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CHAPTER 2B - PHASE I, INITIAL ROADWAY INVESTIGATION & PRELIMINARY FIELD INSPECTION

SECTION 2B – 1 - GROUND SURVEYS

SURVEY AUTHORIZATION

There are certain instances in which it is not necessary to hold a Location Public Hearing after the completion of a Location Study. In these instances, surveys will be authorized by the Assistant Location and Design Engineer. All ground surveys are authorized by the State Location and Design Engineer, or a representative, by memorandum to the District Administrator. The Programming Division authorizes funding and notifies the Fiscal Division of this funding. All surveys will be assigned in cooperation with the District Administrator. Assignments are to be made on the basis of available manpower statewide. At this time, a determination is to be made as to the feasibility of utilizing photogrammetric methods for all or selected phases of the survey. Due to the critical timing necessary in securing photography suitable for mapping purposes, the District Administrator should arrange the work schedule to accomplish the ground control work in a timely manner.

Surveys are performed in accordance with the current Survey Manual. The authorization procedure for each roadway classification is described in this section.

Underground utilities are to be designated as instructed in IIM LD- 140.

INTERSTATE

Interstate projects are authorized for survey after Location Approval has been given by the Commonwealth Transportation Board and the Federal Highway Administration and in accordance with tentative construction schedules.

PRINCIPAL / MINOR ARTERIAL

Principal and Minor Arterial System projects are authorized for surveys in accordance with established construction or planning schedules. Projects with Federal funding for preliminary engineering require prior approval by the Federal Highway Administration.

URBAN

Urban projects are authorized for survey upon receipt of Form PD-3* from the Urban Program Manager / Project Manager. Projects with Federal funding for preliminary engineering require prior approval by the Federal Highway Administration.

* Rev. 1/07

SECONDARY (ARTERIAL-COLLECTOR-LOCAL ROADS)

Secondary project surveys are requested by the District Administrator* in accordance with planning schedules, particularly in the Secondary System Contract Advertisement Schedule.

DATA REQUIRED

In order to assist the survey party in establishing proper horizontal and vertical controls, certain data must accompany the survey authorization. This data should include, but is not limited to:

(1) prints of adjacent projects in the planning or construction stage,
(2) existing road plans,
(3) National Geodetic Survey controls, both horizontal and vertical,
(4) prints of the proposed alignment and grade (if available),
(5) U.S. Geological Survey topographic quadrangle maps of the area and
(6) photographs of the area.
(7) Approved LD-430

COMPLETE SURVEYS

Projects designed in the Districts: When the field work has been completed by the Survey party, the District Survey Party Engineer transmits the electronic data by memorandum to the District Design Unit for the plotting of horizontal and vertical data. The Central Office shall be notified that the survey is complete.

Projects designed in the Central Office, or by Consultants: When the field work has been completed by the Survey Party, the electronic data is to be submitted to the Central Office by memorandum.

When the designer receives the survey, it should be checked for utility designations. If none are shown, a request should be made as outlined in IIM LD- 140.

Bridge site plans and data sheets will be plotted by the survey party and transmitted to the Central Office by the District Survey Party Engineer, with the exception of Secondary Projects, which are to be sent to the District Structure and Bridge Division.

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SECTION 2B – 2 - COORDINATION WITH OTHER DIVISIONS AND AGENCIES

REQUEST FOR SOILS DATA

Soils data is to be requested on Form LD-252. A copy of the tentative alignment and grades is to accompany this form to the Materials Division. It should be noted that this is a very preliminary soils evaluation and is not to be confused with the more detailed soils report furnished at a later date.

REQUEST FOR HYDRAULIC EVALUATION

In projecting alternates, consideration must be given to hydrology, hydraulics, and the potential effects a given projection will have on flood prone areas, wetlands, navigable waters and water quality. Consequently, the alternates being considered are to be reviewed by the Hydraulics Section during this stage of project development.

COORDINATION WITH ENVIRONMENTAL DIVISION

Due to the increased emphasis being placed on the effects of a proposed highway on the environment, it is essential that this Division be contacted in the early stages of development on all projects. A memorandum is to be written stating that preliminary development is underway and requesting their evaluation of the corridors under consideration. A copy of these study corridors is to accompany this memorandum. See Appendix C, Section C-2-NOISE ABATEMENT and Section C-4-WATER RELATED PERMITS for further instructions on coordination with the Environmental Division.

COORDINATION WITH OTHER STATE AGENCIES

Project Early Notification will involve all applicable state environmental resource agencies in the early stages of project development. If, however, a project has not been included in the Project Early Notification Process, requests for review with environmental resource agencies such as Historic Landmarks, State Historian, Commission of Game and Inland Fisheries, etc., are to be coordinated through the Environmental Division. Each project has its own individual characteristics and should be reviewed carefully at an early stage to determine if a possible conflict may arise.

SECTION 2B – 3 - DETERMINATION OF ROADWAY DESIGN

CAPACITY ANALYSES

Traffic Data, as described in Section 2A - 4 - REQUESTING AND ASSEMBLING ADDITIONAL DATA*, must now be analyzed in relation to the pre-determined Functional Classification.

The basic number of thru lanes required in order for the mainline to operate at a satisfactory level of service shall be determined by capacity analyses. Capacities of connecting and crossing roadways shall also be determined, taking into consideration plans for future improvements to these facilities.

Where at-grade intersections are proposed, a capacity analysis shall be made to determine whether or not the intersection will operate at a satisfactory level of service. If the analysis indicates an unsatisfactory service level, an interchange should be considered.

When interchanges are proposed or are being considered, a capacity analysis should be utilized to determine the type of interchange required.

Peak hour traffic projection to the design year shall be used for all capacity analyses.

All capacity checks shall be reviewed with the Transportation & Mobility Planning Division and shall be documented in project files.

Reference materials available at this time to assist in capacity analysis include:

1. Highway Capacity Manual

2. Design of Urban Streets

3. Highway Capacity Software

INTERCHANGE DESIGN

Because of the wide variety of site conditions, traffic volumes, highway types and interchange layouts, the warrants which justify an interchange may differ at each location. The six major factors to be considered are:

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* Rev. 7/06

1. Control of access
2. Elimination of bottlenecks or spot congestion
3. Elimination of hazards
4. Site topography
5. Road user benefits
6. Traffic volumes

Other than on a freeway, the inability to provide the necessary capacity with an at-grade intersection is a common warrant for an interchange.

More detailed warrants and general types of interchanges may be found in Chapter X "Grade Separations and Interchanges" of AASHTO's A Policy on Geometric Design of Highways and Streets.

REFINING HORIZONTAL ALIGNMENT

Horizontal alignment is to be reviewed for possible revisions due to information received under Section 2B-1- GROUND SURVEY* such as: obvious areas of unsuitable material and/or rock, major utility facility relocations and environmental considerations (such as splitting communities, splitting watersheds, conflicts with National or State Forests and Parks, historical property, archaeological sites, recreational areas, sites affected by noise beyond acceptable limits, etc.). Horizontal alignment must remain within acceptable limits as prescribed in the Geometric Design Standards (See Appendix A, Section A-1) unless an authorized exception is made by the State Location and Design Engineer and, if applicable, the Federal Highway Administration.

REFINING VERTICAL ALIGNMENT

Vertical alignment is to be reviewed for possible revisions resulting from data received under Section 2B-1- GROUND SURVEY such as: soil data (compaction factors, etc.) indicating the need to raise or lower grades for earthwork balances, major utility facilities, hydraulic requirements and considerations such as raising grades to obtain adequate cover for drainage structures and vertical clearances for various grade separations. Vertical alignment must remain within acceptable limits as prescribed in the Geometric Design Standards (See Appendix A, Section A-1) unless an authorized exception is made by the State Location and Design Engineer and, if applicable, the Federal Highway Administration.

* Rev. 7/06

PERMIT DETERMINATION

The designer shall submit Form LD-252 to the Environmental Engineer with appropriate data. The Environmental Division will review the project and determine what type of water related permits may be required. (See Appendix C, Section C-4-WATER RELATED PERMITS).

COORDINATION WITH OTHER DIVISIONS AND AGENCIES

After refinements as outlined in this section are made, the electronic files are to be placed in Falcon to allow other* divisions and agencies that have been involved up to this point access to the revised plans. For example, furnishing the electronic files allows the Environmental Division to resolve as many problems as possible at this stage (archaeological sites, etc.) and the Local Assistance Division, on applicable projects, to coordinate with city or town representatives.

* Rev. 1/07

SECTION 2B – 4 - REQUEST FOR ENVIRONMENTAL EVALUATION

REQUEST FOR APPROPRIATE ENVIRONMENTAL DOCUMENT

When preliminary plans are complete, the Environmental Division should be requested (Form LD-252) to prepare an appropriate environmental document. This memorandum should contain a brief description of the corridor or corridors to be presented at the public hearing and the approximate date of the public hearing. Copies of this memorandum should go to the District Administrator, District Construction Engineer and Residency Administrator and other affected divisions within the Department. This is the point at which an official environmental document is requested. The Environmental Division is involved in environmental evaluations earlier in the location studies (See Section 2A-1-PROJECT INITIATION).

DATA TO BE SUBMITTED

Electronic files* of the corridor/s under consideration and copies of pertinent correspondence for each corridor should accompany the request for the preparation of an environmental document. Costs will be figured after the request, and furnished prior to the completion of the document. In addition, it is desirable that the designer and the Environmental Team leader assigned to the project meet in order to review the data submitted and assure a complete understanding of the various aspects of the project. Contact should also be made with the Public Involvement Section to discuss visual aids, statements, brochures and a public involvement program. Traffic data is requested from the Transportation and Mobility Planning Division by Environmental Division.

* Rev. 1/07

SECTION 2B – 5 - COST ESTIMATES

DETERMINING PRELIMINARY ENGINEERING AND CONSTRUCTION COSTS *

At each milestone before Field Inspection (FI) in the project development process, the Project Cost Estimating System (PCES) is to be used to generate an estimate for construction and preliminary engineering.

REQUEST FOR COST ESTIMATES FROM OTHER DIVISIONS

Right of way, utility, relocation advisory assistance, and effect on the local tax base estimates and reports are to be requested on Form LD-419 or by memorandum, depending on the situation. This request is to contain the type access anticipated, a summary of the breakdown required and other information deemed important. Three copies of the proposed method/methods of development are to accompany all requests for R/W information. Request for cost estimates for items such as traffic sign illumination, signals, bridges, etc., required from other divisions, are to be requested on Form LD-419 or by memorandum. A copy of the proposed method or methods, of development is to accompany this request, if available. The Local Assistance Division makes all contacts with municipalities in urban funded projects.

COST ESTIMATES

Cost estimates for Preliminary Engineering (PE), Right of Way (R/W) and Construction (Const.) are to be prepared on all plans of development necessary to advance to Preliminary Field Inspection stage. The estimates are to be submitted to the Programming Division for the allocation of funds and entered into the IPM system within ten days, in accordance with the IPM manual. (See IIM-LD-183)

The Project Manager reviews estimates (Preliminary Engineering and Construction) in IPM at Scoping, Public Hearing, Field Inspection, Right of Way and Construction Stages, as well as at 90-day intervals between these milestones, for accuracy. If a project is significantly modified between these stages, the estimate must be adjusted and entered into IPM and PCES.

<u>ALL</u> Engineers' Estimates (Preliminary Engineering and Construction) will be reviewed by the Project Manager and updated, if necessary, for use by the Programming Division and Local Assistance Division in preparing the SYIP. At this time it is imperative that <u>ALL</u> estimates be reviewed for accuracy before incorporation into the new SYIP.

* Rev. 1/07

SECTION 2B – 6 - CONSTRUCTABILITY QUALITY REVIEW

CONSTRUCTABILITY

Constructability review is defined as the review of plans, specifications, and contract documents from a construction perspective to assure the documents propose an operation that is efficient, cost effective, and buildable. Its emphasis is primarily focused on “how” the documents propose the operation to be built and not on ”what” gets built.

AASHTO defines constructability review as “a process that utilizes construction personnel with extensive construction knowledge early in the design stages of projects to ensure that the projects are buildable, while also being cost-effective, biddable, and maintainable”.

This analysis is normally performed at the Preliminary Field Inspection, Public Hearing, Field Inspection and Pre-Advertisement stage of plan development. Additional reviews can be performed as needed when the plans are further developed.

The constructability review includes the report of findings, a completed checklist, and cost savings report. This report is a detailed tabulation of any anticipated savings identified during the review.

SECTION 2B – 7 - THE PRELIMINARY FIELD INSPECTION

PURPOSE

Preliminary Field Inspections (where necessary) are held to obtain consensus from the District Offices, Municipalities and other affected agencies and Divisions represented concerning items of major importance such as the location or the method of development, median widths, minimum right of way width, typical section geometrics, horizontal and vertical controls, hydrologic and environmental effects, right of way impacts, sight distances, bridges, utilities, need for bicycle facility, etc. It is not intended that minor items, such as exact pipe locations, exact balance of quantities, turning radii, etc., be reviewed and discussed.

SCHEDULING THE PRELIMINARY FIELD INSPECTION

After the proposed method of development has been completed the Project Manager, or a representative, is requested to schedule the Preliminary Field Inspection. On Local Assistance Division projects, the Local Assistance Division makes this request, after being advised that preparations for the review have been completed. The Preliminary Field Inspection is to be scheduled far enough in advance to allow for proper distribution and review of the prints.

AVAILABILITY OF PLANS

The availability of plans is to be made in accordance with instructions contained in IIM LD-68 and Form LD-320. A notice of the availability of the plans should be made two weeks in advance of the Preliminary Field Inspection.

ITEMS TO BE REVIEWED

The proposed scheme of development is to be reviewed in its entirety, starting with the typical section. Items listed above, under PURPOSE, should be discussed, in addition to any other significant items relative to the project. Questions, comments, and recommendations from other divisions are to be considered and discussed. Certain items, such as entrance locations on urban projects, may require a separate review at a later date by appropriate personnel.

REVIEWING THE PROPOSED METHOD OF DEVELOPMENT

All Preliminary Field Inspections are to be conducted by the Project Manager, or a representative, who may request that the Engineer who prepared the scheme of development make the presentation. On Urban projects, the Project Manager or the Engineer who prepared the method of development and/or a representative from the Local Assistance Division may make the presentation.

PREPARATION OF INSPECTION REPORT

A report to the Project Manager, or from each discipline involved, is to be written immediately after the Preliminary Field Inspection outlining items discussed. A similar report is generally received from the District Administrator. Those disagreeing with the conclusions reached at the PFI may also file reports outlining their disagreement.

INCORPORATING CHANGES INTO PLANS

When sufficient time has elapsed to allow those who wish to file a report concerning the Preliminary Field Inspection, the recommendations agreed upon are to be incorporated into the plans. If a difference of opinion exists, the State Location and Design Engineer is to be consulted for a decision. On Urban Projects, the Local Assistance Division Director is to be consulted also.

PREPARATION OF PROJECT COST ESTIMATE AND REPORT

Construction cost estimates are received from other divisions as noted in Section 2B-5- REQUEST FOR COST ESTIMATES FROM OTHER DIVISIONS (Form LD-297). Right of Way and Utility Estimates are then added to the construction estimate to complete the estimate of project costs. These costs are placed in the Project Cost Estimating System.

Deleted Information*

* Rev. 1/07

SECTION 2B – 8 - VALUE ENGINEERING

VALUE ENGINEERING (VE)

Value Engineering is defined as the systematic application of recognized analysis techniques by a multi-disciplined team that:

- Identifies the function of a product or service.
- Establishes a worth for that function.
- Generates alternatives through the use of creative thinking.
- Provides the necessary functions at the lowest overall cost.
- Develops recommendations as a result of the job plan followed during a review.

Value Engineering is required on any project regardless of highway classification with a total construction cost of more than $5 million.

Upon receipt of the Initial Field Review and Scoping Report, the Value Engineering Section of the Scheduling and Contract Division will review and submit the project to the Value Engineering Advisory Committee for their consideration as a VE review candidate.

The Value Engineering Section will assemble the required review team and conduct the review in accordance with Concurrent Engineering Process scheduling. On major/complex projects a second study may* be conducted.

Prior to the review, the VE coordinator will send a letter to the Project Manager outlining the materials necessary for the review.

The Value Engineering Team shall review the project to determine if any significant savings cost avoidance and/or quality improvements can be achieved by providing the required service or necessary function at the lowest overall cost.

In all instances, the required service or necessary function will be achieved at the lowest possible life-cycle cost consistent with requirements for performance, maintenance, safety, and aesthetics.

The analysis is to be performed promptly by the team and is to provide the appropriate Administrator, including the Residency Administrator and appropriate Assistant State L&D Engineer, with the team's recommendations.

* Rev. 1/07

The Chief Engineer* will review the Team's recommendations along with those from the District Administrator and the Division Administrators and determine the implementation potential of the Value Engineering proposals.

The Project Manager will verify that accepted VE recommendations have been incorporated into the project by initialing the accepted recommendation on a copy of the Chief Engineer's Response Letter/Project Summary Information Form and forward it to the VE Regional Coordinator.

Any savings should be noted on Form LD-404 (Final Scoping Certification).

* Rev. 1/07