

Chapter Twenty-one
PROJECT DEVELOPMENT PROCESS

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Chapter Twenty-one

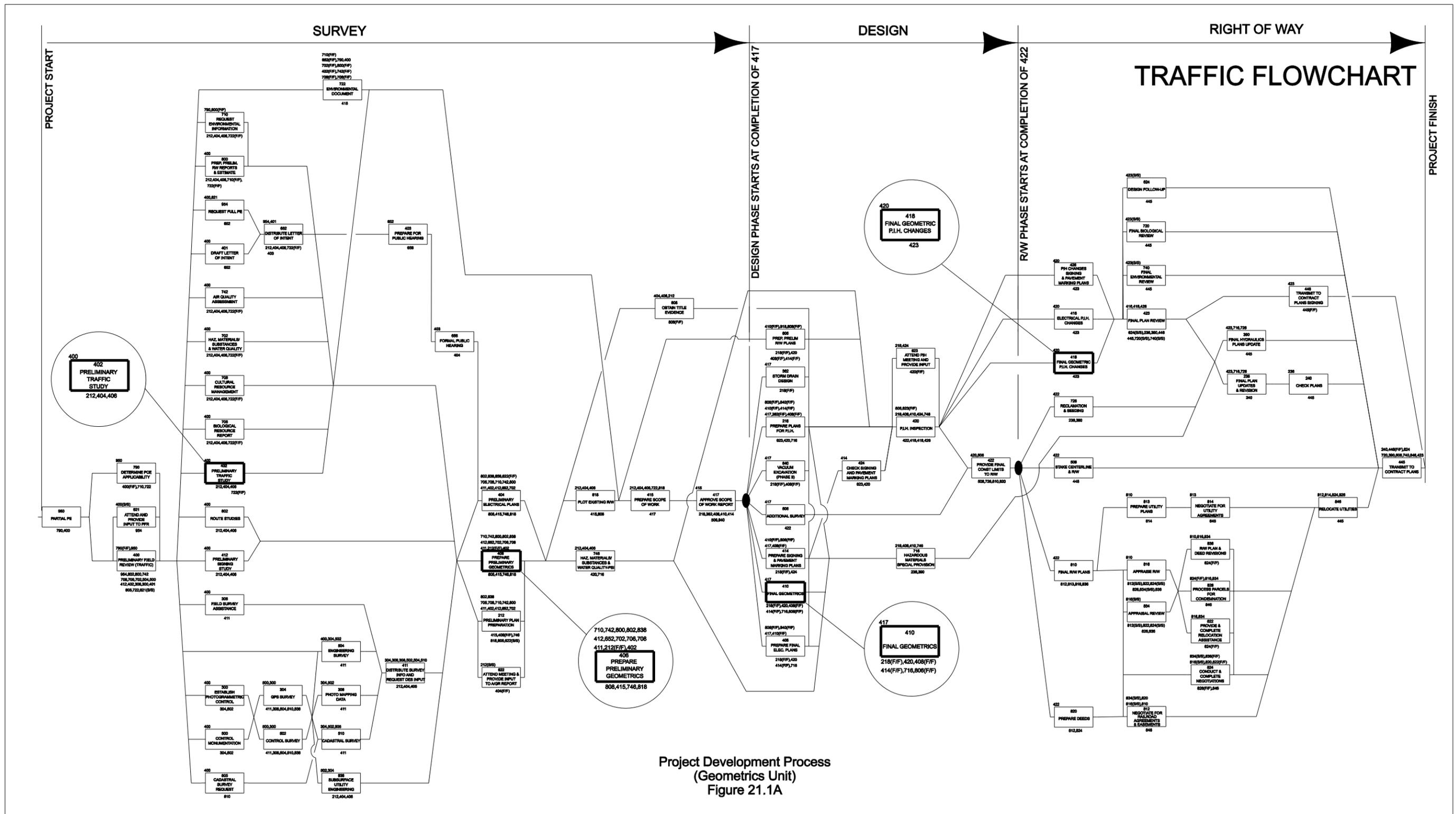
PROJECT DEVELOPMENT PROCESS (Management Unit 4500 — Geometrics)

21.1 GENERAL

[Figure 21.1A](#) illustrates the basic project development approach used by MDT for a typical project. Chapter Twenty-one discusses the activities of the Traffic Engineering Section's Geometrics Unit within this project development process. For a complete description of the activities for all the Units and Sections, the user should review activity numbers and titles located on the Engineer Information Management Services Section webpage located on the Department's intranet. In using Chapter Twenty-one, the user should consider the following:

1. Precedence Activity Network. The network or flowchart in [Figure 21.1A](#) is a precedence activity network. An "activity" occurs when a significant, discrete event occurs and/or when the responsibility for the project (activity) is transferred from one unit to another. The "precedence" nature of the network implies that an activity cannot occur until all activities preceding that one have been completed. However, the user must be aware that some flexibility is necessary to apply this network to project development.
2. Project Application. The network represents the typical process where the Geometrics Unit would be involved in the project. Not every activity will be applicable to every project; i.e., some activities will represent "zero" time on relatively minor projects. Also, not all activities that may be required on a project are shown. However, the user should find that projects which are developed according to this process will have fewer management problems.
3. Lines of Communication. The rigid application of the network would lead to predetermined, precise points at which communication occurs between units. This is neither realistic nor desirable. Communication between units must be continuous. This will result in fewer problems and fewer "surprises" in project development.
4. Geometrics Unit. The Geometrics Unit's activities have been highlighted on the network shown in [Figure 21.1A](#). Note that in some instances the Lead Design Group will be the Geometric Unit. In these cases, the Unit will need to closely review the project development process to ensure all appropriate activities are conducted.

5. Other Manual Chapters. The Montana Traffic Engineering Manual contains several other chapters which provide complementary information to Chapter Twenty-one. The designer should review these chapters for more information on the project development process. In particular, Chapter Twenty-one should be used in combination with [Chapter Twenty-two “Project Coordination \(Geometrics\).”](#)



Project Development Process (Geometrics Unit) Figure 21.1A

21.2 ACTIVITIES

21.2.1 Activity 402 — Preliminary Traffic Studies

21.2.1.1 Purpose

The purpose of Activity 402 is to provide a preliminary investigation of operational needs along a project corridor associated with traffic control signals, highway signing, geometrics, highway lighting, school zones, etc. These investigations are conducted by the Engineering Analysis Unit. For guidance on conducting traffic engineering studies, see [Part VI “Traffic Engineering Investigations”](#) of the [MDT Traffic Engineering Manual](#). The investigator will provide the Lead Design Group with a report outlining the recommendations associated with the traffic related operational needs within the project limits. The Lead Design Group will consider these recommendations and incorporate them into the Scope of Work Report. For guidance on developing the Scope of Work Report, see [Section 2.1.3](#).

21.2.1.2 Tasks

The tasks involved with Activity 402 typically include:

1. conducting a site inspection;
2. preparing warrant studies;
3. preparing a preliminary geometric needs study;
4. conducting capacity and operational analyses (capacity and operational analyses are required in warrant studies);
5. reporting the results to Lead Design Group.

21.2.1.3 Preceding/Succeeding Activities

[Figure 21.2A](#) illustrates the preceding activities that should occur prior to Activity 402 and the succeeding activities that rely on the results of this activity. For additional guidance, see [Figure 21.1A](#).

Project Type	Preceding Activities	Activity Description	Succeeding Activities	Activity Description
Bridge Replacement Project	550	Preliminary Field Review	406	Prepare Preliminary Geometrics
			212	Preliminary Plan Preparation
			722	Environmental Document
Road Design Project	200	Preliminary Field Review	406	Prepare Preliminary Geometrics
			722	Environmental Document
			216	Establish Alignment and Grade
Traffic Engineering Project	400	Preliminary Field Review	406	Prepare Preliminary Geometrics
			404	Preliminary Electrical Plans
			212	Preliminary Plan Preparation
			722	Environmental Document

**PRECEDING/SUCCEEDING ACTIVITIES
(ACTIVITY 402)
Figure 21.2A**

21.2.2 Activity 406 — Prepare Preliminary Geometrics

21.2.2.1 Purpose

The purpose of Activity 406 is to develop the preliminary geometric plan and profile plans based on the Preliminary Field Review Report. The information from Activity 406 is used by the Lead Design Group to get approval of the preliminary geometrics and to start the preparation of the final geometry. The preliminary plan and profile sheets should include:

1. all topographical data from the aerial and/or field survey;
2. all relevant existing on-the-ground survey information;
3. plan views of underground utilities;
4. in profile view, crossing elevations of underground utilities; and
5. existing centerline elevations.

21.2.2.2 Tasks

The tasks involved with Activity 406 typically include:

1. Gathering all pertinent information, including:

- a. the preliminary horizontal alignment from the Road Design strip map;
 - b. any specific requests from the District or Lead Design Group;
 - c. detailed traffic projections and existing traffic counts, these may already be available from Activity 402 or the Preliminary Field Review Report; and/or
 - d. the survey information.
2. Once the above information is gathered, the Geometrics Unit will prepare the preliminary geometric plan and profile design sheets for the project. For interchanges, this will also include interchange grades and typical sections.
 3. For projects with major changes to the alignment, an Alignment Review may be required. Typically, the Road Design Area Engineer will be responsible for setting up the on-site meeting and for preparing the Alignment Review Report. See Section 3.1.2 of the Montana Road Design Manual for additional guidance on the Alignment Review Meeting and Report.
 4. The preliminary geometric plan and profile plan sheets are submitted to the Area Engineer for review. The Area Engineer will review the plans for accuracy.

21.2.2.3 Preceding/Succeeding Activities

[Figure 21.2B](#) illustrates the preceding activities that should occur prior to Activity 406 and the succeeding activities that rely on the results of this activity. For additional guidance, see [Figure 21.1A](#).

Project Type	Preceding Activities	Activity Description	Succeeding Activities	Activity Description
Bridge Replacement Project	562	Distribute Survey Information and Request Design Input	216	Establish Alignment and Grade
			212	Preliminary Plan Preparation
Road Design Project	402	Preliminary Traffic Study	216	Establish Alignment and Grade
	210	Distribute Survey Information and Request Design Input		
	212	Preliminary Plan Preparation		
Traffic Engineering Project	742	Air Quality Assessment	214	Prepare Scope of Work Report
	212	Preliminary Plan Preparation		
	710	Request Environmental Information		
	702	Hazardous Material/Substances and Water Quality		
	706	Biological Resource Report	818	Plot Existing Right-of-Way
	708	Culture Resource Management		
	402	Preliminary Traffic Study		
	800	Prepare Preliminary R/W Reports and Estimates	746	Hazardous Material/Substances and Water Quality PSI
	838	Subsurface Utility Engineering		
	210	District Survey Information and Request Design Input		
	412	Preliminary Signing Study		
	802	Route Studies		
	652	Distribute News Release/Letter of Intent		

**PRECEDING/SUCCEEDING ACTIVITIES
(ACTIVITY 406)
Figure 21.2B**

21.2.3 Activity 410 — Final Geometrics

21.2.3.1 Purpose

The purpose of Activity 410 is to develop the final geometric plan and profile designs based on the approved Scope of Work Report. The Lead Design Group will incorporate these layouts into the plans for the Plan-in-Hand Review.

21.2.3.2 Tasks

The tasks involved with Task 410 typically include:

1. In developing the final geometric design, the Geometrics Unit will review the information provided in the Alignment Review Report and the Scope of Work Report for any changes to the preliminary alignment developed in Activity 406.
2. It will be necessary to check and verify the capacity and level of service of the proposed design.
3. Based on the above information, the Geometric Unit will prepare the final layout plan sheets.
4. The final layout plan sheets are submitted to the Area Engineering for review. The Area Engineer will review the final geometric design for accuracy.

21.2.3.3 Preceding/Succeeding Activities

[Figure 21.2C](#) illustrates the preceding activities that should occur prior to Activity 410 and the succeeding activities that rely on the results of this activity. For additional guidance, see [Figure 21.1A](#).

Project Type	Preceding Activities	Activity Description	Succeeding Activities	Activity Description
Bridge Replacement Project	656	Formal Public Hearing	572	Bridge Plan-in-Hand Inspection
	576	Approve Bridge Scope of Work Report	220	Plan-in-Hand Inspection
Road Design Project	222	Approve Scope of Work Report	220	Plan-in-Hand Inspection
			572	Bridge Plan-in-Hand Inspection
Traffic Engineering Project	222	Approve Scope of Work Report	220	Plan-in-Hand Inspection
	212	Preliminary Plan Preparation	716	Hazardous Material Special Provisions
			218	Prepare Plans for Plan-in-Hand
			408	Prepare Final Electrical Plans
			414	Prepare Signing and Pavement Marking Plans
			806	Prepare Preliminary R/W Plans

**PRECEDING/SUCCEEDING ACTIVITIES
(ACTIVITY 410)
Figure 21.2C**

21.2.4 Activity 418 — Final Geometric Plan-in-Hand Changes

21.2.4.1 Purpose

The purpose of Activity 418 is to make any necessary changes to the geometric design based on the Plan-in-Hand Review. This information will be provided to the Lead Design Group for incorporation into the final plans.

21.2.4.2 Tasks

The tasks involved with Activity 418 typically include:

1. The Geometrics Unit will review the Plan-in-Hand Report and make any necessary changes to the geometric design plan sheets developed in Activity 410.
2. The final layout plan sheets are submitted to the Area Engineering for review. The Area Engineer will review the final geometrics for accuracy.

21.2.4.3 Preceding/Succeeding Activities

Figure 21.2D illustrates the preceding activities that should occur prior to Activity 418 and the succeeding activities that rely on the results of this activity. For additional guidance, see [Figure 21.1A](#).

Project Type	Preceding Activities	Activity Description	Succeeding Activities	Activity Description
Bridge Replacement Project	220	Plan-in-Hand Inspection	230	Final Plan Review
	572	Bridge Plan-in-Hand Inspection		
Road Design Project	220	Plan-in-Hand Inspection	230	Final Plan Review
	572	Bridge Plan-in-Hand Inspection		
Traffic Engineering Project	220	Plan-in-Hand Inspection	230	Final Plan Review

**PRECEDING/SUCCEEDING ACTIVITIES
(ACTIVITY 418)
Figure 21.2D**

