within the work limits of a proposed project, the possibility of railroad involvement exists. Some examples include: work on structures that pass over a rail line, new grade separations, reconstruction or rehabilitation of existing grade separations, proposed at grade crossings, drainage work, removal of right of way encroachments, utility work, traffic signal preemption, etc. In addition, major and minor projects with an intersection in the project limits located within 400 feet of an at-grade rail crossing require coordination with the Ohio Rail Development Commission to determine the need for preemption.

All projects with rail involvement must be coordinated with the **Central Office Railroad Coordinator**. The **Central Office Railroad Coordinator** prepares and processes all Railroad/Railway construction agreements. The construction agreement process is initiated at Stage 1 and is finalized at Stage 3. The District is to send a copy of the final plans to the Railroad/Railway Company.

For projects involving acquisition of rail right of way, the involved railroad/railway company will be allowed an opportunity to comment on the right of way plans and legal descriptions associated with acquisition of their

property. The **Railroad Acquisition Unit** in the **Office of Real Estate** will handle acquisition of right of way from railroads.

1403 Design Review Submittals

1403.1 General Requirements

Figures 1401-1, 1401-2 and 1401-3 outline the design review submissions required for Major, Minor and Minimal Projects, respectively. The following sections define the requirements for each design review submission. No attempt has been made to either detail design standards or to provide guidance on how to evaluate any particular design component or issue. Design standards are provided in the technical manuals and design policies listed in **Figure 1402-1**.

Each review submission includes a numbered list of design activities. The numbering system is provided for reference purposes only and is not intended to suggest a sequence in which these activities should be performed.

Since right of way acquisition is frequently on the critical path for overall project development, Preliminary Right of Way plan preparation and Stage 2 Detailed Design should be developed concurrently. Final Right of Way plan development will normally occur immediately after Preliminary Right of Way approval.

Each project should be scheduled based on its required design activities and anticipated design development timeframes. Some activities are iterative. For example, on a bridge overpass project, the designer may need to assume a deck and/or beam thickness in order to set a vertical profile. Once the profile is set, the actual thickness can be calculated and the profile revised, if necessary. Other activities can proceed concurrently. For example, development of signal plans and structure details can usually proceed at the same time.

Unless otherwise noted in the design scope of services, all review submissions should be sent to the District Office. Multiple copies and direct submittals to Central Office and external agency reviewers may be required. Not every item listed will apply to every project. Care should be taken to ensure that each submission includes all information required to process the review. Review submissions that lack required information or contain inaccuracies that preclude meaningful review will be rejected.

There may be instances where one engineer provides specific design recommendations to the engineer responsible for overall project design. For example, a subconsultant might prepare the Geotechnical Exploration Report. The recommendations contained in this report are then incorporated into the project plans by the prime consultant. When this type of situation occurs, the subconsultant should be given an opportunity to review the plans prior to their submission to ODOT to ensure that the subconsultant's recommendations have been correctly interpreted and incorporated into the project's design.

1403.1.1 General

All submissions must include the following in the letter of transmittal:

1. Project identification: County, Route, Section (Street Name), PID number, Federal number or program (if known).

2. Identification of the type of review submission.

3. Indication of any local government involvement along with any comments the local government may have regarding the submission.

4. Explanation of any special items, situations or potential problem areas.

5. Disposition of previous review comments.

6. A current cost estimate factored up to the year the project will be awarded and indicating reasons for any significant increase or decrease in project cost. (Cost estimates are not required for Red Flag Summaries.)

7. Identification of all plan sheets, reports and other materials.

When both environmental and design documentation are required to complete a review, all documentation should be submitted at the same time. A sufficient number of copies of all submissions must be provided to allow for adequate review by all involved parties.

1403.1.2 Format

The format and number of copies required for all submissions is determined during the design scope of services meeting(s). For plan sets, quarter size 11" x 17" [280 mm x 432 mm] sheets are usually preferred. Plan sets must be bound. Calculations, reports and other documentation should normally be submitted on 8 1/2" x 11" [216mm x 280mm] paper. Large size exhibits or preliminary design work may be needed for public involvement meetings. Multiple sets of documents may be required to facilitate the review.

1403.1.3 Engineers Seal

All final submissions must be sealed by a Registered Professional Engineer in accordance with the **Ohio Revised Code Sections 4733.14, 4733.17, and 4733.23**. This includes not just final plan sets, but also completed preliminary engineering studies. If an Engineer has been hired to prepare plans through the Final Tracing Submittal, then only the final tracings and supporting documentation must be sealed. However, if an Engineer is hired to develop the project through Step 7 of the PDP for Major Projects, then the Preferred Alternative Verification plans and supporting documentation must be sealed.

Although it is preferred that a single design firm develop the preliminary and detailed design phases of a project, it is recognized that there will be times when this is not feasible. For example, in order to maintain continuity in development of the environmental document, a single consultant may develop the preliminary engineering for a large project through completion of the Preferred Alternative Verification.

The Preferred Alternative may then be broken into multiple phases for concurrent detailed design development by the preliminary engineering consultant as well as several other consultants. In these situations, the detailed design Engineers may rely on the preliminary development completed and sealed by the preliminary engineering consultant as the basis for their design. They should note this on the Title Sheet of the plans with a statement similar to: “Alignment, profile, derived from work performed by …XYZ Engineer… shown in the Preferred Alternative Verification dated…”

1403.2 Red Flag Summary

Red flags are points of concern that could cause revisions to: the anticipated design and construction scope of work, the proposed project development schedule, the estimated project budget (including construction, utility reimbursement, right of way acquisition and design costs) or the potential impacts of the project on the surrounding area. Red Flags may include, but are not limited to:

1. Existing substandard geometric features that cannot be readily corrected.

2. Known or suspected geologic and geotechnical issues (e.g., organic soils, karst, rockfalls, landslides, underground mines, poor subgrade conditions).

3. Type of pavement rehabilitation that may be required. For example, the work required to construct full depth pavement reconstruction can be significantly more involved than that required for a thick overlay. Pavement cores or dynaflect testing are usually required to determine the nature of the required pavement repairs. For pavement preservation projects, the proposed pavement design should be specified in the design scope.

4. Difficulty in correcting existing drainage problems.

5. Impacts to **FEMA** flood zones.

6. Physical difficulties in maintaining traffic during construction (e.g., cannot cut bridge to provide part width construction).

7. Unusual impacts to properties for the type of project involved or unusually costly parcel takes. For example, a total take would be unusual on a culvert replacement project. A total take would not be unusual for a realignment project.

8. Possible impacts to major utility facilities (e.g., relocation of fiber optic cables, gas transmission lines, or electric transmission facilities).

9. Railroad issues that could change the magnitude of the project (e.g., a railroad company requests that a bridge span be increased to allow for future track development, railroad needs preemption for traffic signals due to proximity of intersection and at-grade rail crossing, etc.).

10. Cultural resources (i.e., historic properties eligible for or listed in the National Register or Historic Places, prehistoric or historic period cemeteries).

11. Ecologically sensitive areas (i.e., wetlands, streams, parks, endangered species habitat, Lake Erie Coastal Management Area, hazardous materials waste areas, landfills).

12. Environmental justice areas.

Identification of red flag areas must be performed by qualified individuals with successful experience on similar projects. Red flags are based on reasonable knowledge available at the time of project development. Existing data (e.g., old plans, USGS maps, Soil Conservation Maps, etc.) should be researched. A minimum of one site visit by qualified personnel to review the existing field conditions is mandatory.

Reference to ODOT's design and environmental manuals will be necessary to completely identify and evaluate the impacts of potential alternatives to avoid these areas. If red flag areas cannot be avoided, their impacts on the project must be minimized to the point practicable and evaluated in the subsequent steps of the Project Development Process; especially during the preliminary engineering phases.

For Major Projects, the Red Flag Summary is part of Step 2 of the PDP, for Minor and Minimal Projects it is part of Step 1.

Red Flag Summary activities are required for all projects. A written Red Flag Summary is required for Major and Minor Projects and is optional for minimal projects. Design and environmental red flag analyses must be combined and submitted as a single document. A suggested form for the Red Flag Summary is available on the ODOT website. In addition to the form, red flag areas should be shown on USGS or aerial mapping.

The Red Flag Summary must be reviewed and approved by the District. In addition, Central Office and external agency reviews as listed in the **Project Development Process Manual (PDP), Appendix B – Review Matrices** may be required.

1403.3 Conceptual Alternatives Study

1403.3.1 General

The purpose of the Conceptual Alternatives Study is to develop horizontal alignments and associated corridors that avoid and/or minimize impacts to design and environmental red flag areas within the larger planning study area established during Steps 3 and 4 of the PDP for Major Projects. The corridor width is normally in the 1000' to 2000' [300 m to 600 m] range; depending on the proposed cross section and existing topography. For some projects (e.g., urban reconstruction projects), Step 3 activities may indicate that study of a wide corridor is unnecessary and that investigation of alternatives within a smaller study area can adequately address all issues. In these instances, the study area may be constrained to the existing right of way and a limited area adjacent to this right of way. See **Section 1403.3.4** for additional details regarding projects with constrained areas.

The Conceptual Alternatives Study is a combined design and environmental submission. Design activities are detailed in this manual. Refer to the manuals and guidelines published by the **Office of Environmental Services** for information regarding environmental activities.

Conceptual Alternatives Studies are submitted during Step 5 of the PDP for Major Projects. Conceptual Alternatives Studies are not required for Minor or Minimal Projects.

1403.3.2 Conceptual Alternatives Study Activities

The following activities are usually part of a Conceptual Alternatives Study:

1. Collect existing plan information.

2. Obtain mapping in accordance with the ODOT Mapping and Survey Specifications to show proposed alignments/corridors at a detail level (i.e. DTM and Planimetric Accuracy Class) as requested by the District. In some cases, mapping may be needed as early as Step 3.

3. Use projected traffic volumes to develop typical sections which meet geometric criteria.

4. Develop several proposed horizontal alignments that meet the purpose and need of the project. Ensure that these alignments conform to geometric criteria. Avoid or minimize impacts to environmental and design red flag areas. For existing alignments, verify if the centerline of Right of Way does or does not equal the Centerline of Construction. Unless otherwise approved by the District Production Administrator, use the centerline of existing Right of Way as the centerline of construction for projects following existing alignment.

5. Identify specific interchange locations for projects in rural areas or new alignments. For interchanges in urban areas, preliminary configurations may be required.

6. Review existing soils information (e.g., geologic reports, hydrogeologic information, old soil borings, ODNR mapping, maintenance history, etc.) Determine if a preliminary geotechnical exploration is necessary to evaluate the proposed corridors/alignments. Make preliminary design recommendations.

7. Determine the location of **FEMA** flood zones. Develop alignments to avoid or minimize impacts to **FEMA** flood zones.

8. Determine corridor width based on proposed cross section and the general topography of the area (e.g., rolling, hilly).

9. Analyze alignments to determine best placement of bridge structures.

10. Contact utility companies to locate major existing facilities (e.g., high-power transmission lines, fiber optic cable, and gas transmission lines) and provide information regarding the proposed location of future lines. Obtain Sub-Surface Utility Engineering (SUE) Quality Level D and C for rural projects and Quality Level B for urban projects.

11. Identify major utility relocations. Contact District Utility Coordinator to determine estimated utility reimbursement costs.

12. Identify access management issues.

13. Perform environmental field studies. (For requirements, see **Office of Environmental Services'** publications.)

14. Analyze the positives and negatives of each alternative from a design and environmental perspective.

15. Prepare cost estimates (construction, utility reimbursement and right of way acquisition) for each alternative. Utility estimates should include costs to the state or other sponsoring agency as well as costs borne by individual utility companies.

1403.3.3 Conceptual Alternatives Study Review Submission

The Conceptual Alternatives Study Review Submission should include:

1. Design and legal speeds.

2. Functional classification.

3. Projected traffic volumes for opening year and design year.

4. Conceptual typical sections identifying the number of lanes, lane width, type of curb, sidewalk, buffer, graded shoulder width and type of grading.

5. Mapping with design and environmental red flag areas overlain with proposed corridors; including:

   A. Proposed alignments.
   B. Proposed corridor widths.
   C. Proposed bridge structure locations.
   D. Proposed interchange locations.
   E. Streams (i.e., streams that appear as blue lines on USGS 1:24000 scale mapping or located on National Resource Conservation Service Soil Maps.)
   F. **FEMA** flood zones.
   G. Geologic and geotechnical concerns.
   H. Soil and bedrock mapping and topography.
   I. Railroads.
   J. Side roads.
   K. Major utility facilities.

L. Existing residential and commercial structures.
M. Environmental red flags areas such as cemeteries, wetlands, historic properties, hazardous waste sites, and parks. (See the **Office of Environmental Services** publications for additional information.)

6. Curve data (degree of curvature [radius], PI) for all proposed roadways, except interchanges. This information can be shown on the corridor mapping or it may be listed separately.

7. Documentation of preliminary geotechnical analysis of existing data to determine extent of geologic and geotechnical concerns.

8. Documentation of preliminary contact with involved utilities (i.e., list of utility owners, requests for information on major facilities).

9. Results of environmental field studies.

10. Matrix or other summary of the advantages and disadvantages from a design and environmental perspective of each alternative; including cost estimates for construction, utility reimbursement and right of way acquisition.

11. Discussion of selection of alternatives for further development.

Design and environmental portions of the Conceptual Alternatives Study must be submitted as a single combined report.

The Conceptual Alternatives Study must be reviewed and approved by the District. In addition, Central Office and external agency reviews as listed in the **Project Development Process Manual (PDP), Appendix B – Review Matrices** may be required. By the end of Step 5 of the PDP for Major Projects, two or three alternatives should be selected for further analysis during the Assessment of Feasible Alternatives.

1403.3.4 Conceptual Alternatives Studies for Projects with Constrained Study Areas

The Staged Review Process develops an increasing level of design detail as the number of alternatives is reduced. For projects that involve a constrained study area or limited number of alternatives, it is sometimes advantageous to complete detailed design work on the entire study area rather than phasing in these tasks over various review submissions. For this reason, the Project Manager should consider moving selected tasks forward from the Assessment of Feasible Alternatives and the Preferred Alternative Verification into the Conceptual Alternatives Study. It is always necessary to balance the costs of additional design work versus the benefits gained by decreasing the risk associated with design uncertainties.

Consider moving the following tasks forward:

1. Collection of any supplemental mapping required through ground survey or other appropriate method.

2. Completion of pavement design.

3. Development of preliminary vertical alignments.

4. Evaluation of interchange justification issues (Preliminary Access Request Point Documents).

5. Collection of Subsurface Utility Engineering (SUE) Quality Level A or B information.

6. Initiation or completion of geotechnical exploration.

7. Detailed evaluation of structure locations.

8. Development of more narrowly defined construction limits.

9. Development of superelevation tables.

10. Conceptual development for Post Construction Storm Water Best Management Practices (BMP) including the following information:

    A. Recommended types of BMPs suitable to the project settings and drainage features.
    B. Determination of the need for water quantity treatment BMPs.
    C. List of constraints regarding implementation of BMPs resulting from conflicts with major project features. This includes impacts to environmental resources, total parcel takes, major utility relocations, etc.
    D. Classification as Redevelopment or New Development according to the **Location and Design Manual, Volume 2**.

Selected alternatives should minimize impacts to design and environmental red flag areas within the project limits.

1403.4 Assessment of Feasible Alternatives

1403.4.1 General

The purpose of the Assessment of Feasible Alternatives is to analyze two or three of the alternatives developed in the Conceptual Alternatives Study at a higher level of detail than performed in the Conceptual Alternatives Study. Construction limits are developed based on typical cross section criteria. Ditch flowline elevations are not normally established.

The Assessment of Feasible Alternatives is a combined design and environmental submission. Design activities are detailed in this manual. Refer to the manuals and guidelines published by the **Office of Environmental Services** for information regarding environmental activities.

Assessment of Feasible Alternatives is part of Step 6 of the PDP for Major Projects. Assessment of Feasible Alternatives, as discussed in this section, is not required for Minor or Minimal projects. See **Section 1403.6** for Minor Project Preliminary Engineering requirements.

1403.4.2 Assessment of Feasible Alternatives Activities

The following activities are usually part of the Assessment of Feasible Alternatives:

1. For projects or portions of projects within existing roadway right of way, obtain the locations of existing centerline monuments, existing right of way monuments, and existing centerline reference monuments.

2. If not previously obtained, collect mapping suitable for detailed design and construction. In some cases, ground survey may be appropriate.

3. Request certified traffic from the **Office of Multi-Modal Planning**. Procedures for obtaining certified traffic are defined in written customer agreements held by the District Planning & Programs Administrator and the **Office of Multi-Modal Planning**.

Each request for Certified Traffic will include the following information:

A. County-Route-Log or other project identifier;
B. PID number;
C. opening and design years;
D. list of needed design values (K, D, T24, TD, 8th highest hour factor);
E. map(s) clearly showing project limits;
F. list of intersections requiring turning movements, if any, or indicate them on the map(s) and indicate the time periods required (P.M. peak, both peaks, etc.) if needed in addition to the ADT;
G. for Interstate Route resurfacing projects, identify those bridges requiring separate design designations (e.g., bridges under roadways which cross over interstate routes, etc.) by route number or name;
H. any known details on planned developments or other known factors which may impact the project;
I. an accurate "need by" date. Normal turn around is 60 days from day of receipt in the **Office of Multi-Modal Planning** for all projects.

Turning movement counts (preferably 8 hour (7am -11am and 2pm -6pm)) are needed for all intersections where turning movement forecasts are requested.

4. For projects or portions of projects within existing roadway right of way, establish the centerline of existing right of way. Unless otherwise approved by the District Production Administrator, use the centerline of existing right of way as the centerline of construction.

5. Develop preliminary vertical profiles.

6. Check preliminary vertical and horizontal clearances.

7. Evaluate location of superelevation at bridge structures and other critical locations.

8. Perform capacity analyses.

9. Investigate interchange justification issues. Consider a Preliminary Access Point Request Document if it is suspected that a project could result in degradation to the freeway capacity. See **Location and Design Manual, Volume One, Section 500** for further details.

10. Design preliminary interchange layouts.

11. Evaluate relocated drives in areas that may produce landlocked parcels. Evaluate commercial and industrial drives associated with high traffic generators. Develop drive geometry and profiles, as needed. Ensure that the right-of-way acquisition cost estimate(s) account for significant modifications to access.

12. Identify potential design exceptions. Check accident data to determine if there is a correlation between crashes and substandard features.

13. Make a preliminary evaluation of service road justification issues.

14. Perform geotechnical exploration in critical locations for site characterization or to determine preliminary costs.

15. Determine limits of geologic hazards and areas with slope stability, settlement, or poor subgrade concerns. Determine preliminary costs.

16. Complete Drainage Design Criteria Forms. (LD-35)

17. Investigate profile cuts for stream diversions that would require long storm sewers. Stream diversions would require waterway permits.

18. Analyze conceptual storm sewer location:

    A. Approximate outlet locations
    B. Rough catch basin locations
    C. Location of trunk lines

19. Make a preliminary evaluation as to the size of culverts for streams shown on USGS maps. Size all culverts that could change the vertical profile due to depth of cover issues, and bankfull design.

20. Identify potential mitigation areas for stream and wetland impacts.

21. Prepare conceptual cross sections. This is most easily accomplished using a design software program that includes an automated cross section generator. A large cross section interval of up to 500 feet [100 meters] may be used. More closely spaced cross sections may be needed in critical areas. The cross sections should be checked for gross discrepancies. Ditch flowline design is not necessary.

22. Make a preliminary evaluation of proposed structure locations (e.g., check skew angle of crossing, waterway opening, roadway curvature, roadway cross slope, approximate clearances).

23. Determine potential locations for retaining walls.

24. Prepare Maintenance of Traffic Alternatives Analysis.

25. Determine if lighting is needed in any areas. Investigate warrants for freeway and interchange lighting.

26. Determine conceptual construction limits using large interval cross sections. Adjust construction limits for storm sewer outlets, service roads, temporary roads, interchange areas, channel work, culvert outlets, drive relocations, building removals, utility relocations, environmental red flag areas, Post Construction Storm Water Best Management Practice (BMP) locations, etc.

27. Obtain tax maps and overlay property lines, ownerships, and tax identification numbers on mapping data.

28. Determine limits and type of existing right of way.

29. For each alternative, identify possible total take parcels and relocations. Identify possible commercial or residential relocations.

30. Identify major utility relocations. Contact the District Utility Coordinator to determine estimated utility costs; including costs to ODOT and those borne by the utility companies.

31. Contact involved railroad/railway companies to determine their design requirements. Incorporate the railroad/railway companies' requirements into the design.

32. Evaluate aesthetic options. Define the corridor's desired landscaping, lighting, signing, signals and bridge components in terms of texture, shape, color, proportion, scale, order and balance.

33. Investigate noise wall justification issues.

34. Investigate retaining wall justification issues.

35. Prepare exhibits for Preliminary Engineering Phase Value Engineering Study. Submit exhibits to the District who will coordinate the Value Engineering Study with the **Office of Production**. The Preliminary Engineering Phase Value Engineering Study must be completed prior to submission of the Preferred Alternative Verification.

36. Prepare plans for Constructability Review. The Constructability Review will normally be conducted in conjunction with the Preliminary Engineering Phase Value Engineering Study.

37. Estimate cut/fill quantities.

38. Perform environmental field refinement studies. See **Office of Environmental Services** publications for details.

39. Prepare cost estimates (construction, utility reimbursement and right of way acquisition) for each alternative alignment.

40. Prepare a matrix presenting the advantages and disadvantages of each alternative.

41. Conceptually evaluate Post-Construction Storm Water Best Management Practices (BMPs). Consider the following items in the evaluation:

    A. BMP selection based on project setting and drainage features
    B. Requirements, if any, for water quantity treatment
    C. Identification of constraints regarding implementation of BMPs. Constraints include total parcel takes, impacts to environmental resources, major utility relocations, etc.
    D. Project classification as Redevelopment or New Construction according to **Location and Design Manual, Volume 2**.

1403.4.3 Assessment of Feasible Alternatives Review Submission

The Assessment of Feasible Alternatives Review Submission should include:

1. Certified traffic data.

2. Design and legal speeds.

3. Functional classification.

4. Conceptual typical sections identifying the number of lanes, lane width, type of curb, sidewalk, buffer, graded shoulder width and type of grading.

5. Mapping with design and environmental red flag areas overlaid with proposed alternative

alignments and construction limits. Show the following information:

A. Proposed alignments.
B. Proposed bridge structure locations.
C. Proposed interchange locations.
D. Conceptual construction limits.
E. All streams.
F. **FEMA** flood zones.
G. Geologic and geotechnical concerns.
H. Soil and bedrock mapping and topography.
I. Railroads.
J. Side roads.
K. Potential service road locations.
L. Potential noise wall locations.
M. Major utility facilities.
N. Existing residential and commercial structures.
O. Existing right of way lines.
P. Property lines from tax maps.
Q. Tax identification numbers and ownerships.
R. Total take parcels.
S. Commercial and residential relocations.
T. Location and configuration of critical drives.
U. Potential retaining wall locations.
V. Conceptual locations of storm sewer trunk lines and outfalls.
W. Preliminary culvert location, size, and requirements (e.g., bankfull design).
X. Environmental red flags and specific study results such as cemeteries, wetlands, historic properties, hazardous waste sites, parks. (See **Office of Environmental Services** publications for additional information.)

6. In order to see all detail involved, the scale of this mapping may need to be smaller than that used for the Conceptual Alternatives Study. Depending on the size of the project and the detail shown, it may be necessary to provide one map at a large scale showing all alternative alignments and several other maps at a smaller scale showing the details of each alternative.

7. Curve data for all proposed roadways, except interchanges. Curve data can be shown on the alignment mapping or it may be listed separately. Locate points of superelevation transition and full superelevation.

8. Preliminary profiles showing:

A. Estimated vertical clearances at critical locations (e.g., at bridges)
B. Estimated cover at critical locations (e.g., at culverts)
C. Approximate grades and location of vertical curves.
D. Bridge locations.
E. Major culvert locations.

9. Conceptual cross sections showing limits of grading.

10. List of all potential design exceptions and a brief reason as to why they should be considered for acceptance.

11. Capacity analyses.

12. Summary of interchange justification issues (Preliminary Access Point Request Document).

13. Preliminary geotechnical exploration shown on plan and profile view.

14. Summary of the Preliminary Geotechnical Exploration.

15. Completed drainage criteria forms.

16. Maintenance of Traffic Alternatives Analysis.

17. Documentation of highway lighting considerations and warrants.

18. Copies of correspondence with railroad/railway companies.

19. List of aesthetic options considered.

20. Documentation of Noise Wall Justification issues.

21. Documentation of Retaining Wall Justification issues.

22. Exhibits for a Preliminary Engineering Phase Value Engineering Study. The Preliminary Engineering Phase Value Engineering Study must be completed prior to submission of the Preferred Alternative Verification.

23. Plans for a Constructability Review. The Constructability Review will normally be performed concurrently with the Preliminary Engineering Phase Value Engineering Study and must be completed prior to submission of the Preferred Alternative Verification.

24. Submit cut/fill quantity report for each alternative.

25. Results of environmental field studies.

26. Matrix or other summary of the advantages and disadvantages of each alternative; including cost estimates for construction, utility reimbursements and right of way acquisition.

27. Disposition of comments from Conceptual Alternatives Study Review.

28. Discussion of selection of apparent preferred alternative.

29. Discussion of Post-Construction Best Management Practices (BMPs) Conceptual Layout and potential implementation issues.

Design and environmental portions of the Assessment of Feasible Alternatives must be submitted as a single combined report.

The Assessment of Feasible Alternatives must be reviewed and approved by the District. In addition, Central Office and external agency reviews as listed in the **Project Development Process Manual (PDP), Appendix B – Review Matrices** may be required. By the end of Step 6 of the PDP for Major Projects, a single feasible alternative (i.e., the apparent preferred alternative) should be selected for further investigation.

1403.4.4 Assessment of Feasible Alternatives for Projects with Constrained Study Areas

The Staged Review Process develops an increasing level of design detail as the number of alternatives is reduced. For projects that involve a constrained study area or limited number of alternatives, it is sometimes advantageous to complete detailed design work on the entire study area rather than phasing in these tasks over various review submissions. For this reason, the Project Manager should consider moving selected tasks forward from the Preferred Alternative Verification into the Assessment of Feasible Alternatives. It is always necessary to balance the costs of additional design work versus the benefits gained by decreasing the risk associated with design uncertainties.

Consider moving the following tasks forward:

1. Initiation or completion of geotechnical exploration.

2. Completion of pavement design.

3. Completion of the Interchange Justification Studies (Access Point Request Documents).

4. Detailed evaluation of structure locations.

5. Development of more narrowly defined construction limits.

6. Development of superelevation tables.

7. Completion of Bridge Preliminary Design.

1403.5 Preferred Alternative Verification

1403.5.1 General

The purpose of the Preferred Alternative Verification is to refine the preliminary construction limits for the apparent preferred alternative. Assumptions made during the Assessment of Feasible Alternatives are further investigated. Preliminary ditch flowline elevations are established.

Any additional design decisions that could potentially increase the construction limits or otherwise require that the environmental document be revised should be investigated.

Preferred Alternative Verifications are part of Step 7 of the PDP for Major Projects. They are not required for Minor or Minimal Projects.

1403.5.2 Preferred Alternative Verification Activities

The following activities are usually part of the Preferred Alternative Alignment Verification:

1. Collect any supplemental mapping required through ground survey or other appropriate methods. The extent of ground survey will depend on the quality of aerial mapping, the general topography of the site and the type of project. Ground survey data is frequently collected to:

    A. Supplement areas obscured by trees or other topography.
    B. Determine elevations of existing drainage features.
    C. Obtain channel sections at bridge structures.

D. Determine pavement elevations where the proposed pavement ties into existing pavement.
E. Verify vertical clearances for overpass structures.
F. Locate underground utilities based on utility company field markings.
G. Existing centerline monuments.

2. Finalize horizontal alignments.

3. Finalize vertical profiles.

4. Estimate cut/fill quantities.

5. Refine interchange layout.

6. Identify potential design exceptions. Check accident data to determine if there is a correlation between crashes and substandard features.

7. Prepare an Access Point Request Document for new or revised access - interstate or other freeway. These documents are also known as Interchange Justification Studies. Contact the **Office of Roadway Engineering Services** for information regarding these documents. Submit to the District, who will submit through the **Office of Roadway Engineering Services** for approval. Approval must be obtained prior to submission for Stage 1 Detailed Design Review.

8. Use access management techniques to determine if driveway access points/configurations need to be altered. Ensure that the right-of-way acquisition cost estimate(s) account for significant modifications to access.

9. Design turn lane lengths.

10. Perform the geotechnical exploration in accordance with the **Specifications for Geotechnical Explorations**.

11. Modify the typical sections to show chemical stabilization requirements.

12. Evaluate geologic and geotechnical issues based on the geotechnical exploration and revised cross sections and prepare Draft geotechnical reports and plans.

13. Design proposed pavement. Request pavement design as per the **Pavement Type Selection Policy, (#20-006(P))**. Determine if local standards regarding pavement type apply. Pavement design approval, if applicable, must be obtained prior to the Preferred Alternative Verification Review submission.

14. Determine subsurface drainage requirements. Ensure that positive drainage outlets are available.

15. Submit rainfall intensity curves if other than those published in the **Location and Design Manual, Volume 2**, to the **Office of Structural Engineering, Hydraulics Section** for approval.

16. Contact County Engineer to determine if proposed culvert flowline elevations are acceptable using the LD-33 form criteria.

17. Size all culverts expected to be greater than 36 inches [914 mm].

18. Identify all culverts that are to be bankfull designed.

19. Evaluate the use of prefabricated culverts.

20. Refine conceptual design of Post Construction Storm Water Best Management Practices (BMPs) by determining preliminary sizing and approximate location for non-linear BMPs (i.e. detention ponds, infiltration basins, bioretention cell, etc.)

21. Submit projects that involve replacement of existing bridges with span lengths greater than 10 feet [3048 mm] to the **Office of Structural Engineering, Hydraulics Section** for approval of structure type (i.e., prefabricated or cast-in-place).

22. Determine if channel relocations are necessary. Detail proposed channel design. Investigate use of natural stream design.

23. Hydraulically size all major storm sewer trunk lines.

24. Prepare cross sections at normal spacing interval with preliminary flowline information.

25. Prepare Structure Type Studies for all proposed bridge structures as follows:

    A. Complete a bridge hydraulic study and scour analysis.
    B. Compare alternative structure types.
    C. Check vertical and horizontal clearances.
    D. Develop cost estimates for each alternative.

26. Submit non-standard railing types, non-redundant designs and fracture critical members to the **Office of Structural Engineering** for approval. Obtain approval prior to submitting for Stage 1 Detailed Design Review.

27. Analyze impacts on **FEMA** flood zones.

28. Estimate the location and amount of fill material in wetlands, streams and other regulated waters of the United States.

29. Prepare waterway permit determination package or draft waterway permit application per Section 703.0 of the **Office of Environmental Services Waterway Permits Manual**. Submit to the District, prior to Preferred Alternative Verification review, who will review and submit to the **Office of Environmental Services** for preliminary permit determination. Comments from the **Office of Environmental Services** should be incorporated into the draft waterway permit. Complete draft waterway permit and submit to **Office of Environmental Services**.

30. Determine potential locations for on and off site stream and wetland mitigation.

31. Contact the **Office of Environmental Services** to determine if a project requires U.S. Coast Guard coordination or is a Section 9 Bridge Project. The **Office of Environmental Services** will, if necessary, contact the **U.S. Coast Guard** to determine if design requirements impact proposed design.

32. Verify that the maintenance of traffic scheme will work based on the additional design completed during Preferred Alternative Verification development.

33. As per the **Traffic Management in Work Zones Interstate and other Freeways Policy (#516-003(P))**, perform quantitative analysis to determine queues generated by proposed lane closures that violate the Permitted Lane Closure Map.

34. Submit lane closure exception requests to the District Deputy Director. If approved, these requests must then be submitted to the Multi-Lane Coordinator for approval by the Maintenance of Traffic Exceptions Committee (MOTEC). Approval must be obtained prior to submission for Stage 1 Detailed Design Review. An alternate must be submitted to MOTEC.

35. Prepare preliminary pavement marking plans to show lane alignment, lane assignments and turn lane storage lengths, unless information can be adequately shown on the plan views.

36. Perform signal warrant analysis for all proposed signals and existing signals to remain.

37. Contact maintaining agency to determine if alternate bid items for signal or lighting equipment should be used in addition to ODOT's generic bid items.

38. Prepare Proprietary Bid Justification.

39. Determine if additional Right of Way is needed for overhead sign poles, signal controllers, light poles or other equipment.

40. Determine permissible locations for on-site waste and borrow areas and portable asphalt and concrete plants, if any.

41. Identify existing Right of Way lines (No bearings or distances required).

42. Determine proposed Right of Way lines based on available construction limits. Determine if permanent right of way is to be acquired by warranty deed or easement. Identify channel easements, temporary right of way, etc.

43. Identify construction limits.

44. Contact property owners to determine presence of underground items (e.g., septic systems, sprinklers, etc.)

45. Reevaluate possible total take parcels and relocations. Evaluate the possibility of wetland mitigation with parcel takes.

46. Contact utility companies to verify existing utility locations; including depths.

47. For projects with significant utility involvement, determine utility depths using subsurface utility engineering through Quality Level "B". Quality Level "A" may be needed in critical areas.

48. Request that the utility companies identify any utility relocations outside the proposed construction limits. These areas should be included in the environmental document.

49. Send copies of the Preferred Alternative Verification plans to all involved utilities for input on the proposed design. Responses from the utility companies should be considered during Stage 1 design development.

50. Identify possible right of way acquisitions from railroad/railway companies.

51. Prepare Noise Wall Justification.

52. Prepare Retaining Wall Justification **(Section 1404.2)**.

53. Prepare Pedestrian Overpass Justification (**Section 1404.4**)

54. Perform Airway/Highway Clearance Analysis **(Section 1404.1)**.

55. Evaluate and incorporate recommendations from the Preliminary Engineering Phase Value Engineering Study.

56. Evaluate the need for landscape plans.

57. Obtain a list of environmental commitments and ensure that all commitments are maintained.

58. Prepare cost estimates for construction, utility reimbursements and right of way acquisition. Evaluate any significant increases or decreases in cost.

59. Prepare a revised schedule for further design development through submission of Final Tracings. See the **Project Development Process Manual** for example GANTT charts. The District should be contacted before proposing changes to established commitment dates.

1403.5.3 Preferred Alternative Verification Review Submission

The Preferred Alternative Verification Review Submission should include:

1. Title Sheet including:

    A. Project designation.
    B. Design designation.
    C. Index of sheets for this submission to facilitate review comments.
    D. Location map.
    E. Project description.

2. Schematic Plan sheet including:

    A. Reference lines and stationing.
    B. Horizontal curve data and bearings.
    C. Political boundaries.
    D. Waterways.
    E. Delineated wetlands.
    F. Bridges.
    G. Railroads.
    H. Utility lines as per **Section 1303.14**.
    I. Public roads.
    J. Existing culverts.
    K. Delineated wetlands and major environmental features.
    L. Location of permissible on site waste and borrow areas.
    M. Location of permissible on site locations for portable plants.

3. Typical Section sheets including:

   A. Roadway, treated and paved shoulder widths and cross slopes.
   B. Location of reference lines and profile grade point.
   C. Typical foreslopes and backslopes.
   D. Pavement buildup.
   E. Subsurface drainage (e.g., underdrains, aggregate drains). Ensure that positive outlets are available.
   F. Chemical stabilization.

4. Plan and Profile sheets including:

   A. Existing topographic items.
   B. Existing buildings.
   C. Existing septic systems, sprinklers, etc.
   D. Delineated wetlands and major environmental features.
   E. Relocated channels.
   F. Critical drive locations.
   G. Total take parcels.
   H. Tax identification numbers and ownerships.
   I. Commercial and residential relocations.
   J. Property lines based on tax map information.
   K. Existing right of way lines.
   L. Overhead and underground utilities.
   M. Proposed and existing alignment information
      i. Centerlines.
      ii. Curve data.
   N. Lane widths.
   O. Interchanges
   P. Proposed pavement.
   Q. Proposed and existing roadway profile.
   R. Vertical clearance for bridge overpass structures.
   S. Conceptual location of storm sewer trunk lines and outfalls.
   T. Conceptual location of non-linear Post Construction Storm Water Best Management Practices (BMP) (i.e. ponds, infiltration basins, bioretention cells, etc.).
   U. Intersection turning radii, labeling is not necessary.
   V. Construction limits.
   W. Show proposed culvert locations in plan view only.
   X. Name and location of waterways, side roads and railroads.
   Y. Existing Right of Way lines (No bearings or distances required).
   Z. Preliminary proposed Right of Way lines.
   AA. Rail lines.
   BB. Retaining walls.
   CC. Geologic and geotechnical concerns.
   DD. Temporary fill locations.

5. Cross Section information including:

   A. Existing ground.

B. Foreslopes, backslopes and approximate ditch flowlines. Sheets are not required to be in standard format as per **Section 1310** until Stage 1. Labeling of foreslopes, backslopes and flowlines not required until Stage 1. Underground utilities and drainage features not required until Stage 1.

6. Submit cut/fill quantity report.

7. Channel sections with preliminary flowline information.

8. Preliminary pavement marking plan.

9. Draft Soil Profile, Draft Structure Foundation Exploration sheets, and Draft Geotechnical Reports.

10. List of all potential design exceptions not previously identified along with a brief reason why the design exception should be considered for approval.

11. Access Point Request Documents (also known as Interchange Justification Studies). Approval for these documents must be obtained through the **Office of Roadway Engineering Services** prior to submission for Stage 1 Detailed Design Review.

12. Documentation of approved pavement design in accordance with the **Pavement Type Selection Policy, (#20-006(P))**, if applicable.

13. Documentation of approval of rainfall intensity curves other than those published in the **Location and Design Manual, Volume 2**.

14. Initial drainage calculations for proposed culverts

    A. Delineated contributing drainage areas shown on topographic mapping:
        i. For drainage areas less than 50 acres [20 ha] or where the Rational Method is used to estimate discharges use 1:2400 preferred, 1:6000 minimum topographic mapping scale.
        ii. For drainage areas greater than 50 acres [20 ha], use 1:24000 minimum topographic mapping scale.
    B. Drainage areas
    C. Magnitude of the 2-year, design-year and 100-year discharges.
    D. Allowable headwater elevations.
    E. Water surface elevation of the ordinary high water (may be assumed to be the 2-year storm), design-year flood, 100-year flood and the flood of record for existing and proposed conditions.

15. Documentation of contact with County Engineer for preliminary flowline information (Form LD-33).

16. Documentation of approval of structure type (i.e., prefabricated or cast-in-place) from the **Office of Structural Engineering, Hydraulics Section.**

17. Initial drainage calculations for proposed storm sewer trunk lines.

18. Documentation of Post-Construction Best Management Practices (BMPs) implementation issues and calculations for preliminary sizing of non-linear BMPs (i.e. ponds, infiltration basins, bioretention cells, etc.)

19. Structure Type Study, including:

    A. Preliminary Site Plan for preferred bridge alternative.
    B. Sketches showing:
        i. Profile for each bridge alternative considered.
    C. Hydraulic study and scour analysis.
    D. Narrative discussing the bridge alternatives.
    E. Cost estimate for each alternative.
    F. Foundation recommendation.
    G. Sketches of preliminary maintenance of traffic plan on the bridge.

20. Documentation of approval of non-standard railing type, non-redundant designs or fracture critical members. Approval must be obtained prior to submitting for Stage 1 Detailed Design Review.

21. Waterway permit determination package, or draft waterway permit. Comments from the **Office of Environmental Services** must be obtained prior to submission for Stage 1 Detailed Design Review.

22. Documentation of **U.S. Coast Guard** coordination or determination that the project is a Section 9 Bridge Project.

23. Identification of all proposed encroachments into **FEMA** flood zones.

24. Queue analysis for lane closures on interstates and other freeways.

25. Documentation of application for approval from the Maintenance of Traffic Exceptions Committee. Approval must be obtained prior to submission for Stage 1 Detailed Design Review.

26. Signal warrants.

27. Documentation of Proprietary Bid Justification. Approval from the **Office of Traffic Engineering** should be obtained for traffic related items prior to the Stage 1 submittal.

28. Documentation of alternate bid considerations for signal and lighting equipment.

29. Copies of utility company correspondence regarding verification of utility locations. Utility companies should identify any relocations outside the proposed construction limits. The Preferred Alternative Verification plans should be sent to the involved utilities either before or concurrent with the District review submittal. Utility responses should be considered during Stage 1 design development.

30. Copies of correspondence with railroad/railway companies.

31. Noise Wall Justification.

32. Retaining Wall Justification

33. Pedestrian Overpass Justification.

34. Documentation of Airway/Highway Clearance Analysis.

35. Disposition of Preliminary Engineering Phase Value Engineering Study recommendations.

36. Disposition of Constructability Review comments.

37. Disposition of all environmental commitments.

38. Cost estimates for construction and right of way acquisition. Explain any significant increase or decrease in estimated cost from previous estimates.

39. Identify utility relocations. Contact the District Utility Coordinator to determine estimated utility reimbursement costs.

40. Detailed schedule for further design development.

41. Disposition of comments from Alternative Analysis Study Review.

42. Determine potential locations for on and off site stream and wetland mitigation.

The Preferred Alternative Verification must be reviewed and approved by the District. In addition, Central Office and external agency reviews as listed in the **Project Development Process Manual (PDP), Appendix B – Review Matrices** may be required.

1403.6 Minor Project Preliminary Engineering Study

1403.6.1 General

The purpose of a Minor Project Preliminary Engineering Study is to perform sufficient design work to determine an accurate design scope, project development schedule and budget for construction, utility reimbursement and right of way acquisition; as well as to provide construction limits from which to base environmental clearances. Right of Way and utility impacts should be identified. Design work should minimize impacts to design and environmental red flag areas within the project limits. Any additional design decision that could potentially increase the construction limits or otherwise require revisions to the environmental document should be investigated during the Minor Project Preliminary Engineering Study.

A Minor Project Preliminary Engineering Study may be performed on a single feasible alternative or on multiple feasible alternatives. When multiple feasible alternatives are studied, the extent of design work may be limited to critical items at the discretion of the District Production Administrator. The preferred alternative must be fully developed.

A Minor Project Preliminary Engineering Study is part of Step 3 of the PDP for Minor Projects. A Minor Project Preliminary Engineering Study is not required for Major or Minimal Projects.

1403.6.2 Minor Project Preliminary Engineering Study Activities

The following activities are typically part of a Minor Project Preliminary Engineering Study:

1. Request certified traffic from the **Office of Multi-Modal Planning**. Traffic validation requests should include a clear description of project type, location and limits as well as the specific information required (e.g., ADT, directional distribution, percent trucks, turning movements, eighth highest hour factor, peak hour factor, growth factor, etc.) as well as the years for which this information is required (e.g., current traffic, opening-year traffic, design-year traffic). Traffic data for non-Interstate bridge replacement/rehabilitation projects should be developed or validated by the District Office. All other traffic data should be developed or validated by the **Office of Multi-Modal Planning**.

2. Obtain original plans.

3. Obtain mapping in accordance with the ODOT Mapping and Survey Specifications at a detail level (i.e. DTM and Planimetric Accuracy Class) as requested by the District. The mapping should include, but not be limited to the following:

   A. Topographic survey of the project site.
   B. Channel survey information.
   C. Bridge survey information.
   D. Underground utilities based on utility company field markings.
   E. Existing centerline monuments, existing right of way monuments, and existing centerline reference monuments.

4. Use traffic counts to develop typical sections that meet geometric criteria. Identify number of lanes, lane width, type of curb, sidewalk, buffer area, graded shoulder width, type of grading and chemical stabilization.

5. Determine the proposed horizontal alignment. For existing alignments, verify if the centerline of Right of Way does or does not equal the centerline of construction. Unless otherwise approved by the District Production Administrator, use the centerline of existing right of way as the centerline of construction.

6. Determine proposed vertical profile.

7. Determine approximate vertical and horizontal clearances.

8. Evaluate the location of superelevation at bridge structures and other critical locations.

9. Perform capacity analyses.

10. Design turn lane lengths.

11. Evaluate intersection turning radii.

12. Use access management techniques to determine if driveway access points/configurations need to be altered. Analyze drive locations and evaluate for potential areas of concern, such as:

    A. Impacts of profile work.
    B. Landlocking.
    C. Conflicts with proposed guardrail.
    D. Evaluate commercial or industrial drives associated with high traffic generators.
    E. Develop drive geometry and profiles for critical areas.

    Ensure that the right-of-way acquisition cost estimate(s) account for significant modifications to access.

13. Prepare an Access Point Request Document for revised access - interstate or other freeway. These documents are also known as Interchange Justification Studies. Contact the **Office of Roadway Engineering Services** for information regarding these documents. Submit to the District, who will submit through the **Office of Roadway Engineering Services** for approval. Approval must be obtained prior to submission for Stage 1 Detailed Design Review.

14. Identify potential design exceptions. Check accident data to determine if there is a correlation between crashes and substandard features.

15. Make a preliminary evaluation of Service Road Justification issues.

16. Review existing soils information (e.g., geologic reports, hydrogeologic information, old soil borings, maintenance history, etc.) and make preliminary design recommendations and determine if additional exploration is necessary. Perform the geotechnical exploration in accordance with the **Specifications for Geotechnical Explorations**.

17. Determine limits of geologic hazards and areas with slope stability, settlement, or poor subgrade concerns. Determine preliminary costs.

18. Determine pavement buildup. Request pavement design as per the **Pavement Type Selection Policy (#20-006(P))**. Determine if local standards regarding pavement type apply. Approval of pavement design, where applicable, must be obtained prior to submission of the Minor Project Preliminary Engineering Study.

19. Determine subsurface drainage requirements. Ensure that positive outlets are available.

20. Submit rainfall intensity curves if other than those published in the **Location and Design Manual, Volume 2**, to the **Office of Structural Engineering, Hydraulics Section** for approval.

21. Complete Drainage Design Criteria Forms. (Form LD-35)

22. Contact County Engineer to determine if proposed culvert flowline elevations are acceptable using the LD-33 form criteria.

23. Analyze conceptual storm sewer locations:

    A. Approximate outlet locations.
    B. Rough catch basin locations.
    C. Location of trunk lines.

24. Determine if channel relocations are necessary. Detail proposed design including channel sections at appropriate intervals. Investigate use of natural channel design.

25. Perform preliminary hydraulic analysis to size culverts for streams shown on USGS maps. Size all culverts that could change the roadway vertical profile due to depth of cover issues. Identify bankfull designed culverts.

26. Prepare roadway cross sections at normal spacing interval with preliminary flowline information.

27. Prepare Structure Type Studies for all proposed bridge structures as follows:

    A. Complete bridge hydraulic study and scour analysis.
    B. Compare alternative structure types.
    C. Check vertical and horizontal clearances.
    D. Develop a cost estimate for each alternative.

28. Submit non-standard railing types, non-redundant designs and fracture critical members to the **Office of Structural Engineering** for approval. Obtain approval prior to submitting for Stage 1 Detailed Design Review.

29. Estimate the location and amount of fill material in wetlands, streams and other regulated waters of the United States.

30. Prepare waterway permit determination package per Section 703.0 of the **Office of Environmental Services Waterway Permits Manual**. Submit to the District; who will review and submit to the **Office of Environmental Services** for preliminary permit determination. Comments from the **Office of Environmental Services** must be obtained prior to submission of Stage 1 Detailed Design, and should be incorporated into draft waterway permit to be submitted to the **Office of Environmental Services**.

31. Determine potential locations for on and off site stream and wetland mitigation.

32. Contact the **Office of Environmental Services** to determine if a project requires **U.S. Coast Guard** coordination or is a Section 9 Bridge Project. The **Office of Environmental Services** will, if necessary, contact the **U.S. Coast Guard** to determine if design requirements impacts proposed design.

33. Analyze impacts on **FEMA** flood zones.

34. Determine potential locations for retaining walls.

35. Prepare Retaining Wall Justification (Section 1404.2).

36. Prepare Maintenance of Traffic Alternatives analysis for Interstates and Interstate look-alikes only. For other projects, investigate:

    A. Number of lanes to be maintained.
    B. Lane widths
    C. Type of maintenance of traffic (e.g., signalized, detoured, part width, runaround, median crossover).
    D. Establish preliminary phasing/sequence of operations.
    E. Local access.
    F. Staged construction phasing on bridge structures.
    G. Detour routes.
    H. Use of pavement for maintaining traffic.
    I. Maintenance of pedestrian traffic.
    J. Innovative contracting methods (e.g., Work Day, Incentive/Disincentive, Lump Sum Incentive, Liquidated Savings, and A+B Contracts).

37. As per the **Traffic Management in Work Zones Interstate and other Freeways Policy (#516-003(P))**, perform quantitative analysis to determine queues generated by proposed lane closures.

38. Submit lane closure exception requests to the District Deputy Director. If approved, these requests must then be submitted to the Multi-Lane Coordinator for approval by the Maintenance of Traffic Exceptions Committee. Approval must be obtained prior to submission for Stage 1 Detailed Design Review.

39. Plot preliminary pavement markings on the plan views to define lane assignments and traffic patterns.

40. Determine if additional Right of Way is needed for overhead sign poles, signal poles, signal controllers, light poles or other equipment.

41. Determine if lighting is needed in any areas, investigate warrants for freeway and interchange lighting.

42. Perform signal warrant analysis for all proposed signals and all existing signals to remain.

43. Contact maintaining agency to determine if alternate bid items for signal or lighting equipment should be used in addition to ODOT's generic bid items.

44. Prepare Proprietary Bid Justification.

45. Obtain tax map and overlay property lines, tax identification numbers, and ownerships on base map survey data.

46. Contact property owners to determine presence of underground items (e.g., septic systems, sprinklers, etc.)

47. Determine limits and type of existing right of way.

48. Identify possible total take parcels. Identify possible commercial or residential relocations.

49. Determine permissible locations for on-site waste and borrow areas and portable asphalt and concrete plants, if any.

50. Determine preliminary limits of proposed Right of Way lines based on available construction limits. Determine if permanent right of way is to be purchased by warranty deed or easement. Identify channel easements, temporary right of way, etc. (No bearings or distances required).

51. Determine if additional right of way will be needed for sediment basins for temporary erosion control.

52. Identify construction limits.

53. Contact utility companies to locate and verify their underground facilities; including depths.

54. Request that the utility companies identify any utility relocations outside the proposed construction limits. These areas should be included in the environmental document.

55. Send copies of the Minor Project Preliminary Engineering Study to all involved utilities to allow for input on the proposed design(s). Request that the utility company identify any relocations that might fall outside the proposed construction limits. Responses from the utility companies should be considered during completion of the environmental document and Stage 1 design development.

56. Identify utility relocations. Contact the District Utility Coordinator to determine estimated utility costs: including costs to ODOT and those borne by the utility companies.

57. For projects with significant utility involvement (e.g., electric lines 69 kilovolt and above, gas lines above 8 inch and a pressure of 125 pounds per square inch (psi) or more, electrical substations, sanitary pump stations, gas pumping facilities, etc.) determine utility depths using subsurface utility engineering through Quality Level B and, at critical locations, Quality Level A.

58. Contact involved railroad/railway companies to determine their design requirements. Incorporate

the railroad/railway companies' requirements into the design.

59. Identify possible right of way acquisition from railroad/railway companies.

60. Evaluate how the proposed project fits into the existing corridor aesthetically. Consider features such as landscaping, lighting, signing, signals, retaining walls and bridge structures in terms of texture, shape, color, proportion, scale, order and balance. Identify modifications to proposed design.

61. Prepare a Noise Wall Justification.

62. Prepare Pedestrian Overpass Justification.

63. Perform Airway/Highway Clearance Analysis.

64. Evaluate the need for landscaping plans.

65. Obtain a list of environmental commitments and ensure that all commitments are maintained.

66. Prepare exhibits for Preliminary Engineering Phase Value Engineering Study. Submit exhibits to the District who will coordinate the Value Engineering Study with the **Office of Production**.

67. Prepare plans for Constructability Review. The Constructability Review will normally be completed concurrently with the Preliminary Engineering Phase Value Engineering Study.

68. Prepare cost estimates (construction, utility reimbursement and right of way acquisition) for each alternative.

69. Analyze the positives and negatives of each alternative from a design and environmental perspective.

70. Prepare a revised schedule for further design development through submission of Final Tracings. See the **Project Development Process Manual** for example GANTT charts. The District should be contacted before proposing changes to established commitment dates.

71. Conceptually evaluate Post-Construction Storm Water Best Management Practices (BMP). Consider the following items in the evaluation:

    A. BMP selection based on project setting and drainage features
    B. Requirements, if any, for water quantity treatment
    C. Identification of constraints regarding implementation of BMPs. Constraints include total parcel takes, impacts to environmental resources, major utility relocations, etc.
    D. Project classification as Redevelopment or New Construction according to **Location and Design Manual, Volume 2**

1403.6.3 Minor Project Preliminary Engineering Study Review Submission

The Minor Project Preliminary Engineering Study Review Submission should include:

1. Title Sheet including:

    A. Certified traffic data.
    B. Project Description.
    C. Design Designation Information.
    D. Design and legal speeds.

2. Typical sections identifying:

    A. Number of lanes.
    B. Lane width.
    C. Graded shoulder width.
    D. Type of grading.
    E. Type of curb.
    F. Sidewalk.
    G. Buffer.
    H. Pavement buildup.
    I. Subsurface drainage (e.g., underdrains, aggregate drains).

3. Plan views showing:

    A. Existing topography.
    B. Existing buildings.
    C. Delineated wetlands and major environmental features.
    D. Existing right of way lines.
    E. Existing septic systems, sprinklers, etc.
    F. Overhead and underground utilities.
    G. Geologic and geotechnical concerns.
    H. Relocation channels.
    I. Proposed and existing alignment information.
        i. Centerlines
        ii. Curve data for all existing and proposed roadways. This information can be shown on the plan view or it may be listed separately. Locate points of superelevation transition and full superelevation.
    J. Lane widths.
    K. Interchanges.
    L. Proposed pavement.
    M. Proposed culvert locations.
    N. Property lines based on tax map information.
    O. Tax identification numbers and ownerships.
    P. Critical drive locations.
    Q. Preliminary pavement markings.
    R. Conceptual locations of storm sewer trunk lines and outfalls.
    S. Existing Right of Way lines.
    T. Preliminary proposed Right of Way lines.
    U. Preliminary intersection turning radii; labeling is not necessary.
    V. Construction limits.
    W. Total take parcels.
    X. Commercial or residential relocations.

Y. Name and location of waterways, side roads and railroads.
Z. Potential service road locations.
AA. Rail lines.
BB. Retaining walls.
CC. Temporary fill locations.

These may be plan sheets or larger exhibit type sheets.

4. Profile views showing:
5.

A. Existing and proposed roadway profile.
B. Existing drainage system.
C. Underground utilities.
D. Proposed culvert locations.
E. Approximate vertical clearances for bridge overpass structures.

Profiles may be shown on plan and profile sheets or on larger exhibit type sheets.

5. Cross Section information including:

A. Existing ground.
B. Foreslopes, backslopes and approximate ditch flowlines. Sheets are not required to be in standard format as per **Section 1310** until Stage 1. Labeling of foreslopes, backslopes, flowlines and utilities is not required until Stage 1. Drainage features are not required until Stage 1.

6. Channel sections with preliminary flowline information.

7. Draft Soil Profile, Draft Structure Foundation Exploration sheets, and Draft Geotechnical Reports.

8. Access Point Request Documents (also known as Interchange Justification Studies). Approval for these documents must be obtained through the **Office of Roadway Engineering Services** prior to submission for Stage 1 Detailed Design Review.

9. List of potential design exceptions and a brief reason as to why they should be considered for acceptance.

10. Capacity Analyses.

11. Approval of pavement design.

12. Completed Drainage Design Criteria Forms. (LD-35)

13. Drainage calculations for proposed culverts

A. Delineated contributing drainage areas shown on topographic mapping:
   i. For drainage areas less than 50 acres [20 ha] or where the Rational Method is used to estimate discharges use 1:2400 preferred, 1:6000 minimum topographic mapping scale.
   ii. For drainage areas greater than 50 acres [20 ha], use 1:24000 minimum topographic mapping scale.

B. Drainage areas.
C. Magnitude of the 2-year, design-year and 100-year discharges.
D. Allowable headwater elevations
E. Water surface elevation of the ordinary high water (may be assumed to be the 2-year storm), design-year flood, 100-year flood and flood of record for existing and proposed conditions.

14. Documentation of approval of rainfall intensity curves other than those published in the **Location and Design Manual, Volume 2**.

15. Documentation of contact with County Engineer for flowline information.

16. Documentation of conceptual storm sewer locations

    A. Approximate outlet locations.
    B. Location of trunk lines.

    Show on plan view or discuss in narrative.

17. Structure Type Study including:

    A. Preliminary Site Plan for preferred bridge alternative.
    B. Sketches showing:
        i. Profile for each bridge alternative considered.
    C. Hydraulic study and scour analysis.
    D. Narrative discussing the proposed bridge alternatives.
    E. Cost estimate for each alternative.
    F. Foundation recommendations.
    G. Sketches of preliminary maintenance of traffic plan on bridge.

18. Documentation of approval of non-standard railing type, non-redundant designs or fracture critical members. Approval must be obtained prior to submitting for Stage 1 Detailed Design Review.

19. Waterway permit determination package or draft waterway permit application. Comments from the **Office of Environmental Services** must be obtained prior to submission for Stage 1 Detailed Design Review.

20. Determine potential locations for on and off site stream and wetland mitigation.

21. Documentation of **U.S. Coast Guard** coordination or determination that the project is a Section 9 Bridge Project.

22. Documentation identifying all proposed encroachments into **FEMA** flood zones.

23. Retaining Wall Justification.

24. Pedestrian Overpass Justification.

25. Maintenance of Traffic Alternatives Analysis for Interstates and Interstate look alikes only. For other projects, provide a summary of conceptual maintenance of traffic schemes with a discussion of each alternatives, including:

A. Number of lanes to be maintained.
B. Lane widths.
C. Access management.
D. Preliminary sketches, if necessary to show phasing.
E. Critical areas and large traffic generators.
F. Detour routes.
G. Maintenance of pedestrian traffic.

26. Queue analysis for lane closures on interstates and other freeways.

27. Documentation of application for approval from the Maintenance of Traffic Exceptions Committee. Approval must be obtained prior to submission for Stage 1 Detailed Design Review.

28. Signal warrants.

29. Documentation of lighting considerations and lighting warrants.

30. Documentation of Proprietary Bid Justification. Approval from the **Office of Traffic Engineering** should be obtained for traffic related items prior to the Stage 1 submittal.

31. Documentation of alternate bid considerations for signal and lighting equipment.

32. Copies of correspondence with railroad/railway companies. Estimates of possible right of way acquisition from railroad/railway companies.

33. Copies of utility company correspondence regarding verification of utility locations. Utility companies should identify any relocations outside the proposed construction limits.

34. Minor Project Preliminary Engineering plans should be sent to all involved utilities either before or concurrent with the District review submittal. Utility responses should be considered during Stage 1 design development.

35. Documentation of aesthetic considerations.

36. Noise Wall Justification.

37. Documentation of Airway/Highway Clearance Analysis.

38. Exhibits for a Preliminary Engineering Phase Value Engineering Study. The Preliminary Engineering Phase Value Engineering Study must be completed prior to submission of the Stage 1 Detailed Design.

39. Plans for Constructability Review. The Constructability Reviews will normally be completed concurrently with the Preliminary Engineering Phase Value Engineering Study.

40. Disposition of all environmental commitments.

41. For projects with more than one alternative, a matrix or other summary of advantages and disadvantages of each alternative from a design perspective.

42. Cost estimates for construction, utility reimbursement and right of way acquisition. Explain any significant increase or decrease in estimated cost from previous estimates.

43. Detailed schedule for further design development.

44. Discussion of Post-Construction Best Management Practices (BMPs) Conceptual Layout and potential implementation issues.

The Minor Project Preliminary Engineering Study must be reviewed and approved by the District. In addition, Central Office and external agency reviews as listed in **Project Development Process Manual (PDP), Appendix B – Review Matrices** may be required.

1403.7 Stage 1 Detailed Design

1403.7.1 General

Stage 1 plans are developed to a sufficient level of design detail to ensure that right of way plan development may begin immediately after completion of this stage. Construction limits should be accurate; with little or no changes anticipated due to Stage 2 development. All issues affecting environmental clearances should be resolved by the end of Stage 1 design.

Stage 1 Detailed Design is part of Step 8 of the PDP for Major Projects and part of Step 4 of the PDP for Minor Projects. Minimal Projects and Limited Review Projects do not require a Stage 1 Detailed Design Submission.

1403.7.2 Stage 1 Detailed Design Activities

The following activities are usually part of the Stage 1 Detailed Design:

1. Contact property owners, **Natural Resources Conservation Services (NRCS)**, etc. to determine location of all field tiles.

2. Design superelevation transitions.

3. Prepare exaggerated profiles.

4. Design intersection geometry; including proposed elevations for projects with closed drainage systems.

5. Determine vertical and horizontal bridge clearances.

6. Evaluate guardrail length of need. Determine end treatment type.

7. Layout all drives. Determine drive vertical profiles.

8. Prepare Design Exception Request. Submit Design Exception Request and supporting plan sheets to District, who will review and submit through the **Office of Roadway Engineering Services** for approval. Design Exception approval is required prior to Stage 1 Detailed Design Review submission.

9. Prepare Service Road Justification.

10. Perform additional geotechnical exploration, if needed.

11. Complete the design of all proposed culverts; including grading and outlet protection.

12. Submit deviations from the Pipe Policy to the **Office of Structural Engineering, Hydraulics Section**. Approval of deviations is required for Stage 1 Detailed Design approval.

13. Complete the design of all storm sewer systems; including spread calculations.

14. Obtain approval from the **Office of Structural Engineering, Hydraulics Section** for oversizing storm sewer systems for anticipated development. Approval of oversized systems is required for Stage 1 Detailed Design approval.

15. Evaluate proposed field tile outlets.

16. Prepare a Flood Hazard Evaluation for all water course involvements, except crossings where roadway culverts are selected to satisfy minimum size requirements.

17. Evaluate underdrain placement. Ensure that positive outlet locations are available.

18. Determine ditch flowline elevations.

19. Locate and design all drive pipes.

20. Design ditch drainage system for flow capacity and identify need for erosion protection.

21. Complete Post Construction Storm Water Best Management Practices (BMP) design.

22. Complete channel hydraulic design for relocated channels. Design channel stabilization and erosion protection.

23. Determine potential locations for on and off site stream and wetland mitigation.

24. Prepare channel sections.

25. Determine the amount of proposed fill to be placed below ordinary high water elevation, at each culvert and structure and the amount of proposed fill in wetlands.

26. Complete LD-33 County Engineer approval form.

27. Complete Bridge Preliminary Design Report for all bridge structures. Define all work in streams for final waterway permit applications, if required.

28. Incorporate all **Office of Environmental Services** comments on the waterway permit determination package. Prepare and submit final waterway permit applications to the District, if required. The District will review the permit and submit to the **Office of Environmental Services**. Approval (either **Office of Environmental Services, USACE** or **OEPA**) must be obtained prior to submission of Final Tracings to Central Office.

29. Submit and obtain approval from Local Flood Plain Coordinator for all flood zone encroachments. Obtain approval from Local Flood Plain Coordinator prior to submitting for Stage 1 Detailed Design Review.

30. Complete retaining wall preliminary design.

31. Verify that selected maintenance of traffic scheme will work based on the additional design completed in this stage.

32. Determine if proposed maintenance of traffic phasing will require any right of way beyond what is required for the proposed work.

33. Prepare preliminary pavement marking plan.

34. Refine Systems Engineering Analysis for Intelligent Transportation System (ITS) projects.

35. Locate signal poles and controllers.

36. Determine location of the power source for all signal and lighting installations.

37. Identify removal items that will have an impact on right of way (e.g., trees, steps, etc.)

38. Refine construction limits. Stage 1 construction limits should encompass all anticipated work. Right of way acquisition will be based off these limits.

39. Conduct title and deed research.

40. Locate property pins.

41. Determine existing property line locations.

42. Determine proposed right of way lines.

43. Identify right of way encroachments.

44. Identify all total take parcels. Identify commercial and residential relocations.

45. If not previously completed, determine utility depths using subsurface utility engineering through Quality Level “B”, at times Quality Level “A” in critical areas.

46. Evaluate responses from utility company comments on the Preferred Alternative Verification or Minor Project Preliminary Engineering Study plans. Identify utility conflicts. Minimize relocations, where possible.

47. Send copies of the Stage 1 plans to all involved utilities to allow input on the proposed design. Responses should be considered during Stage 2 design development.

48. Determine if any proposed water line or sanitary sewer line will be included in the plans and evaluate any reimbursement issues.

49. Submit Stage 1 Detailed Design plans to Railroad/Railway Company for information and comments. Include information on possible right of way acquisition from railroad/railway companies. Railroad/Railway comments must be obtained prior to submission for Stage 2 Detailed Design Review.

50. Determine specific noise wall locations. Assess impact of noise wall locations on proposed drainage system. Modify system, as necessary.

51. Determine if warranty items should be used on the project.

52. Complete Airway/Highway Clearance Analysis, if not completed previously.

53. Identify and incorporate environmental commitments.

54. Prepare exhibits for a Detailed Design Phase Value Engineering Study. Submit exhibits to the District; who will coordinate the Value Engineering Study with the **Office of Production**. The Detailed Design Phase Value Engineering Study must be completed prior to submission of Stage 2 Detailed Design plans. Minor projects that qualify for Value Engineering typically require only one Value Engineering Study that is usually during Preliminary Engineering.

55. Prepare cost estimates for construction, utility reimbursement and right of way acquisition for all alternatives.

1403.7.3 Stage 1 Detailed Design Review Submission

The Stage 1 Detailed Design Review Submission should include:

1. Title Sheet including:

    A. Project designation.
    B. Design designation.
    C. Index of sheets for this submission to facilitate review comments.
    D. Location map.
    E. Project description.

2. Schematic Plan sheet including:

    A. Reference lines and stationing.
    B. Horizontal curve data and bearings.
    C. Political boundaries.
    D. Waterways.
    E. Delineated wetlands.
    F. Bridges.
    G. Railroads.
    H. Utility lines as per **Section 1303.14**.
    I. Public roads.
    J. Existing culverts.
    K. Location of permissible on site waste and borrow areas.
    L. Location of permissible on site locations for portable plants.
    M. Benchmarks and reference points.

3. Typical Section sheets including:

    A. Roadway, treated and paved shoulder width and cross slope.
    B. Location of reference lines and profile grade point.
    C. Typical foreslopes and backslopes.
    D. Pavement buildup.
    E. Longitudinal joints.
    F. Subsurface drainage (e.g., underdrains, aggregate drains).

G. Normal crown and superelevated sections.
H. Approach slabs.
I. Existing pavement buildup (material and thickness).

4. General Note Sheets:

A. Utility company listing (as per **Appendix B, Note G102**)
B. Environmental commitment notes.

5. Plan and Profile sheets including:

A. Existing topography.
B. Existing buildings.
C. Property lines.
D. Existing right of way lines.
E. Delineated wetlands and major environmental features.
F. Overhead and underground utilities.
G. Field tile locations.
H. Geologic and geotechnical concerns.
I. Proposed and existing alignment information (e.g., centerlines, curve data).
J. Horizontal alignment data.
K. Proposed pavement.
L. Vertical profile data.
M. Horizontal and vertical clearances.
N. Final construction limits.
O. Proposed Right of Way lines.
P. Culverts.
Q. Post Construction Storm Water Best Management Practices (BMP).
R. Storm sewer systems, trunk lines.
S. Drives.
T. Drive pipes.
U. Guardrail.
V. Total take parcels.
W. Commercial and residential relocations.
X. Identify items to be removed that impact right of way (e.g., trees, steps).
Y. Signal pole locations.
Z. Noise wall locations.
AA. Retaining walls.

6. Cross Section sheets:

A. Foreslopes and backslopes.
B. Ditch flowline elevations.
C. Grading for guardrail end treatments.
D. Underground utilities.
E. Existing drainage items.
F. Proposed drainage items, including:
   i. Storm sewers.
   ii. Drive pipes.
G. Special benching.
H. Retaining walls.

7. Superelevation table(s).

8. Intersection Details sheets showing:

   A. Turning radii.
   B. Proposed elevations.

9. Interchange Detail sheets showing interchange layout.

10. Drive Detail sheets. Plan and profile information for all drives must be shown in the plans. Plan information may be labeled on the Plan and Profile sheets, on a separate drive detail sheet or in tabular format. Profile information may be shown on the cross sections or on a separate drive detail sheet.

11. Storm Sewer Profile sheets.

12. Culvert Detail sheets. Include all information as per **Section 1312.2**, except estimated quantities and headwall design details.

13. Channel Relocation Detail sheets.

14. Channel Section sheets:

   A. Side slopes.
   B. Flowline elevations.

15. Conceptual Maintenance of Traffic, if revised from previous submissions.

16. Preliminary Pavement Marking Plan.

17. Revised Systems Engineering Analysis for Intelligent Transportation System (ITS) projects.

18. Retaining wall plans, including:

   A. Wall locations.
   B. Wall elevations.
   C. Wall type.
   D. Footing depth.
   E. Foundation type.

19. Exaggerated profiles for areas of superelevation transition.

20. Final Soil Profile, Final Structure Foundation Exploration Sheets, and Final Geotechnical Reports.

21. Documentation of approved Access Point Request Document (also known as Interchange Justification Studies). These documents must be approved through the **Office of Roadway Engineering Services** prior to submitting for Stage 1 Detailed Design Review.

22. Documentation of approved Design Exception. Design Exceptions must be approved through the **Office of Roadway Engineering**. Approval of Design Exceptions is required for Stage 1 Detailed Design Approval.

23. Service Road Justification.

24. Documentation of approval of deviations from the Pipe Policy.

25. Documentation of approval of oversized storm sewers.

26. Drainage calculations, including:

    A. Culverts. (Include pipe alternates if applicable).
    B. Storm Sewers. (Include pipe alternates if applicable).
    C. Drive pipes. (Include pipe alternates if applicable).
    D. Ditches.
    E. Flood Hazard Evaluation.
    F. Spread Calculations.

27. LD-33 County Engineer approval form. County Engineer approval should be obtained prior to submission for Stage 1 Detailed Design Review.

28. Bridge Preliminary Design report including:

    A. Final Structure Site Plan.
    B. Final Maintenance of Traffic Plan.
    C. Foundation Report.
    D. Supplemental Site Plan for railway crossings.

    For additional requirements refer to the **Bridge Design Manual Section 200**.

29. For projects with historic properties, including historic bridges, submit plans to the **SHPO**, if requested by **SHPO**. The **Office of Environmental Services** will submit to **SHPO** for review and comment.

30. Final waterway permit application. Approval from the **Office of Environmental Services,** the **USACE** or **OEPA**, as applicable, must be obtained prior to submission of Final Tracings to Central Office.

31. Stream and/or wetland mitigations plans, if required.

32. Local Flood Plain Coordinator approvals for all flood zone encroachments.

33. Retaining wall calculations.

34. List of any right of way encroachments.

35. List of all total take parcels and relocations.

36. List of known utility conflicts and anticipated relocations.

37. Copies of utility company correspondence including: utility responses to requests for comments during the Preferred Alignment Verification/Minor Project Preliminary Engineering Study and a request for comments on the Stage 1 design. Utility concerns regarding the Stage 1 plans should be evaluated during Stage 2 design development.

38. Description of proposed water line or sanitary sewer line work to be included in the ODOT contract.

39. Copies of all railroad correspondence. Railroad comments must be obtained prior to Stage 2 Detailed Design submission.

40. Documentation, of which warranty items, if any, will be used on the project.

41. Refine proposed Right of Way lines based on final construction limits.

42. Documentation of Airway/Highway Clearance Analysis, if not previously submitted.

43. Exhibits for a Detailed Design Phase Value Engineering Study. Detailed Design Phase Value Engineering must be completed prior to submission for Stage 2 Detailed Design Review.

44. Cost estimates for construction and right of way acquisition. The District Utility Coordinator will prepare a utility reimbursement cost estimate and provide this estimate to the District Planning and Production Administrators for inclusion in the total estimated project cost. Explain any significant increase or decrease in estimated cost from previous estimate.

45. Disposition of Preferred Alternative Verification or Minor Project Preliminary Engineering review comments.

46. Disposition of Constructability Review.

47. Final Post Construction Storm Water Best Management Practices (BMP) Design Calculations and documentation of any BMP implementation issues.

The Stage 1 Detailed Design must be reviewed and approved by the District. In addition, Central Office and external agency reviews as listed in the **Project Development Process Manual (PDP), Appendix B – Review Matrices** may be required.

1403.8 Preliminary Right of Way

1403.8.1 General

Right of way plans provide detailed information regarding existing and proposed property rights and how they relate to the proposed project.

Preliminary Right of Way is part of Step 9 of the PDP for Major Projects and Step 5 of the PDP for Minor Projects. A Preliminary Right of Way Review Submission is required for all plans that involve acquisition of temporary or permanent right of way.

1403.8.2 Preliminary Right of Way Activities

The following activities are usually part of Preliminary Right of Way design:

1. Revise Stage 1 plans based on review comments that have an impact on construction limits and/or right of way plan information.

2. Establish proposed right of way lines based on construction limits determined during Stage 1 Detailed Design.

3. Identify proposed easements (e.g., temporary, drainage, channel).

4. Prepare a centerline plat detailing the proposed centerline and its precise geographic and boundary related position.

5. Prepare a property map showing the relationship of proposed right of way to each entire ownership.

6. Prepare a summary of additional right of way that tabulates all aspects of areas involved in the acquisition.

7. Prepare detailed right of way plan sheets showing all existing and proposed features and their relationship to existing and proposed rights of way.

8. Prepare Railroad Plats.

9. Prepare draft legal descriptions for railroad parcels, including: bearings, distances and valuation stations.

10. Submit Preliminary Right of Way plans and legal descriptions for all railroad parcels to the District. District is to submit this information to the Railroad/Railway Company for review and comments. Comments should be received prior to Final Right of Way Tracing Submission.

11. Identify all encroachments.

12. Contact the District Utility Coordinator for a revised cost estimate if Right of Way plan development indicates any changes to assumptions used to generate the Stage 1 utility cost estimate (e.g. additional easements found).

13. Prepare an updated right of way acquisition cost estimate.

The **Real Estate Policies and Procedures Manual, Section 3100 Right of Way Plans**, details additional requirements for the Preliminary Right of Way Design Submission.

1403.8.3 Preliminary Right of Way Review Submission

The Preliminary Right of Way Review Submission should include:

1. Title Sheet, Schematic Plan, General Note, Plan and Profile sheets containing corrected Stage 1 Detailed Design information.

2. Centerline plat:

    A. Centerlines.
    B. Monuments.
    C. Curve data and bearings.

3. Property map:

    A. Entire periphery of ownerships.
    B. Property owner names.
    C. Buildings and drives.

4. Summary of Additional Right of Way sheet:

    A. Parcel numbers.
    B. Owner identification.
    C. Owners Record.
    D. Auditor's Parcel numbers.
    E. Record Area.
    F. Total Present Roadway Occupied (P.R.O.).

5. Detailed Right of Way Plan sheets:

    A. Existing topographic features.
    B. Property lines.
    C. Parcel boundaries.
    D. Centerlines and associated data.
    E. Proposed right of way.
    F. Easements.
    G. Encroachments.
    H. Total take parcels.

6. Railroad Plats.

7. Copies of the deeds and all pertinent information used to resolve the boundary lines and a surveyors report identifying any boundary resolution issues, problems of occupation lines vs. deed calls, boundary closure problems, deeds that do not close, existing centerline of right of way resolution issues, etc.

8. Draft legal descriptions for railroad parcels, including: bearings, distances and valuation stations.

9. Copy of railroad correspondence.

10. Right of way acquisition cost estimate with an explanation of any changes from previous submissions. District Utility Coordinator to provide revised utility reimbursement cost estimate, if necessary.

11. Disposition of Stage 1 Detailed Design Review comments as they pertain to the right of way plans.

For additional details on the contents of the preliminary right of way sheets see the **Real Estate Policies and Procedures Manual, Section 3100 Right of Way Plans**.

The Preliminary Right of Way Review Submission must be reviewed and approved by the District. In addition, Central Office and external agency reviews as listed in the **Project Development Process Manual (PDP), Appendix B – Review Matrices** may be required.

1403.9 Stage 2 Detailed Design

1403.9.1 General

Stage 2 Detailed Design involves the detailing of the various portions of a plan. At the end of the Stage 2 Detailed Design, all design issues of any significance should be resolved.

Stage 2 Detailed Design is part of Step 9 of the PDP for Major Projects and Step 5 of the PDP for Minor Projects. A Stage 2 Detailed Design Submission is not required for Minimal or Limited Review Projects.

1403.9.2 Stage 2 Detailed Design Activities

The following activities are usually part of Stage 2 Detailed Design:

1. Add pavement elevations to Interchange Details. Develop grading plans.

2. For concrete pavements, determine locations of longitudinal and transverse joints. Show the locations of these joints on the Intersection Details and Interchange Details.

3. Detail underdrain system.

4. Prepare reinforcing details for full height culvert walls.

5. Submit designs for precast reinforced concrete box culverts, three-sided flat-topped culverts and precast reinforced concrete arch sections where the usual maximum height of cover is exceeded. Approval must be obtained prior to submission for Stage 2 Detailed Design Review.

6. Detail new and rehabilitated bridge structures.

7. Prepare and submit Coast Guard Section 9 Bridge Permits to the District. The District will review the permit and submit to the **Office of Environmental Services**. The **Office of Environmental Services** will submit the permit to the **U.S. Coast Guard**. Coast Guard permits are required to construct a new bridge or causeway or to modify an existing bridge or causeway across commercially navigable “Waters of the United States”.

8. The environmental document and 404/401 permits must be approved prior to **U.S. Coast Guard** authorization under **Section 9 of River and Harbor Act. U.S. Coast Guard** approval must be obtained prior to submission of Final Tracings to Central Office.

9. Complete retaining wall detail design.

10. Detail maintenance of traffic phasing plans.

11. Prepare a detour plan.

12. Determine the local alternate detour route. Obtain County Engineer approval. Approval must be obtained prior to submission for Stage 2 Detailed Design Review.

13. Layout pavement markings.

14. Layout signing. Re-evaluate guardrail length of need if use to protect major guide signs.

15. Revise Systems Engineering Analysis for Intelligent Transportation System (ITS) projects.

16. Determine signal design requirements:

    A. Signal head locations.
    B. Loop detector locations.
    C. Phasing diagram.
    D. Loop detector chart.

E. Pedestrian considerations.
F. Emergency transit and/or railroad preemption.

17. Design proposed lighting. Determine:

    A. Type of lighting equipment.
    B. Type of light source.
    C. Light pole layout and circuit design.
    D. Need for lighting on signs.
    E. Significance of light trespass into surrounding areas.
    F. Light pole foundation design.

18. Determine the disposition of all miscellaneous items (e.g., mailboxes).

19. Prepare plan for fencing at right of way lines.

20. Add proposed right of way lines to Plan and Profile sheets.

21. Add proposed right of way lines to Cross Section sheets.

22. Evaluate utility responses to Stage 1 plans. Revise plans to incorporate responses, if warranted.

23. Send copy of Stage 2 plans to utility companies to begin relocation plans. Indicate known utility relocations. Utilities may comment on water line and sanitary sewer work.

24. Notify the District Utility Coordinator of any changes to utility impacts and/or anticipated reimbursements.

25. Evaluate railroad/railway responses to Stage 1 plans. Revise plans to incorporate responses, if warranted.

26. Send copy of Stage 2 plans to railroad/railway company.

27. Complete water work and sanitary sewer design. Send copy of plans to involved utilities for review and approval.

28. Develop landscaping plan.

29. Develop/complete mitigation plan for stream and wetlands, if required. Submit mitigation plan to **USACE** and **OEPA** for approval. Approval must be obtained prior to submission of Final Tracings.

30. Structurally design and detail noise walls.

31. Obtain approval from the Design Aesthetics Committee for all aesthetic items (e.g., noise walls, concrete textures, landscape design, color, etc). Approval must be obtained prior to Stage 2 Detailed Design approval

32. Evaluate and incorporate recommendations from Detailed Design Phase Value Engineering Study.

33. Prepare plans for Second Constructability Review.

34. Update the construction cost estimate.

1403.9.3 Stage 2 Detailed Design Review Submission

The Stage 2 Detailed Design Review Submission should include:

1. Title Sheet including all information per **Section 1302**; except Engineer's seal, Supplemental Specifications, Special Provisions, Standard Construction Drawings, and Earth Disturbed Areas.

2. Schematic Plan sheet including all information per **Section 1303**.

3. Typical Sections sheets including all information per **Section 1304**.

4. General Note sheet listing utility companies as per **Appendix B, Note G102**.

5. Maintenance of Traffic sequence of operations and local alternate detour notes.

6. Maintenance of Traffic Phasing Plans including:

    A. Location of proposed work, by phase.
    B. Existing and maintenance of traffic signing and pavement marking.
    C. Median crossovers.
    D. Channelizing devices (e.g., barriers, drums).
    E. Work zone lane widths.
    F. Pavement for maintaining traffic.
    G. Sections showing existing and proposed pavement and lane widths.
    H. Attenuator.

7. Detour map.

8. Plan and Profile sheets including all information as per **Section 1309**. Estimated quantities are not required. Proposed work should be identified, if not obvious.

9. Cross Sections sheets as per **Section 1310**; except:

    A. Earthwork and seeding calculations.

10. Intersection Details sheets showing:

    A. Turning radii.
    B. Proposed elevations.
    C. Joints for concrete pavement.
    D. Proposed drainage system.

11. Interchange Detail sheets including:

    A. Interchange layout.
    B. Proposed elevations.
    C. Joints for concrete pavement.
    D. Grading details.

12. Drive Detail sheets showing plan and profile information. Plan information may be labeled on the Plan and Profile sheets, on a separate drive detail sheet or in tabular format. Profile information may be shown on the cross sections or on a separate drive detail sheet.

13. Culvert Detail sheets including all information as per **Section 1312.2**, except estimated quantities.

14. Headwall/wingwall details for all headwalls not covered by the Standard Construction Drawings.

15. Channel Relocation Detail sheets.

16. Channel Section sheets. Earthwork quantities not required.

17. Storm Sewer Profile sheets.

18. Water work and sanitary sewer plans, if not covered by the Plan and Profile sheets.

19. Pavement Marking and Signing Plan sheets as per the **Traffic Engineering Manual**; except:

    A. Raised pavement markers.
    B. Delineators.
    C. Barrier reflectors.
    D. Estimated quantities.

20. Revised Systems Engineering Analysis for Intelligent Transportation System (ITS) projects.

21. Signal Plan sheets as per the **Traffic Engineering Manual**; except:

    A. Estimated quantities.
    B. Wiring diagram.
    C. Pole orientation chart.
    D. Timing chart.
    E. Notes.

22. Lighting plan as per the **Traffic Engineering Manual**; except estimated quantities.

23. Landscaping Plan; except estimated quantities.

24. Mitigation Plan, except estimated quantities.

25. Noise wall details.

26. Bridge plans as per the **Bridge Design Manual**; except estimated quantities and reinforcing steel tables. These plans will usually include:

    A. Site Plan.
    B. Stage Construction Detail sheets.
    C. Abutment Detail sheets.
    D. Pier Detail sheets.
    E. Superstructure Detail sheets.
    F. Transverse Section.
    G. General Notes.

27. Documentation of Design Aesthetics Committee approval of aesthetic details.

28. Retaining Wall Detail Sheets.

29. Fencing Plan.

30. Detailed Right of Way Plan Sheets from the Preliminary Right of Way Review.

31. Coast Guard Section 9 Bridge Permit Application. Approval must be obtained prior to submission of Final Tracings to Central Office. Final permit applications must be indicative of the final project design (i.e., Amount of fill below ordinary high water and bridge navigational clearance). Project designers and waterway permit preparers must coordinate to ensure the applications accurately depict the final design.

32. Documentation of local alternate detour route and County Engineer approval.

33. Lighting analysis to determine pole spacing and locations. Voltage drop calculations.

34. Copies of utility company correspondence.

35. Copies of railroad/railway company correspondence.

36. Disposition of Detailed Design Phase Value Engineering recommendations.

37. Plans for Second Constructability Review. The Second Constructability Review must be completed prior to submission of the Final Right of Way.

38. Cost estimate for construction and right of way acquisition. The District Utility Coordinator to provide revised utility reimbursement cost estimate, if necessary. Explain any significant increase or decrease in estimated cost from previous estimates.

39. Disposition of Stage 1 Review comments.

The Stage 2 Detailed Design must be reviewed and approved by the District. In addition, Central Office and external agency reviews as listed in the **Project Development Process Manual (PDP), Appendix B – Review Matrices** may be required.

1403.10 Final Right of Way

1403.10.1 General

Final Right of Way is part of Step 10 of the PDP for Major Projects and part of Step 6 of the PDP for Minor Projects. A Final Right-of-Way Submission is required for any project that involves acquisition of temporary or proposed right of way.

1403.10.2 Final Right of Way Activities

The following activities are usually part of Final Right of Way preparation:

1. Incorporate all comments from the Preliminary Right of Way Review as well as any Stage 2 Detailed Design elements that have an impact on the right of way plans.

2. Incorporate railroad review comments, if applicable.

3. Prepare a legal description for each parcel to be acquired.

4. Complete a closure calculation for each parcel.

5. Update right of way cost estimates.

6. Notify the District Utility Coordinator of any changes to utility impacts or anticipated reimbursements.

1403.10.3 Final Right of Way Review Submission

The Final Right of Way Submission should include:

1. Legal descriptions.

2. Closure calculations.

3. Centerline Plat**,** Property Map, Summary of Additional Right of Way, Detailed Right of Way Plan and Special Plat sheets as described in the **Real Estate Policies and Procedures Manual, Section 3100 Right of Way Plans**.

4. Corrected Title Sheet, Schematic Plan, General Notes and Plan and Profile sheets from the Stage 2 Detailed Design Review.

5. Copy of railroad correspondence.

6. Right of way cost estimate with an explanation of any changes from previous submissions. District Utility coordinator to provide revised utility reimbursement cost estimate, if necessary.

7. Disposition of Preliminary Right of Way Review comments.

The Final Right of Way Review Submission must be reviewed and approved by the District. In addition, Central Office and external agency reviews as listed in the **Project Development Process Manual (PDP), Appendix B – Review Matrices** may be required.

1403.11 Final Right of Way Tracings

Final Right of Way Tracings are part of Step 10 of the PDP for Major Projects and part of Step 6 of the PDP for Minor Projects. Final Right of Way Tracings are required for any plan that involves acquisition of temporary or permanent right of way. Submission of Final Right of Way Tracings should be made within 20 days after receipt of the Final Right of Way Review comments unless stated otherwise in the project scope.

Fifteen days prior to submitting the Final Right of Way Tracings, conduct an in-depth field review of the project and verify property owners. Determine:

1. Any new ownership transactions.

2. Any changes to topographic features, structures, utilities or ownership.

3. Submit legal descriptions to the County Engineer or County Recorder for pre-approval.

Revise the Right of Way plan and descriptions to accurately reflect this information.

The Final Right of Way Tracings Submission includes:

1. Centerline Plat**,** Property Map, Summary of Additional Right of Way, Detailed Right of Way Plan and Railroad Plat sheets as described in the **Real Estate Policies and Procedures Manual, Section 3100 Right of Way Plans**.

2. Final legal descriptions with county pre-approval stamp, if applicable.

3. Final closure calculations.

4. Disposition of Final Right of Way Review comments.

Final Right of Way Tracings are submitted to the District. Additional paper copies for Central Office and external agencies as listed in the **Project Development Process Manual (PDP), Appendix B – Review Matrices** may be required.

1403.12 Stage 3 Detailed Design

1403.12.1 General

The Stage 3 Detailed Design should complete the design and detailing of the project. These plans must contain all details and quantities required to bid and construct the proposed work. Plans should be numbered and submitted as a complete set, organized as per **Section 1301.1**.

Stage 3 Detailed Design is part of Step 11 of the PDP for Major Projects, Step 7 of the PDP for Minor Projects and Step 2 of the PDP for Minimal Projects. A Stage 3 Detailed Design Review is required for all projects; except Limited Review and Design-Build Projects.

It is recommended that a second Stage 3 Detailed Design Review be conducted if more than two years have elapsed since the first Stage 3 Detailed Design Review and the Final Tracing Package has not been submitted to Central Office. The purpose of this review is to ensure that the plans reflect current field conditions as well as all current design standards, policies and specifications.

1403.12.2 Stage 3 Detailed Design Activities

The following activities are usually part of Stage 3 Detailed Design:

1. Prepare Simplified Plans including:

    A. Plans as per **Section 1301.2**.
    B. Existing utility locations.

C. County Engineer approval of local alternate detour routes.
D. Local Flood Plain Coordinator approval for all flood zone encroachments.
E. Approval of pavement design if required by the **Pavement Type Selection Policy (#20-006(P))**. Pavement design for Minimal Projects is usually completed prior to the project scope.
F. As per the **Traffic Management in Work Zones Interstate and other Freeway Policy (#516-003(P))**, perform quantitative analysis to determine queues generated by proposed lane closures.
G. Submit lane closure exception request to the District Deputy Director. If approved, these requests must then be submitted to the Multi-Lane Coordinator for approval by the Maintenance of Traffic Exceptions Committee. Approval must be obtained prior to submission for Stage 3 Detailed Design Review.
H. Warranty item determination.
I. Innovative contracting methods (e.g., Work Day, Incentive/Disincentive, Liquidated Savings, and A + B Contracts).

2. Prepare underdrain bends and branches list.

3. Prepare Project Site Plan.

4. Determine all estimated quantities throughout the plan. This will include, but is not limited to:

A. Pavement calculations.
B. Drainage quantities.
C. Roadway quantities.
D. Earthwork and seeding calculations.
E. Maintenance of Traffic quantities. (Including workzone pavement marking subsummaries).
F. Pavement Marking subsummaries.
G. Signing subsummaries.
H. Signal subsummary.
I. Bridge estimated quantities and reinforcing steel tables.
J. Lighting subsummaries.
K. Landscape subsummaries.

5. Determine appropriate notes:

A. General Notes.
B. Maintenance of Traffic Notes.
C. Traffic Control Notes.

6. Submit non-standard notes to the appropriate specification committee (i.e., Pavement Materials and Construction, Structures, Earthwork and Hydraulics, Contract Administration or Traffic and Misc.) for approval. Approval must be obtained prior to submission of Final Tracings to Central Office.

7. Confer with the District Planning Administrator to determine if any participation splits are desired.

8. Prepare the General Summary and Bridge Estimated Quantity sheets.

9. Finalize Systems Engineering Analysis for Intelligent Transportation System (ITS) projects.

10. Complete Traffic Signal plans by preparing:

    A. Wiring diagram.
    B. Pole orientation chart.
    C. Timing chart.

11. Complete signing plans by preparing:

    A. Elevation views for major signs.

12. Submit plans to involved railroad/railway companies for approvals. Obtain railroad agreement. Railroad agreement must be obtained prior to submission of Final Tracings to Central Office.

13. Prepare **FAA Form 7460-1** for Airway/Highway Clearance.

14. Submit plans to **ODNR** for all work involving State Scenic Rivers, State Wildlife Areas and State Recreational Areas.

15. Submit plans to the **SHPO** for all projects involving work on historic bridges.

16. Prepare revised construction utility reimbursement cost estimates.

1403.12.3 Stage 3 Detailed Design Review Submission

The Stage 3 Detailed Design Review Submission should include:

1. A complete set of construction and right of way plans as per:

    A. **Section 1300** of this Manual
    B. **Bridge Design Manual**
    C. **Traffic Engineering Manual**
    D. **Real Estate Policies and Procedures Manual**
    E. **Specifications for Geotechnical Explorations**

2. Documentation of approval of non-standard plan notes. Approval must be obtained prior to submission of final tracings to Central Office.

3. Systems Engineering Analysis for Intelligent Transportation System (ITS) projects.

4. Railroad Agreement. Railroad agreement must be obtained prior to submission of Final Tracings to Central Office.

5. Completed **FAA Form 7460-1**. The District should submit this form as per **Section 1404.1.7**. **FAA** approval must be obtained prior to submission of Final Tracings to Central Office.
6. **ODNR** plan approvals.

7. Documentation of wetland mitigation plans submitted to **USACE** and **OEPA** for approval. Approval must be obtained prior to submission of Final Tracings.
8. **SHPO** plan approvals.

9. Construction and utility reimbursement cost estimates. Explain any significant increase or decrease in estimated cost from previous estimates.

10. Disposition of Second Constructability Review comments.

11. Disposition of Stage 2 Detailed Design Review comments.

The Stage 3 Detailed Design Review Submission must be reviewed and approved by the District. In addition, Central Office and external agency reviews as listed in the **Project Development Process Manual (PDP), Appendix B – Review Matrices** may be required.

1403.13 Final Tracings

Submission of Final Tracings is part of Step 12 of the PDP for Major Projects, Step 8 of the PDP for Minor Projects and Step 3 of the PDP for Minimal Projects. Final Tracings for Design-Build Projects will include "as-built" details as per the Design-Build Scope of Services. For projects in which a railroad/railway company is involved, a copy of the final plans will be sent to the railroad/railway company.

The submission of completed plans to the District from a consultant should follow **Section 1505**. Submission of the Final Tracing Package to Central Office should follow the **Policy for the Submission of Plan Packages (Policy #26-001(P)).**

1404 Miscellaneous Studies

1404.1 Airway/Highway Clearance Analysis

1404.1.1 Introduction

The purpose of an Airway/Highway Clearance Analysis is to determine if a proposed project will encroach into the theoretical approach or traverse surfaces of an airport or heliport. When a project is identified as being within 20,000 feet [6.1 kilometers] of a public-use or military airport or heliport, an analysis must be performed to determine if **FAA** notification is required. The initial determination whether or not a project is within the 20,000 foot [6.1 kilometers] distance is to be made at the time of programming, and it should be so noted on the programming forms and in ODOT's project management system.

The Airway/Highway Clearance Analysis procedures contained in this manual are based on the "**Federal Aviation Regulations, Part 77 - Objects Affecting Navigable Airspace**." Information on the location of airports and lengths of runways may be obtained from the "**Ohio Airport Directory**," as published by the **Ohio Department of Transportation, Office of Aviation**.

1404.1.2 Notification Surfaces

The following conditions need to be examined to determine if notification is required.

1. Any construction or alterations of more than 200 feet [60 meters] in height above ground level.

2. Any construction or alteration of greater height than an imaginary surface extending outward and upward at the following slopes:

   A. 100:1, for horizontal distance of 20,000 feet [6.1 kilometers] from the nearest point of the nearest runway, for any airport with at least one runway with a length of more than 3,200 feet [975 meters], excluding heliports.

B. 50:1, for a horizontal distance of 10,000 feet [3 kilometers] from the nearest point of the nearest runway, for any airport where the length of the longest runway does not exceed 3,200 feet [975 meters], excluding heliports.

C. 25:1, for a horizontal distance of 5,000 feet [1.5 kilometers] from the nearest point of the nearest landing and takeoff area, for a heliport.

See **Figure 1404-1** for a graphical depiction of these surfaces.

1404.1.3 Traverse Way Adjustments

In determining whether any roadway or other traverse way (e.g., railroad, waterway, bikeway, etc.) will violate the limits described in the previous section, it is necessary to include an additional upward height above the traverse way elevation for vehicles that might travel on the facility. The adjustments are as follows:

1. 17 feet [5.2 meters] for Interstate highways, other freeways, and expressways.

2. 15 feet [4.6 meters] for all other public roadways and commercial driveways.

3. 10 feet [3.0 meters] for all private roads and driveways.

4. 23 feet [7.0 meters] for railroads.

5. An amount equal to the height of the highest mobile object that would normally traverse the facility, for a waterway or for any other traverse way not previously mentioned.

This additional height must be considered to apply over the full width of the traveled portion and the shoulders of the roadway. **Figure 1404-1** includes examples of several traverse way adjustments.

1404.1.4 Exceptions to Notification Requirements

FAA notification is not required where one or more of the following applies to the object penetrating the notification surface:

1. The object is shielded by existing structures of a permanent and substantial character or by natural terrain or topographic features, of equal or greater height.

2. The object is located in the congested area of a city, town, or settlement where it is evident beyond all reasonable doubt that there could be no adverse effect on safe air navigation.

3. The object is an antenna of 20 feet [6 meters] or less in height, except one that would increase the height of another antenna structure.

Figure 1404-2 includes examples of locations where **FAA** notification is and is not required.

1404.1.5 Temporary Structures and Construction Equipment

It is possible that a project located within 20,000 feet [6.1 kilometers] of an airport will not require **FAA** notification for permanent features, but will require notification for temporary structures or construction equipment. **Figure 1404-3** contains height allowances for equipment or structures associated with various types of construction. These allowances should be used to determine if the notification surface will be penetrated. For short projects (100 feet [30 meters] or less in length), any applicable heights should be considered to apply over the entire length of the project.

Judgment must be used when applying these heights to longer projects. For example, the allowance for equipment used to construct a bridge would only be needed in the vicinity of the bridge; however, the allowance for earth moving and paving equipment should be applied over the entire length. When any doubt exists, it is advisable to consult the **FAA**.

1404.1.6 Controlled Areas

Figure 1404-4 displays cross-sectional and profile views of imaginary surfaces that exist above the notification surface. **Figure 1404-5** depicts an area at the end of a runway called the runway protection zone (RPZ). **Figure 1404-6** contains dimensions that define the sizes of RPZ's for different facilities. Projects should be designed so that these controlled areas are not penetrated by any features, as the **FAA** will not normally permit violations.

1404.1.7 FAA Notification/Clearance Procedures

Whenever a project is located within 20,000 feet [6.1 kilometers] of a public-use or military airport or heliport, an Airway/Highway Clearance Analysis must be performed. Documentation which provides the information contained in **Figure 1404-7** must be supplied. The District will use this information to complete **FAA Form 7460-1**. The **FAA** requires the use of English units. For metric projects, **FAA Form 7460-1** shall be filled out using dual (i.e., both metric and English) units.

The District will submit the following information to the **FAA** for approval:

1. Two completed **FAA Form 7460-1's**. One form is for the proposed project and the other form is for the construction equipment and/or temporary structures.

2. Latitude, longitude (NAD), and elevation (above mean sea level) of the following points:

   A. For short bridge projects, 100 feet [30 meters] or less in length:

      i. Highest point of the superstructure of the bridge.

   B. For all other projects:

      i. Beginning of the project.

      ii. End of the project.

      iii. Highest point of the project.

      iv. Closest point to the runway.

      v. Any other points that may be important to the study (e.g., various high points throughout the project that may penetrate the imaginary surface).

      vi. Each light tower or signal pole. In addition, include: structure number, latitude, longitude, ground elevation, structure height and overall height.

      vii. Highest point of the superstructure of each bridge.

   Accuracy of points should be within 50 feet [15 meters] horizontally and 20 feet [6 meters] vertically.

3. A **USGS** map of the project location relative to the airport showing a reference for each point listed above.

Two copies of all forms and supporting information will be submitted to the **Office of Aviation**.

When approval (or comments) is received from the **FAA**, the District Production Administrator will retain the original correspondence and distribute copies to the **Office of Aviation, Office of Maintenance Administration**, **Office of Estimating** and the **FHWA** (for federal oversight projects only).

FAA comments will generally relate to certification of the coordinates submitted or the submission of **Form 7460-2, Supplemental Notice**. The **FAA** may also request that a light pole or other similarly tall structure be visibly marked or possibly reduced in height.

Approvals are valid for a period of eighteen (18) months. The District Production Administrator will monitor project status (sale date) relative to the approval expiration date, and submit a request for extension to the **FAA** at least two (2) weeks prior to the expiration date.

When construction equipment is expected to penetrate the notification surface of a public-use or military airport or heliport, note **G119A** should be added to the plans. When construction equipment is not expected to penetrate the notification surface, but the project is within the influence area of a public-use or military airport or heliport, note **G119B** should be used.

1404.1.8 Private Facilities

An Airway/Highway Clearance Analysis is required for private airports and heliports. Coordination with the private owner shall be made and note **G119C** should be added to the plans. Coordination with the **FAA** is not required.

1404.2 Retaining Wall Justification

A Retaining Wall Justification compares the impacts and costs (both right of way and construction) of the project with and without retaining walls. Estimated right of way costs are to be provided or verified by the **Office of Real Estate**.

A Retaining Wall Justification should include:

1. Plan sheets showing wall and no-wall alternatives, including:

   A. Approximate construction limits.
   B. Right of way parcels affected.

2. Cross sections showing wall and no-wall alternatives.

3. Economic analysis comparing right of way and construction costs, with and without the wall.

4. Discussion of environmental impacts with and without the wall (optional).

1404.3 Service Road Justification Study

Service roads (sometimes called access roads or frontage roads) are used to: reduce the number of existing access points, connect roads cut off by highway relocation and to provide access to parcels that would

otherwise be landlocked by a highway relocation. The decision to use a service road to decrease the number of existing access points is usually made for safety or capacity reasons, although in some cases it could be based on economics. Using a service road to connect roads cut off by a relocation is done primarily to provide needed traffic circulation. Providing access via a service road to otherwise landlocked parcels is primarily an economic decision.

When economics is the primary factor in the decision making process, a Service Road Justification Study is required.

Maintenance of service roads by the state is not desirable because, in many cases, these facilities are not readily accessible from a state highway. It is therefore necessary that a statement of acceptance of routine maintenance by a local government agency be obtained.

A Service Road Study Form (see **Appendix D**) must be completed. In preparing the analysis, maintenance costs related to the service road must be considered. For this purpose, a cost equal to ten times the anticipated annual maintenance cost should be added to the construction cost. Estimated right of way costs are to be provided or verified by the **Office of Real Estate**. For information and guidance on preparing the Service Road Study Form contact the **Office of Roadway Engineering Services**.

The Service Road Justification Study should include:

1. Plan sheet showing:

    A. Service Road location.
    B. Property lines of involved parcels.

2. Completed Service Road Study Form.

3. Statement of maintenance responsibility.

1404.4 Pedestrian Overpass Justification

A Pedestrian Overpass Justification compares the impacts and costs of a project with and without a pedestrian overpass. A statement of acceptance of routine maintenance responsibility of the structure and approaches by a local government agency must be obtained. Routine maintenance includes: clearing debris from the deck, sweeping, snow and ice removal, minor wearing surface patching, clearing bridge drainage systems, marking decks for traffic control, minor and emergency repairs to railing and appurtenances, emergency patching of deck and maintenance of traffic signal and lighting systems including the supply of electrical power. For information on Pedestrian Overpass Justification refer to **Location and Design Manual, Volume 1**.

A Pedestrian Overpass Justification should include:

1. An area map showing:

    A. The pedestrian service area.
    B. Major pedestrian attractors.
    C. School zones.
    D. Traffic signals.
    E. Alternate paths for pedestrian travel.
    F. Lengths of alternate travel routes.

2. Alternate designs.

3. Costs of alternate designs.

4. Anticipated peak periods and volumes of pedestrian traffic and the volume of vehicular traffic travel that might be encountered along alternate routes.

5. Statement of acceptance of routine maintenance responsibility.

1404.5 Value Engineering Studies

Value Engineering is a systematic analysis by a multi-discipline team which identifies the functions of a project, establishes the worth of that function, generates alternatives through the use of creative thinking and identifies ways to provide the needed functions at the lowest overall cost. The Department requires that Value Engineering Studies must be performed on all projects having a total cost (including design, right of way and construction) in excess of twenty million dollars. These studies may also be performed on projects involving complex items or whose costs have increased substantially since initial estimates were developed.

Value Engineering Studies are usually performed on Major Projects. Two studies are typically performed; one after completion of the Assessment of Feasible Alternatives (Step 6 of the PDP) and the other following Stage 1 Detail Design development (Step 8 of the PDP). Minor projects that qualify for Value Engineering Studies typically require only one Value Engineering Study. The Value Engineering Study for Minor Projects is usually during Preliminary Engineering (Step 3 of the PDP).

1404.6 Constructability Review

Constructability Review is an evaluation of the project plans, sometimes supplemented by a site visit, conducted by an individual familiar with construction techniques to evaluate construction means and methods; including: site access, material types, maintenance of traffic issues, equipment needs, etc.

To ensure an independent evaluation, constructability reviews should not be conducted by the design consultant who prepared the plans. Designers should routinely consider constructability issues during the normal course of project development.

List of Figures

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MAJOR PROJECT DESIGN REVIEW SUBMISSIONS IN THE PROJECT DEVELOPMENT PROCESS

1401-1

REFERENCE SECTION
1401.3.1

MINOR PROJECT DESIGN REVIEW SUBMISSIONS IN THE PROJECT DEVELOPMENT PROCESS

1401-2

REFERENCE SECTION
1401.3.2

MINIMAL PROJECT DESIGN REVIEW SUBMISSIONS IN THE PROJECT DEVELOPMENT PROCESS	1401-3
	REFERENCE SECTION **1401.3.3**

DESIGN INFORMATION SOURCES	1402-1
	REFERENCE SECTION 1402.1

OFFICE/ SPECIALTY AREA	CENTRAL OFFICE DESIGN AREA OF EXPERTISE	DESIGN MANUALS, STANDARD DRAWINGS AND POLICIES[(1)(2)]
Aerial Engineering	• Aerial mapping • Ground surveys	• Design Mapping Specifications • Survey Manual
Aviation	• Airway/Highway Clearance Analysis	• Federal Aviation Regulations, Part 77-Objects Affecting Navigable Airspace (Published by the Federal Aviation Administration)
Construction Administration	• Specifications • Supplemental Specifications • Proposal Notes • Plan Notes • Warranties	• Construction and Materials Specifications • Supplemental Specifications • Proposal Notes • Implementation and Administration of Warranty Provisions (#510-002(P)) • Value Engineering in Construction Policy (#27-008(P)) • Construction and Materials Specification Development Policy (#27-005(P)) and related Standard Procedure (#510-005(SP)) • Innovative Contracting Manual
Environmental Services	• 404/401 permits • Coast Guard permits • Noise walls	• Categorical Exclusion Confirmation Handbook • Consistent Methodology for Characterization of Ditches • Egological Guidelines • Environmental Site Assessment Manual • Programmatic Categorical Exclusion • Public Involvement Handbook • Section 4(f) Resource Handbook • Technical Guidance on Impact Assessment for Jurisdictional Streams on New Location Projects • Water Quality Data Letter • Analysis and Abatement of Highway Traffic Noise Policy (#21-001(P)) and related Standard Procedure (#417-001(SP)) • Waterway Permits Manual
Estimating	• Application of design related proposal notes • Historical bid data • Items numbers and item extensions • Construction cost estimates	• Item Master • Summary of Contracts Awarded

DESIGN INFORMATION SOURCES	1402-1 REFERENCE SECTION 1402.1

OFFICE/ SPECIALTY AREA	CENTRAL OFFICE DESIGN AREA OF EXPERTISE	DESIGN MANUALS, STANDARD DRAWINGS AND POLICIES[(1)(2)]
Geotechnical Engineering	• Geologic hazards (karst, rockfalls, landslides etc.) • Earthwork (embankments, cut slopes, benching, etc.) • Subgrade • Retaining walls (not attached to bridges) • Abandoned underground mines • Hydrogeology	• Manual for Abandoned Underground Mine - Inventory and Risk Assessment • Specifications for Geotechnical Explorations • Geotechnical Engineering Design Checklists • Geotechnical Bulletins
Multi-Modal Planning	• Traffic data • Bike/Pedestrian design	• Bike/Pedestrian Design Guidance • AASHTO for the Development of Bicycle Facilities
Pavement Engineering	• Pavement design	• Pavement Design and Rehabilitation Manual • Pavement Preventative Maintenance Program Guidelines • Pavement Design and Selection Process Policy (#515-002(P))
Production	• Value Engineering for preliminary and detailed design • Constructability Review • CADD (MicroStation and GEOPAK) • Design-Build Projects • Post-Construction Storm Water BMPs	• Location and Design Manual, Volume 3 - Highway Plans, including Sample Plan Sheets • Design-Build Scope of Services Manual
Railroad Coordinator	• Railroad coordination • Railroad agreements	• Design manuals published by individual railroad/railway companies
Real Estate	• Utility locations/relocations • Subsurface Utility Engineering • Right of Way plans and legal descriptions • Right of Way acquisition and utility relocation cost estimates	• Real Estate Policies and Procedures Manual (Right of Way Plans and Utilities)

DESIGN INFORMATION SOURCES	1402-1
	REFERENCE SECTION 1402.1

OFFICE/ SPECIALTY AREA	CENTRAL OFFICE DESIGN AREA OF EXPERTISE	DESIGN MANUALS, STANDARD DRAWINGS AND POLICIES[(1)(2)]
Roadway Engineering Services	• Geometric features (alignments, profiles, typical sections, drives, slopes, guardrail, barrier wall) • Interchange Justification/Modification Studies • Access modifications • Landscaping • Fencing • Guardrail	• Location and Design Manual, Volume 1 - Roadway Design • Standard Construction Drawings (Fencing, Guardrail, Landscaping and Roadway Miscellaneous) • Policy on the Use of Rumble Strips on Shoulders (#322-001(P)) • Policy for Applying Level of Service and Volume-to-Capacity Ratio in Transportation Development Process (#322-002(P)) • Curb Ramps Required in Resurfacing Plans (#519-002(P)) • Landscaping Guidelines
Structural Engineering	• Bridges (hydraulics, foundations, structural design) • Retaining walls • Roadway hydraulics (storm sewers, culverts) • Subsurface drainage (underdrains, aggregate drains) • Water lines • Sanitary sewers • Channels	• Bridge Design Manual • Location and Design Manual, Volume 2 - Drainage Design • Standard Construction Drawings (Catch Basins, Headwalls, Inlets, Manholes and Drainage Miscellaneous) • Standard Bridge Drawings
Traffic Engineering	• Maintenance of Traffic • Signing • Pavement marking • Signals • Lighting	• Traffic Engineering Manual (includes the Design Manual for Directional Guide Signs) • Ohio Manual of Uniform Traffic Control Devices • Standard Sign Design Manual • Standard Construction Drawings (Traffic Control, Highway Lighting and Maintenance of Traffic) • Installation of Traffic Control Signals and Intersection Control Beacons on State Highways Policy (#516-002(P)) • Traffic Management in Work Zones Interstate and Other Freeways Policy (#516-003(P))
Major Program Coordinators	• Aesthetics	• Aesthetic Design Guidelines

DESIGN INFORMATION SOURCES	1402-1
	REFERENCE SECTION 1402.1

(1)This is not an all all-inclusive list of manuals published by each office. Only those manuals containing design standards and policies are shown.

(2) Design Manuals can be found on the Design Reference Resource Center portion of the ODOT web site.

FEDERAL OVERSIGHT DETERMINATION PROCESS	1402-8
	Reference Section 1402.2

RELATIONSHIP OF TRAVERSE WAYS TO THE IMAGINARY NOTIFICATION SURFACE

1404-1

REFERENCE SECTION
1404.1

* Notification required
** Notification not required

EXAMPLES OF FACTORS AFFECTING THE IMAGINARY SURFACE

1404-2

REFERENCE SECTION 1404.1.4

1. Nofication not required - object is shielded by natural topographic features.
2. Notification not required - roadway is shielded by existing structures of - permenant and substantial character.
3. Nofitication required - penetrates notification surface.
4. Nofitication required - penetrates notification surface.
5. Nofitication not required - below notification surface.
6. Nofitication not required - below notification surface.

MAXIMUM OPERATING HEIGHT OF CONSTRUCTION EQUIPMENT	1404-3
	REFERENCE SECTION 1404.1.5

WORK TYPE	HEIGHT	CONTROLLING CRITERIA
Small Bridges	60 ft. [18.5 m]	Crane
Large Bridges	100 ft. [30.5 m]	Crane
Culverts	50ft. [15.5 m]	Crane
Bridge Painting	Bridge Height + 10ft. [3.5 m]	Containment Stucture
Deck Overlays	25 ft. [8.0 m]	Truck
Resurfacing	25 ft. [8.0 m]	Raised Dump Truck
Highway Lighting	Pole Height	Pole Height
Traffic Signals	50ft. [15.5 m]	Cherry Picker
Pavement Repair	25 ft. [8.0 m]	Raised Dump Truck
Pavement Marking	12 ft. [4.0 m]	Truck
Bikeways	25 ft. [8.0 m]	Truck
Guardrail	25 ft. [8.0 m]	Auger
Noise Walls	25 ft. [8.0 m]	Crane
Barrier Construction	50ft. [15.5 m]	Crane
Rest Areas	50ft. [15.5 m]	Crane
House Demolition	25 ft. [8.0 m]	Excavator
Earthwork	25 ft. [8.0 m]	Truck
Slope Repair	25 ft. [8.0 m]	Excavator/Grader
Pile Driving	50 ft. [15.5 m]	Crane
Mowing/Landscaping	10 ft. [5.0 m]	Mower
Trash Collection	25 ft. [8.0 m]	Truck

The heights given are on average height for the specific types of projects.
These heights should be adjusted, as necessary for any project.

CROSS-SECTIONAL AND PROFILE VIEWS OF IMAGINARY SURFACES

1404-4

REFERENCE SECTION 1404.1.6

April 2008

RUNWAY PROTECTION ZONE

1404-5

REFERENCE SECTION 1404.1

DIMENSIONS FOR RUNWAY PROTECTION ZONE	1404-6
	REFERENCE SECTION 1404.1

FACILITIES EXPECTED TO SERVE	RUNWAY END		DIMENSIONS FOR APPROACH END					
	APPROACH END	OPPOSITE END	LENGTH L		INNER WIDTH W_1		OUTER WIDTH W_2	
			ft.	m	ft.	m	ft.	m
ONLY SMALL AIRPLANES	V	V	1000	300	250	75	450	135
		NP	1000	300	500	150	600	195
		NP ¾ P	1000	300	1000	300	1050	315
	NP	V NP	1000	300	500	150	800	240
		NP ¾ P	1000	300	1000	300	1200	360
LARGE AIRPLANES	V	V NP	1000	300	500	150	700	210
		NP ¾ P	1000	300	1000	300	1100	330
	NP	V NP	1700	510	500	150	1010	303
		NP ¾ P	1700	510	1000	300	1425	427.5
ALL	NP ¾	V NP NP ¾ P	1700	510	1000	300	1510	453
	P	V NP NP ¾ P	2500	750	1000	300	1750	525

V = Visual approach
NP = Nonprecision instrument approach with visibility minimums not more than ¾ statute mile [1.2 kilometers]
NP ¾ = Nonprecision instrument approach with visibility minimums as low as ¾ statute mile [1.2 kilometers]
P = Precision instrument approach

For locations of L, W_1, and W_2 see Figure 1404-5.

SAMPLE LETTER OF AIRWAY/HIGHWAY CLEARANCE ANALYSIS	1404-7
	REFERENCE SECTION 1404.1.7

District Production Administrator
Title
ODOT-District Office
Address
City, State & Zip

Re: Airway/Highway Clearance Analysis
County-Route-Section
PID:

Dear Mr. /Ms. :

We have reviewed the above mentioned project and have determined that the project (will/will not) not encroach into the (X:1) notification surface. This determination is based on an airport elevation of (A) feet, a project elevation of (B) feet, with a distance of (C) feet between the airport and the project locations. The attached diagram will provide a detailed analysis of the study. The study has also determined that a height of (Z) feet exists between the (X:1) notification surface and the project. Therefore, based on this height and the heights from Figure 1404-3, plan note *[G119A: Use note G119A when the construction equipment penetrates the notification surface of a public use airport or heliport; G119B: Use note G119B when the construction equipment does not penetrate the notification surface of a public airport or heliport; or G119C: Use note G119C when the construction equipment penetrates the notification surface of a private use airport.]* (will/will not) be required.

Respectfully,

John Doe
Title

$$Z = \frac{C}{X} + A - B$$

X:1	–	Notification Slope *[See Section 1404.1.2 to determine Notification Slope]*
A	–	Airport Elevation
B	–	Project Elevation
C	–	Distance between Project and Airport
Z	–	A positive value of Z is the amount of clearance. A negative value of Z will require notification.

[The Z value should be calculated at critical points for projects of considerable length and variable heights (i.e. closest point, highest point, etc.).]

[Positive Z values are inserted into Plan Note G119B or G119C, unless the heights from Figure 1404-3 exceed the Z value calculated.]