PROJECT DEVELOPMENT GUIDE

Prepared by:

Division of Design Services
Bureau of Engineering and Construction
Connecticut Department of Transportation

October 2012

Table of Contents

Section Number	Description	Page
	List of Exhibits	vi
1.0	FUNDAMENTALS	1
1.1	Nomenclature	1
1.1.1	Glossary	1
1.1.2	Abbreviations and Acronyms	7
1.2	Introduction	12
1.2.1	Purpose, Coverage and Structure of Guide	13
1.2.2	Relationship to Other Publications	13
1.3	Project Development Principles and Concepts	14
1.3.1	Principles	15
1.3.2	Systematic Decision Making	16
1.3.3	Context Sensitive Solutions/Design	23
1.3.4	Public Involvement and Public Information	23
1.4	Environmental Considerations and Requirements	24
1.4.1	Overview	25
1.4.2	Major Participants, Roles and Responsibilities	27
1.4.3	Common Categories of Impacts	29
1.4.4	Environmental Review Processes	31
1.5	Project Development Phases and Project Categories	43
1.5.1	Project Development Phases	46
1.5.2	Minor Projects	47
1.5.3	Intermediate Projects	47
1.5.4	Major Projects	48
2.0	DETAILED PROCESS GUIDANCE	52
2.1	Project Development Cost	52
2.2	Typical Activity Patterns, By Phase	56
2.2.1	Typical Project Initiation Phase	57
2.2.2	Typical Preliminary Design Phase (Without Studies)	58
2.2.3	Typical Preliminary Design Phase (With Studies)	66
2.2.4	Typical Final Design Phase	71
2.2.5	Typical Contract Development Phase	75
2.3	Activity Descriptions, By Phase	75

Table of Contents

Section Number	Description	Page
2.3.1	Project Initiation Phase	76
2.3.2	Studies/Preliminary Design Phase	81
2.3.3	Final Design Phase	103
2.3.4	Contract Development Phase	121
3.0	DESIGN SUBMISSION REQUIREMENTS	125
3.1	Requirements at Design Completion	124
3.1.1	Construction Plans	125
3.1.2	Special Provisions	125
3.1.3	Construction Cost Estimate and Schedule	126
3.1.4	Design Report and Design Statement	128
3.1.5	Other Documentation	131
3.2	Milestone Submissions	131
3.2.1	Overview	131
3.2.2	Studies Submission	136
3.2.3	Preliminary Design Submission	137
3.2.4	Drainage Submission	138
3.2.5	Semi-Final Design Submission	138
3.2.6	Final Plans for Review Submission	139
3.2.7	Final Design Plans Submission	139
3.3	Other Deliverables	139
3.3.1	Property Maps	139
3.3.2	Environmental Analysis/Support	140
3.3.3	Permit Applications	140
3.3.4	Design Exceptions	140
3.3.5	Interstate Point of Access Modification Requests	140
3.3.6	Interim/Progress Submissions	140
4.0	APPROVALS	141
4.1	Initiation and New Phases	141
4.1.1	Financial and Programming	142
4.2	Agreements	144

Table of Contents

Section Number	Description	Page
4.2.1	Utility Agreements	144
4.2.2	Railroad/Highway Agreements	144
4.2.3	Municipal Agreements	144
4.3	Plans (Outside Contract Documents)	144
4.3.1	Financial Plans	145
4.3.2	Project Management Plans	145
4.3.3	Transportation Management Plans	145
4.4	Consultant Administration	145
4.4.1	Retaining a Consultant	145
4.4.2	Entering a Consultant Supplemental Agreement	146
4.4.3	Consultant Agreements and Supplemental Agreements	146
4.4.4	Consultant Scope of Services	146
4.4.5	Consultant Notice to Proceed	147
4.5	Technical	147
4.5.1	Hydraulic Engineer	147
4.5.2	Hydraulics/Drainage Programs	147
4.5.3	Railroad Clearances	147
4.5.4	Structure Type Studies	147
4.5.5	Rehabilitation Study Reports	148
4.5.6	Structure Layout for Design	148
4.5.7	Pilot Boring Plans	148
4.5.8	Subsurface Exploration Programs	148
4.6	Construction Documents and Procurement	149
4.6.1	Public Interest Findings	149
4.6.2	Plans, Specifications and Estimates	149
4.6.3	Waivers to Advertise	149
4.6.4	Advertise for Bids	149
4.6.5	Addenda	150
4.7	Other	150
4.7.1	Design Exceptions	150

Table of Contents

Section Number	Description	Page
4.7.2	Major Scope Revisions	150
4.7.3	Environmental Documentation	150
4.7.4	Interstate Point of Access Modification	152
4.7.5	Design Approval	152
4.7.6	Value Engineering	152
4.7.7	Rail Regulatory Approval	152

List of Exhibits

Number	Title	Page
1	Project development process concept	12
2	Department project development references	14
3	Comparison of example acceptable/unacceptable needs statements	17
4	Example evaluation matrix	22
5	Common environmental laws, regulations and references	25
6	NEPA document flow chart	33
7	Typical agency environmental activities and roles	39
8	Project categories	44
9	Project development within project life	45
10	Schematic for development of minor projects	49
11	Schematic for development of intermediate projects	50
12	Schematic for development of major projects	51
13	Example of percentages used to develop engineering cost for programming purposes	53
14	Sample engineering cost worksheet	54
15	Typical activity patterns, by project phase and type	56
16	Typical project initiation activities, consultant-designed projects	57
17	Typical project initiation activities, State-designed projects	57
18	Typical preliminary design activities, minor projects (no studies)	58
19	Typical preliminary design activities, intermediate projects (no studies)	60
20	Typical preliminary design activities, major projects, CATX (no studies)	62
21	Typical preliminary design activities, major projects, EA or EIS (no studies)	64
22	Typical preliminary design activities, major projects, CATX (with studies)	66
23	Typical preliminary design activities, major projects, EA or EIS (with studies)	68
24	Typical final design activities, minor projects	71
25	Typical final design activities, intermediate and major projects	73

List of Exhibits

Number	Title	Page
26	Typical contract development activities, minor projects	75
27	Typical contract development activities, intermediate and major projects	75
28	Typical schedule milestones	77
29	Design Report outline	128
30	Design Statement outline	130
31	Milestone submissions	132
32	Items included with highway milestone submissions	134
33	Plans included with highway milestone submissions	134
34	Color convention for annotated display plans	137
35	Summary of individual approvals required to initiate a project or new phase	142
36	Summary of agency roles for different types of environmental (CEPA/NEPA) documentation	151

1.0 FUNDAMENTALS

This section provides the basic background information related to development of transportation projects for the Connecticut Department of Transportation (Department). Section 2 provides detailed information using the nomenclature, principals and concepts outlined in here.

1.1 Nomenclature

An extensive lexicon has developed around the transportation profession and within individual organizations. The same word or term may have different meanings. To facilitate effective communications, this section identifies and defines various terms used in this Guide.

1.1.1 Glossary

Advisory Council on Historic Preservation: An independent federal agency that promotes the preservation, enhancement, and productive use of historic resources.

Approval: Documented acceptance of a proposal.

Bureau of Engineering and Construction: Department bureau responsible for implementation of the capital program for all transportation modes. It includes engineering and construction services as well as property acquisition and management, research and material testing.

Bureau of Finance and Administration: Department bureau responsible for funds management, construction contract procurement and award and other functions.

Bureau of Highway Operations: Department bureau responsible for the safe operation and maintenance of the State's highway and bridge system including snow and ice control, equipment repair and maintenance.

Bureau of Policy and Planning: Department bureau responsible for recommending transportation policy, plans and programs.

Categorical Exclusion: Actions that do not have significant environmental impacts under NEPA (40 CFR 1508.4, 23 CFR 771.117).

Code of Federal Regulations: Compilation of the general and permanent rules and regulations published by federal executive departments and agencies.

Commissioner: State of Connecticut Transportation Commissioner acting through a duly-authorized representative.

Connecticut Commission on Culture and Tourism: State agency with a mission of preserving and promoting Connecticut's cultural and tourism assets. The Commission's Historic Preservation and Museum Division is the State Historic Preservation Office.

Connecticut Council on Environmental Quality: State agency that monitors environmental trends in Connecticut and recommends improvements to state environmental policies and advises other agencies on environmental impacts of projects.

Connecticut Environmental Policy Act: Connecticut law establishing the requirement to identify and evaluate the impacts of proposed state actions which may significantly affect the environment; codified at Connecticut General Statutes, Sections 22a-1 through 22a-1h, annotated.

Connecticut General Statutes: The official General Statutes of Connecticut, including the Constitution of the United States, the Amendments to the Constitution of the United States, the Constitution of the State of Connecticut, and the thirty Amendments to the Constitution of the State of Connecticut adopted since 1965.

Contract documents: Plans, special provisions and other documents (e.g., notices, permits) defining the construction requirements and responsibilities of the parties.

Construction contract: Agreement with a private company for construction and based primarily on the contract documents.

Consultant: Private company contracted to provide project development services for a project.

Consultant-designed project: Infrastructure project designed exclusively or primarily by a consultant.

Contract Development: Development phase during which the engineering elements of the contract documents are completed by refining and augmenting the designer-prepared materials (e.g., drawings, special provisions).

Contract Development Section: Organizational element of the Department's Bureau of Engineering and Construction, Division of Design Services responsible for preparation of the final construction contract documents.

CORE-CT: Connecticut State government's core financial and administrative information systems

Cost Estimating Section: Organizational element of the Department's Bureau of Engineering and Construction, Division of Design Services responsible for preparation of engineer's estimates and bid analysis.

***De minimis* impact:** An impact to a Section 4(f) resource meeting the definition in 23 CFR 774.17.

Department: State of Connecticut Department of Transportation

Design Approval: Documented selection, by an authorized official, of a particular alternative for implementation after having evaluated transportation considerations, completed the environmental analysis and fulfilled other requirements. Design approval

is required prior to commencement of final design, rights of way acquisition and construction.

Designer: Entity with primary responsibility for design of the project; may be a consultant or Department organizational unit. Also known as the Prime Designer.

Division of Bridges and Facilities: Organizational unit of the Department's Bureau of Engineering and Construction, Office of Engineering responsible for facility- and structures-related infrastructure, including the development of projects consisting primarily of bridges, facilities and other structures.

Division of Design Services: Organizational unit of the Department's Bureau of Engineering and Construction, Office of Engineering, that provides technical support services to project development lead units.

Division of Highway Design: Organizational unit of the Department's Bureau of Engineering and Construction, Office of Engineering responsible for developing projects that are primarily "highway" in character.

Division of Traffic Engineering: Organizational unit of the Department's Bureau of Engineering and Construction, Office of Engineering that manages, directs and coordinates traffic designs, studies, and investigations, provides design and review services of maintenance and protection of traffic, traffic signals, signing and pavement markings and projects with railroad involvement and administers the railroad/highway at-grade crossing program.

Endangered Species Act: Federal law designed to protect critically imperiled species from extinction as a consequence of economic growth and development.

Environmental Assessment: This term has two distinct meanings: (1) Public document prepared under NEPA for projects not classified as a categorical exclusion and the necessity of preparing an environmental impact statement is not clear. (40 CFR 1508.9, 23 CFR 771.119) (2) Under CEPA (regulations 22a-1a-1), it is the process of determining if a proposed action may have a significant impact on the environment.

Environmental Classification Document: Document used by a sponsoring agency in conjunction with the CEPA regulations to determine which of its actions may have significant impacts.

Environmental Compliance Section: Organizational unit of the Department's Bureau of Engineering and Construction, Office of Engineering, Division of Design Services that conducts investigations of suspected waste sites in the vicinity of Department projects and operating facilities and provides technical support and regulatory guidance on hazardous wastes and regulated contaminated materials.

Environmental Impact Evaluation: Detailed written document concerning the environmental impacts of a proposed action prepared under CEPA (regulations 22a-1a-1).

Environmental Impact Statement: Detailed written document concerning the environmental impacts of a proposed action prepared under NEPA (40 CFR 1508.11, 23 CFR 771.123-5).

FHWA High Cost Project: Project with an estimated cost exceeding $100 million, funded in part with FHWA-administered funds, and subject to special oversight and review requirements (e.g., Project Management Plan, Financial Plan).

Final Design: Development phase during which the selected alternative is completely defined in construction contract documents, a detailed cost estimate is prepared and other required arrangements (e.g., utility agreements, securing environmental permits and clearances) are completed.

Finding of No Significant Impact: Documented determination that an action/project will have no significant environmental impact, prepared under CEPA (regulations 22a-1a-1) or NEPA (40 CFR 1508.13, 23 CFR 771.121).

Freedom of Information Act: Connecticut laws requiring state and local agencies to disclose records, with limited exceptions, to any requester; codified at Connecticut General Statutes, Chapter 14, Sections 1-200 through 1-242.

Green Book: Latest edition of the *Policy on Geometric Design of Highways and Streets*, published by the AASHTO.

Highway Capacity Manual: Latest edition of the *Highway Capacity Manual*, published by the TRB.

Highway Design Manual: Latest edition of the *Highway Design Manual*, published by the Department.

Highway Safety Manual: Latest edition of the *Highway Safety Manual*, published by the AASHTO.

Hydraulics and Drainage Section: Organizational unit of the Department's Bureau of Engineering and Construction, Office of Engineering, Division of Engineering Services that provides specialized engineering, technical support and policy advice on all storm water and water resource management issues related to the planning, permitting, design, construction and maintenance of transportation facilities.

Interactive Highway Safety Design Model: Suite of software analysis tools for evaluating safety and operational effects of geometric design decisions on highways.

Lead Unit: Department organizational unit with principal responsibility for advancing a particular project.

Long Range Plan: Federally-recognized statewide long-range transportation plan for the State of Connecticut prepared pursuant to 23 CFR 450.214. The plan is general as opposed to project-specific.

National Environmental Policy Act: US law establishing national policy promoting protection and enhancement of the environment; codified at 42 USC 42, Chapter 55.

Office of Construction: Organizational unit of the Department's Bureau of Engineering and Construction responsible for the management and coordination of all construction activities administered by the Construction Districts.

Office of Engineering: Organizational unit of the Department's Bureau of Engineering and Construction responsible for the management, direction, and coordination of engineering activities.

Office of Environmental Planning: Organizational unit of the Department's Bureau of Policy and Planning responsible for development and administration of environmental policy, including preparation and oversight environmental documents required by the state and federal laws and regulations.

Office of Policy and Management: Multi-function Connecticut State agency

Office of Right of Way: Organizational unit of the Department's Bureau of Engineering and Construction responsible for acquiring and managing State property interests with a primary purpose of transportation.

Permit: Regulatory agency's written authorization to perform a regulated action.

Planning: Development phase leading to completion of an intermodal Transportation Plan. Also used to mean the Department's Bureau of Policy and Planning**.**

Plans: Drawings developed by the designer whether used in reports, for meeting displays or incorporation in the contract documents. Also refers to documents prepared to describe an approach or strategy (e.g., Management Plan, Financial Plan)

Preliminary Design: Development phase during which an alternative is selected for final design following definition of the underlying problem and identification, refinement and detailed evaluation of alternatives.

Preliminary Engineering: Term used by the Federal Highway Administration to denote all the engineering activities leading up to completion of the Plans, Specifications and Estimate. The studies, preliminary design, final design and contract development phases are all included within Preliminary Engineering.

Programming: Development phase during which planned projects are prioritized and available funds are assigned.

Project Memorandum: Memorandum from the Bureau of Engineering and Construction to the Bureau of Finance and Administration requesting a change in a project's funding, scope or schedule. There are two types of Project Memoranda: Recommended Project Memoranda (RPM) and Project Memoranda, Modification (MOD). A template for this document is located in the ProjectWise Project Development folder.

Project Memorandum, Modification: Project Memorandum documenting request/approval for administrative modification of an established project.

Recommended Project Memorandum: Project Memorandum documenting request/approval for the administrative creation (initiation) of a project. A template for this document is located in the ProjectWise Project Development folder.

Record of Decision: Concise statement of an agency's decision following completion of an environmental impact statement prepared pursuant to NEPA (40 CFR 1506.1, 23 CFR 771.127).

Report of Meeting: Documentation summarizing the date, names and affiliations of participants, subject (project number and topic) and discussions and conclusions of a meeting, signed by the persons preparing and approving the report.

SafetyAnalyst: Set of software tools available through the AASHTO, used by state and local highway agencies for highway safety management.

Scope of Work: Statement of work, activities and work products associated with a consultant agreement.

Section 4(f): Section 4(f) of the Department of Transportation (DOT) Act of 1966, codified at 23 USC 138.

Section 106: Section 106 of the National Historic Preservation Act of 1966 (16 USC 470 et seq.).

Selected Alternative: Alternative selected for final design after having been classified and evaluated in conformance with CEPA/NEPA.

Soils and Foundations Section: Organizational unit of the Department's Bureau of Engineering and Construction, Office of Engineering, Division of Engineering Services that provides design and review services on matters related to soil, rock, and foundations for the planning, design, construction, and maintenance of roads, bridges, and transportation facilities.

Special Provisions: Specifications applicable to an individual project prepared by the designer, utility owner, municipality or another entity.

Sponsoring Agency: Agency responsible for the preparation of environmental classification documents, environmental impact evaluations, and findings of no significant impact required by CEPA.

State Historic Preservation Officer: Entity designated by the governor (of each state) to administer the national historic preservation program at the State level, review National Register of Historic Places nominations, maintain data on historic properties that have been identified but not yet nominated, and consult with federal agencies during Section 106 review.

State Implementation Plan: State-level plan for complying with the federal Clean Air Act, consisting of narrative, rules, technical documentation, and agreements that Connecticut will employ to meet the requirements of the law.

State-designed project: Infrastructure project designed exclusively or primarily by state forces, with little or limited support by a consulting engineer.

Statewide Bicycle and Pedestrian Transportation Plan: Document directing the Department's policy development and initiatives to advance programs and projects to accommodate non-motorized transportation (bicycling, walking, and horse riding).

Strategic Highway Safety Plan: The statewide-coordinated safety plan that provides a comprehensive framework for reducing highway fatalities and serious injuries on all public roads in Connecticut.

Studies: Optional project development phase, between project initiation and preliminary design, during which the information on the transportation problem is developed, the range of alternatives is narrowed and remaining alternatives are analyzed.

Suggested List of Surveillance Study Sites: List of locations with the greatest promise of accident reduction, as identified by the Department's Division of Systems Information using the Rate-Number Quality Control method. The information is not subject to disclosure under the FOIA.

Traffic Accident Surveillance Report: Compilation of comparative accident statistics developed by the Department's Division of Systems Information. This information is not subject to disclosure under the FOIA.

Traffic Engineering project: Project for which the Division of Traffic Engineering is the lead unit.

Trns•port: Suite of software modules that supports the Department's delivery of construction projects through functionality in the areas of cost estimation, proposal development, bidding, contract award, construction contract administration and materials management.

United States Code: Compilation of the general and permanent federal laws.

Utility: Any public service company and their facilities.

Utilities Section: Organizational unit of the Department's Bureau of Engineering and Construction, Office of Engineering, Division of Engineering Services that coordinates the relocation of public utilities with the construction or reconstruction of transportation facilities.

1.1.2 Abbreviations and Acronyms

The following abbreviations and acronyms are used in this Guide:

AASHTO: American Association of State Highway and Transportation Officials

ACHP: Advisory Council on Historic Preservation

ADA: Americans with Disabilities Act

ADT: Average Daily Traffic

ADV: Advertising date (construction contract)

BFO: Burden, Fringe and Overhead

BID: Bid opening date (construction contract)

CAM: Coastal Area Management

CATX: Categorical Exclusion

CCEQ: Connecticut Council on Environmental Quality

CCT: Commission on Culture and Tourism (Connecticut)

CEPA: Connecticut Environmental Policy Act

CFR: Code of Federal Regulations

CGS: Connecticut General Statutes

CN: Construction

CSD/S: Context-Sensitive Design/Solutions

CTDOT: Connecticut Department of Transportation

DBE: Disadvantaged Business Enterprise

DCD: Design Completion Date

DDHV: Directional Design Hourly Volume

DECD: Department of Economic and Community Development (Connecticut)

DEIS: Draft Environmental Impact Statement

DEP: Department of Environmental Protection (Connecticut)

DHV: Design Hourly Volume

DOA: Department of Agriculture (US)

DOI: Department of Interior (US)

DOT: Department of Transportation

DPH: Department of Public Health (Connecticut)

EA: Environmental Assessment

ECD: Environmental Classification Document

EIE: Environmental Impact Evaluation

EIS: Environmental Impact Statement

EPA: Environmental Protection Agency (US)

ESA: Endangered Species Act

FAA: Federal Aviation Administration (US)

FD: Final Design

FDP: Final Design Plans

FHWA: Federal Highway Administration

FOIA: Freedom of Information Act

FONSI: Finding of No Significant Impact

FPFR: Final Plans for Review

FTA: Federal Transit Administration

FWS: Fish and Wildlife Service (US)

HCM: Highway Capacity Manual

HDM: Highway Design Manual

HSIP: Highway Safety Improvement Program

HSM: Highway Safety Manual

HUD: Department of Housing and Urban Development (US)

IHS: Interstate Highway System

IHSDM: Interactive Highway Safety Design Model

ISTEA: Intermodal Surface Transportation Efficiency Act of 1991

ITS: Intelligent Transportation System

LRP: Long Range Plan

MPO: Metropolitan Planning Organization

MOA: Memorandum of Agreement

MOD: Project Memorandum, Modification

MOE: Measures of Effectiveness

MOU: Memorandum of Understanding

MPO: Metropolitan Planning Organization

MS4: Municipal Separate Storm Sewer System

MVMT: Million Vehicle Miles of Travel

NAAQS: National Ambient Air Quality Standards

NEPA: National Environmental Policy Act

NHPA: National Historic Preservation Act of 1966 (16 USC 470)

NHS: National Highway System

NPDES: National Pollutant Discharge Elimination System

NRHP: National Register of Historic Places

NTP: Notice to Proceed

OPM: Office of Policy and Management

PD: Preliminary Design

PIP: Public Involvement Plan

PIGM: Public Involvement Guidance Manual

PM: Project Manager

PS&E: Plans, Specifications and Estimates

ROD: Record of Decision

ROM: Report of Meeting

ROW: Right of Way

RPO: Regional Planning Organization

RPM: Recommended Project Memorandum

R/W: Right of Way

SBE: Small Business Enterprise

Section 106: Section 106 of the National Historic Preservation Act of 1966

Section 401: Section 401 of the Clean Water Act

Section 404: Section 404 of the Clean Water Act

SCEL: Stream Channel Encroachment Line

SEE: Social, Economic, and Environmental

SEP: Subsurface Exploration Program

SFD: Semi-Final Design

SHPO: State Historic Preservation Officer

SHSP: Strategic Highway Safety Plan

SIP: State Implementation Plan

SLOSSS: Suggested List of Surveillance Study Sites

SPN: State Project Number

STIP: Statewide Transportation Improvement Program

TASR: Traffic Accident Surveillance Report

TIP: Transportation Improvement Program

TRB: Transportation Research Board

US: United States

USACOE: United States Army Corps of Engineers

USC: US Code

USCG: US Coast Guard

USDOT: US Department of Transportation

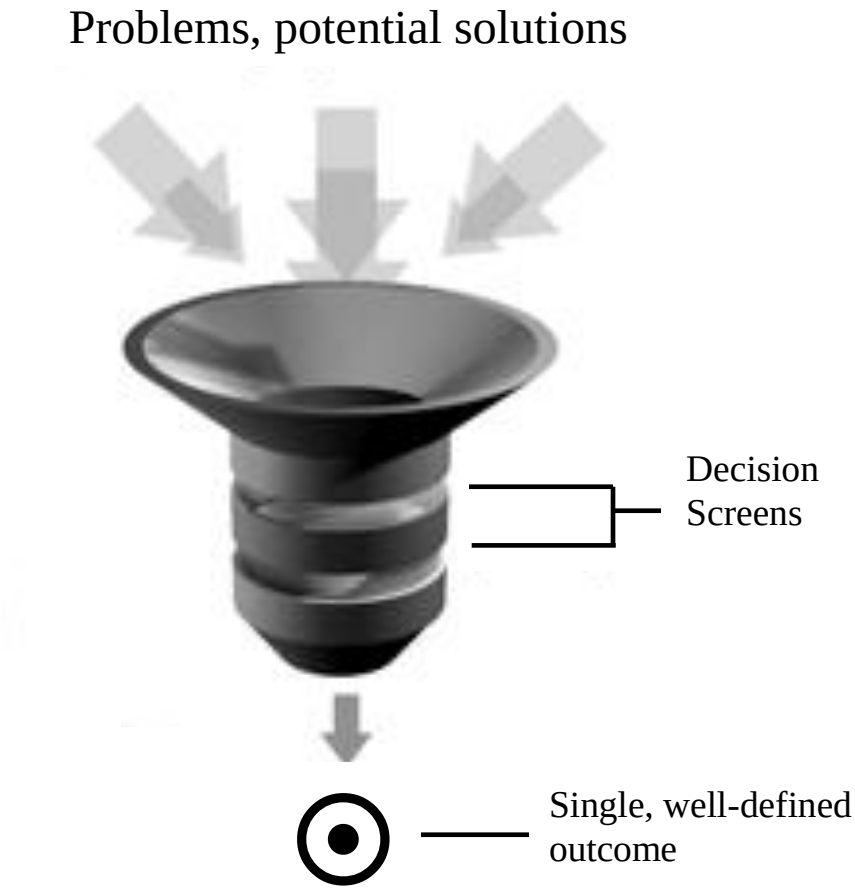
US EPA: US Environmental Protection Agency (same as EPA)

VE: Value Engineering

1.2 Introduction

A "project" is a transportation improvement or a package of improvements identified in Connecticut's Long Range Plan for implementation. The project description, as included in the Long Range Plan, is often very general. "Project development" is the process of transforming a general need to a specific and well-defined solution, often involving infrastructure construction. This process is conceptually represented by Exhibit 1.

Exhibit 1. Project development process concept.



The Department undertakes projects with a wide variety of scopes and complexities. Even moderately complex projects involve a multitude of decisions and activities involving the project team, Department functional units (e.g., Utility Section, Office of

Environment Planning), joint-lead and cooperating agencies, and other stakeholders (e.g., municipalities, planning agencies, property owners, regulatory agencies, utility owners). Recognizing these complexities and challenges is the first step in mapping out a successful project delivery plan.

At the dawn of the Interstate Highway era, project development consisted almost entirely of engineering design. Much has changed. As our transportation network has matured, public expectations have changed. Numerous State and federal laws have been enacted directly affecting how projects are developed. Today, project decisions take into account a complex and evolving array of environmental, funding and technical factors. The Department has published references (e.g., policies, manuals) on many individual subjects (e.g., drainage and hydraulics, geometric design, utility coordination). This Guide does not alter or supersede any Department-issued policy or manual. This Guide covers the entire project development process, tying together many individual topics, some of which are covered by separate guidance.

1.2.1 Purpose, Coverage and Structure of Guide

This Guide is written primarily for Department personnel and consultants involved in project development. It outlines typical activities leading to the completion of construction contract documents for Department capital projects. The Guide covers administrative, technical and project management topics and consists of four sections, summarized below:

1. Terminology and abbreviations used within the Guide are defined. Key concepts are summarized and a project classification system is established.
2. This section included guidance on engineering cost estimation and detailed project development guidance. Typical activity patterns for common project types are provided along with narrative guidance for each activity.
3. This section describes typical products developed during project development, including the final deliverables (contract documents) and interim milestone submissions.
4. This section summarizes typical Department and FHWA approvals. It identifies required approvals in relation to development activities (Section 2) and authorized approving officials. It does not include approvals made by other agencies (e.g., permits).

This Guide is used most-efficiently in electronic format through a Web browser, which enables the hypertext links that connect the Guide to primary reference materials. It is also useable in print (hard copy).

1.2.2 Relationship to other Publications

This Guide relies extensively on other publications, mostly Department Manuals and procedures. The referenced publications are identified in Exhibit 2 and provide detailed information within specific topical areas but often do not relate technical activities within one disciplines to those in another or to the overall development process. As previously noted, this Guide ties together numerous technical, coordination and administrative activities.

This Guide does not establish any new engineering or technical criteria nor does it supersede any technical information within the publications listed in Exhibit 2.

Exhibit 2. Department project development references.

Title or Description	Date
Bridge Design Manual	2003
Connecticut Bicycle and Pedestrian Transportation Plan	2009
Constructability Review Program	2009
Construction Contract Bidding & Award Manual	2010
Consultant Administration & Project Development Manual	2008
Digital Design Environment Guide	2007
Consultant Selection, Negotiations and Contract Monitoring Procedures for Municipally-Administered Projects	2011
Digital Project Development Manual	2011
Drainage Manual	2000
Engineering Policy Statements	Various
Geotechnical Engineering Manual	2005
Highway Design Manual	2003
Information Guide for Right of Way Acquisition Activities	2007
Location Survey Manual	1997
Implementation of Policy Ex.O-29 (permitting) – in development	TBD
Policies and Procedures for Property Maps	2000
Policy and Procedures for New or Revised Interstate Access Approval	1998
Preliminary Cost Estimating Guidelines	Annual
Professional Services, Consultant Selection Procedures Manual	2010
Public Involvement Guidance Manual	2009
Public Involvement Procedures	2009
Public Service Facility Policy and Procedures for Highways	2008
Traffic Control Signal Design Manual	2009
Utility Accommodation Manual	2009
Value Engineering Program	2009

1.3 Project Development Principles and Concepts

This section outlines the principles and concepts that serve as the foundation for various policies, processes and procedures. These tenets are woven into the detailed guidance found in Section 2. Understanding the concepts makes it easier to follow the procedures and adapt them when appropriate. Procedures change frequently to reflect organizational, personnel, information technology and business process evolution. Further, detailed guidance cannot address every situation that may be encountered during project development. There will always be situations for which explicit detailed guidance is not available. When faced with this circumstance, project teams should adapt the enduring principles and basic concepts, along with their collective experience.

The Department is a mission-oriented executive agency with numerous responsibilities, none being more important than the development and improvement of the State's intermodal transportation network. Transportation systems are critical to a vibrant economy and social interaction at the local, regional, national and global levels. Public interest and expectations in transportation are justifiably high. As users and principal sponsor of transportation systems, the public is the Department's customer.

In project development, results matter. So does process. Project development must reflect the public will and prevailing values on both counts: results and process. This section describes how to get the job done, consistent with the Department's responsibilities as a State agency.

1.3.1 Principles

Although this Guide provides procedures for many specific activities, no set of instructions can be comprehensive. In some situations, the path forward is not clear. Decisions involve numerous factors. Uniform, unequivocal rules ("always do A" or "never do B") do not exist. The project team and Department managers will be called upon to adapt, innovate and exercise judgment. The following principles, which are embedded in many policies, should guide project development decisions.

Deliberative: Decisions should be made thoughtfully and, when appropriate, after consultation. Decisions made in haste or without pertinent information are often revisited and reversed, negating substantial resources and time. Key decisions should be documented in project records (e.g., correspondence, ROMs).

Inclusive: Actively seek and consider a broad range of factors and perspectives.

Objective: Utilize information and techniques that are free of bias, distortion and prejudice. Use quantitative measures when possible; never describe complex conditions with vague, simple terms (e.g., good, poor). When information sources are in conflict, weigh the authority and basis (e.g., technical merit) of each.

Proportional: The scale of the solution should correspond to the problem. Significant problems warrant costs and impacts that may not be justified for lesser problems. This principle also applies to process. A significant problem (e.g., persistently high crash rate) may warrant very rigorous study. Conversely, no task or activity should be made more complicated than is needed.

Responsive: Recognize, characterize and consider the varying levels of remediation or resolution that different actions (e.g., project alternatives) provide to the defined problem or concern. When viewed objectively, some commonly perceived solutions offer very little remediation.

Transparent: All interested persons should have access to, and visibility of, the process. The decision process and decisions should be an open book.

These principles are utilized throughout the project development process.

1.3.2 Systematic Decision Making

Project development is a systematic method of selecting and implementing the optimal solution to a transportation problem. As noted in the Context Sensitive Design/solutions (CSD/S) discussion that follows (Section 1.3.3), solutions reflect consideration of technical and non-technical factors. .

When decisions rely too heavily on historical practice, both threats and opportunities are overlooked. Use progressive technical and technological methods within a deliberative, objective and rigorous process. This section outlines a four-step problem solving process that is widely used in transportation and other fields.

1. Define the Problem

Projects are initiated to solve problems. However, at the outset, the problem may not be clearly understood. The starting point for all technical activities is to define the problem using objective methods and characteristics. *This step is critical*. Ultimately, each potential alternative will be assessed on the basis of its responsiveness to the stated needs. Without a clear definition of the problem, subsequent evaluations and decisions can be arbitrary.

The project development team usually has some information about the nature of the perceived problem at the time of initiation. The type, format and support for this information vary widely. In all cases, the information should be scrutinized to determine its adequacy and reliability for further use. The following are examples (but not a complete list) of information that is generally considered reliable:

- Objective, current data from Department inventory and asset management systems (e.g., pavement management),
- Objective, current data from Department operational data (e.g., traffic and safety records),
- Recent surveys (e.g., topographic, wetland) conducted and certified by licensed professionals,
- Objective analyses (e.g., demand projections) from recent studies conducted or managed by the Department.

Other information should be reviewed on a case-by-case basis to assess its usefulness. In some cases, the problem can be adequately defined at initiation. Problem statements should:

- Concisely identify/describe a patently undesirable condition,
- Be easily understandable by the general public (free of arcane terms and agency jargon),
- Be based on a rigorous technical evaluation,
- Not identify a solution, explicitly or implicitly.

Exhibit 3 provides examples of acceptable and unacceptable problem statements.

Exhibit 3. Comparison of example acceptable/unacceptable needs statements.

Appropriate/acceptable	Poor/unacceptable
The existing bridge is structurally deficient.	Replacement bridge needed.
The average travel time along Route 1, between the intersections at Routes 2 and 22, is 4 minutes longer during peak periods compared to off peak.	Route 1 capacity is inadequate.
Average delay on all uncontrolled approaches exceeds 3 minutes during AM and PM peaks.	A traffic signal at the intersection is needed.
The actual crash rate at the intersection is approximately double the critical accident rate.	A left turn lane is needed.

When an acceptable and supportable problem definition has been provided or can be formulated at project initiation, this step requires no further work and is concluded. In the absence of adequate pre-initiation support, a technical plan should be prepared to adequately define the problem.

There is no set formula for conducting problem/needs studies. The scope and depth of studies should be responsive and proportional to the problem location and description. The following are examples of information that is collected and developed through analysis in connection with problem statement technical studies.

- Existing traffic conditions and performance
  - Functional classification,
  - Traffic conditions (volumes, turning movements, levels of service),
  - Mobility (levels of service, delay, travel times),
  - Bicycle and pedestrian accommodation,
  - Accessibility for the disabled,
  - Public transportation facilities and service,
  - Accident history.

- Existing infrastructure conditions
  - Pavements,
  - Structures (bridges, walls, sign supports, etc.),
  - Traffic control devices (pavement markings, signs, signals),
  - Barriers and safety hardware.

- Plans/Requirements
  - Long Range Plan,
  - Statewide Transportation Improvement Program,
  - Strategic Highway Safety Plan,
  - Statewide Bicycle And Pedestrian Transportation Plan,
  - Corridor plans,
  - Legislative mandates.

- Projected traffic conditions and performance
    - Traffic conditions (volumes, turning movements, levels of service),
    - Mobility (levels of service, delay, travel times),
    - Accidents/safety.

Given the potential breadth of the subjects involved, the project development team may not have direct access to all/key relevant information or the resources to perform some analysis. Department functional units and external organizations (e.g., MPOs, municipalities) may have information and other resources readily available and should be contacted.

In planning and conducting technical studies, the project team should bear in mind the relationship of these studies to future evaluations. As a subsequent step, the responsiveness of each alternative will be assessed. The approach used to define problems, or one similar, should be used to assess solutions. Therefore, study methods that work for both existing and proposed conditions are desirable.

Very often, technical studies reveal several problems at a potential project location. In such cases, the project team will determine which problem(s) should be identified as the underlying project purpose. There is no simple answer but the following guidance is provided:

- The primary problem is the one most closely related to the general description provided in the initiation and posing the most pressing public interest. The primary problem at a location should always be defined,
- The project's merit (benefit) is not based on the number of identified problems,
- There is no preferred number of problems; a single or several identified problems for the same project are equally acceptable,
- A condition should be identified and included within the problem definition if it is of critical importance; meaning:
    - it is so troublesome (e.g., hazardous, disruptive) that it would justify a separate project, or
    - remediation is a necessary outcome for a project at the location;
- Conditions should not be identified and defined as a problem simply to accommodate a suggestion (as a "courtesy") without meeting the test of critical importance,
- Conditions that do not rise to the level of a defined problem/need are not unimportant and should not be disregarded. When alternatives are evaluated, all benefits (including improvements not identified in the problem statement) of each alternative will be consideration as part of the selection.

Problem definitions should be developed through an objective and deliberative process. However, the initial results of this step (problem definition with support) are not fixed or unalterable. With the progression of time and circumstances, additional and updated information may become available. When warranted by circumstances, the project

manager may determine that the problem definition should be revisited and, if appropriate, revised.

Stakeholders should have ample opportunity to participate in problem identification and the project PIP should address public participation in this step of project development. For some minor projects (e.g., resurfacing), public participation may be accomplished on a program-wide basis (e.g., TIP/STIP development).

The information in this Guide is not sufficient for projects requiring an EIS, which include a Purpose and Need section. When preparing an EIS, reference the applicable law, regulations and reference guides.

2. Identify and Evaluate Alternatives

An "ideal" solution is one in which every evaluation factor favors the same alternative. In real-world project development, ideal alternatives are rare. Most projects involve tradeoffs, wherein a desired result (e.g., increased safety) can only be obtained if less-desirable effects (e.g., cost, negative impacts) are also incurred. The overriding goal of the evaluation process is to enable a "well informed, well considered" decision. To accomplish this, a decision maker needs comprehensive and unbiased information on the available choices (range of reasonable alternatives). An alternative selection based on inadequate information is inherently flawed. When the record is corrected, the selection decision is called into question and may be reversed.

Potential solutions originate at many sources, including asset and performance management systems, planning and municipal organizations, pre-design studies, public comments and investigations by the project development team. The range of input and diversity of candidate alternatives depends on the scope and complexity of the defined problem. Early in the process, alternatives may evolve by combining the positive features of different concepts and through refinement. The project development process should be very receptive to input from all sources. The project PIP should address public involvement opportunities in this phase. At the outset, the number, type and range of alternatives should not be constrained. Failing to consider a potentially viable solution is a much greater risk than considering a poor candidate.

The "No Build" (also known as No Action) alternative is the condition that will exist if none of the Build alternatives are implemented. Evaluation of the No Build alternative provides useful perspective for alternatives comparison. NEPA documents (EAs, EISs) always include evaluation of the No Build and its inclusion is often helpful for evaluations not directly related to NEPA.

Time and funds are required to evaluate each alternative. These expenditures are a worthy investment when the alternative is potentially viable. However, no public interest is served by evaluating alternatives that are not reasonable. There are no minimum or maximum numbers of alternatives that require evaluation. Prior to commencing detailed evaluation, the viability of each candidate alternative is assessed, often on a qualitative basis. Evaluation methods employed at this stage are typically less rigorous than those used for detailed design and analysis. Unreasonable alternatives do not require detailed evaluation and should be dismissed from consideration ("screened out"). For reasons explained previously, the No Build is retained and fully evaluated.

For some projects (e.g., less-complicated, low-impact), a single, consensus, best-choice alternative may emerge from the refinement processes. In other cases, several unique alternatives are identified, each with unique benefits, impacts and advocacies.

The approach and techniques used for detailed evaluation should be objective and include all critical factors. Although the specific factors associated with a particular project vary widely, they tend to fall within three general categories. One category of measures is related to how effectively the alternative responds to the defined problem and other desirable outcomes. A second category identifies social, environmental and economic impacts. Costs, both initial and recurring, are a third category. An example of specific factors within these three categories follows:

- Responsiveness/Effectiveness
    - Select measures of effectiveness (MOEs) based on problem definition, such as:
        - Accessibility,
        - Crash frequency and severity,
        - Emissions,
        - Ride quality,
        - Ridership,
        - Travel time.
    - Other benefits (not counted elsewhere)

- Impacts (positive and negative)
    - Community/social,
    - Cultural resource,
    - Economic,
    - Natural resources,
    - Temporary impacts,
    - Right-of-way, property.

- Cost
    - Initial (construction, purchase),
    - Maintenance,
    - Operating.

The measures and methods used to estimate responsiveness, impacts and cost should be consistent with professional practices for the relevant technical disciplines (e.g., environmental science, hydraulics, structural engineering, traffic).

Evaluation documentation varies with project scale, impacts, cost and public interest. For minor projects, documentation is modest. A much more rigorous process and comprehensive documentation is needed for complex projects since they involve more variables, stakeholders, development time, collaborative decision making and generally greater risk. An enduring record of key decisions and relevant background information is needed. Even for minor projects, summary documentation of the evaluation should be included in the project file. The documentation should summarize how the evaluations were conducted and the results. Exhibit 4 is an example of a summary presentation format that can be easily adapted to most projects.

3. Select an Alternative

After the evaluation is complete and information is available to the decision maker, a single alternative is selected from among those evaluated. The selection doesn't take place at a single moment in time. Following discussion within the project team, a meeting should be scheduled for the purpose of presenting a summary of the evaluation and selecting an alternative. Based on the specific project factors (e.g., cost, complexity, controversy, range of alternatives), the project manager will determine the appropriate level of management representation. A summary of the evaluation should be circulated in advance of the meeting. A summary of the meeting discussion and conclusions, including the tentative selection of an alternative, should be documented in the file.

Design Approval is the conclusive and documented selection of an alternative. In essence, this approval is the point where resources can be committed to implementing the selected design concept.

4. Refine Selected Alternative

Under this activity, the detailed information required for implementation of the selected alternative is developed. Typical activities include refinement of geometry, structural design, traffic control design, identification and acquisition of required property interests, utility and railroad coordination, preparation of permit applications and completion of construction contract documents.

The project PIP should address public involvement opportunities in this phase.

In Section 2 of this Guide, the concepts outlined in this section are translated to Department processes and procedures. The general decision-making approach described here applies to every project. However, the range of considerations, intensity of effort and timing of individual activities vary substantially by project and circumstance.

Exhibit 4. Example evaluation matrix.

	Transportation Responsiveness		Impacts							Cost	
Factor →	Safety	Mobility	Wetland	Noise	Real property			Historic	Economic	Construction	Maintenance
Measure → Alternative ↓	Expected number of serious crashes, annually	Reduction in average travel time (minutes)	Wetland area displaced (acres)	Impacted noise receptors	Partial property acquisitions	Total residential acquisitions & relocations	Commercial & industrial relocations	Historic properties affected	Employment dislocation (full time positions)	All inclusive, construction, utilities, R/W ($ million)	Demand and routine ($thousand/annually)
No Build	2.3	0.0	0.0	3	0	0	0	0	0	0	4.2
Alternative A	1.6	1.2	0.08	6	3	1	1	0	3	3.6	0.3
Alternative B	1.8	1.1	0.12	4	2	2	0	0	0	2.5	0.5

1.3.3 Context Sensitive Design/Solutions

Context Sensitive Design/Solutions (CSD/S) is an approach to transportation decision-making and design that considers the communities and land (i.e., context) that streets and highways pass through. While there is a general consistency in how various agencies define and apply CSD/S, there is also some variation. The following are the Department's CSD/S objectives:

- The project purpose and needs are forged early in the process with ample opportunity for stakeholder input and dialogue.
- The resources (e.g., time, budget) of all involved parties are used efficiently and effectively.
- The selected alternative satisfies the defined purpose and needs.
- The project improves or maintains user and community safety.
- The project is in harmony with the community and preserves environmental, scenic, aesthetic, historic, and natural resource values of the area.
- Attentive design and construction provisions minimize community disruption.
- The completed project is seen as an enduring community enhancement.

"Context sensitive" is not a unique type of project or approach; it is the Department's routine mode of project development. While some projects present greater challenges and generate more public interest than others, the objectives are the same for all projects.

1.3.4 Public Involvement and Public Information

It is Department policy to engage in early, active and continuous public involvement efforts throughout all phases of project planning, development, implementation and operation. The Department's public involvement requirements and guidance for various development phases (e.g., planning, programming, design) are outlined in the Public Involvement Guidance Manual and Public Involvement Procedures. These documents are the primary references for public involvement activities. Several key points are summarized here as an introduction to, not a substitute for, the primary reference publications.

The "public" refers to the very broad range of people and organizations with an interest in the project. These people and organizations are often referred to as "stakeholders", which may include:

- Federal officials,
- Other state agencies (e.g., DEP or SHPO),
- Local elected officials,
- Town engineers/planners,
- Regional officials,

- Special interest or advocacy groups (e.g., Sierra Club, Commuter Rail Council, etc.),
- Ad hoc groups created for a specific project,
- Abutting or nearby property owners,
- Civic associations,
- Business or economic development interests,
- Other interested parties,
- State legislators and congressional delegation.

In addition to satisfying legal requirements, public involvement is the principal mechanism for identifying stakeholders and their concerns. Early coordination improves the opportunity for meaningful consideration of issues and their efficient resolution. Encountering a significant concern late in the process is inherently problematic since modifications are more disruptive and expensive. To avoid this situation, initiate public outreach at the onset of the development of any proposed action, prior to conducting detailed analysis.

The extent of public outreach for each proposed action depends on the project's scope, location and other factors. A public involvement plan (PIP) should be developed and documented for each project in consideration of (minimum) requirements and needs. Again, Department publications outline relevant policies and guidance.

1.4 Environmental Considerations and Requirements

The protection and enhancement of environmental resources is a global pursuit. In the US, public support is reflected in an extensive body of State and federal laws, regulations, executive orders and policies that define our environmental goals and required actions. This section of the Guide introduces several of the more important and frequently occurring requirements. Exhibit 5 identifies environmental-related laws and regulations that are routinely encountered during project development, along with several information sources.

Environmental regulation of transportation projects is a very complicated subject. It is not practical to summarize or even identify all of the possible requirements under State and federal environmental laws. This section provides key highlights. Similarly, Exhibit 5 is sample rather than a comprehensive list of environmental requirements and guidance. The list of potentially relevant laws, regulations and executive orders is too extensive for inclusion in this Guide.

Exhibit 5. Common environmental laws, regulations and references.

	Title or Description	Citation
State	Environmental Protection	CGS 22a
	Water Resources, Flood and Erosion Control	CGS 25
	Endangered Species	CGS 26-303
	Air Quality Standards regulation	22a-174-1
	Connecticut Stormwater Quality Manual	
	Implementation of Policy Ex.O-29	
	OEP Office Processes and Procedures Manual	
Federal	National Environmental Policy Act	42 USC 4321
	Section 4(f)	23 USC 138
	National Historic Preservation Act	16 USC 470 et seq
	Endangered Species Act	16 USC 1531 - 1544
	Clean Water Act, Section 401	33 USC 1341
	Clean Water Act, Section 404	33 USC 1344
	Coastal Zone Management Act	16 USC 1451 et seq
	FAA NEPA Implementing Instructions	Order 5050.4B
	FHWA environmental regulation	23 CFR 771
	FHWA Section 4(f) regulation	23 CFR 774
	FHWA noise regulation	23 CFR 772
	FTA environmental regulation	49 CFR 662
	NHPA Section 106 Regulations	36 CFR 800
	FHWA Environmental Review Toolkit	

1.4.1 Overview

The term "environment" generally refers to the natural and physical surroundings. In some cases, economic and social conditions and setting are also included within the meaning of environment. The following are generally considered elements of the human environment:

- Air quality,
- Aquatic resources,
- Contaminated and hazardous material,
- Cultural (e.g., archeological, historic) resources,
- Fauna (i.e., animal life),
- Flora (i.e., plant life),
- Land use,
- Sound quality (i.e., noise), and
- Visual/viewshed.

The Department has a responsibility to consider the effects of its actions on the environment. All projects require an environmental review. The extent of analysis and documentation depends primarily on the value of the impacted resource(s) and intensity of the impact. Extensive analysis and documentation of avoidance and mitigation are required when a severe impact to a high-value resource is proposed. Limited documentation is required for projects with no or minor environmental impacts.

The core responsibility of the Department under various laws and regulations is to avoid environmental impacts whenever practicable. The following four-step process is a generally accepted approach to developing transportation projects in relation to environmental resources:

> **Identification:** Develop information on the location, limits and characteristics of environmental resources. Begin with research of secondary sources (e.g., archival data bases and mapping), including online materials. Conduct location/project investigations as the range of alternatives narrows.
>
> **Avoidance:** In developing alternatives, avoid impacts where practicable. In assessing practicality, consider the value of the resource and impact/avoidance consequences.
>
> **Impact assessment:** When avoidance is not practicable, assess and characterize the effect using accepted techniques and protocols corresponding to the resource(s).
>
> **Mitigation:** Identify and evaluate measures that reduce the negative effects. Mitigation measures vary by the type and value of the impacted resource.

For some projects, several iterations of this sequence may be necessary. For example, some resources (i.e., located below ground) are difficult to identify and may be discovered only after the completion of initial investigations. Additionally, impacts and avoidance are related to the configuration of specific alternatives. As alternatives evolve, the impact area and affected resources may also change, resulting in additional review.

Environmental reviews take place at several "levels". A high-level review is one that considers all relevant impacts. A focused review is an in-depth examination of one or more related impacts. The high-level and focused reviews often occur at different points in development but they should not be in conflict. High-level reviews often compare different alternatives using estimated impacts based on secondary information sources (e.g., mapping in lieu of field surveys). Using this information, an alternative may be selected that will be the subject of focused studies using detailed information (resource and impact) developed later in the design process. It's important that the information in the high-level review allow for a reasonably-accurate comparison.

The Connecticut Environmental Policy Act (CEPA) and National Environmental Policy Act (NEPA) are State and federal laws of similar purpose. All Department actions are subject to conformance with CEPA. Any actions taken by a federal agency also require compliance with NEPA. Therefore, NEPA compliance is required for all federally-funded projects. Additionally, other federal actions such as a federal permit or approval to modify an Interstate Highway point of access (interchange) also require compliance with NEPA, even absent federal funding.

When NEPA is applicable, the analysis and documentation may also be used to satisfy the requirements of CEPA. Even when NEPA is not applicable, CEPA requirements must be met. The CEPA and NEPA are high-level reviews as previously described. The requirements are primarily "process" related and compel consideration of environmental factors in government decisions. These laws do not establish an environmental resource value system, prohibit specific impacts or require particular outcomes or mitigation measures.

Impacts to certain specified resources (e.g., coastal areas, endangered species) require permits, findings, agreement, concurrence or another other form of documentation. Some of these actions take place in conjunction with the CEPA/NEPA process while others have a separate timeline. Permit applications often require very detailed information on the resource, impacts and mitigation, which is generally only available near the completion of final design.

The timing and sequencing of environmental processes, especially permits, often defines the critical path to construction.

1.4.2 Major Participants, Roles and Responsibilities

Environmental reviews and decisions are primarily the responsibility of State and federal agencies, with consideration of input from other government entities and the general public. Project impacts vary widely and therefore there is also a wide range in how external agencies affect the project development process. For complex projects with the potential for substantial impacts, many State and federal agencies may be involved in some capacity. For minor projects and intermediate projects, the necessary coordination with external agencies, which will be identified on the Environmental Review Form, may be limited. Some projects involve extensive coordination. The following summary identifies possible project-level agency coordination.

The NEPA regulations identify roles for "cooperating", "lead", and "sponsoring" agencies in the preparation of environmental documents. These roles are most pertinent to environmental impact statements (EIS) and do not apply to categorical exclusions. Section 1.4.4 outlines the various levels of NEPA documentation. All Department EISs have two or more "lead agencies" (i.e., "NEPA lead"), operating in a "joint lead" arrangement. The Department, as the direct recipient of federal funds and project sponsor, is required to serve as NEPA lead for its projects. Additionally, a federal agency must also serve as a NEPA lead. Typically, the federal funding agency (FAA, FHWA, FTA) fills that role. Other agencies may serve as joint NEPA leads. Examples are a

federal agency with permitting jurisdiction (e.g., US Army Corps of Engineers) or an MPO. Local governmental entities that are subrecipients of federal funds may, at the discretion of the Department and federal lead agency, serve as a joint lead agency but are not required. When a role or decision under NEPA is assigned to the lead agency, it should be made collaboratively by the joint lead agencies. The lead agencies are responsible for preparation of the NEPA documentation.

As a lead agency, project owner and initiator, the Department bears primary responsibility for advancing projects, including development of nearly all environmental-related documentation.

"Cooperating agency" is a status that may be assigned to an agency with regulatory jurisdiction or non-regulatory stewardship of specific environmental resources. An agency with jurisdiction by law over some environmental aspect of the project is designated as a cooperating agency by the lead agency. Other agencies, such as those with relevant expertise, may be invited by the lead agency to serve as cooperating agencies. The basic responsibilities of cooperating agencies are:

- Participation in the process at the earliest possible time;
- Participation in scoping;
- Upon request from the lead agency, develop information and prepare environmental analysis relevant to the cooperating agencies expertise; and
- Upon request from the lead agency, provide staff support to enhance the interdisciplinary capability of the lead agencies.

Involving these agencies in the NEPA (high-level environmental review) process reduces the possibility of not fulfilling a subsequent critical requirement (e.g., environmental permit). Designation as a "cooperating agency" does not mean an agency will necessarily agree or concur with the lead agencies.

"Participating agency" is a relatively new designation developed by USDOT in relation to the NEPA process. A local, regional, state, federal or tribal government agency with an interest in the project may, upon invitation, agree to serve as a participating agency. Potential roles for this group include participation in:

- Development of the purpose and need statement, range of alternatives, methodologies, and the level of detail for the analysis of alternatives;
- Identification of potential environmental or socioeconomic impacts at the earliest practicable time;
- Resolution of critical issues; and
- Scoping.

All cooperating agencies are participating agencies but not all participating agencies are cooperating agencies.

The public plays a critical role in project development and public involvement is discussed throughout this Guide. The Department has an obligation to engage the public in the development of transportation programs and projects, including environmental analysis. Additionally, regulatory agencies consider public comment in their decisions. Therefore, the public is an important stakeholder in project development, including the environmental analysis phase.

1.4.3 Common Categories of Impacts

The Department has a general responsibility to protect environmental resources. However, the construction, improvement and operation of transportation facilities cannot always be accomplished without some negative impacts. Attaining the proper balance between the societal benefits of efficient and safe transportation and the associated impacts is a responsibility of government, acting on behalf of its citizens.

CEPA and NEPA provide for general environmental protection and require that government actions consider environmental effects. Other laws, regulations and executive orders identify specific resources for special consideration and protection. These general and specific environmental stewardship roles correspond with the multi-level reviews discussed in Section 1.4.1. This section identifies several resource types that may be impacted by transportation projects.

Air quality: The federal government has established the National Ambient Air Quality Standards (NAAQS), which are concentrations of six specific "criteria pollutants" in outdoor air. The State has also adopted primary and secondary air quality standards through regulation. Transportation, along with many other factors, affects air quality. Understanding and managing the relationship between air quality and transportation projects is a challenge. An overview of several analysis techniques employed during planning, programming and project development are summarized in the following section.

Aquatic resources: Water is critical to sustaining the earth's ecosystems, including human life. Water, through floods, also poses a threat to society and development. Consequently, an array of State and federal laws has been enacted to control the effect of human activity on the earth's water resources. Activity within or affecting coastal areas, inland and tidal wetlands, flood plains, stream channels and water courses are subject to compliance with State and federal laws and executive orders. Erosion, sedimentation and diversions are also regulated. Compliance with applicable requirements requires detailed review and potential permits issued by State and federal regulatory agencies.

Endangered, threatened and special concern species: Without protection, certain animal and plant populations would become extinct. State and federal laws seek to conserve these species by reducing the loss of supportive ecosystems and habitat. All projects are screened based on a biological inventory database and project character (e.g., location and type of work). This initial review may be conclusive (i.e., little or no potential impact or need for further investigation) or

indicate the need for additional steps (e.g., agency coordination, investigation). When there is a potential for impacts to protected species, the detailed biological assessment and subsequent coordination is a critical consideration in the selection of an alternative and subsequent project development.

Hazardous and contaminated materials: When sites and structures contaminated with hazardous materials are encountered in projects, remediation may be required. The level of, and responsibility for, remediation is determined by the Department in consultation with federal and State regulatory agencies. Environmental Compliance investigations are conducted to determine the probable existence and nature of impacts.

Historic resources: The importance of preserving historic properties and resources is recognized by the State and federal governments. These two levels of government, sometimes with local participation, carry out a coordinated process of identifying, assessing and preserving historic properties. Several federal statutes and regulations come into play. Historic resources are identified from both secondary sources and site-specific reviews. A feature (e.g., structure, location) is normally considered historic if it is listed or eligible for listing in the National Register of Historic Places (NRHP). In addition to the resources previously known and identified, additional properties are sometimes discovered during project development. Specialized expertise and consultation is needed to determine if a feature should be treated as a historic resource. Effects to these resources require consideration under CEPA and NEPA. Additionally, when a project is funded by the USDOT (e.g., FHWA, FTA), the National Historic Preservation Act and another federal statute known as "Section 4(f)" are also applicable.

Public parks and recreation areas: Publicly-owned parks provide the opportunity for physical activity (e.g., athletics), other forms of recreation, relaxation, child development and social interaction. Parks and recreation areas are generally "undeveloped" (i.e., limited standing structures) and may be viewed as a favorable location for expanded transportation facilities. However, because of their social value public parks are specifically protected by Section 4(f), along with historic resources and wildlife and waterfowl refuges.

Sound: Noise is unwanted sound and can interfere with sleep, work or recreation. In extremes, noise may cause physical and psychological damage. Transportation, including highways, is a principal noise source. When the Department undertakes a "Type I" project (construction of a new highway or the physical alteration of an existing highway that significantly changes either the horizontal or vertical alignment or increases the number of through-traffic lanes) with FHWA-administered funds, a noise analysis is required.

Wildlife and waterfowl refuges: Sustaining biodiversity is a core goal of environmental preservation. Refuges provide habitat and controls on human

interference to animal populations. Wildlife and waterfowl refuges are protected by Section 4(f), along with public parks and historic resources.

This section introduces several common environmental resource impacts. For Department projects, potential impacts are identified by the OEP on the Environmental Review Form as "Environmental Concerns".

1.4.4 Environmental Review Processes

The terms "environmental approval" and "permits" are often used to indicate that some environmental-related process has been completed and the project can continue as proposed. These terms are often used imprecisely, if not inaccurately. Environmental review processes follow many different paths, involving decisions by several agencies. The agency roles and processes related to environmental impacts can be complicated. In some cases (e.g., traffic noise), there is a one-to-one correspondence between the impacted resource and review process. In other cases, several different processes are applicable to the same impact. For example, several different statutes (and review processes) are required when federal-aid funds are used to replace a historic bridge. In addition to NEPA, two separate federal laws, the National Historic Preservation Act (NHPA) and Section 4(f), each with specific requirements, would also apply. In some cases, the same resource is protected by State and federal statutes, with distinct requirements. A general understanding of the review processes is needed for effective project management.

This section summarizes several environmental review processes that project development teams are required to navigate. It is not comprehensive. Depending on the project, processes not identified here may be required. Further, the descriptions are not intended to be a set of instructions. This section introduces several common review processes and decision-makers that influence project development.

NEPA: The National Environmental Policy Act has been identified as "our basic national charter for protection of the environment". Most major and intermediate projects require compliance with NEPA because they involve federal funding and/or permitting decisions. Insomuch as NEPA (the basic statute) governs the entire federal executive branch, it is not very specific regarding any particular area of government action (e.g., transportation). A framework of regulations, policies and guidance has been created providing requirements, direction and guidance, with various levels of authority and detail. Many federal agencies, including FAA, FHWA and FTA, have developed NEPA-related requirements tailored specifically to their programs. Several of these references are identified in Exhibit 5. Many other non-regulatory publications and references, including web discussion groups, are also available.

Identifying the NEPA as a separate process or requirement (as this publication does) is potentially misleading. The NEPA requires, to the fullest extent possible, that federal laws, regulations and policies be interpreted and administered in accordance with its environmental protection goals. The NEPA also requires

federal agencies to use an interdisciplinary approach in planning and decision-making for any action that adversely impacts the environment. This reinforces the notion that NEPA (documentation and process) is often the overarching or "umbrella" mechanism used to capture many of the other requirements discussed under separate headings.

The three types of basic NEPA documentation are listed below:

- environmental impact statements (EIS),
- environmental assessment followed by a finding of no significant impact (EA/FONSI), and
- categorical exclusions (CATX).

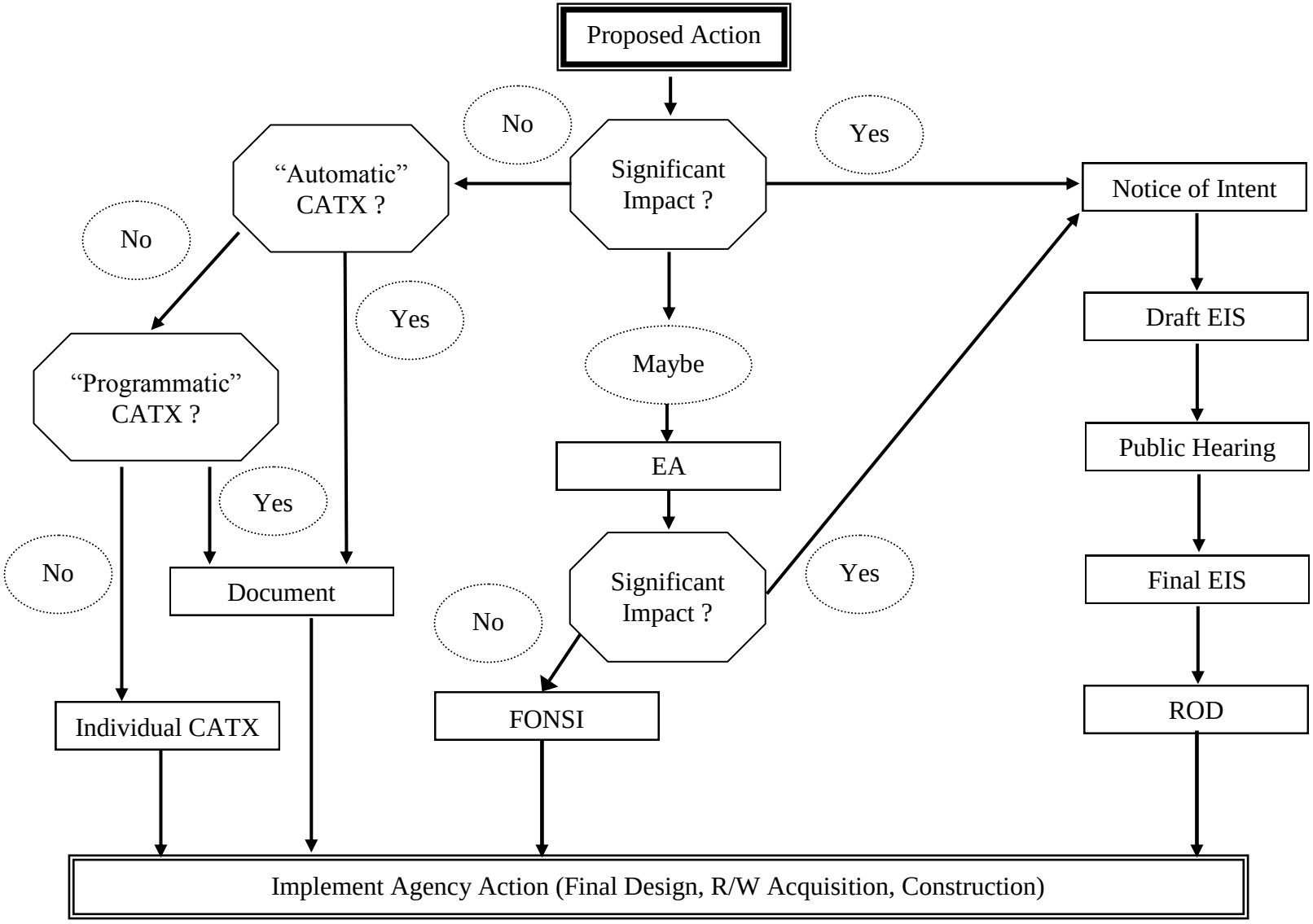
The NEPA documentation decision map is provided as Exhibit 6. As indicated, the decision of documentation type hinges on the probability of incurring a "significant impact". Categorical exclusion documentation is the simplest type and is prepared when it is clear there are no significant impacts. For Department projects, the Environmental Review Form prepared by the OEP recommends the documentation type. Most Department projects qualify as CATXs.

The project development process and NEPA are closely related, often inseparable. Both involve deliberative decision making as outlined in Section 1.3. The extent of agency coordination and public involvement vary substantially by project impacts, stakeholder interest and documentation type. Since some approvals (e.g., permits) often taken place after NEPA decisions and approvals (e.g., alternative selection), an ongoing dialogue with critical stakeholders is essential. Ultimately, the NEPA process is concluded by the lead agency(ies).

Some NEPA documentation (e.g., EIS, ROD, EA, FONSI, individual CATX) requires signature by the federal lead agency(ies) whereas others (e.g., automatic CATX, programmatic CATX) are administered entirely by the Department. When NEPA is applicable, completion of the evaluation is required for Design Approval.

CEPA: All Department projects must comply with the Connecticut Environmental Policy Act. When NEPA is also applicable, compliance with both laws can be attained with minimal additional process and documentation. Limited discussion of CEPA is provided here because of its similarity to NEPA and the limited number of CEPA-only documents (i.e., meet CEPA but not NEPA requirements) prepared by the Department. For information on this subject, reference the Office Processes and Procedures Manual prepared by the OEP. Under CEPA, the Department is the "sponsoring agency" which carries certain responsibilities defined by regulation and practice. Other oversight responsibilities are assigned to the Office of Policy and Management, a separate State agency. Completion of the CEPA evaluation is required for Design Approval.

Exhibit 6. NEPA documentation flow chart.



Air quality analysis: Air quality is affected by a multitude of transportation and non-transportation factors, including travel demand, modal distribution, fuel science, metrology and technology. Motorized vehicles impact air quality directly by emitting pollutants (e.g., carbon monoxide, particulates) and indirectly, when certain emissions (e.g., oxides of nitrogen, volatile organic compounds) react in the atmosphere to form a pollutant (e.g., ground-level ozone). After several decades of scientific research and legislation, a framework has evolved that regulates how transportation programs and projects are developed while attaining or maintaining suitable air quality. The complexity of the underlying science precludes an approach that is simple and effective, while still permitting economic expansion. The federal Clean Air Act, with its amendments, is the statutory backbone of air quality and vehicle emissions regulation. Regulations and various agency policies guide implementation. Projects are assessed at several levels, programmatically (as a component of the TIP, STIP) and individually (i.e. project level). In general terms, a State Implementation Plan (SIP) is developed by DEP that identifies how the Connecticut will attain and maintain air quality goals. Transportation plans and projects must "conform" to the SIP. Additionally, some projects also require other (mobile source air toxic) analysis. Numerous agencies are involved in air quality analysis and review ("conformity") including MPOs, the Department, Connecticut DEP, USDOT (FHWA, FTA) and US EPA. The processes are too complex to cover in this publication. The Environmental Review Form identifies the types of air quality analysis required and is based primarily on the air quality status of the location (e.g., attainment/nonattainment) and nature of project (i.e., potential effect on vehicle-miles-traveled).

Biological evaluations: The potential effect of a project on biological resources (i.e., animal and plant life) is a consideration in project development and is included within the scope of the CEPA/NEPA documentation. Additionally, under separate State and federal laws, special preservation efforts are required to conserve, protect, restore and enhance threatened and endangered species. The Connecticut DEP maintains the Natural Diversity Data Base. The information is based on years of accumulated sightings, field observations, archival records and specimens. Some of the pertinent information is mapped. An initial project screening is made by OEP to assess the probable impacts on habitat and known populations. The screening may be conclusive or indicate the need for additional evaluation and/or consultation with specified agencies to determine the effects of proposed projects on these species. Impacts are characterized through documented studies (e.g., Biological Evaluations, Biological Assessments) that serve as the basis for coordination with State (DEP) and federal (Fish and Wildlife Service) agencies. These studies are critical to the decisions made by other State (DOT, OPM) and federal agencies (USACOE, EPA, FHWA, FTA). Executive-level Department involvement is required. The selection of an alternative and mitigation measures reflect consideration of the evaluations.

Environmental Compliance: Potential and suspected contaminated sites in the vicinity of project locations (i.e., alternatives and existent facilities) are identified and investigated by the Environmental Compliance section. The initial step is a screening based on secondary information sources. Depending on the results, increasingly-specific evaluations (e.g., Task 110, 210, 310) may be conducted to identify and characterize the probability and level of contamination and corresponding remediation. When alternatives are under consideration, environmental compliance should be one of the factors considered in selection.

Section 4(f): This law applies to USDOT funded projects and protects three resources: land from publicly owned parks and recreational areas; wildlife and waterfowl refuges and historical sites. Except for a "*de minimis* impact", a protected property may only be used when:

- There is no feasible and prudent alternative to the use of land, and
- The action includes all possible planning to minimize harm to the property resulting from use.

A Section 4(f) Evaluation is the documented support for these determinations. (A *de minimis* impact does not require such an evaluation). Section 4(f) Evaluations are circulated to other agencies and comments are considered in the final decision. Section 4(f) evaluations are approved by the lead USDOT agency (i.e., FHWA or FTA). The Section 4(f) use is typically approved coincident with the final NEPA documentation (i.e., ROD, FONSI, CATX). The Office Processes and Procedures Manual (prepared by the Department's Bureau of Policy and Planning, Office of Environmental Planning) should be referenced. Section 4(f) approval is required for Design Approval.

Section 106: Section 106 of the National Historic Preservation Act of 1966 requires federal agencies to consider the effects of their undertakings on historic properties. The process proceeds in steps, beginning with the identification of historic properties in the area of potential effect. When historic properties are identified, effects are assessed, which can range from none to adverse. For "adverse effects", consultation is required to explore avoidance, minimization and mitigatation. Desirably, a Memorandum of Agreement (MOA) can be developed and executed governing how the project will proceed in relationship to the resource. The federal lead agency has a central role in the Section 106 process. "Consulting parties" also play an important role. The SHPO and Department are consulting parties and other entities may also serve in this role. The Advisory Council on Historic Preservation has national responsibility for Section 106 and may also become engaged in specific projects. The potential for parties disagreeing on an issue (e.g., eligibility, affect, mitigation) increases as the number of involved parties increases. Typically, the final NEPA documentation (i.e., ROD, FONSI, individual CATX) is approved after completion of the Section 106 review process and the results summarized in the NEPA documentation. An explanation of the many different scenarios and paths through the Section 106

process is beyond the scope of this publication and the Office Processes and Procedures Manual, prepared by the Department's Bureau of Policy and Planning, Office of Environmental Planning should be referenced for more specific guidance. It should also be understood, that NHPA Section 106 and Section 4(f) both protect historic resources. Yet meeting the requirements of one law does not automatically satisfy the other. Completion of the Section 106 process is required for Design Approval.

Section 401: Section 401 of the Clean Water Act requires that applicants seeking to discharge dredged or fill materials into waters of the US, obtain a certification or waiver from the state water pollution control agency (Connecticut DEP) that the discharge is consistent with the State (Connecticut Water Quality Standards) and federal (Clean Water Act) standards.

Section 404: Section 404 of the Clean Water Act authorizes the USACOE to regulate the discharge of dredged and fill material into waters of the US, including wetlands. Therefore, in a fashion similar to other potential resource impacts, the identification and evaluation of avoidance and mitigation measures should be integrated into project development, especially alternatives analysis. The USACOE issues two types of permits: general and individual. General permits apply to activities the USACOE has found to be similar in nature and cause minimal environmental impact, individually and cumulatively. Individual permits are required when the project does not meet the criteria for general permits. Individual permits require more extensive application materials and longer review times. Section 404 (Discharge of Dredge or Fill Material Into Water) permits are required prior to construction.

Inland Wetlands: An Inland Wetland and Watercourse permit is required for Department projects that involve operations within or use of a wetland or watercourse involving the removal or deposition of material, or any obstruction, construction, alteration or pollution of those resources (wetlands or watercourses). Again, the strategy of resource identification, avoidance and mitigation should be integrated into alternatives evaluation and selection. Inland Wetland Permits are issued by the Connecticut DEP and are required prior to construction.

Coastal Areas: Activities and projects affecting the State's coast are regulated through a set of related State and federal laws and regulations managed by the Connecticut DEP. A number of individual regulatory activities fall under this umbrella, including Tidal Wetlands Permits (required prior to work within tidal wetlands) and Structures and Dredging Permits (required prior to any work waterward of the high tide line in tidal, coastal or navigable waters, including dredging and the placement of structures or fill material). A Coastal Area Management Consistency Review is required in connection with permits and for certain other cases. All coastal area related permits should be obtained and reviews complete prior to construction.

Flood management: Department projects involving activity within or affecting a floodplain or impacting natural or man-made storm drainage facilities require certification that: the project is consistent with state standards and criteria for preventing flood hazards to human life, health or property and with the provisions of the National Flood Insurance Program and municipal floodplain regulations; does not adversely affect fish populations or fish passage; and does not promote intensive use and development of flood prone areas. This is known as a Flood Management Certification. The Connecticut DEP has general responsibility for flood management. The Department and DEP have developed arrangements wherein certain reviews are made by the Hydraulics and Drainage Unit in lieu of DEP. For all other cases, Flood Management Certificates must be submitted to DEP. Drainage Manual (Sections 2.6.5, 3.11.2) should be referenced for information when Flood Management Certification is needed and the appropriate procedures for a particular situation. Flood Management Certificates should be obtained prior to construction.

Stream channels: A Stream Channel Encroachment Line (SCEL) permit is required for the placement of encroachments and obstructions riverward of SCELs. About 270 linear miles of riverine floodplain SCELs have been established and mapped. The Department's Hydraulics and Drainage Section maintains a set of SCEL maps. Additional information is available in the Drainage Manual (Section 3.11.3). Permits are issued by the DEP and should be obtained prior to construction.

Stormwater: Activities impacting water quality are regulated by State and federal laws and regulations, including the National Pollutant Discharge Elimination System (NPDES), which is intended to restore, protect and maintain the quality of stream, lake and river water through control and regulation of point source pollutant discharges. Point sources are discrete conveyances such as pipes or man-made ditches. All construction projects disturbing more than a specified area (in acres) and all designated Municipal Separate Storm Sewer Systems (MS4s) are required to obtain and meet the requirements. The Connecticut Stormwater Quality Manual provides guidance for activities subject to regulation.

Noise: Noise impacts are evaluated in connection with CEPA. Additionally, when the Department undertakes a federal-aid highway project certain regulations, including the "Procedures for Abatement of Highway Traffic Noise and Construction Noise" apply. For a Type I projects (but not Type II), the Department is required to analyze expected traffic noise impacts and alternative noise abatement measures. When impacts are identified, consideration of specific abatement measures, including noise barriers, is mandatory. Reasonable and feasible measures must be included in the project. A preliminary assessment of traffic noise is required in the CEPA/NEPA documentation. A detailed analysis, if required, is completed in a time frame that permits the results to be integrated into the final plans. FHWA is responsible for administering the regulation.

Exhibit 7 elaborates on agency environmental review roles. As indicated previously, the environmental review processes summarized above are a sample, rather than a complete list of those that may be applicable. The environmental processes discussed provide some insight on the range of impacts subject to review and the roles of various State and federal agencies. To determine the environmental analysis and permitting requirements for a specific project, an Environmental Review Request should be completed and submitted to the Office of Environmental Planning. A template for this document is located in the ProjectWise Project Development folder.

The roles and responsibilities of various Department organizations (e.g., Environmental Planning, Engineering, Construction) with regard to permits are identified in the "Policy Concerning the Processing of Environmental Permits" (EX O-29). Additional information on specific activities and coordination is covered in Section 2.0.

Exhibit 7. Typical agency environmental activities and roles.

Organization		Typical Activities and Roles								
		CEPA	NEPA	Section 4(f)	Section 106	Air Quality	Aquatic	Biological	Coastal	Noise
State agency	CCEQ	4	14							
	DECD	3	14							
	DEP	3	13, 14	See 25		44	51	62	71	
	CCT (also see SHPO)	3	14							
	DPH	3	14							
	DOT	1	11	23	34	42	53	64	72	82
	OPM	2	14					61		
	SHPO (part of CCT)	3	14	See 24	32					
Federal agency	ACHP		14	See 26	33					
	USACOE		12, 13				52	66		
	DOA		14	28						
	DOI (also see FWS)		14	27						
	EPA		13, 14			44	54	66		
	FAA		11	21	31					
	FHWA, FTA		11	21	31	43		65		81
	FWS (part of DOI)		14					63		
	HUD		14	28						
Other	MPOs	3	12, 14			41				
	Municipalities	3	12, 14	See 25	35					
	Official with jurisdiction			22						

Exhibit 7. Typical agency environmental activities and roles (continued).

Activity		Description of typical agency activities and roles
CEPA	1	Sponsoring agency
	2	Reviews projects, selectively. Determines adequacy of EIE
	3	Reviews projects, selectively.
	4	Reviews projects, selectively. Publishes Environmental Monitor
NEPA	11	Lead agency
	12	Potential lead agency
	13	Potential cooperating agency. Reviews projects, selectively.
	14	Potential participating agency. Reviews projects, selectively.
Section 4(f)	21	Review/approve use
	22	As defined in regulation (23 CFR 774), including determination of resource significance and coordination (e.g., draft evaluation, *de minimis* impacts, constructive use determination) and concurrence with an exception.
	23	Prepare analysis
	24	"Official with jurisdiction" for historic properties.
	25	Potential "Official with jurisdiction" (e.g., municipal, state parks).
	26	Potential (under unique conditions) "Official with jurisdiction" for historic properties.
	27	Consulted (provided with opportunity for comment/coordination) prior to approval.
	28	Consulted (provided with opportunity for comment/coordination), as appropriate, prior to approval.

Exhibit 7. Typical agency environmental activities and roles (continued).

Activity		Description of typical agency activities and roles
Section 106	31	Lead federal agency
	32	Consulting party; assists lead federal agency comply with requirements, including consultation on public involvement, historic property identification, effect assessment and resolution of adverse effects; MOA signatory.
	33	Potential (under unique conditions) project involvement, including MOA signatory
	34	Primary preparer of documentation; potential consulting party
	35	Potential consulting party
Air Quality	41	Prepare TIP conformity determination in accordance with SIP
	42	Prepare conformity for projects not in TIPs; conduct hot spot analysis in CO and PM nonattainment and maintenance areas and project-level conformity, if required
	43	Conformity determinations
	44	Prepare SIP; review and approve conformity
	45	Approve SIP
Aquatic	51	Issue State Inland Wetland permit; certify Section 401 compliance and Flood Management, except reviews that have been delegated to the Department's Hydraulics and Drainage section
	52	Issue Section 404 permits
	53	Permit applicant and Flood Management reviews that have been delegated to the Department's Hydraulics and Drainage section
Biological	61	Makes decisions when agency action threatens continued existence of state-listed species
	62	Screening (if initial is inconclusive) and consultation of state-listed species
	63	Determine critical habitat of federal-listed species under Endangered Species Act
	64	Initial screening; prepare documentation if required
	65	Make decisions on basis of FWS determination
	66	If applicable, make decisions on basis of FWS determination

Exhibit 7. Typical agency environmental activities and roles (continued).

Activity		Description of typical agency activities and roles
Coastal	71	Issue State permits (Tidal Wetland, Structures and Dredging); administer Coastal Area Management program
	72	Permit applicant and prepare information for Coastal Area Management determination
Noise	81	Approve noise determinations (impact analysis and mitigation)
	82	Prepare noise studies and recommend mitigation

1.5 Project Development Phases and Project Categories

The concepts discussed in Section 1.3 apply to all projects but not uniformly. The practical implementation of those principles is highly dependent on the nature of the project. Every project has features that are both similar to other projects and those that are unique. Therefore, the development process and activities associated with each project also vary. The following factors have a significant impact on the project development process:

- Cost and funding source(s),
- Impacts (e.g., construction traffic, cultural resources, land use, natural resources, noise, right of way, travel/modal pattern, visual),
- Intensity of public interest,
- Scope and scale (i.e., addition of capacity, geotechnical measures, structural involvement),
- Railroad involvement, and
- Utility relocations.

Given these differences, no single project development process map or guideline would be appropriate for all cases. A process map for the most complex projects would be unnecessarily complicated for simple projects; guidance for simple projects would be incomplete and inadequate for complex projects. To address common situations at the appropriate level of completeness, guidance was developed for three categories of projects:

- Major,
- Intermediate, and
- Minor.

The detailed guidance in subsequent sections is based on these three project categories. It is also noted here that the term "major projects" has more than one meaning. FHWA defines major projects based entirely on cost. Projects meeting that definition are referred to as "FHWA High Cost Projects" in this guide. The term "major projects" as used are described subsequently in this section.

Exhibit 8 identifies the characteristics and examples of each category. The sole purpose of the project classification system is to create an efficient method for organizing the information in this Guide (i.e., to point the user toward the applicable information). A project's classification has no effect on the legal, regulatory or other substantive requirements (e.g., environmental, geometric criteria) associated with a project.

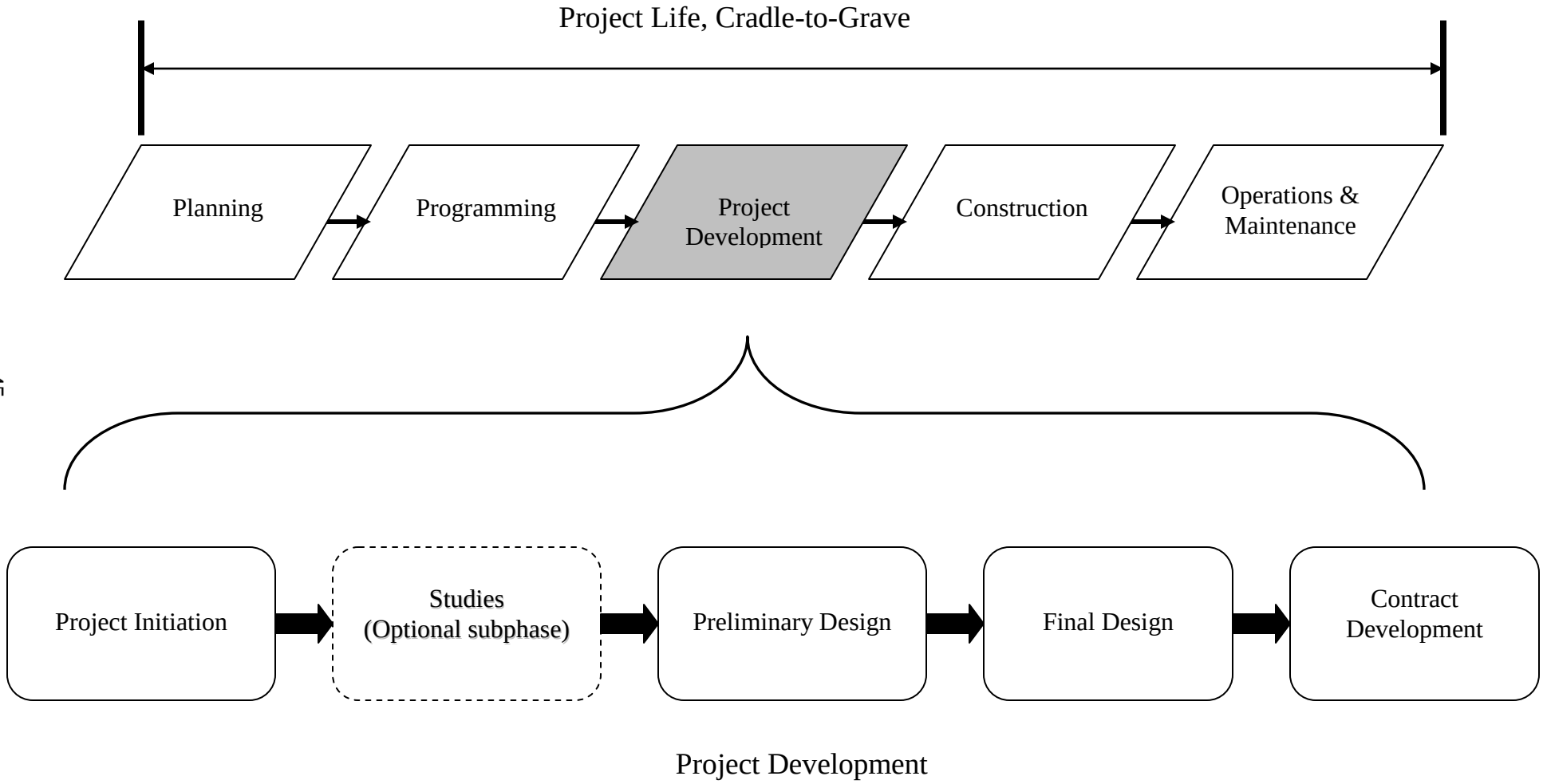
The life of a project, from inception through operational service, is shown schematically in Exhibit 9. The phases shown are typical for Department projects. As depicted, project development begins after programming and ends with the start of construction. In practice, phases often overlap. For example, funds are often programmed (i.e., for

construction) after project development is well underway. Nonetheless, Exhibit 9 is a useful framework for outlining the project development process.

Exhibit 8. Project categories.

	Minor	Intermediate	Major
Characteristics	Total cost ≤ $5 million No R/W (fee or easements) required No permits required No utility relocations or railroad involvement No/minor interference to traffic or access Does not alter geometry so as create a non-compliant controlling-criteria features Qualifies for Automatic or Programmatic CATX	Total cost ≤ $10 million Does not modify Interstate access Qualifies for CATX Does not add capacity (travel lanes)	All projects not classified as Minor or Intermediate
Examples	Bicycle facilities Bridge rehabilitation/repair * Culvert repair * Drainage pipe/structure replacement ITS expansion/enhancement Longitudinal barrier elimination and replacement Noise barrier repair Pedestrian facilities Pavement preservation Traffic control device (markings, signs, signals) installation and upgrade Widening lanes and shoulders * If scope does not require capacity analysis	Auxiliary lanes at intersections Bridge replacement (minor), including minor realignment of approaches Culvert (box and pipe) replacement Commuter parking Illumination Intersection signalization Intersection (minor) reconfiguration ITS New/replacement structures (e.g., retaining walls) Noise barrier installation Resurfacing or reconstruction with no added capacity Wetland replacement/ restoration	Bridge replacement (major) Interchange reconfiguration Intersection reconfiguration (major) New/extended highway New interchange Realignment Widening (addition of travel lanes or shoulders) All projects with potentially significant impacts

Exhibit 9. Project development, within project life.



1.5.1 Project Development Phases

Project development is a series of decisions that connect initiation to completion. Decisions are made in one of several phases discussed in this section. Each phase has a specific purpose. All projects culminating in Department-awarded contracts progress through all phases, except for the studies subphase, which is optional. The core purpose and individual activities associated with each phase are based on the concepts outlined in Section 1.3.

Project Initiation: The purpose of this phase is to commit resources (funds, personnel) and administrative mechanisms to a particular project. It is comprised of managerial and administrative activities and decisions. The actions can occur in relation to a "new" project (no previous studies, reports) or at another juncture (re-initiation, new phase, priority or major scope change).

Studies: These activities are a subphase of preliminary design. The studies subphase consists of intense analytic activities, sometimes in concert with public involvement and agency coordination. The subjects studied vary (e.g., corridor evaluation, resource screening, origin-destination data collection/modeling, demand forecasting, conceptual/functional design) depending on the project. Through these activities, information is generated to inform dialogue, build consensus and document early, critical decisions. Successfully resolving critical, potentially-controversial issues early is always advantageous.

The purpose of studies is to form a clear understanding and definition of the principal problem(s) and the range of reasonable alternatives. The studies subphase is optional. When projects begin with uncertainty or varied internal and external perspectives on project direction, purpose and scope, a studies subphase should be considered. Conversely, a studies subphase is not warranted if the problem definition and a consensus set of alternatives can be developed without significant analysis. Minor projects never involve a studies subphase. For other projects, the project manager determines if a studies subphase will be conducted.

Preliminary Design: The purpose(s) of this phase is to select (for intermediate and major projects) or refine (minor projects) the project scope. One or more alternatives are developed (e.g., rehabilitation strategy, geometric design, establish limits), assessed, leading to Design Approval for a single, defined design concept. The CEPA/NEPA evaluation is completed and an alternative is selected for implementation (i.e., final design, construction).

Final design activities are not permitted during the preliminary design phase. For FHWA-funded projects, the permissible limits of preliminary design activities are set forth in regulations (23 CFR 771.113, 23 CFR 636.103) and clarified by the FHWA Policy on Permissible Project Related Activities During the NEPA Process. Design Approval is required prior to beginning final design.

Final Design: The purpose of this phase is to fully develop the selected alternative and produce the completed Final Design Plan Submission. This phase consists of detailed design (e.g., geometric, geotechnical, hydraulic, structural, traffic control design) making provisions for utility adjustments, refining cost estimates and construction schedules, preparing applications and securing permits. Final design activities are not permitted before Design Approval.

Rights of ways, when required, are generally acquired during the final design phase, as a distinct but coordinated set of activities.

Contract Development: The purpose of this phase is to complete the engineering elements of the contract documents. During contract development, the Final Design Plan Submission is refined and augmented resulting in the production of the Plans, Specification and Estimate (PS&E) and other information needed to prepare for advertising the construction contract.

Detailed guidance on each phase is provided in Section 2.

1.5.2 Minor Projects

As indicated by Exhibit 8, these projects are characterized by lower cost and environmental impacts and the absence of utilities relocations and right of way requirements. They have less risk with respect to scope expansion, cost overrun and schedule delay.

The project development process for minor projects is depicted as Exhibit 10. The basic project concept is determined prior to preliminary design, eliminating the need for documented alternatives analysis by the designer. During preliminary design the project concept is refined and environmental (CEPA/NEPA) documentation prepared.

Since minor projects do not involve right of way acquisition, utility relocations or extensive environmental impacts, they can be developed and implemented (i.e., begin construction) much faster than intermediate and major projects.

1.5.3 Intermediate Projects

Intermediate projects may involve utility relocations, rights of way acquisition and environmental permits, each of which increases cost and schedule risk. The risks can be reduced by careful project planning. Project development teams are expected to utilize the principles in Section 1.3 to define the problem, analyze alternatives (including the risks of each) and ultimately select one for development. The systematic development and selection of an alternative and completion of the environmental analysis are principal preliminary design activities. Environmental documentation (e.g., CATX) is prepared for a single alternative. The project development process for intermediate projects is depicted as Exhibit 11.

Intermediate projects typically require more development time than minor projects. With broader scopes, these projects will elicit more Department review comments and generate greater stakeholder (e.g., local officials, public) interest.

1.5.4 Major Projects

These most-complicated undertakings often involve high and uncertain cost, conflicted public sentiment, impacts to various environmental resources and numerous potential solutions. Extensive procedural requirements may also apply. Nonetheless, project teams are expected to attain results while completing mandated processes and outcomes. Exhibit 8 identifies typical characteristics of major projects.

Establishing and maintaining progress requires a clear understanding of relevant background. Information is obtained from a combination of existing databases (e.g., accident records), archival sources and modeling. The optional studies subphase, as discussed in Section 1.5.1, should be considered. When utilized, studies are a subphase of the preliminary design phase. When a studies subphase is not conducted, the problem definition and preliminary alternatives analysis are folded into the preliminary design phase.

For major projects, several decisions during the studies/preliminary design phase (e.g., defining purpose and need, alternatives selected for detailed evaluation) set the general direction. After development is advanced into alternatives analysis, changes in direction come at a high price. Project teams are well served by soliciting input and building consensus for significant decisions. Outreach, agency coordination and public involvement activities should be employed to establish and maintain engagement with the public and organizations with approval roles (agencies, municipalities).

Nearly all major projects require NEPA compliance because of the necessity for federal actions (e.g., funding, permits). As indicated by Exhibit 12, the documentation may be an individual CATX, environmental assessment (EA) or environmental impact statement (EIS), depending on the nature (or absence) of impacts. The type of NEPA documentation influences the range the alternatives that are evaluated and how a single alternative is selected for implementation. When preparing EAs and EISs, a preferred alternative is designated, a step that is not required/taken when preparing CATX documentation. An EIS must evaluate all reasonable alternatives and the selection is made in the Record of Decision, and not before. Alternatively, if the Department favors an alternative that qualifies as a CATX, the NEPA documentation can be assembled for that (single) alternative only. Therefore, the specific preliminary design steps vary by NEPA documentation type and project category. These differences are identified in Exhibit 13 and detailed in Exhibits 16 – 21.

The FHWA uses the term “Major Projects” to denote high-cost projects to which there are special requirements and procedures. In this publication, these projects are referred to as “FHWA High Cost Projects”. All FHWA High Cost projects are also major projects.

Exhibit 10. Schematic for development of minor projects.

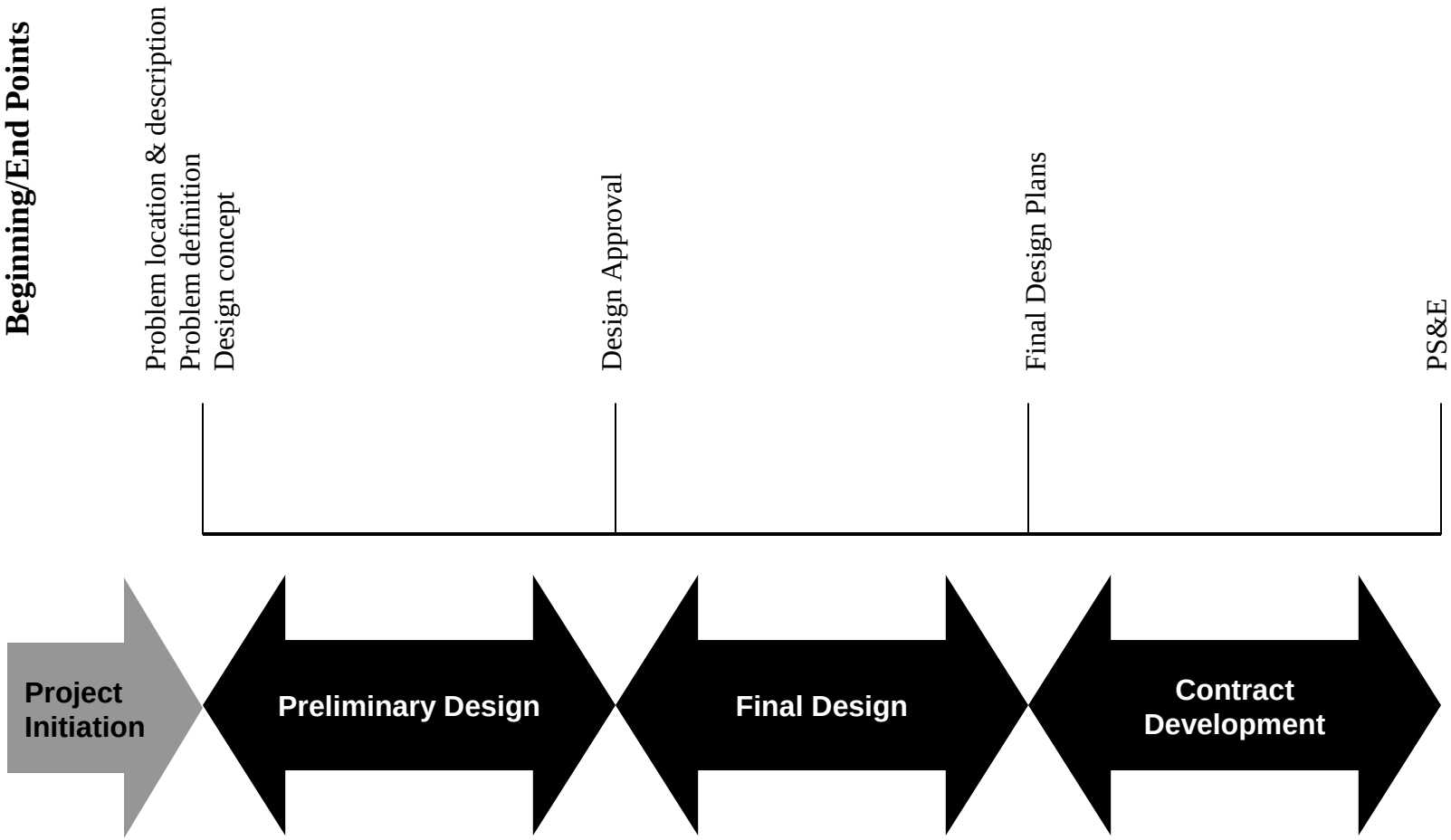
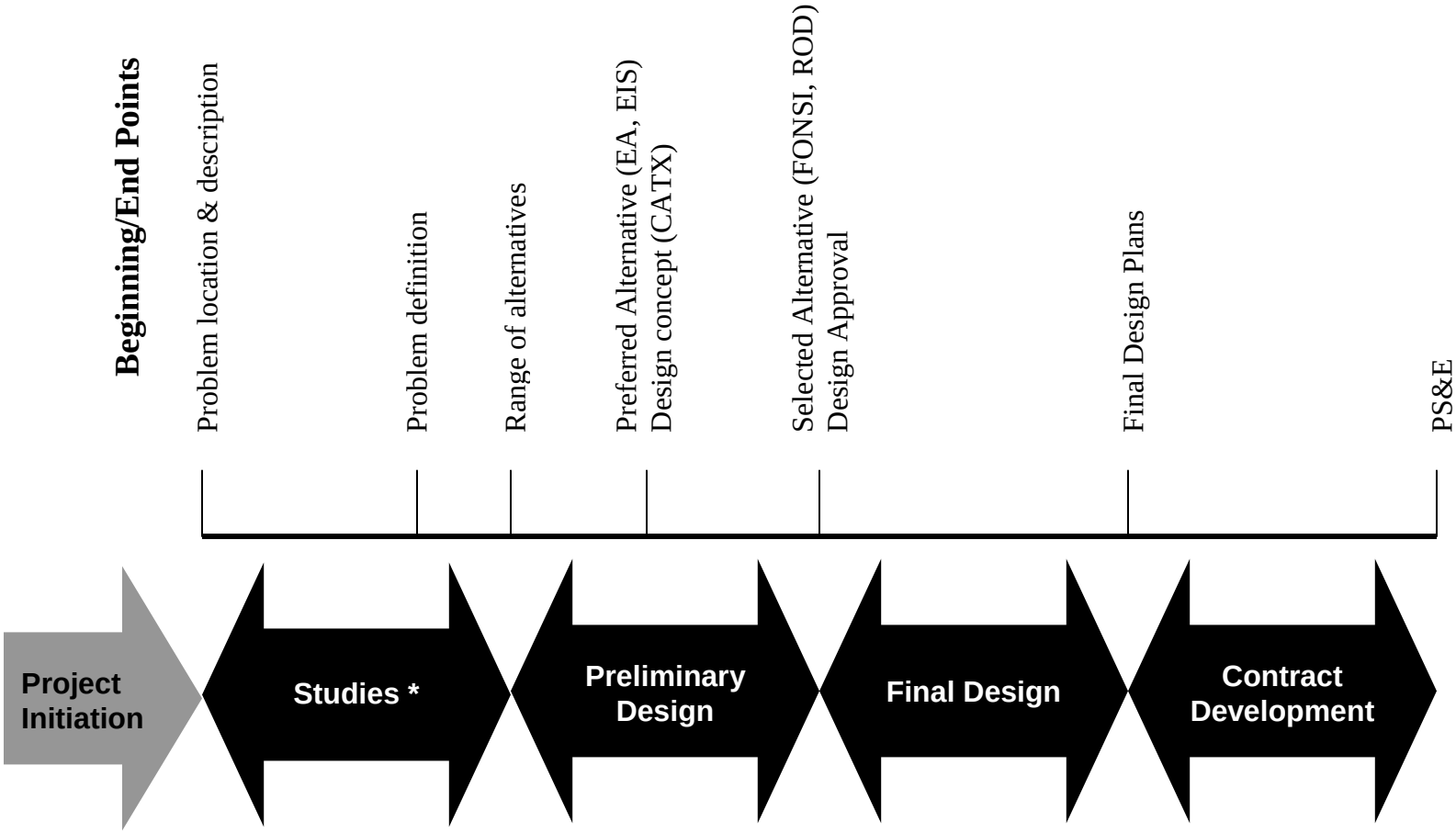


Exhibit 11. Schematic for development of intermediate projects.

Exhibit 12. Schematic for development of major projects.



* The Studies subphase is optional

2.0 DETAILED PROCESS GUIDANCE

Section 2 provides detailed guidance for implementing the concepts outlined in Section 1 and delivering the outcomes listed in Sections 3 and 4. It begins (Section 2.1) with a discussion of project development cost which is a subject relevant to every project, regardless of scope or design organization. Sections 2.2 and 2.3 provide information on the various activities that typically take place during project development. The activities vary by project, as a reflection of the project characteristics. The required activities depend on the technical scope, environmental impacts, right of way requirements and utility and railroad involvement. These variables are reflected in the project classification. To an extent, the activities also depend on whether a State unit or consultant serves as the designer.

It is not practical to address all the possible combinations of project development activities. Typical activity patterns for several types of projects are identified in Section 2.2. Section 2.3 is a catalog of all activities, listing and describing each activity under major phase headings.

2.1 Project Development Cost

Cost estimation and control are key project management functions. The total cost of delivering a project includes preconstruction development (e.g., design and rights of way) and implementation (construction). The total cost is determined primarily by decisions made during project development, although construction-phase decisions can have significant cost implications. Cost estimates are developed prior to project initiation and refined or revised in advance of or during subsequent phases. Estimated costs serve as the basis for critical decisions, including project selection, schedule and funding source. Cost effectiveness cannot be achieved through any single action, plan or product. Cost is a factor in, and therefore controlled through, virtually every managerial decision (e.g., scope, specific features) and action (e.g., personnel assignments). CORE-CT is an information system that can be used to monitor and, to an extent, facilitate project cost control. Scope and technical decisions are the responsibility of managers and project managers and not controlled by CORE-CT. Project managers and project engineers should use CORE-CT to extract cost information (e.g., Department labor, vendor payments) and exercise project cost control.

Preliminary Estimates: Project development cost estimates are used for various purposes, such as capital budgeting, programming and fee negotiation. Ideally, all cost estimates should be accurate; however, some estimates are more reliable than others. Initial engineering estimates are usually developed long before the scope of construction and its ramifications (e.g., utility relocations, mitigation) are fully known. Practical challenges notwithstanding, preliminary estimates are required for programming and other purposes. Often, this need is met with a "top down" estimate, wherein the preconstruction development cost is approximated as a percent of the estimated construction cost. Exhibit 13 is an example of percentages that may be used to estimate engineering cost for programming purposes. The percentages are derived from the cost

of completed design projects and corresponding construction award amounts (i.e., *not* preliminary estimates of engineering and construction).

Exhibit 13. Example of percentages used to develop engineering cost for programming purposes.

Estimated construction cost	Engineering cost (% of construction)
< $1 million	15 – 35
$1 - $2 million	12 – 30
$2 - $5 million	10 - 18
$5 – $15 million	8 - 15
> $20 million	5 - 12

The low end of the range is typically associated with projects involving only simple replacement or repair of existing transportation infrastructure, such as pavement restoration, guiderail, sign and signal replacement, bridge deck repairs and bridge joint and bearing replacements. Factors tending to cause disproportionate increases in project development cost (i.e., higher end of % range) are: realignment, reconfiguration and widening, impacts to aquatic (wetlands, watercourses) and archeological resources, utility relocations, rights of way acquisition, intense roadside development and public controversy. Each complicating factor increases cost (i.e., raises the engineering cost as a percent of construction). Lead units (e.g., State Highway Design, State Bridge Design) have developed and periodically refine engineering cost estimating tools for common project categories under their management.

Programming (top down) estimates are developed early in project development, in the absence of information about project scope, scale and impacts. For several reasons, these estimates are often inaccurate. A major shortcoming of this approach is the use of a preliminary construction cost estimate as the base (i. e., amount the percent is applied to). Construction costs cannot be reliably estimated prior to engineering design, so using these suspect estimates as the base for engineering estimates significantly diminishes the expected accuracy.

Final (Detailed) Estimates: Programming estimates are developed early in project development and are not sufficient for some purposes (e.g., Project Memoranda, fee negotiation). A reasonably-accurate engineering cost estimate requires knowledge of the specific activities and products required. A "bottom up" estimate is one developed by accumulating the individual cost elements comprising the overall preconstruction development process. Exhibit 14 is a sample worksheet used to develop a bottom up engineering cost estimate. The individual elements represent the costs of specific

Exhibit 14. Sample engineering cost worksheet.

PRELIMINARY ENGINEERING (PE) ESTIMATE				
Rev. Date:			DATE:	
Project No.	Description:		PDU Engineer:	
Funding			Design Unit Engr.:	
Town(s):				
TOWN/CONSULTANT ENGINEERING			Est. Amount	Totals
Surveys		Field Survey	completed	
		Borings		
Design		Highway Design		
		Traffic Engineering		
		Bridge/Structural Design		
		Hydraulic Analysis/Drainage Design		
		Permit Preparation/Environmental		
TOWN/CONSULTANT PE SUBTOTAL				
ConnDOT DESIGN/REVIEW	Dept ID #		Est. Amount	Totals
Consultant Designer				
Rights of Way		ROW Administration Office		
		Titles		
Central Surveys		Review/Coordination/Property Maps		
District Surveys		Survey/Test Pits		
		Contract Development		
Environmental Compliance		Hazardous/Contam. Mat'l. Investigation		
		Environmental Compliance Consultant		
Structures and Bridges		Consultant Bridge Liaison		
		Bridge/Structural Design		
		Bridge Safety & Evaluation		
Highway Design		Local Roads		
		Consultant Highway Liaison		
		Highway Design		
External Audits		External Audit Unit		
Design Services		Utility Section		
		Hydraulics & Drainage		
		Soils & Foundations		
		Pavement Management		
		Design Development Unit		
		Contract Development		
		Engineering by Utility Companies		
Division of Traffic		Traffic Engineering and Review (All Units)		
Construction		District Construction Office Reviews		
		Office of Construction Reviews		
Environmental Planning		Envr. Reviews/Documents/Permit Coord.		
Office of Maintenance		Highway Maintenance		
		Bridge Maintenance		
ConnDOT PE SUBTOTAL				
TOTAL PE ESTIMATE				
CONTINGENCIES				
TOTAL AMOUNT OF PE PHASE				

design activities, including Department support units. For each element (i.e., worksheet row), a short narrative should be developed and retained in the project file describing the activities, products and corresponding personnel requirement, in staff hours by classification (e.g., project engineer, TE2).

"Direct payroll" cost (e.g., hourly rate of compensation) alone should never be used as the estimated cost of an activity. The actual cost (and amount that will ultimately be charged against the project) includes a share of the costs all organizations (i.e., Department units, consultants, municipalities, utilities) incur to employ personnel and carry out business.

To account for these other costs (e.g., employee medical insurance, training, holiday and vacation pay), a "multiplier" is applied to the direct payroll amount. Multipliers vary by organization, reflecting the permissible types and actual costs incurred by a specific organization. Multipliers are determined by an audit of actual expenditures. The appropriate multiplier value or a reasonable estimate should be obtained for each organization. The Department's multiplier (Payroll Additive and Fringe Benefit Rates) is determined and disseminated annually, normally in July. The multiplier for consulting engineers is known as the "Burden, Fringe and Overhead" (BFO) factor and is developed for each consultant. Use actual (audit-based) multiplier values when available or a reasonable estimate when the actual value cannot be determined (check with the Agreements unit). The consultant lump sum fee example indicates how the BFO is applied and the overall amount computed.

To prepare a detailed engineering cost estimate, the lead unit's project manager should:

- Identify and, where practical, describe tasks,
- Develop staff time estimates for tasks within knowledge base,
- Request input (description, time) from support units for other tasks,
- Convert task staff time estimates to cost, using appropriate multipliers,
- Estimate direct expenses,
- Compute a total cost from the cost elements and a contingency, and
- Review the total estimated cost for reasonableness.

Compare bottom-up and top-down estimates as part of the last item (review for reasonableness), Use this comparison as a "reality check" rather than the basis for any specific conclusion on the detailed (i.e., bottom up) estimate.

For most projects, a cost estimate for the entire development process (i.e., through PS&E) is prepared prior to initiation. Typically, approximately 20 – 30% of the total design cost is expended to reach Design Approval. Whenever a modification or new-phase authorization (e.g., final design) is prepared, the cost to complete is revisited and, when necessary, an updated estimate is prepared.

2.2 Typical Activities, By Phase

In this section, typical activity patterns are identified for various phases, based on project category and other characteristics. Project phases have fairly distinctive beginning and end points, as outlined in Section 1.5. The project classification system is a mechanism employed to help identify the requirements and activities applicable to a particular project. It is important to note that the project attributes and requirements determine the project classification and applicable activities, not the reverse (i.e., project classification does not define the required activities). Project delivery cannot be "streamlined" by using an inappropriate project classification.

This section tabulates typical activity patterns. In Exhibit 15, several common situations are identified. For each situation, typical activity patterns for a specified phase are provided at the locations indicated by the exhibit. Additional information on individual activities is available in Section 2.3.

Exhibit 15. Typical activity patterns, by project phase and type.

Phase	Project Characteristics	Guidance	
		Exhibit	Section
Project Initiation	All categories, consultant-design	16	2.2.1
	All categories, State-designed	17	
Preliminary Design (without Studies)	Minor	18	2.2.2
	Intermediate	19	
	Major, CATX	20	
	Major, EA or EIS	21	
Preliminary Design (with Studies)	Major, CATX	22	2.2.3
	Major, EA or EIS	23	
Final Design	Minor	24	2.2.4
	Intermediate and major	25	
Contract Development	Minor	26	2.2.5
	Intermediate and major	27	

Project initiation activities depend primarily on whether the lead design unit is a Department unit (State design) or a consultant. Following project initiation, activity patterns depend primarily on project category (scope and impacts). The preliminary design phase varies substantially depending on project classification. Conversely, the contract development phase is conceptually similar for all projects. Final design has an intermediate level of variability.

In the next section, "typical" project activity patterns are identified. However, each project is unique and many situations require modification of these typical patterns. *Review and adaptation of the detailed activity guidance is required*. The project manager should assemble a plan for each phase of each project.

2.2.1 Typical Project Initiation Phase

As previous noted, project initiation is primarily a series of administrative and management activities and decisions. There are two general patterns of activities, one for consultant-designed projects and another for projects designed by State forces. These patterns are represented by Exhibits 16 and 17, respectively.

Exhibit 16. Typical project initiation activities, consultant-designed projects.

Number	Description
002	Designate Lead Division and Project Manager
004	Determine Consultant/State Roles
006	Identify Special Requirements
008	Establish DBE/SBE Engineering Goal
010	Obtain Approval to Retain a Consultant
012	Establish Schedule
014	Prepare Project Description and Location Map
016	Solicit and Evaluate Proposals, Select Consultant
018	Notify Responding Consultants of Selection or Non-Selection
020	Hold Assignment Meeting
022	Prepare Consultant Scope of Services
024	Prepare Independent Price Proposals
026	Negotiate Consultant Fee
028	Prepare/Execute Consultant Agreement
030	Determine Federal/State Oversight Roles
032	Assess/Adjust Administrative and Fiscal Status

Exhibit 17. Typical project initiation activities, State-designed projects.

Number	Description
002	Designate Lead Division and Project Manager
004	Determine Consultant/State Roles
006	Identify Special Requirements
012	Establish Schedule
014	Prepare Project Description and Location Map
030	Determine Federal/State Oversight Roles
032	Assess/Adjust Administrative and Fiscal Status

2.2.2 Typical Preliminary Design Phase (Without Studies)

Only preliminary engineering activities should be carried out prior to Design Approval. This section outlines typical activities when no separate "studies" phase is performed. Exhibits 18 – 21 are typical activity patterns for various project categories and environmental documentation.

Exhibit 18. Typical preliminary design activities, minor projects (no studies).

Number	Description
200	Authorize Initial Phase
202	Review Background
204	Conduct Field Review
206	Initiate Survey
208	Update/Focus Traffic Data and Characteristics
210	Assess Traffic Capacity and Flow
212	Obtain and Analyze Accident History
214	Obtain and Evaluate Plans for Other Area Projects
216	Develop Public Involvement Plan
218	Execute Public Involvement Plan Elements
226	Inventory/Confirm Key Context Features and Characteristics
228	Identify Critical Controls
230	Establish Design Classifications and Criteria
232	Define Project Limits
234	Complete Bicycle and Pedestrian Assessment and Incorporate Conclusions
246	Assess Need for New or Revised Interstate Access
250	Evaluate Hydraulic Crossings and Floodplain Impacts
252	Request/Receive Environmental Review
254	Conclude Determination of "Effect" on Historic Resources
256	Identify/Resolve Environmental Issues
258	Request/Receive Hazardous/Contaminated Materials Screening
260	Conduct Scope Review
264	Prepare Typical Sections, Including Roadside and Barriers
266	Recommend ADA-Related Measures
408	Identify Additional Design Features
410	Prepare 1"= 40' Plans and Profiles
418	Design Pavement Section(s)
420	Evaluate Illumination Needs and Develop Recommendations
422	Determine Need/Locations of Structure-Mounted Illumination
436	Execute Approved Pilot Boring Plan (if Applicable)
438	Identify Sign Support Structures (Bridge-Supported & Sign-Only Structures)
440	Prepare Subsurface Exploration Program
442	Prepare/Deliver Condition Survey and Rehabilitation Study(ies)
446	Prepare Preliminary Staging and Maintenance and Protection of Traffic Concepts
448	Begin Transportation Management Plan Development

Exhibit 18. Typical preliminary design activities, minor projects (no studies).

Number	Description
450	Develop Preliminary Signing Plan
454	Obtain Hydraulic Engineer Approval (if Applicable)
456	Obtain Approval for Hydraulics/Drainage Programs to Be Used (if Applicable)
462	Investigate and Confirm Major Drainage Areas
464	Determine Design Information for Structures Draining > 1 Square Mile
466	Develop Conceptual Drainage Plan
468	Analyze Adequacy of Existing Drainage Systems under Proposed Conditions
470	Develop Erosion and Sedimentation Control Plan
472	Review/Update Environmental Requirements and Commitments
476	Estimate/Update Project Cost
478	Prepare Preliminary Design Report
480	Deliver Preliminary Design Submission
482	Distribute Preliminary Design Submission for Review/Comments
484	Compile Written Comments on Preliminary Design Submission
486	Schedule and Conduct Town Road Meeting
488	Schedule and Conduct Preliminary Design Review Meeting
498	Request/Receive CATX Documentation Approval
500	Evaluate Consistency with Environmental Document and Commitments
502	Request/Receive Design Approval
504	Assess/Adjust Administrative and Fiscal Status
506	Request/Obtain Consultant Supplemental Agreement (if Required)

Exhibit 19. Typical preliminary design activities, intermediate projects (no studies).

Number	Description
200	Authorize Initial Phase
202	Review Background
204	Conduct Field Review
206	Initiate Survey
208	Update/Focus Traffic Data and Characteristics
210	Assess Traffic Capacity and Flow
212	Obtain and Analyze Accident History
214	Obtain and Evaluate Plans for Other Area Projects
216	Develop Public Involvement Plan
218	Execute Public Involvement Plan Elements
222	Define Problem/Need(s) and Evaluation Framework
224	Identify Conceptual Solutions
226	Inventory/Confirm Key Context Features and Characteristics
228	Identify Critical Controls
230	Establish Design Classifications and Criteria
234	Complete Bicycle and Pedestrian Assessment and Incorporate Conclusions
236	Investigate Structure Crossing Options
238	Evaluate Conceptual Solutions
240	Select Potentially-Viable Alternative(s) for Further Evaluation
246	Assess Need for New or Revised Interstate Access
250	Evaluate Hydraulic Crossings and Floodplain Impacts
252	Request/Receive Environmental Review
254	Conclude Determination of "Effect" on Historic Resources
256	Identify/Resolve Environmental Issues
258	Request/Receive Hazardous/Contaminated Materials Screening
264	Prepare Typical Sections, Including Roadside and Barriers
266	Recommend ADA-Related Measures
268	Prepare Preliminary Plans and Profiles
280	Select Alternative(s) for Detailed Evaluation
284	Complete Environmental Impact Analyses
286	Prepare Overall Alternatives Analysis/Comparison
304	Identify Design Concept
306	Document Environmental and Community Commitments
402	Update Public Involvement Plan
404	Refine Typical Sections, Including Roadsides and Barriers
406	Recommend Intersection Control Types
408	Identify Additional Design Features
410	Prepare 1”= 40’ Plans and Profiles
412	Identify Preliminary Property Rights Needs
416	Screen for Utilities and Initiate Coordination
418	Design Pavement Section(s)
420	Evaluate Illumination Needs and Develop Recommendations

Exhibit 19 (continued). Typical preliminary design activities, intermediate projects (no studies).

Number	Description
422	Determine Need/Locations of Structure-Mounted Illumination
424	Identify Potential Railroad Involvement
426	Initiate Coordination and Railroad/Highway Agreement (if Applicable)
428	Prepare/Execute Railroad/Highway Agreement for Preliminary Engineering (if Applicable)
430	Schedule and Conduct Railroad Meeting (if Applicable)
432	Obtain Approval of Railroad Clearances (if Applicable)
434	Determine Navigation Clearance Requirements (if Applicable)
436	Execute Approved Pilot Boring Plan (if Applicable)
438	Identify Sign Support Structures (Bridge-Supported & Sign-Only Structures)
440	Prepare Subsurface Exploration Program
442	Prepare/Deliver Condition Survey and Rehabilitation Study(ies)
444	Prepare/Deliver Structure Type Study(ies)
446	Prepare Preliminary Staging and Maintenance and Protection of Traffic Concepts
448	Begin Transportation Management Plan Development
450	Develop Preliminary Signing Plan
452	Delineate and Map Wetlands
454	Obtain Hydraulic Engineer Approval (if Applicable)
456	Obtain Approval for Hydraulics/Drainage Programs to Be Used (if Applicable)
458	Identify Floodways, Floodplains, Stream Channel Encroachment Lines and Watercourses
460	Meet with DEP Fish Biologist and Determine Fish Passage Locations
462	Investigate and Confirm Major Drainage Areas
464	Determine Design Information for Structures Draining > 1 Square Mile
466	Develop Conceptual Drainage Plan
468	Analyze Adequacy of Existing Drainage Systems under Proposed Conditions
470	Develop Erosion and Sedimentation Control Plan
472	Review/Update Environmental Requirements and Commitments
474	Prepare Preliminary Schedule of Property Owners and Mylar Base
476	Estimate/Update Project Cost
478	Prepare Preliminary Design Report
480	Deliver Preliminary Design Submission
482	Distribute Preliminary Design Submission for Review/Comments
484	Compile Written Comments on Preliminary Design Submission
486	Schedule and Conduct Town Road Meeting
488	Schedule and Conduct Preliminary Design Review Meeting
490	Submit Structures Studies for Review/Approval
492	Schedule and Conduct Design/Right-of-Way Meeting
494	Prepare Title Search
496	Develop Design Exception Documentation
498	Request/Receive CATX Documentation Approval
500	Evaluate Consistency with Environmental Document and Commitments
502	Request/Receive Design Approval
504	Assess/Adjust Administrative and Fiscal Status
506	Request/Obtain Consultant Supplemental Agreement (if Required)

Exhibit 20. Typical preliminary design activities, major projects, CATX (no studies).

Number	Description
200	Authorize Initial Phase
202	Review Background
204	Conduct Field Review
206	Initiate Survey
208	Update/Focus Traffic Data and Characteristics
210	Assess Traffic Capacity and Flow
212	Obtain and Analyze Accident History
214	Obtain and Evaluate Plans for Other Area Projects
216	Develop Public Involvement Plan
218	Execute Public Involvement Plan Elements
222	Define Problem/Need(s) and Evaluation Framework
224	Identify Conceptual Solutions
226	Inventory/Confirm Key Context Features and Characteristics
228	Identify Critical Controls
230	Establish Design Classifications and Criteria
234	Complete Bicycle and Pedestrian Assessment and Incorporate Conclusions
236	Investigate Structure Crossing Options
238	Evaluate Conceptual Solutions
240	Select Potentially-Viable Alternative(s) for Further Evaluation
246	Assess Need for New or Revised Interstate Access
248	Study Interchange Configurations
250	Evaluate Hydraulic Crossings and Floodplain Impacts
252	Request/Receive Environmental Review
254	Conclude Determination of "Effect" on Historic Resources
256	Identify/Resolve Environmental Issues
258	Request/Receive Hazardous/Contaminated Materials Screening
264	Prepare Typical Sections, Including Roadside and Barriers
266	Recommend ADA-Related Measures
268	Prepare Preliminary Plans and Profiles
280	Select Alternative(s) for Detailed Evaluation
282	Update Public Involvement Plan
284	Complete Environmental Impact Analyses
286	Prepare Overall Alternatives Analysis/Comparison
304	Identify Design Concept
306	Document Environmental and Community Commitments
308	Assess/Adjust Administrative and Fiscal Status
402	Update Public Involvement Plan
404	Refine Typical Sections, Including Roadsides and Barriers
406	Recommend Intersection Control Types
408	Identify Additional Design Features
410	Prepare 1”= 40’ Plans and Profiles
412	Identify Preliminary Property Rights Needs
414	Prepare/Submit Request for New or Modified Interstate Access (if Required)
416	Screen for Utilities and Initiate Coordination

Exhibit 20 (continued). Typical preliminary design activities, major projects, CATX (no studies).

Number	Description
418	Design Pavement Section(s)
420	Evaluate Illumination Needs and Develop Recommendations
422	Determine Need/Locations of Structure-Mounted Illumination
424	Identify Potential Railroad Involvement
426	Initiate Coordination and Railroad/Highway Agreement (if Applicable)
428	Prepare/Execute Railroad/Highway Agreement for Preliminary Engineering (if Applicable)
430	Schedule and Conduct Railroad Meeting (if Applicable)
432	Obtain Approval of Railroad Clearances (if Applicable)
434	Determine Navigation Clearance Requirements (if Applicable)
436	Execute Approved Pilot Boring Plan (if Applicable)
438	Identify Sign Support Structures (Bridge-Supported & Sign-Only Structures)
440	Prepare Subsurface Exploration Program
442	Prepare/Deliver Condition Survey and Rehabilitation Study(ies)
444	Prepare/Deliver Structure Type Study(ies)
446	Prepare Preliminary Staging and Maintenance and Protection of Traffic Concepts
448	Begin Transportation Management Plan Development
450	Develop Preliminary Signing Plan
452	Delineate and Map Wetlands
454	Obtain Hydraulic Engineer Approval (if Applicable)
456	Obtain Approval for Hydraulics/Drainage Programs to Be Used (if Applicable)
458	Identify Floodways, Floodplains, Stream Channel Encroachment Lines and Watercourses
460	Meet with DEP Fish Biologist and Determine Fish Passage Locations
462	Investigate and Confirm Major Drainage Areas
464	Determine Design Information for Structures Draining > 1 Square Mile
466	Develop Conceptual Drainage Plan
468	Analyze Adequacy of Existing Drainage Systems under Proposed Conditions
470	Develop Erosion and Sedimentation Control Plan
472	Review/Update Environmental Requirements and Commitments
474	Prepare Preliminary Schedule of Property Owners and Mylar Base
476	Estimate/Update Project Cost
478	Prepare Preliminary Design Report
480	Deliver Preliminary Design Submission
482	Distribute Preliminary Design Submission for Review/Comments
484	Compile Written Comments on Preliminary Design Submission
486	Schedule and Conduct Town Road Meeting
488	Schedule and Conduct Preliminary Design Review Meeting
490	Submit Structures Studies for Review/Approval
492	Schedule and Conduct Design/Right-of-Way Meeting
494	Prepare Title Search
496	Develop Design Exception Documentation
498	Request/Receive CATX Documentation Approval
500	Evaluate Consistency with Environmental Document and Commitments
502	Request/Receive Design Approval
504	Assess/Adjust Administrative and Fiscal Status
506	Request/Obtain Consultant Supplemental Agreement (if Required)

Exhibit 21. Typical preliminary design activities, major projects, EA or EIS (no studies).

Number	Description
200	Authorize Initial Phase
202	Review Background
204	Conduct Field Review
206	Initiate Survey
208	Update/Focus Traffic Data and Characteristics
210	Assess Traffic Capacity and Flow
212	Obtain and Analyze Accident History
214	Obtain and Evaluate Plans for Other Area Projects
216	Develop Public Involvement Plan
218	Execute Public Involvement Plan Elements
222	Define Problem/Need(s) and Evaluation Framework
224	Identify Conceptual Solutions
226	Inventory/Confirm Key Context Features and Characteristics
228	Identify Critical Controls
230	Establish Design Classifications and Criteria
234	Complete Bicycle and Pedestrian Assessment and Incorporate Conclusions
236	Investigate Structure Crossing Options
238	Evaluate Conceptual Solutions
240	Select Potentially-Viable Alternative(s) for Further Evaluation
246	Assess Need for New or Revised Interstate Access
248	Study Interchange Configurations
250	Evaluate Hydraulic Crossings and Floodplain Impacts
252	Request/Receive Environmental Review
254	Conclude Determination of "Effect" on Historic Resources
256	Identify/Resolve Environmental Issues
258	Request/Receive Hazardous/Contaminated Materials Screening
262	Initiate Preparation of Draft CEPA/NEPA document
264	Prepare Typical Sections, Including Roadside and Barriers
266	Recommend ADA-Related Measures
268	Prepare Preliminary Plans and Profiles
280	Select Alternative(s) for Detailed Evaluation
282	Update Public Involvement Plan
284	Complete Environmental Impact Analyses
286	Prepare Overall Alternatives Analysis/Comparison
288	Designate Preferred Alternative, if appropriate
290	Complete/Distribute Draft CEPA/NEPA Document
292	Public Involvement (Draft CEPA/NEPA Document)
294	Review Comments/Prepare Responses on Draft Environmental Document
296	Designate Preferred Alternative (if not done previously)
298	Complete/Distribute Final CEPA/NEPA Document
300	Review Comments/Prepare Responses on Final Environmental Document
302	Select Alternative, Prepare/Approve Environmental Decision (FONSI, ROD)
306	Document Environmental and Community Commitments
308	Assess/Adjust Administrative and Fiscal Status
402	Update Public Involvement Plan
404	Refine Typical Sections, Including Roadsides and Barriers
406	Recommend Intersection Control Types
408	Identify Additional Design Features
410	Prepare 1”= 40’ Plans and Profiles
412	Identify Preliminary Property Rights Needs

Exhibit 21 (continued). Typical preliminary design activities, major projects, EA or EIS (no studies).

Number	Description
414	Prepare/Submit Request for New or Modified Interstate Access (if Required)
416	Screen for Utilities and Initiate Coordination
418	Design Pavement Section(s)
420	Evaluate Illumination Needs and Develop Recommendations
422	Determine Need/Locations of Structure-Mounted Illumination
424	Identify Potential Railroad Involvement
426	Initiate Coordination and Railroad/Highway Agreement (if Applicable)
428	Prepare/Execute Railroad/Highway Agreement for Preliminary Engineering (if Applicable)
430	Schedule and Conduct Railroad Meeting (if Applicable)
432	Obtain Approval of Railroad Clearances (if Applicable)
434	Determine Navigation Clearance Requirements (if Applicable)
436	Execute Approved Pilot Boring Plan (if Applicable)
438	Identify Sign Support Structures (Bridge-Supported & Sign-Only Structures)
440	Prepare Subsurface Exploration Program
442	Prepare/Deliver Condition Survey and Rehabilitation Study(ies)
444	Prepare/Deliver Structure Type Study(ies)
446	Prepare Preliminary Staging and Maintenance and Protection of Traffic Concepts
448	Begin Transportation Management Plan Development
450	Develop Preliminary Signing Plan
452	Delineate and Map Wetlands
454	Obtain Hydraulic Engineer Approval (if Applicable)
456	Obtain Approval for Hydraulics/Drainage Programs to Be Used (if Applicable)
458	Identify Floodways, Floodplains, Stream Channel Encroachment Lines and Watercourses
460	Meet with DEP Fish Biologist and Determine Fish Passage Locations
462	Investigate and Confirm Major Drainage Areas
464	Determine Design Information for Structures Draining > 1 Square Mile
466	Develop Conceptual Drainage Plan
468	Analyze Adequacy of Existing Drainage Systems under Proposed Conditions
470	Develop Erosion and Sedimentation Control Plan
472	Review/Update Environmental Requirements and Commitments
474	Prepare Preliminary Schedule of Property Owners and Mylar Base
476	Estimate/Update Project Cost
478	Prepare Preliminary Design Report
480	Deliver Preliminary Design Submission
482	Distribute Preliminary Design Submission for Review/Comments
484	Compile Written Comments on Preliminary Design Submission
486	Schedule and Conduct Town Road Meeting
488	Schedule and Conduct Preliminary Design Review Meeting
490	Submit Structures Studies for Review/Approval
492	Schedule and Conduct Design/Right-of-Way Meeting
494	Prepare Title Search
496	Develop Design Exception Documentation
500	Evaluate Consistency with Environmental Document and Commitments
502	Request/Receive Design Approval
504	Assess/Adjust Administrative and Fiscal Status
506	Request/Obtain Consultant Supplemental Agreement (if Required)

2.2.3 Typical Preliminary Design Phase (With Studies)

All engineering and design activities prior to Design Approval are considered preliminary design. When the optional "studies" subphase is conducted as part of preliminary design, there several additional administrative and technical activities, as compared to preliminary design without studies. The studies subphase is most common for major projects. Exhibits 22 and 23 are typical activity patterns for major projects and different types of environmental documentation. Intermediate projects are similar.

Exhibit 22. Typical preliminary design activities, major projects, CATX (with studies).

Number	Description
200	Authorize Initial Phase
202	Review Background
204	Conduct Field Review
206	Initiate Survey
208	Update/Focus Traffic Data and Characteristics
210	Assess Traffic Capacity and Flow
212	Obtain and Analyze Accident History
214	Obtain and Evaluate Plans for Other Area Projects
216	Develop Public Involvement Plan
218	Execute Public Involvement Plan Elements
220	Conduct Analysis & Modeling
222	Define Problem/Need(s) and Evaluation Framework
224	Identify Conceptual Solutions
226	Inventory/Confirm Key Context Features and Characteristics
228	Identify Critical Controls
230	Establish Design Classifications and Criteria
234	Complete Bicycle and Pedestrian Assessment and Incorporate Conclusions
236	Investigate Structure Crossing Options
238	Evaluate Conceptual Solutions
240	Select Potentially-Viable Alternative(s) for Further Evaluation
242	Develop Preliminary/Functional Layouts of Potentially-Viable Solutions
244	Analyze/Model/Evaluate/Compare Potentially-Viable Solutions
246	Assess Need for New or Revised Interstate Access
248	Study Interchange Configurations
250	Evaluate Hydraulic Crossings and Floodplain Impacts
252	Request/Receive Environmental Review
254	Conclude Determination of "Effect" on Historic Resources
256	Identify/Resolve Environmental Issues
258	Request/Receive Hazardous/Contaminated Materials Screening
264	Prepare Typical Sections, Including Roadside and Barriers
266	Recommend ADA-Related Measures
268	Prepare Preliminary Plans and Profiles
270	Prepare/Deliver Studies Submission
272	Distribute Studies Submission for Review/Comments
274	Schedule and Conduct Studies Review Meeting

Exhibit 22 (continued). Typical preliminary design activities, major projects, CATX (with studies).

Number	Description
276	Compile Written Comments on Studies Submission
278	Respond to Review Comments
280	Select Alternative(s) for Detailed Evaluation
282	Update Public Involvement Plan
284	Complete Environmental Impact Analyses
286	Prepare Overall Alternatives Analysis/Comparison
304	Identify Design Concept
306	Document Environmental and Community Commitments
308	Assess/Adjust Administrative and Fiscal Status
310	Request/Obtain Consultant Supplemental Agreement (if Required)
400	Initiate Preliminary Design (when Studies is the initial phase)
402	Update Public Involvement Plan
404	Refine Typical Sections, Including Roadsides and Barriers
406	Recommend Intersection Control Types
408	Identify Additional Design Features
410	Prepare 1”= 40’ Plans and Profiles
412	Identify Preliminary Property Rights Needs
414	Prepare/Submit Request for New or Modified Interstate Access (if Required)
416	Screen for Utilities and Initiate Coordination
418	Design Pavement Section(s)
420	Evaluate Illumination Needs and Develop Recommendations
422	Determine Need/Locations of Structure-Mounted Illumination
424	Identify Potential Railroad Involvement
426	Initiate Coordination and Railroad/Highway Agreement (if Applicable)
428	Prepare/Execute Railroad/Highway Agreement for Preliminary Engineering (if Applicable)
430	Schedule and Conduct Railroad Meeting (if Applicable)
432	Obtain Approval of Railroad Clearances (if Applicable)
434	Determine Navigation Clearance Requirements (if Applicable)
436	Execute Approved Pilot Boring Plan (if Applicable)
438	Identify Sign Support Structures (Bridge-Supported & Sign-Only Structures)
440	Prepare Subsurface Exploration Program
442	Prepare/Deliver Condition Survey and Rehabilitation Study(ies)
444	Prepare/Deliver Structure Type Study(ies)
446	Prepare Preliminary Staging and Maintenance and Protection of Traffic Concepts
448	Begin Transportation Management Plan Development
450	Develop Preliminary Signing Plan
452	Delineate and Map Wetlands
454	Obtain Hydraulic Engineer Approval (if Applicable)
456	Obtain Approval for Hydraulics/Drainage Programs to Be Used (if Applicable)
458	Identify Floodways, Floodplains, Stream Channel Encroachment Lines and Watercourses
460	Meet with DEP Fish Biologist and Determine Fish Passage Locations
462	Investigate and Confirm Major Drainage Areas
464	Determine Design Information for Structures Draining > 1 Square Mile
466	Develop Conceptual Drainage Plan
468	Analyze Adequacy of Existing Drainage Systems under Proposed Conditions

Exhibit 22 (continued). Typical preliminary design activities, major projects, CATX (with studies).

Number	Description
470	Develop Erosion and Sedimentation Control Plan
472	Review/Update Environmental Requirements and Commitments
474	Prepare Preliminary Schedule of Property Owners and Mylar Base
476	Estimate/Update Project Cost
478	Prepare Preliminary Design Report
480	Deliver Preliminary Design Submission
482	Distribute Preliminary Design Submission for Review/Comments
484	Compile Written Comments on Preliminary Design Submission
486	Schedule and Conduct Town Road Meeting
488	Schedule and Conduct Preliminary Design Review Meeting
490	Submit Structures Studies for Review/Approval
492	Schedule and Conduct Design/Right-of-Way Meeting
494	Prepare Title Search
496	Develop Design Exception Documentation
498	Request/Receive CATX Documentation Approval
500	Evaluate Consistency with Environmental Document and Commitments
502	Request/Receive Design Approval
504	Assess/Adjust Administrative and Fiscal Status
506	Request/Obtain Consultant Supplemental Agreement (if Required)

Exhibit 23. Typical preliminary design activities, major projects, EA or EIS (with studies).

Number	Description
200	Authorize Initial Phase
202	Review Background
204	Conduct Field Review
206	Initiate Survey
208	Update/Focus Traffic Data and Characteristics
210	Assess Traffic Capacity and Flow
212	Obtain and Analyze Accident History
214	Obtain and Evaluate Plans for Other Area Projects
216	Develop Public Involvement Plan
218	Execute Public Involvement Plan Elements
220	Conduct Analysis & Modeling
222	Define Problem/Need(s) and Evaluation Framework
224	Identify Conceptual Solutions
226	Inventory/Confirm Key Context Features and Characteristics
228	Identify Critical Controls
230	Establish Design Classifications and Criteria
234	Complete Bicycle and Pedestrian Assessment and Incorporate Conclusions
236	Investigate Structure Crossing Options
238	Evaluate Conceptual Solutions

Exhibit 23 (continued). Typical preliminary design activities, major projects, EA or EIS (with studies).

Number	Description
240	Select Potentially-Viable Alternative(s) for Further Evaluation
242	Develop Preliminary/Functional Layouts of Potentially-Viable Solutions
244	Analyze/Model/Evaluate/Compare Potentially-Viable Solutions
246	Assess Need for New or Revised Interstate Access
248	Study Interchange Configurations
250	Evaluate Hydraulic Crossings and Floodplain Impacts
252	Request/Receive Environmental Review
254	Conclude Determination of "Effect" on Historic Resources
256	Identify/Resolve Environmental Issues
258	Request/Receive Hazardous/Contaminated Materials Screening
262	Initiate Preparation of Draft CEPA/NEPA document
264	Prepare Typical Sections, Including Roadside and Barriers
266	Recommend ADA-Related Measures
268	Prepare Preliminary Plans and Profiles
270	Prepare/Deliver Studies Submission
272	Distribute Studies Submission for Review/Comments
274	Schedule and Conduct Studies Review Meeting
276	Compile Written Comments on Studies Submission
278	Respond to Review Comments
280	Select Alternative(s) for Detailed Evaluation
282	Update Public Involvement Plan
284	Complete Environmental Impact Analyses
286	Prepare Overall Alternatives Analysis/Comparison
288	Designate Preferred Alternative, if appropriate
290	Complete/Distribute Draft CEPA/NEPA Document
292	Public Involvement (Draft CEPA/NEPA Document)
294	Review Comments/Prepare Responses on Draft Environmental Document
296	Designate Preferred Alternative (if not done previously)
298	Complete/Distribute Final CEPA/NEPA Document
300	Review Comments/Prepare Responses on Final Environmental Document
302	Select Alternative, Prepare/Approve Environmental Decision (FONSI, ROD)
306	Document Environmental and Community Commitments
308	Assess/Adjust Administrative and Fiscal Status
310	Request/Obtain Consultant Supplemental Agreement (if Required)
400	Initiate Preliminary Design (when Studies is the initial phase)
402	Update Public Involvement Plan
404	Refine Typical Sections, Including Roadsides and Barriers
406	Recommend Intersection Control Types
408	Identify Additional Design Features
410	Prepare 1”= 40’ Plans and Profiles
412	Identify Preliminary Property Rights Needs
414	Prepare/Submit Request for New or Modified Interstate Access (if Required)

Exhibit 23 (continued). Typical preliminary design activities, major projects, EA or EIS (with studies).

Number	Description
416	Screen for Utilities and Initiate Coordination
418	Design Pavement Section(s)
420	Evaluate Illumination Needs and Develop Recommendations
422	Determine Need/Locations of Structure-Mounted Illumination
424	Identify Potential Railroad Involvement
426	Initiate Coordination and Railroad/Highway Agreement (if Applicable)
428	Prepare/Execute Railroad/Highway Agreement for Preliminary Engineering (if Applicable)
430	Schedule and Conduct Railroad Meeting (if Applicable)
432	Obtain Approval of Railroad Clearances (if Applicable)
434	Determine Navigation Clearance Requirements (if Applicable)
436	Execute Approved Pilot Boring Plan (if Applicable)
438	Identify Sign Support Structures (Bridge-Supported & Sign-Only Structures)
440	Prepare Subsurface Exploration Program
442	Prepare/Deliver Condition Survey and Rehabilitation Study(ies)
444	Prepare/Deliver Structure Type Study(ies)
446	Prepare Preliminary Staging and Maintenance and Protection of Traffic Concepts
448	Begin Transportation Management Plan Development
450	Develop Preliminary Signing Plan
452	Delineate and Map Wetlands
454	Obtain Hydraulic Engineer Approval (if Applicable)
456	Obtain Approval for Hydraulics/Drainage Programs to Be Used (if Applicable)
458	Identify Floodways, Floodplains, Stream Channel Encroachment Lines and Watercourses
460	Meet with DEP Fish Biologist and Determine Fish Passage Locations
462	Investigate and Confirm Major Drainage Areas
464	Determine Design Information for Structures Draining > 1 Square Mile
466	Develop Conceptual Drainage Plan
468	Analyze Adequacy of Existing Drainage Systems under Proposed Conditions
470	Develop Erosion and Sedimentation Control Plan
472	Review/Update Environmental Requirements and Commitments
474	Prepare Preliminary Schedule of Property Owners and Mylar Base
476	Estimate/Update Project Cost
478	Prepare Preliminary Design Report
480	Deliver Preliminary Design Submission
482	Distribute Preliminary Design Submission for Review/Comments
484	Compile Written Comments on Preliminary Design Submission
486	Schedule and Conduct Town Road Meeting
488	Schedule and Conduct Preliminary Design Review Meeting
490	Submit Structures Studies for Review/Approval
492	Schedule and Conduct Design/Right-of-Way Meeting
494	Prepare Title Search
496	Develop Design Exception Documentation
500	Evaluate Consistency with Environmental Document and Commitments
502	Request/Receive Design Approval
504	Assess/Adjust Administrative and Fiscal Status
506	Request/Obtain Consultant Supplemental Agreement (if Required)

2.2.4 Typical Final Design Phase

All engineering and design activities subsequent to Design Approval are considered final design. Exhibits 24 and 25 are typical final design activity patterns.

Exhibit 24. Typical final design activities, minor projects.

Number	Description
600	Authorize Final Design
604	Resolve Preliminary Design Comments
606	Schedule and Hold Design Field Check
608	Finalize Definition of Ancillary Features
610	Define Noise Barrier Geometry (if Applicable)
612	Complete Typical Sections, Plans, Profiles and Cross Sections
620	Complete Environmental Studies and Update Requirements
624	Coordinate Design with Environmental Compliance Studies (if Applicable)
626	Integrate Environmental Requirements and Commitments
628	Prepare Sedimentation and Erosion Control Plan
630	Prepare Turf Plans
632	Prepare Detour Plans and Coordinate with Town (if Applicable)
634	Prepare Stage Construction Plans (if Applicable)
636	Execute Public Involvement Plan Elements
638	Execute Approved Subsurface Exploration Program
640	Prepare Geotechnical Engineering Reports
642	Prepare/Submit Structure Layout for Design (SL/D)
644	Prepare Final Structures Plans
646	Survey Condition of Existing Drainage Facilities to Remain in Use
648	Complete Drainage Design
650	Prepare Drainage Report
654	Develop Maintenance and Protection of Traffic Plans and Specifications
656	Prepare Final Signing and Pavement Marking Plans
658	Prepare Traffic Control Signal Plans, Specifications and Related Information
660	Complete Transportation Management Plan
666	Prepare/Execute Municipal Agreement (if Applicable)
668	Complete Illumination and Electrical Supply Plans
698	Obtain/Integrate Provisions for Contaminated Materials (if Applicable)
716	Modify Scope (if Required)
718	Request/Receive Environmental Re-evaluation (if Applicable)
720	Prepare Drainage Details
722	Prepare Miscellaneous Details
724	Implement Approved Requests for Inclusion of Other Work in State Contract
726	Estimate/Update Project Cost
728	Determine Construction Contract Time and Bar Chart
730	Identify Salvage Materials and Determine Salvage Credit
732	Obtain Approval of Public Interest Findings
734	Identify Pay Items and Document Quantities
736	Identify Applicable Standard Sheets and Include Guide Sheets

Exhibit 24 (continued). Typical final design activities, minor projects.

Number	Description
738	Prepare Special Provisions
742	Prepare Design Statement
744	Prepare Design Report
746	Deliver Design Submissions
748	Distribute Design Review Submissions for Comments
750	Evaluate Consistency with Environmental Document and Commitments
752	Compile Written Comments on Design Review Submissions
754	Respond to Review Comments
756	Establish Construction DBE/SBE Goal(s)
758	Complete Checklist
760	Assess/Adjust Administrative and Fiscal Status
762	Prepare Final Design Plans Submission
764	Request/Obtain Consultant Supplemental Agreement (if Required)
766	Obtain Waiver to Advertise (if Required)
768	Deliver FDP and Transfer Project to Contract Development

Exhibit 25. Typical final design activities, intermediate and major projects.

Number	Description
600	Authorize Final Design
602	Update Public Involvement Plan
604	Resolve Preliminary Design Comments
606	Schedule and Hold Design Field Check
608	Finalize Definition of Ancillary Features
610	Define Noise Barrier Geometry (if Applicable)
612	Complete Typical Sections, Plans, Profiles and Cross Sections
614	Schedule and Hold Permit Coordination Meeting
616	Prepare Permit Applications
618	Review/Submit Permit Applications
620	Complete Environmental Studies and Update Requirements
622	File Section 13a-57 Layout Plan with Town (if Applicable)
624	Coordinate Design with Environmental Compliance Studies (if Applicable)
626	Integrate Environmental Requirements and Commitments
628	Prepare Sedimentation and Erosion Control Plan
630	Prepare Turf Plans
632	Prepare Detour Plans and Coordinate with Town (if Applicable)
634	Prepare Stage Construction Plans (if Applicable)
636	Execute Public Involvement Plan Elements
638	Execute Approved Subsurface Exploration Program
640	Prepare Geotechnical Engineering Reports
642	Prepare/Submit Structure Layout for Design (SL/D)
644	Prepare Final Structures Plans
646	Survey Condition of Existing Drainage Facilities to Remain in Use
648	Complete Drainage Design
650	Prepare Drainage Report
652	Prepare Hydrologic, Hydraulic, Stream Channel Encroachment Line and Scour Reports
654	Develop Maintenance and Protection of Traffic Plans and Specifications
656	Prepare Final Signing and Pavement Marking Plans
658	Prepare Traffic Control Signal Plans, Specifications and Related Information
660	Complete Transportation Management Plan
662	Conduct Constructability Review
664	Conduct and Implement Value Engineering Study
666	Prepare/Execute Municipal Agreement (if Applicable)
668	Complete Illumination and Electrical Supply Plans
670	Develop Utility Milestone Schedule
672	Provide Utilities with Plans and Hold Design/Utility Meeting(s)
674	Obtain Preliminary Engineering Cost Estimates from Utilities
676	Prepare/Execute Utility Preliminary Engineering Agreements
678	Identify Long-Lead Utility Material Orders and Operations
680	Utilities Request Test Pits
682	Test Pit and Survey Utility Facilities
684	Provide Utilities with Base Plans

Exhibit 25 (continued). Typical final design activities, intermediate and major projects.

Number	Description
686	Receive and Review Utility Information-Only Plans
688	Obtain Construction Estimates from the Utilities
690	Prepare/Execute Utility Construction Agreements
692	Prepare Documentation for Railroad Regulatory Process (if Applicable)
694	Obtain Railroad Regulatory Approval (if Applicable)
696	Obtain Railroad Construction Estimate (if Applicable)
698	Incorporate Railroad Protective Provisions (if Applicable)
700	Prepare/Execute Railroad/Highway Agreement for Construction (if Applicable)
702	Obtain/Integrate Provisions for Contaminated Materials (if Applicable)
704	Define All Permanent and Temporary Property Needs
706	Submit/Review Draft Property Map Formats
708	Prepare/Submit Property Maps
710	Review Property Maps and Check Titles
712	Acquire Property Interests
714	Submit Final Mylar Property Maps
716	Modify Scope (if Required)
718	Request/Receive Environmental Re-evaluation (if Applicable)
720	Prepare Drainage Details
722	Prepare Miscellaneous Details
724	Implement Approved Requests for Inclusion of Other Work in State Contract
726	Estimate/Update Project Cost
728	Determine Construction Contract Time and Bar Chart
730	Identify Salvage Materials and Determine Salvage Credit
732	Obtain Approval of Public Interest Findings
734	Identify Pay Items and Document Quantities
736	Identify Applicable Standard Sheets and Include Guide Sheets
738	Prepare Special Provisions
740	Incorporate Information-Only Plans
742	Prepare Design Statement
744	Prepare Design Report
746	Deliver Design Submissions
748	Distribute Design Review Submissions for Comments
750	Evaluate Consistency with Environmental Document and Commitments
752	Compile Written Comments on Design Review Submissions
754	Respond to Review Comments
756	Establish Construction DBE/SBE Goal(s)
758	Complete Checklist
760	Assess/Adjust Administrative and Fiscal Status
762	Prepare Final Design Plans Submission
764	Request/Obtain Consultant Supplemental Agreement (if Required)
766	Obtain Waiver to Advertise (if Required)
768	Deliver FDP and Transfer Project to Contract Development

2.2.5 Typical Contract Development Phase

Exhibits 26 and 27 are typical contract development activity patterns, based on project category.

Exhibit 26. Typical contract development activities, minor projects.

Number	Description
800	Review/Adjust Final Design Plans Information
802	Establish Contract Time
804	Establish Liquidated Damages
806	Document Status of Right of Way, Utility and Railroad Activities
808	Prepare Engineer's Estimate
812	Estimate Other Costs
814	Prepare Cost Data Summary
816	Prepare Federal Estimate (if Applicable)
818	Obtain PS&E Approval
820	Transfer Project Responsibility to Bureau of Finance and Administration
822	Prepare Addenda
824	Analyze Construction Bids

Exhibit 27. Typical contract development activities, intermediate and major projects.

Number	Description
800	Review/Adjust Final Design Plans Information
802	Establish Contract Time
804	Establish Liquidated Damages
806	Document Status of Right of Way, Utility and Railroad Activities
808	Prepare Engineer's Estimate
810	Obtain Utility and Railroad Cost Estimates
812	Estimate Other Costs
814	Prepare Cost Data Summary
816	Prepare Federal Estimate (if Applicable)
818	Obtain PS&E Approval
820	Transfer Project Responsibility to Bureau of Finance and Administration
822	Prepare Addenda
824	Analyze Construction Bids

2.3 Activity Descriptions, By Phase

This section provides a listing of all activities and short narrative description of each. Not every activity is applicable to every project. The purpose of the previous section (2.2) is to identify typical activity patterns for common project characteristics. This section provides more detailed activity information.

2.3.1 Project Initiation Phase

The Department's leadership decides which projects to advance and may also establish some general cost and schedule parameters. The Bureau of Engineering and Construction is responsible for implementing these decisions.

The general purposes of this phase are outlined in Section 1.5.1. This section provides detailed guidance.

002 Designate Lead Division and Project Manager

In undertaking a new project or the next phase of a previously-initiated project, the Bureau Chief will designate a lead division, typically: Bridges and Facilities, Highway Design or Traffic Engineering. The division manager will assign a project manager.

004 Determine Consultant/State Roles

After reviewing the technical complexity and any schedule requirements, the lead division manager will recommend that either state forces or a consultant serve as the project's prime design organization. Although only the Commissioner is authorized to retain consultants, the project manager will take follow-on actions (schedule, funding request) based on the division manager's tentative determination.

006 Identify Special Requirements

Review the preliminary information and determine if there are unique requirements that will significantly affect the outcomes, methods or schedule of project development. Special requirements are those that apply to just one project or a small number of projects. The requirements may be imposed administratively or by legislation. Administrative requirements may be imposed by the Department or a funding agency. For example, FHWA High Cost projects (i.e., cost exceeding $100 million) entail certain requirements outlined by the Joint Stewardship & Oversight Agreement. Occasionally, legislation will mandate a particular scope, restrain consideration of alternatives (e.g., location, mode, scope) or establish project time frames.

Since these special requirements apply to only a single or small number of active projects, they are not integrated into the general guidance in this publication. However, compliance is required and early identification and accommodation will facilitate efficient project development.

008 Establish DBE/SBE Engineering Goal (Consultant-Designed Projects Only)

The Department is committed to effective Disadvantaged Business Enterprise (DBE) and Small Business Enterprise (SBE) programs. In implementing those programs DBE or SBE participation goals are established for specific contracts. A goal for each engineering contract is established by the DBE/SBE Screening Committee, upon request of and with a recommendation by the project manager. Since the goal is identified in the request to retain a consultant (next activity), it is desirable to secure goal in advance of the request. The DBE/SBE Screening Committee meets monthly. Recommended goals and supporting information are submitted in advance using a format prescribed by the

Screening Committee. A template for this document is located in the ProjectWise Project Development folder. Preparation of the recommendation and information are the responsibility of the designer/lead unit. Contact the Chair, DBE/SBE Screening Committee for additional information.

010 Obtain Approval to Retain a Consultant (Consultant-Designed Projects Only)

The Bureau Chief, Engineering and Construction submits a memorandum (drafted by the lead division) to the Commissioner requesting approval to retain a consultant. A template for this document is located in the ProjectWise Project Development folder. The Commissioner's endorsement (for approval or disapproval) documents the decision. This activity is fully described in the Professional Services, Consultant Selection Procedures Manual. See Section 4.4.1.

012 Establish Schedule

Certain key schedule dates are established at project initiation. The project manager should prepare a design development schedule of key dates leading up to the start of construction. As indicated in Section 3.2, the types of submissions, and therefore the scheduled milestones, vary by the nature of individual projects. Exhibit 28 identifies candidate schedule milestones, based on project category.

Exhibit 28. Typical schedule milestones.

Event/Milestone	Potentially Applicable Project Categories
Start of Survey	All
Studies Submission	Major
Start of Preliminary Design	All
Baseline Development Submission	Intermediate, Major
Preliminary Design Submission	All
Structure Type Studies Submission	Intermediate, Major
Start of Final Design	All
Drainage Submission	All
Structure Layout for Design Submission	Intermediate, Major
Permit Application Submission	Intermediate, Major
Property Maps Submission	Intermediate, Major
Semi-Final Review Submission	All
Final Plans for Review Submission	All
Final Design Plans	All
Design Completion	All
(Beginning of) Advertising	All
Construction Notice to Proceed	All

Some of the submissions noted above are not required/applicable for all projects.

014 Prepare Project Description and Location Map

Prepare a narrative description of the project, as it is contemplated. The description is a living document and evolves with project development. The document/file should be periodically renamed to create a history. As indicated in Section 1.5.2, for minor project the selected alternative is known at project initiation. For other categories (major, intermediate), the project is not defined until the conclusion of preliminary design. In preparing a project description, do not include information (e.g., scope, descriptive detail) that has not been resolved. In the early stages (e.g., studies) of a major project, the description should indicate what is being evaluated and not attempt to describe the outcome. Also prepare a map, with scale and detail corresponding to the specificity of the instruction/direction.

016 Solicit and Evaluate Proposals, Select Consultant (Consultant-Designed Projects Only)

The lead division works collaboratively with the Office of Consultant Selection to identify and solicit consultant interest using a process described in the Professional Services, Consultant Selection Procedures Manual. The Office of Consultant Selection will coordinate, with the assistance of a selection panel, the evaluation of candidate consultants. The final selection is made by the Commissioner and documented in a memorandum.

018 Notify Responding Consultants of Selection or Non-Selection (Consultant-Designed Projects Only)

Following the Commissioner's decision, the Bureau Chief, Engineering and Construction or designee (e.g., Manager, lead division) sends notification letters to the consultant selected for the assignment and those that responded but were not selected. This activity is fully described in the Professional Services, Consultant Selection Procedures Manual.

020 Hold Assignment Meeting (Consultant-Designed Projects Only)

Following notification of their selection, the lead division staff contacts the consultant to initiate communication and to schedule an Assignment Meeting for the purposes of:

- Providing key milestone dates,
- Identifying key personnel and organizational units and their respective roles,
- Reviewing/emphasizing certain contract provisions,
- Providing key background information,
- Discussing technical issues related to project development, and
- Outlining the contract preparation process, schedule and related near-term actions.

The project manager is responsible for confirming meeting arrangements by letter, with copies to Department units with potential project involvement serving as notice and/or invitation to participate in the meeting. The lead division develops an agenda and conducts the meeting.

The consulting engineer will be provided with previously-developed and available information, such as planning reports, needs and alternatives studies, environmental analysis and public outreach documentation (e.g., public hearing transcripts, summaries of public meetings). The Department will identify any known unusual design problems which may be encountered. The Department will designate the State Project Number, which is to be used on all pertinent documents and correspondence.

The consulting engineer is expected to advance project development through a systematic and deliberative process as described in this publication. The need for specific phases, subphases (e.g., studies, baseline) and phase submissions and deliverables (e.g., property maps, permit applications) pertinent to the assignment will be identified for inclusion in the scope. During the assignment meeting, affirmative action requirements will be identified and discussed, the rights of way process will be reviewed and sample property acquisition maps provided to the consulting engineer. Work that the Department elects to have performed by an organization other than the consulting engineer (e.g., surveying, soils engineering, hydraulic analysis) will be identified. A schedule for submission of the scope to the Department will be established.

022 Prepare Consultant Scope of Services (Consultant-Designed Projects Only)

Following the Assignment Meeting, the consulting engineer will prepare and submit a written scope of work to the Department. Department units with expertise and a project review role (e.g., lead division, Division of Environmental Planning, Central Surveys section, Soils and Foundations section) will be requested to review the draft scope. After solicitation and receipt of comments, a follow-up discussion with specific Department review units may be scheduled to resolve scope issues in a timely and efficient manner.

The consultant should also develop a blank "manhour matrix" corresponding to the scope tasks. The base matrix is provided by the Department (by the project engineer, upon request) and adapted to the specific assignment proposal by the consulting engineer. Ultimately, the matrix cells will be populated with the proposed time (i.e., staff hours) needed by each staff classification for each task. However, no values should be included at this juncture in the process; hence the expression "blank". Several iterations (submission of drafts, followed by review and comment) are sometimes necessary to develop a scope that adequately describes the activities, deliverables and schedule of the assignment. Secure approval as outlined in Section 4.4.4. The Department letter approving the scope will also identify the schedule for submitting a fee proposal. A copy of the approval letter is provided to the Agreements section.

024 Prepare Independent Price Proposals (Consultant-Designed Projects Only)

After approval of the scope, the consulting engineer will prepare and submit a fee proposal to the Department's Negotiations Committee for the work specified in the approved scope. The consulting engineer shall submit the fee proposal on a form supplied by the Department, which is generally the manhour matrix, described in the previous activity. This direction is generally provided in the same correspondence approving the scope.

The lead division prepares a separate fee proposal, on behalf of the Department, based on the final scope, also using the manhour matrix. The updated estimate is based on a scope prepared by the consultant and reviewed/approved by the Department. Refer to the consultant lump sum fee example. Preparation of this estimate often requires input and assistance from other units, generally the same units that commented on the scope. The lead unit transmits the Department estimate to the Negotiations Committee by the specified due date for the consultant proposal.

026 Negotiate Consultant Fee (Consultant-Designed Projects Only)

The Department generally enters into one of the following general types of Agreements:

Lump Sum: The total fee is not subject to any adjustment on the basis of the Consultant's cost experience in performing the scope of services

Cost Plus Fixed Fee: The total fee is based on cost-reimbursement plus a negotiated fee for profit that is fixed at the inception of the Agreement

The Negotiations Committee is responsible for negotiating consultant fees. After receiving and evaluating the two independent price proposals, the Negotiations Committee Chair determines how to advance the process. Often, but not always, an in-person negotiations meeting is held with representatives of the consulting engineer. The lead division project manager usually participates in these meetings, with supporting personnel and units as needed.

Immediately following completion of fee negotiations, the consulting engineer will submit a letter to the Department detailing the revisions to the scope of services made during the negotiations process or a letter stating that the scope did not change.

Upon conclusion of negotiations, the Department (Negotiations Committee) sends the consultant a letter identifying the conclusions. The consulting engineer's representative endorses the document to complete the process.

028 Prepare/Execute Consultant Agreement (Consultant-Designed Projects Only)

The Department will prepare and process the agreement. The consultant agreement is drafted by the Department's Agreements section by tailoring the Standard Agreement, a copy which will be provided to the consulting engineer at the Assignment Meeting.

The consulting engineer's current Affirmative Action Plan must be on file with the Office of Contract Compliance prior to consummating an agreement. Corporations, Limited Liability Partnerships and Limited Liability Companies must be registered with the Secretary of State. Corporations must be registered with the Professional Engineer's Board and Architectural Board. Joint registration is required if practicing engineering and architecture. If the firm is a Partnership or Sole Proprietorship, individual(s) must be appropriately licensed. The individual signing the agreement must have written

authorization to do so on behalf of the Corporation or Partnership. If a conflict arises between the agreement and any of the referenced documents, the agreement takes precedence. Any comments or questions the consulting engineer has concerning the format of the agreement should be addressed immediately to the project manager.

Typically, consultant agreements include an established amount for future extra work. The funding available for the agreement is reviewed (through CORE-CT) in relation to the negotiated fee, and modified if necessary.

After the agreement is prepared, it is circulated for review/approval signatures by the consultant, Attorney General and the Department. See Section 4.4.3. When the agreement is fully executed, a copy is provided to the lead division, which then sends the consultant a copy. When called for by the Joint Stewardship & Oversight Agreement, provide a copy to FHWA.

030 Determine Federal/State Oversight Roles

Many Department projects utilize federal-aid funds administered by the Federal Highway Administration (FHWA). The use of these funds requires compliance with certain requirements imposed by federal laws, regulations and executive orders. The Department and FHWA share responsibility for attaining compliance. The respective roles of the two agencies for various categories of projects are outlined in the Joint Stewardship & Oversight Agreement. As a first step, the project manager should review the Project Oversight Determination section of the Stewardship Agreement and determine if a project is "FHWA Oversight" or "State Oversight". In some cases, the determination requires correspondence between the Department and FHWA. A template for this document is located in the ProjectWise Project Development folder. The agency roles associated with each oversight classification are also identified in the Stewardship Agreement.

032 Assess/Adjust Administrative and Fiscal Status

Initiating a project requires approval as indicated by Sections 4.1 and 4.1.1. Prior to approving the initial engineering phase, review available funding and approved activities through CORE-CT. If required, prepare a Project Memorandum in anticipation of the Approve Initial Phase activity. A template for this document is located in the ProjectWise Project Development folder.

2.3.2 STUDIES/PRELIMINARY DESIGN PHASE

As described in Section 1.5.1, the purpose of the studies subphase is to clearly define the problem and range of reasonable alternatives. If significant effort is needed to reach these determinations, a studies subphase should be conducted. If not, a separate studies subphase is probably not warranted.

Even though studies have a specific purpose, there are administrative and practical reasons to consider them as part of preliminary design, rather than as a standalone phase. In this section, the first phase of project development is either "preliminary design (with

studies)" or "preliminary design (no studies)". See Exhibits 18 – 23 for typical preliminary design phase activity patterns, with and without studies.
The general purposes of this phase are outlined in Section 1.5.1. This section provides detailed guidance.

200 Approve Initial Phase

The approval(s) needed to begin the major subphases (studies, preliminary design, final design) are indicated by Sections 4.1 and 4.1.1. No separate approval is needed to initiate contract development. The specific approvals required depend on the lead designer (consultant, State) and funding (e.g., federal, State only). A notice-to-proceed letter from the Department to the consultant is required before compensable work can be performed. This requirement applies regardless of funding source and is separate from agency funding authorization.

202 Review Background

Some projects enter the initial phase with significant history. If they exist, review project files, including studies and reports, environmental documents, reports of meeting and correspondence. Building on previous determinations and fulfilling prior commitments generally fosters efficient project development and maintaining stakeholder trust. However, continuity of previous direction is not always appropriate. Some projects are reinitiated explicitly to "rethink" the scope. Reversal of significant conclusions or commitments requires coordination with the affected party(ies).

204 Conduct Field Review

After reviewing the background, online mapping and Digital Highway prepare a list of items to observe during a field visit. During the visit, identify critical controls and other features for which location (survey) is needed. Make note of and photograph new features (not shown on mapping/aerial photography).

206 Initiate Survey

Survey for consultant-designed projects may be performed by the Department forces or the consultant as previously determined and reflected in the scope. Survey for State-designed projects is typically performed by Department forces. The date for the start of survey is established as a schedule benchmark event. Survey methods and required coverage area and level of detail vary by project and phase. When the Department performs the survey, the designer (consultant or Department) should prepare a narrative description of the required information, with an accompanying graphic. Survey supports project development. The direction of studies and design determine the locations, types, sequence and schedule of needed information (e.g., typography, wetland delineation and mapping, drainage, utility test pits).

When a consultant scope includes survey, the consultant manages and prioritizes survey activities to support the engineering effort and schedule.

208 Update/Focus Traffic Data and Characteristics

Traffic characteristics are needed to assess quality of service and capacity. Common characteristics include average daily traffic (ADT), design hourly volume and directional design hourly volume. Since traffic generally increases over time, to be useful, each of the listed characteristics must be associated with a particular year.

By memorandum, the project manager should request that the Office of Policy & Systems Information provide traffic characteristics (e.g., current and projected ADT, turning volumes) for analyzing and designing specific project elements (e.g., route segment, intersection, etc.). A template for this document is located in the ProjectWise Project Development folder. Also, determine the 50^{th} and 85^{th} percentile speeds. Through research, direct observation and reports from local officials, gather preliminary information on other-than-automobile travel (i.e., pedestrian, bicycle, transit) characteristics.

210 Assess Traffic Capacity and Flow

Utilize the *Highway Capacity Manual* or an approved alternative analysis tool to assess traffic capacity and quality of flow for segments, intersections and ramps.

212 Obtain and Analyze Accident History

Request the accident history from the Office of Data Inventory and Statewide Coordination, Crash Data and Analysis unit. Typically, the most recent three-year history should be used. However, occasionally some reason (e.g., road closed for construction) may compel use of a different sample. Determine if any project elements (i.e., segments, intersections) within the project area are on the Suggested Locations of Surveillance Study Sites (SLOSSS). Review over-represented accident locations, accident types and causative factors. Use safety publications and evaluation processes (e.g., *Highway Safety Manual*, *SafetyAnalyst*) to assess effects of project on safety and, if appropriate, recommend safety countermeasures for inclusion.

214 Obtain and Evaluate Plans for Other Area Projects

Coordinate with regional transportation agencies and local governments to identify private (e.g., subdivisions, commercial developments, healthcare facilities) and public undertakings (e.g., new and expanded schools, parks). Review the Long Range Transportation Plan, Transportation Improvement Program and Maintenance projects. Obtain available information (e.g., permit applications, plats) available from public offices and private parties. Indicate the status (e.g., planned, construction pending) and source of information related to proposed projects.

216 Develop Public Involvement Plan

Public involvement is a set of strategies used to communicate with and actively engage the public in the agency decisions, including project development. It is essential for all projects. The "public" refers to the very broad range of people and organizations with an interest in the project. These people and organizations are often referred to as "stakeholders", which may include:

- Federal officials,

- Other state agencies (e.g., DEP or SHPO),
- Local elected officials,
- Town engineers/planners,
- Regional officials,
- Special interest or advocacy groups (e.g., Sierra Club, Commuter Rail Council, etc.),
- Ad hoc groups created for a specific project,
- Abutting or nearby property owners,
- Civic associations,
- Business or economic development interests,
- Other interested parties,
- State Legislators and Congressional Delegation.

Stakeholders provide information and offer a unique perspective. They often identify concerns and request changes. This input should be considered in advancing project development.

Public involvement does not refer to a single event or format for public engagement. Public Involvement Plans are developed (and revised) to meet project or program circumstances. The Department's Public Involvement Guidance Manual and Public Involvement Procedures outline the pertinent Federal regulations (FHWA and FTA) and provide guidance on developing a project-specific Public Involvement Plan.

218 Execute Public Involvement Plan Elements

Carry out the elements of the Public Involvement Plan (previously developed/updated) identified for the studies subphase.

Public notice/notification and content disclosure are currently governed by the State's Freedom of Information Act. Public meetings related to Department projects (e.g., information meetings, public hearings) are classified as "special meetings" under the statute. Review and comply with current requirements.

Document public involvement activities and the resolution of issues. Develop and retain copies of public notice publication, meeting summaries, hearing transcripts and documentation of how comments were resolved.

220 Conduct Analysis & Modeling

The scope and methods employed for this activity are determined by the nature of the studies. Demand forecasting and traffic simulation are common types of analysis but others may be appropriate for different topics (e.g., infrastructure condition assessment, freight movement, network safety screening). For consultant-performed analysis, the analysis and modeling methods and tools should be consistent with the scope.

222 Define Problem/Need(s) and Evaluation Framework

Use the analysis and modeling results to prepare a problem definition. Apply the concepts and principles outlined in Section 1.3. For major projects, develop the problem

definition (or needs) in concert with the public involvement process. Develop a system for evaluating potential solutions. Performance measures used to rate alternatives should be easily understandable by the public. The evaluation framework should cover the spectrum of relevant decision variables. Potential categories include: esthetics, transportation performance (i.e., mobility, safety), cost and environmental impacts. An example is provided as Exhibit 4.

224 Identify Conceptual Solutions

Based on internal (e.g., initiating unit, project team) and public input, identify and refine potential solutions. When appropriate, combine and refine features from disparate concepts. Do not dismiss even marginally-feasible solutions prematurely. When the number of individual solutions is large, use categories (additional capacity, ITS) and other grouping methods to capture the range of concepts.

226 Inventory/Confirm Key Context Features and Characteristics

The designer should acquire available information related to:

- Cultural and historic resources,
- Demography and population,
- Economic activity centers,
- Land use (distribution and nature of commercial, industrial, institutional, recreational and residential development, open space),
- Natural resources (aquatic, terrestrial habit),
- Transportation (major routes and ports, transit centers, routes and stops; intermodal connections, etc.), and
- Utilities (transmission lines and mains).

Initially, collect information from secondary sources (e.g., published reports, public records and maps). As the development process becomes more focused, verify and supplement these sources with first-hand observations and data collection.

228 Identify Critical Controls

Critical controls are existent and proposed physical features, natural and man-made, affecting infrastructure location (i.e., cross section, horizontal or vertical alignment). Use graphics and narrative to identify and document the location and nature of critical controls.

230 Establish Design Classifications and Criteria

Design criteria are limiting values or ranges for geometric and design characteristics (e.g., design speed, stopping sight distance, grades, lane and shoulder widths). Design criteria are based on a facility's functional classification, setting (e.g., rural, urban) and project scope. Not all criteria are of equal significance. Those judged to have the greatest influence on safety and serviceability are designated as "controlling criteria". The Highway Design Manual provides guidance on establishing applicable design criteria for specific facilities (e.g., highways, streets) within projects, including controlling criteria. Identify and prepare documentation (e.g., table format) of the design criteria for

each facility proposed for construction or alteration. A template for this document is located in the ProjectWise Project Development folder. Meeting all design criteria is generally desirable; however, there are conditions (e.g., disproportionate costs, impacts) when it is not appropriate to do so. A deliberative, documented evaluation (i.e., design exception) is required to deviate from a controlling criterion. Identification of design exceptions and preparation of requests/documentation is discussed subsequently (Develop Design Exception Documentation).

232 Define Project Limits

Based on refined analysis (e.g., constructability, traffic control) and cost considerations, establish or refine the specific begin and end points along each facility.

234 Complete Bicycle and Pedestrian Assessment and Incorporate Conclusions

The Department is required to encourage, whenever possible, areas for bicycles and pedestrians when creating a state highway layout or relocating a state highway. Review the Connecticut Bicycle and Pedestrian Transportation Plan, which provides the Department with direction in developing policy and pursuing initiatives to advance programs and projects to accommodate non-motorized transportation. Prepare a "Bicycle and Pedestrian Travel Needs Assessment" and develop recommendations for each alternative. Retain the approved/signed copy in the project file.

238 Investigate Structure Crossing Options

When applicable, identify and evaluate alternative structure crossing configurations (e.g., over-under concepts).

236 Evaluate Conceptual Solutions

Review each conceptual solution or category of solutions. Assign a rating to each alternative (or category) for each factor in the evaluation framework. Qualitative ratings and empirical estimates are acceptable when quantitative data is infeasible or impractical. Summarize the results using a format and set of terms easily understood by the general public.

240 Select Potentially-Viable Alternative(s) for Further Evaluation

Consider the results from the Evaluate Conceptual Solutions activity to select the conceptual solution(s) that warrant further evaluation based on cost, impacts and the extent to which a specific alternative meets the defined need(s). Consult with other agencies and solicit public comment when appropriate (e.g., intense public interest). This is a significant step, especially for projects requiring an EIS. For intermediate projects, selection of a single alternative is common. Secure and document concurrence from Department management for selections.

242 Develop Preliminary/Functional Layouts of Potentially-Viable Solutions

Prepare layouts (horizontal alignment and preliminary) of the potentially-viable alternatives using a combination of available mapping (photo image background, record

drawings) and survey, at an appropriate scale. Identify critical controls and apply geometric design criteria.

244 Analyze/Model/Evaluate/Compare Potentially-Viable Solutions

Apply previously-selected models and analysis techniques to each candidate solution. Develop information for each factor in the evaluation framework. Use objective methods and report findings with quantitative terms whenever practical.

246 Assess Need for New or Revised Interstate Access

Determine if project requires FHWA approval of a new or revised Interstate access. Review FHWA's "Policy Statement on Access to the Interstate System", "Interstate System Access Informational Guide" and Department's "Policy and Procedures for New or Revised Interstate Access Approval". If Interstate access is being changed, follow guidance on how to prepare the approval request (Prepare/Submit Request for New or Modified Interstate Access). See Section 4.7.4.

248 Study Interchange Configurations

When an alternative under consideration involves a new interchange or modification of an existing interchange, alternatives should be evaluated using guidance in the Highway Design Manual.

250 Evaluate Hydraulic Crossings and Floodplain Impacts

Assess all hydraulic crossings covered by a Flood Insurance Study or with a contributing area greater than one square mile as outlined in the Drainage Manual, Chapter 3.

252 Request/Receive Environmental Review

Environmental Reviews are conducted by the Office of Environmental Planning upon request of the lead unit. A template for this request is located in the ProjectWise Project Development folder. In its request, the lead unit provides information on project location and scope. All projects require at least an initial Environmental Review, some require several. The initial Environmental Review is conducted during the first phase after Project Initiation (i.e., studies or preliminary design). An Environmental Review should be requested whenever one or more of the following applies:

- The initial Environmental Review has not be made,
- The initial Environmental Review was made but the project characteristics (e.g., limits, scope) and/or impacts were subsequently changed to an extent that is materially different, or
- Three years or more have passed since the most recent Federal action (authorization of phase, approval of previous NEPA documentation).

Environmental Review Forms include a variety of conclusions, including the resources impacted or potentially impacted, appropriate level of environmental documentation, coordination requirements and types of environmental analysis. The lead unit should become familiar with the information in the completed Environmental Review Form,

maintain a copy in the project file, perform the assigned tasks and monitor the progress of developments.

254 Conclude Determination of "Effect" on Historic Resources

In responding to the Request for Environmental Review, the Office of Environmental Planning will conduct a preliminary screening of the project's likely effect on known historical and archeological resources. The Environmental Review will indicate the additional steps and coordination (e.g., SHPO correspondence) needed to reach a definitive determination and associated documentation ("letter of effect"). A template for the initial coordination correspondence is located in the ProjectWise Project Development folder. The outcome dictates future steps, if any, under Section 106 and Section 4(f). Retain copies of related documentation in the project files.

256 Identify/Resolve Environmental Issues

The Environmental Review Form may identify impacts and potential impacts across the environmental spectrum (e.g., aquatic, biological, socio-economic). Additional coordination is often needed to address and resolve specific concerns. Assignments to OEP and the lead unit are made by OEP through the Environmental Review Form or follow-up coordination. The lead division is responsible for specific assignments and monitoring the status of all issues identified on the Environmental Review Form.

258 Request/Receive Hazardous/Contaminated Materials Screening

The lead division should request that the Environmental Compliance section make an initial assessment of the risk that hazardous and/or contaminated materials will be encountered during construction of the project. A template for this document is located in the ProjectWise Project Development folder. The assessment will determine the need and direction of further evaluation. Possible outcomes include: no further work or conducting a Corridor Land Use Evaluation (Task 110) or proceeding directly to a Subsurface Site Investigation (Task 210) as the next phase.

260 Conduct Scope Review

Conduct a critical analysis of the scope to determine if, based on current information, it meets the intended purpose and can be accomplished within the general parameters (i.e., schedule and cost). Meet with the initiating office to discuss the project status and discuss results of the review. Implement the conclusions of the review.

262 Initiate Preparation of Draft CEPA/NEPA Document

Initiate preparation of an environmental document when the Environmental Review Form indicates that CEPA requires a Finding of No Significant Impact, Environmental Impact Evaluation or NEPA requires an Environmental Assessment or Environmental Impact Statement. Preparation of these documents can be complex and requires reference to current regulations and guidance.

264 Prepare Typical Sections, Including Roadside and Barriers

Prepare typical sections using guidance in the Highway Design Manual. Pavement structures are not required for Studies submission typical sections. Otherwise the information provided should be similar to that for the Preliminary Design submission.

266 Recommend ADA-Related Measures

Determine and meet the applicable requirements of the Americans with Disability Act (ADA). ADA requirements are distinct from, but related to, pedestrian access. Some ADA requirements pertain directly to sidewalks and walkways.

Specific provisions of the ADA are being clarified through implementing regulations and non-regulatory guidance. The ADA-related requirements of many transportation and ancillary facilities, including highways, streets, sidewalks, parking and pedestrian signals are being addressed under the heading of Public Rights-of-Way, for which Guidelines have been proposed (July 26, 2011) but not finalized (as of September 2012). The proposed Guidelines reflect the objectives of the ADA, balanced against the practical challenges presented by natural terrain, existing land use and the differing needs of user groups. Department guidance related to geometry is provided primarily in the Highway Design Manual.

Use these publications to identify requirement and potential design options. Develop typical sections and specific features in consideration of ADA requirements and the travel needs of motorized and non-motorized users.

For the studies and preliminary design phases, identify the applicable requirements and a general approach to ADA compliance. Defer detailed development of specific provisions until final design.

268 Prepare Preliminary Plans and Profiles

Develop preliminary plans and profiles for the proposed roadway, bridges and appurtenances. Select a scale and coverage that is suitable to assess the feasibility and comparative impacts of each alternative. Include all critical controls and environmental resources.

270 Prepare/Deliver Studies Submission

Develop the Studies Submission consisting of a report and supporting graphics as described in Section 3.2.2.

272 Distribute Studies Submission for Review/Comments

When the Studies Submission is delivered, it should be reviewed for completeness and circulated as outlined in Section 3.2.

274 Schedule and Conduct Studies Review Meeting

Convene and prepare an agenda for the Studies Review meeting. Department units providing comments should be invited to the review meeting. During the meeting, the

designer will make a summary presentation of the submission and answer questions. Review comments will be discussed. Written review comments will be provided to the designer.

276 Compile Written Comments on Studies Submission

The lead unit is responsible for assembling the written comments, distributing as needed (e.g., consultant) and retaining a copy in the project file.

278 Resolve/Respond to Review Comments

After considering the Studies Submission review comments, the designer proposes a resolution for each. In the case of difficult-to-resolve issues, the designer and commenter should meet to facilitate communication and expedite resolution. Comments should be resolved prior to preparation of the subsequent submission. The Department's project manager determines the final resolution and disposition of comments.

280 Select Alternative(s) for Detailed Evaluation

Based on more refined development and impact assessment, identify alternatives that appear as reasonable candidates for future designation as the most-balanced (preferred/selected) alternative. These alternatives will be retained for consideration. For intermediate projects, it is common to select just one alternative for detailed evaluation.

282 Update Public Involvement Plan

Evaluate and make appropriate adjustments to the Public Involvement Plan in consideration of alternatives selected for detailed evaluation and the type of environmental documentation being prepared.

284 Complete Environmental Impact Analyses

For each alternative evaluated in detail, evaluate potential impacts identified on the Environmental Review Form. Document impacts using a method and format (e.g., calculations, subject matter expert reports) appropriate for the type of resource and impact intensity. Frequently, the results of individual impact assessment reports are summarized in CEPA/NEPA documents or to facilitate Section 106 consultation. Correspondence is often used to support and document determinations (e.g., "effects letter").

286 Prepare Overall Alternatives Analysis/Comparison

For each alternative evaluated in detail, prepare summary documentation of the associated costs and impacts. Describe the expected transportation effects (e.g., reduction in accident rates or severity, reduction in delay, improved bicycle accommodation), summarize environmental impacts and total implementation cost (i.e., construction, utilities, etc.).

288 Designate Preferred Alternative, if appropriate

The designation of a preferred alternative in a CEPA/NEPA document is the first documented indication of the lead agencies' preference. It is not conclusive, meaning that at the end of the process a different alternative may be selected, provided it was also

fully evaluated in the environmental document. The lead agencies should collaborate and consult with others (e.g., cooperating and participating agencies) in designating the preferred alternative. If the Department and other lead agency(ies) do not have a preferred alternative at this juncture, none is designated in the draft environmental document and associated public involvement.

290 Complete/Distribute Draft CEPA/NEPA Document

Complete the document in accordance with applicable laws, regulations, executive orders and practices. Identity the preferred alternative in the document (along with the reasoning) if one has been designated.

Draft CEPA/NEPA documents are made available for review and comment. To provide agencies, organizations and individuals with the opportunity to participate in the review, the availability of, and access to, the document must be published. The notice/circulation documentation should also designate the time frame (close of comment period) and available methods (e.g., email, letters, public testimony) for commenting. The requirements for publicizing availability and distributing the document vary by document type. Some documents (e.g., draft EIS) require distribution. The emergence of web-accessible documents has generally increased availability and changes in how documents are distributed. Develop a distribution list meeting the requirements (i.e., legal, regulation, Department policy) and reasonable needs of stakeholders.

292 Public Involvement (Draft CEPA/NEPA Document)

Public availability of a CEPA/NEPA document is often an occasion for a public forum. Review the Public Involvement Plan and regulations related to the document type. A public hearing is sometimes mandatory. Carry out a compliant and appropriate public involvement program.

294 Review Comments/Prepare Responses on Draft Environmental Document

Following receipt of comments, the Department, in collaboration with the other lead agency(ies), should prepare a response to each substantive comment provided in writing or public hearing testimony on the draft environmental document. Responses should be proportional to the relevance and basis of the comment. Some comments, such as those expressing a preference or support, require only acknowledgement. When comments identify errors or shortcomings in the environmental document, revise (e.g., clarify, correct) the document (for final publication) and note the revisions in the response. When the lead agency(ies) disagree with a criticism, the reasons should be stated and no change made to the information criticized.

Multiple organizations or people may make the same or similar comment. When this occurs and the volume of comments is high, a unique response to each comment is not necessary. In these cases, an appropriate response should be prepared and each similar commenter can be referenced to the common response. Usually, the comments and responses are appended to the final document. In some cases, the lead agency(ies) will respond to comments via correspondence.

296 Designate Preferred Alternative (if not done previously)

Designate a preferred alternative if one was not identified in the draft environmental document. Responsibility for the designation rests with the Department and other joint lead agencies, normally with input from other stakeholders (e.g., cooperating and participating agencies), consideration of the public input and comments on the draft environmental document. Include an explanation for the designation in the final environmental document.

298 Complete/Distribute Final CEPA/NEPA Document

Complete the document in accordance with applicable laws, regulations, executive orders and practices. The requirements for publicizing availability and distributing the document vary by document type. Some documents (e.g., final EIS) require distribution. Review and comply with applicable laws, regulations and Department policies.

300 Review Comments/Prepare Responses on Final Environmental Document

The Department, in collaboration with the other lead agency(ies), should prepare a response to each substantive comment on the final environmental document.

302 Select Alternative, Prepare/Approve Environmental Decision (FONSI, ROD)

When an environmental document (EIE, EIS, EA) is prepared, the evaluation process and alternative selection are documented and approved. Separate procedures apply to each category and should be referenced. Any alternative that is fully evaluated in the final environmental document may be selected. When an EA indicates that a proposed action will cause no significant impacts, a Finding of No Significant Impact (FONSI) is used to conclude the process. When an EIS has been prepared, the decision process is concluded with a Record of Decision (ROD). These documents signify that a proposed action (project) complies with CEPA/NEPA requirements. This does not preclude the possible requirement for a re-evaluation.

304 Identify Design Concept

Based on the overall assessment, identify the best overall alternative as the Design Concept. The alternative, with possible refinement, will be evaluated in the environmental documentation (CATX).

306 Document Environmental and Community Commitments

Through the environmental evaluation, public involvement and agency coordination processes, the lead agencies may have made commitments to various stakeholders (e.g., citizens, agencies, municipalities). These commitments may be found in meeting summaries, correspondence, environmental documents, study conclusion or other forms of documentation. It's important that these commitments be implemented. To facilitate their integration into design, construction and maintenance, a comprehensive list of commitments should be compiled. The compilation should identify the source/basis of each commitment and the means by which it will be satisfied. Depending on project complexity, the commitment monitoring system may be relatively simple or quite

complex. Types of information that are sometimes in connection with individual commitments include: subject (e.g., water quality, noise), type of outcome (e.g., noise walls, limitations on construction operations, preservation/relocation of specific features) responsible parties, relevant contracts, schedule and status.

308 Assess/Adjust Administrative and Fiscal Status

Based on the Studies Submissions and review, the project manager should review the project status (e.g., right of way requirements, environmental processes, mitigation and permits, utility and railroad involvement and development schedule) to determine its accuracy.

Through CORE-CT, review previously-approved funding by phase and activity and purchase orders, expenditures and balances relative to approved and anticipated needs. If needed, prepare Project Memorandum (Modification) as outlined under in Sections 4.1 and 4.1.1. A template for this document is located in the ProjectWise Project Development folder.

If the provisions are not consistent with the anticipated needs (i.e., not representative of next phase scope), a supplemental agreement or another type of contract revision (e.g., extra work) may be needed. Initiate and complete the administrative steps needed to reflect completion (i.e., cost and schedule for subsequent phases). If the provisions are not consistent with the anticipated next engineering phase (i.e., not included or not representative of need), a supplemental agreement or another type of contract revision (e.g., extra work) may be needed. Initiate and complete the administrative steps needed in preparation of final design.

310 Request/Obtain Consultant Supplemental Agreement (if Required) (Consultant-Designed Projects Only)

If the status review indicates the current consultant agreement is not adequate for anticipated future consultant services, initiate a supplemental agreement. Commissioner approval is required to enter into supplemental agreements. To obtain approval, the Bureau Chief, Engineering and Construction submits a memorandum (drafted by the lead division) to the Commissioner requesting approval. The Commissioner's endorsement (for approval or disapproval) documents the decision. See Sections 4.4.2 and 4.4.4.

The development/preparation of a supplemental agreement is similar to that for an original agreement, including scope approval, independent price proposals and negotiation.

Consultant supplemental agreements, like original agreements, are drafted by the Department's Agreements section. After the supplemental agreement is prepared, it is circulated for review/approval signatures by the consultant, Bureau Chief (Engineering and Construction), Attorney General and the Department's EEO Contract Compliance Office. A funding/fiscal review is also made. When the supplemental agreement is fully executed, a copy is provided to the lead division, which then sends the consultant a copy.

When called for by the Joint Stewardship & Oversight Agreement, provide a copy to FHWA.

400 Initiate Preliminary Design

Refer to Sections 4.1 and 4.1.1. This action is only needed when a studies subphase is conducted. When no studies subphase is conducted, preliminary design begins through the Approve Initial Phase activity. If a Project Memorandum (Modification) were determined necessary and submitted under a previous activity (Assess/Adjust Administrative and Fiscal Status), verify its approval. Additionally, this activity involves issuing a consultant notice to proceed, if applicable. A template for this document is located in the ProjectWise Project Development folder.

402 Update Public Involvement Plan

Update the Public Involvement Plan based on the scope and development process of the selected alternative.

404 Refine Typical Sections, Including Roadsides and Barriers

Prepare typical sections covering the entire length of each facility (road, street, highway) constructed or significantly altered by the project. Development of the sections should reflect design criteria, public involvement and environmental analysis and commitments.

406 Recommend Intersection Control Types

Prepare and depict turning volume diagrams for each intersection. Based on operational analysis, accident history and potential impacts, recommended control (e.g., signal, Stop, none) for each intersection/approach. Prepare and report operational analysis (level of service) and queue lengths for each approach. Also, address potential control devices and measures for non-motorist modes and transit. When traffic signals are proposed, prepare design and information as described by the Traffic Control Signal Design Manual.

408 Identify Additional Design Features

Identify and depict other design features (e.g.., bicycle accommodation and pedestrian facilities, walkways and ramps, climbing lanes, noise walls, retaining walls) that are required or recommended from other development analyses.

410 Prepare 1"= 40' Plans and Profiles

Develop Preliminary Design plans and profiles as indicated by Exhibit 33.

412 Identify Preliminary Property Rights Needs

For purposes of impact analysis and cost estimation (but not acquisition), develop and indicate preliminary rights of way needs. The determinations shall be general (i.e., graphic), rather than definitive, and address key access requirements.

414 Prepare/Submit Request for New or Modified Interstate Access (if Required)

The applicably of this requirement is determined under a previous activity (Assess Need for New or Revised Interstate Access). If applicable, review FHWA's "Policy Statement

on Access to the Interstate System", "Interstate System Access Informational Guide" and Department's "Policy and Procedures for New or Revised Interstate Access Approval". A draft request should be prepared and reviewed within the Department prior to its submission to FHWA. Formal FHWA approval may only occur after NEPA procedures and other applicable requirements have been met. The lead division submits the request to FHWA for approval when all substantive issues have been resolved and the NEPA process has been completed or is imminent. See Section 4.7.4.

416 Screen for Utilities and Initiate Coordination

Existing utility facilities located in the roadway right-of-way that conflict with the proposed design will be relocated or adjusted. The Utility will be directed to prepare plans for the necessary facility relocations or adjustments. To begin the coordination and potential relocation process, the lead unit sends a memorandum to the Department's Utilities section providing general project information. A template for this document is located in the ProjectWise Project Development folder. Using the current Utility by Town List, the Department's Utilities section notifies individual utilities of the project and its potential impacts and contact information of project personnel.

418 Design Pavement Section(s)

Prepare pavement structure recommendations and supporting information. Incorporate recommendations in typical section(s).

420 Evaluate Illumination Needs and Develop Recommendations

Assess illumination needs and prepare preliminary illumination concept in accordance with current national and state standards and guidance, including the AASHTO *Roadway Lighting Design Guide* and the *National Electrical Code*.

422 Determine Need/Locations of Structure-Mounted Illumination

In conjunction with the overall illumination needs and Structure Layout for Design submission review, determine when lighting on bridges should be provided and the basic lighting requirements (e.g., light intensities, and types and location of luminaries).

424 Identify Potential Railroad Involvement

Construction activities conducted on over, under or immediately adjacent to a railroad right of way are subject to review by the affected railroad. Identify railroad involvement as early as possible. The designer, through the lead division, should develop a list of railroad facilities that might be affected by construction, accompanied by a map and/or plan and the name of the owning railroad.

426 Initiate Coordination and Railroad/Highway Agreement (if Applicable)

By memorandum from the lead division to the Utilities section, with a project location map and description attached, request that railroad coordination be initiated. The Utilities section will contact the railroad and request an estimate for the railroad's Preliminary Engineering (preconstruction) work.

428 Prepare/Execute Railroad/Highway Agreement for Preliminary Engineering (if Applicable)

The Utilities section prepares a Railroad/Highway Agreement for Preliminary Engineering (preconstruction) as outlined in the Public Service Facility Policy and Procedures for Highways, III and V. After the agreement is executed, the Utilities section requests a purchase order.

430 Schedule and Conduct Railroad Meeting (if Applicable)

For projects affecting highway bridges over railroads, the designer should contact the railroad to arrange a meeting to determine controls and establish clearances. The lead division and Utilities section railroad liaison engineer should participate. The liaison from the Division of Bridges and Facilities should also participate for Highway-Design-lead projects involving railroad bridges.

432 Obtain Approval of Railroad Clearances (if Applicable)

Following the railroad meeting, the designer should prepare railroad clearance diagrams and an "Approval of Railroad Clearance" form in accordance with the Bridge Design Manual. For approval roles, see Section 4.5.3.

434 Determine Navigation Clearance Requirements (if Applicable)

When the project has the potential to alter the clearance at a water crossing, the designer should determine the navigability of the watercourse. Some watercourse segments have already had their navigability determined, whereas others have not. The existence and result of previous determinations and requests for new determinations can be obtained via request from the Office of Environmental Planning. For some locations, coordination between the Office of Environmental Planning and US Coast Guard may be needed to determine navigability and corresponding clearance requirements.

436 Execute Approved Pilot Boring Plan (if Applicable)

For some projects, the subsurface exploration is conducted in two phases, Pilot Borings during preliminary design followed by a more intensive final design effort (Subsurface Exploration Program). The designer should review all available data on subsurface conditions and assess the need for pilot borings in preparing the Preliminary Design or Structure Type Study(s) submissions. When Pilot Borings are needed, a proposed plan should be submitted to the Department for review. The implementation process, albeit for a less extensive investigation, is essentially the same used for the Subsurface Exploration Program.

The results and analysis from the Pilot Boring Plan are included with the above-noted submission, including a summary in the Preliminary Design Report.

438 Identify Sign Support Structures (Bridge-Supported & Sign-Only Structures)

Project-wide signing recommendations are developed through another activity (Develop Preliminary Signing Plan). Based on the project-wide signing plan recommendations, identify structure-mounted sign supports and tubular and truss sign support structures.

440 Prepare Subsurface Exploration Program

The designer should prepare a proposed Subsurface Exploration Program (SEP) consisting of:

- A brief narrative which describes the overall program, the types of explorations recommended,
- Discussion of any unusual requirements (e.g., access issues, limiting Maintenance and Protection of Traffic factors, scheduling/timing constraints, permits, etc.),
- Proposed contract specifications including invitation to bid, proposal, bid sheet and contract agreement; the Geotechnical Engineering Manual, Chapter 3 appendix includes a sample contract,
- 1" = 40' scale plan sheets denoting the location of proposed explorations,
- Detailed quantity and cost estimate.

The proposed SEP is submitted with the Preliminary Design submission.

442 Prepare/Deliver Condition Survey and Rehabilitation Study(ies)

When an existing bridge structure is contemplated for retention (i.e., will continue in use under post-project condition), obtain and review the latest bridge inspection report, conduct a survey and prepare a rehabilitation study report in accordance with the Bridge Design Manual.

444 Prepare/Deliver Structure Type Study(ies)

When the Department determines a new structure is needed, the designer should prepare a Structure Type Study in accordance with the Bridge Design Manual.

446 Prepare Preliminary Staging and Maintenance and Protection of Traffic Concepts

The designer should develop and evaluate alternative conceptual approaches for construction phasing and associated traffic management. The lead division should request/obtain relevant "Limitation of Operations" for any affected expressways from the Division of Traffic Engineering. The designer should discuss alternatives (i.e., advantages and disadvantages) and recommend an approach. For major projects, prepare 1" = 200' concept plan(s) and narrative. For minor and intermediate projects, a narrative should be provided and accompanied by graphics when needed to clearly convey the intent and evaluate the feasibility.

448 Begin Transportation Management Plan Development

Determine if project is "significant" under the Department's Work Zone Safety and Mobility Policy. Evaluate and characterize probable transportation effects at, and beyond, the project location and its immediate approaches. Based on anticipated impacts, consider the need for Transportation Operations and Public Involvement components. Develop candidate Transportation Management Plan (TMP) mitigation strategies and recommendations. For projects of moderate to high complexity, develop a 1" = 200'

scale concept plan and descriptive narrative. Narrative and graphics (e.g., plans, cross sections), as appropriate should be used for less complicated projects. Include with the Preliminary Design submission.

450 Develop Preliminary Signing Plan

Prepare a preliminary signing plan (1" = 200') for inclusion in the Preliminary Design submission.

452 Delineate and Map Wetlands

An element of field survey is the identification, verification, delineation and mapping of any regulated activities within resources regulated by the Connecticut DEP and/or USACOE.

Identify DEP-regulated inland wetlands based on soil type as defined in CGS Section 22a-38. Boundaries will be field verified by a State certified soil scientist. Identify watercourses based on the CGS Section 22a-38 definition. Identify Tidal Wetlands based on the CGS Section 22a-29 definition. Identify USACOE-regulated waters and wetlands based on the definition in 33 CFR 328 and current applicable references

Field verified wetlands, waters and watercourses will be accurately depicted on design plans and index plans included as part of the Preliminary Design submission and subsequent submissions.

454 Obtain Hydraulic Engineer Approval (if Applicable) (Consultant-Designed Projects Only)

The engineer designing a structure draining one square mile or more requires Department approval for each project (i.e., approval for a previous project is not sufficient) as outlined in Drainage Manual 1.2.4. Approval requests for previously qualified engineers to work on other State projects will not require the resubmission of a resume. However, an approval request for the current project together with a copy of the Department's prior approval letter and an updated list of hydraulic designs performed by the candidate is required. See Section 4.5.1.

456 Obtain Approval for Hydraulics/Drainage Programs to Be Used (if Applicable) (Consultant-Designed Projects Only)

Any hydraulic and drainage software intended for use and not identified in the Drainage Manual require approval as outlined in Drainage Manual 1.1.3. See Section 4.5.2.

458 Identify Floodways, Floodplains, Stream Channel Encroachment Lines and Watercourses

Identify floodways and floodplains within the project impact area and evaluate floodway related considerations and design alternatives (e.g., avoidance, encroachment) as outlined in Drainage Manual 2.3 and Drainage Manual 3.11. Identify Stream Channel Encroachment Lines (shown on maps on file in the Town Clerk's office in the affected town) and evaluate project alternatives with considerations noted in Drainage Manual 3.11. Identify lines and consider design alternatives. Also, determine which crossing are

to be considered watercourses as outlined in Drainage Manual 3.4.4. Collect documented determinations on these features and resources and conduct a field view. Characterize presence and effects of design choices. Provide information as outlined in Drainage Manual, Chapter 3, Appendix B (Hydraulics and Drainage Submission Check List). Include information in the Preliminary Design Report.

460 Meet with DEP Fish Biologist and Determine Fish Passage Locations

When a project crosses or relocates a watercourse, a meeting at the project site should be arranged by the lead unit with the DEP fish biologist and a representative from the Department's Hydraulic and Drainage unit. The meeting should be held prior to the completion of Preliminary Design and in advance of hydraulic design. The purpose of the meeting is to review project impacts and which, if any, crossings and channels should be provided with fish passage. Refer to the DEP Stream Crossing Guidelines. Information on proposed fish passage facilities will be included in applicable permit applications.

462 Investigate and Confirm Major Drainage Areas

Revisit previous evaluations of major drainage patterns within the project area. Identify significant crossings and determine contributing areas. Include information in Preliminary Design Report as outlined in Section 3.1.4.

464 Determine Design Information for Structures Draining > 1 Square Mile

Prepare hydrology studies and hydraulic analysis and bridge scour design for structures draining more than one square mile.

466 Develop Conceptual Drainage Design

Develop a conceptual drainage plan as outlined in Drainage Manual 3.4.

468 Analyze Adequacy of Existing Drainage Systems under Proposed Conditions

Determine how the conceptual drainage design is likely to impact the existing drainage facilities as outlined in Drainage Manual 3.4.3.

470 Develop Sedimentation and Erosion Control Plan

Prepare a conceptual Sedimentation and Erosion Control plan indicating the locations and type(s) of proposed protection.

472 Review/Update Environmental Requirements

Environmental factors strongly influence both substantive design decisions (i.e., designs to avoid impacts) and the effort and time required to complete process requirements (e.g., analysis, coordination, reviews, approvals). Periodic review of environmental decisions, rendered and pending, is needed to ensure the design schedule reflects processing time and that the final design is consistent with the environmental commitments.

Environmental Review and final CEPA/NEPA documentation (CATX, EA/FONSI, EIS/ROD) and permits are the principal sources of information for affected resources, required analysis and commitments. In addition to requirements that emerge from regulatory processes, the Department may also make other commitments to stakeholders (e.g., town, advocacy group). These non-regulatory commitments are documented through either correspondence or other means (project commitment form).

Each version of the Design Report (e.g., Preliminary Design, Semi-Final Design) should include a comprehensive list of commitments and the means by which each has been or will be fulfilled (e.g., inherent to the design, special provisions with restrictions, inclusion of specific items for mitigation).

474 Prepare Preliminary Schedule of Property Owners and Mylar Base

Prepare the Preliminary Schedule of Property Owners for inclusion in the Preliminary Design Report and a Mylar base survey plan with the proposed baseline.

476 Estimate/Update Project Cost

Cost is always considered in design decisions. Cost estimates are prepared or updated at specific points in the development process (alternatives comparison, each submission). When comparing alternatives, use the same method and comparable level of detail for each. Review the Department's Preliminary Cost Estimating Guidelines.

478 Prepare Preliminary Design Report

A Design Report is prepared as an element of the Preliminary Design submission and each subsequent submission (i.e., Semi-Final Design, Final Plans for Review, Final Design Plans). Guidance for preparing Design Reports is provided in Section 3.1.4. The contents and specificity provided evolve commensurate with the stage of development.

480 Prepare/Deliver Preliminary Design Submission

Prepare the Preliminary Design submission as outlined in Sections 2.3.2 and 3.2.3.

482 Distribute Preliminary Design Submission for Review/Comments

When the Preliminary Design submission is delivered, it should be reviewed for completeness and circulated as outlined in Section 3.2.1. A template for the distribution memorandum is located in the ProjectWise Project Development folder.

484 Compile Written Comments on Preliminary Design Submission

The lead division assembles the comments from review units.

486 Schedule and Conduct Town Road Meeting

Key elements of the Preliminary Design submission (e.g., plans, design report, cost estimate) should be provided to the affected municipality. The lead division should schedule a meeting (with designer participation) with the affected town(s) to provide the progress and status of the project and discuss any town comments and concerns. Send a letter to the town confirming the meeting purpose, date, time and location. The Department representative(s) should brief the municipal officials on the project (status

and schedule of development) and discuss Department policy requiring Town cost sharing, if applicable. Following the meeting, send a follow-up letter to the municipality, signed by the division manager, summarizing the meeting discussion and conclusions. A template for this document is located in the ProjectWise Project Development folder.

488 Schedule and Conduct Preliminary Design Review Meeting

After the review period, the lead unit schedules a Preliminary Design meeting to discuss review comments. At the meeting, the designer should present the Preliminary Design, using the color-coded plans (as described in Section 3.2.3). Units with relevant expertise (e.g., Environmental Compliance, Soils, Hydraulics and Drainage, Traffic Engineering) and those providing comments on the Preliminary Design submission should be invited to attend. To the extent practical, the meeting should be used to clarify background for the design and elaborate on review comments. In some cases, comments can be resolved.

490 Submit Structures Studies for Review/Approval

Following the Preliminary Design meeting, submit Structure Type Studies and Rehabilitation Studies in accordance with the Bridge Design Manual. The Department's approving office will review and approve the recommendations or provide alternative direction. See Sections 4.5.4 and 4.5.5.

492 Schedule and Conduct Design/Right-of-Way Meeting

Whenever property rights (right of way or easements) are required, the lead division will schedule and conduct a Design/Right-of-Way meeting, usually immediately after (i.e., same day as) the Preliminary Design review meeting. A template for the memorandum scheduling this meeting is located in the ProjectWise Project Development folder. The designer will provide a Mylar base plan for the meeting. The Preliminary Schedule of Property Owners, submitted as part of the Preliminary Design submission, should be confirmed or updated and be redesignated as the Schedule of Property Owners.

494 Prepare Title Search

The Division of Rights of Way prepares the title search and compiles the information on the base plan upon request of the lead division. The Preliminary Schedule of Property Owners is prepared by the lead unit prior to the Design/Division of Right of Way meeting and reviewed at the meeting. A template for the Schedule of Property Owners is located in the ProjectWise Project Development folder. When the title search is complete or updated, it is provided to the lead division.

496 Develop Design Exception Documentation

When design exception approval, as described in Highway Design Manual 6-6, is required the designer should prepare the request and supporting documentation. The design is not final until any required design exceptions are submitted and approved as described in Sections 3.3.4 and 4.7.1. Internal staff and management reviews precede approval.

498 Request/Receive CATX Documentation Approval

Prepare documentation for the automatic, programmatic or individual categorical

exclusion documentation in accordance with the Environmental Review Form, applicable regulations and the "Programmatic Agreement for Approval of Certain Categorical Exclusions between the Federal Highway Administration and the Connecticut Department of Transportation" which is located in the ProjectWise Project Development folder. Prepare the project documentation and secure the necessary signatures. A copy with original signatures should be in the lead unit's project file. See Section 4.7.3.

500 Evaluate Consistency with Environmental Document and Commitments

Check current project design for consistency with environmental documentation (scope of project, impacts) and environmental commitments. The Design Report includes a comprehensive list of commitments and means by which each is fulfilled (e.g., inherent to the design, special provisions with restrictions, inclusion of specific items for mitigation).

502 Request/Receive Design Approval

A project may not advance to final design until Design Approval has been issued. Certain requirements related to design definition, public involvement, coordination, major cost identification and environmental documentation must be satisfied prior to Design Approval. See Section 4.7.5.

Key information is compiled in the Design Approval request. A template for this document is located in the ProjectWise Project Development folder. The following subjects are covered:

- Description,
- Purpose,
- Funding,
- Schedule,
- Public involvement,
- Design features,
- Exception to design standards,
- Environmental documentation,
- Public utilities,
- Rights of Way impacts,
- Final design cost
- Estimated total project cost,
- Value Engineering Study, and
- Hazardous/contaminated materials.

Design Approval is made by the either a Department official or the FHWA as indicated by Section 4.7.5 and the Joint Stewardship & Oversight Agreement. Templates for various project categories (oversight, funding), each with signature/endorsement lines, are located in the ProjectWise Project Development folder.

504 Assess/Adjust Administrative and Fiscal Status

Advancing a project from preliminary design to final design requires approval as indicated by Sections 4.1 and 4.1.1. Prior to seeking approval for final design, review previously-approved funding, expenditures and balances relative to approved and anticipated needs through CORE-CT. Begin preparation of a Project Memorandum, Modification in anticipation of the first activity listed under Final Design Phase, Section 2.3.3 (Authorize Final Design).

The lead division should also evaluate the agreement and consultant scope related to subsequent phase(s) (e.g., final design and construction). If the provisions are not consistent with the anticipated needs (i.e., not representative of future phases), a supplemental agreement or another type of contract revision (e.g., extra work) may be needed. Initiate and complete the administrative steps needed to prepare for final design and construction phases.

506 Request/Obtain Consultant Supplemental Agreement (if Required) (Consultant-Designed Projects Only)

If the status review indicates the current consultant agreement is not adequate for anticipated future consultant services, initiate a supplemental agreement. Commissioner approval is required to enter into supplemental agreements. To obtain approval, the Bureau Chief, Engineering and Construction submits a memorandum (drafted by the lead division) to the Commissioner requesting approval. The Commissioner's endorsement (for approval or disapproval) documents the decision.

The development/preparation of a supplemental agreement is similar to that for an original agreement, including scope approval, independent price proposals and negotiation.

Consultant supplemental agreements, like original agreements, are drafted by the Department's Agreements section. After the supplemental agreement is prepared, it is circulated for review/approval signatures by the consultant, Bureau Chief (Engineering and Construction), Attorney General and the Department's EEO Contract Compliance Office. A funding/fiscal review is also made. When the supplemental agreement is fully executed, a copy is provided to the lead division, which then sends the consultant a copy. See Sections 4.4.2 and 4.4.3. When called for by the Joint Stewardship & Oversight Agreement, provide a copy to FHWA.

2.3.3 FINAL DESIGN PHASE

The general purposes of this phase are outlined in Section 1.5.1. This section provides detailed guidance.

600 Authorize Final Design

Final design must be authorized separately (i.e., not under the preliminary design authorization) as indicated by Section 4.1. Design Approval is required prior to beginning final design.

For FHWA-funded engineering projects, the permissible limits of preliminary design activities are set forth in regulations (23 CFR 771.113, 23 CFR 636.103) and clarified by FHWA Policy on Permissible Project Related Activities During the NEPA Process as indicated in Section 1.5.1.

After verifying the availability of funding and administrative mechanisms by a previous activity (Assess/Adjust Administrative and Fiscal Status), complete the requirements indicated in Section 4.1.1, including the Financial and Programming approval (Modification) component. As also noted in Section 4.1.1, a notice to proceed is required before consultants can undertake compensable work.

602 Review/Update Public Involvement Plan

Review the Public Involvement Plan in consideration of project status and direction using the Department's Public Involvement Guidance Manual and Public Involvement Procedures. Update the Public Involvement Plan for the final design phase.

604 Resolve Preliminary Design Comments

Comments on the Preliminary Design submission should be resolved very early in final design, prior to the next milestone submission. Some comments may be tentatively resolved (and resolution documented) at the Preliminary Design review meeting (Schedule and Conduct Preliminary Design Review Meeting). After considering the review comments, the designer proposes a resolution for each. When needed, the designer and commenter should meet to discuss and resolve the comment. Ultimately, the project manager determines the final resolution and disposition of comments.

606 Schedule and Hold Design Field Check

Conduct a field visit to observe conditions and features (e.g., critical controls, regulated resources, development) related to final design and review proposed sedimentation controls.

608 Finalize Definition of Ancillary Features

Define type(s) and locations of various design features (e.g., barrier end treatments, fences, support systems).

610 Define Noise Barrier Geometry (if Applicable)

Identify limits (begin and end points), offsets and top elevation of all noise walls. Identify and design any access provisions.

612 Complete Typical Sections, Plans, Profiles and Cross Sections

Update the typical sections, plans and profiles and cross sections based on Preliminary Design comments and other developments. Each milestone submission should reflect previous comments, developments and current conditions.

614 Schedule and Hold Permit Coordination Meeting

Department policy and general roles related to environmental permits for projects are outlined in a Policy Concerning the Processing of Environmental Permits and Permit

Compliance for all Aspects of Project Development, Construction, and Operations (Policy No. EX.O-29). The project's Environmental Review Form will indicate the required permits, as anticipated at the time of the review.

The procedural and substantive requirements for attaining the required permits can be complex, exacting and extensive. Requirements also change. Completing the various processes requires clear communication and attention to detail. To set direction and establish clear paths of communication, the lead division/designer should meet with representatives from the Office of Environmental Planning and Hydraulics and Drainage unit to identify the required permits and roles of the various parties.

616 Prepare Permit Applications

The required permit types, process requirements and schedule should be established through the Permit Coordination Meeting and follow-up communications. The designer completes the applications and supporting documentation. The lead unit/designer submits the material for review to the OEP. Comments and the need for revisions are common.

618 Review/Submit Permit Applications

Completed permit applications are reviewed by the project manager and then transmitted to the Office of Environmental Planning for processing. The Office of Environmental Planning applies for permits (i.e., submits applications) on behalf of the Department.

620 Complete Environmental Studies and Update Requirements

After the CEPA/NEPA documentation is complete, additional environmental studies during final design are often needed (e.g., final noise studies, wetland mitigation plans, implementation of Section 106 MOA measures). Each of these activities should be identified, initiated and completed in a timeframe consistent with the project schedule. When applicable, communicate new/revised commitments and requirements to consultant designers for inclusion in Design Report. Any commitments and requirements emerging from these studies should be included in the overall project list.

622 File Section 13a-57 Layout Plan with Town (if Appropriate)

CGS 13a-57 allows the Department to file layout plans with municipalities to "freeze" all zone changes within the project corridor. Layout Plans are prepared for projects on a selective basis. When the need for a Layout Plan is anticipated, it is prepared by the designer in cooperation with the Central Surveys section. The lead unit transmits the Layout Plan to the town and publishes the legal notice.

624 Coordinate Design with Environmental Compliance Studies (if Applicable)

When the Request/Receive Hazardous/Contaminated Materials Screening indicates that additional investigation is needed, the Environmental Compliance section is invited to the Preliminary Design meeting to develop a plan for integrating their work into the project development and delivery process.

The typical post-screening sequence is to perform a Corridor Land Use Evaluation (Environmental Compliance Task 110) to determine if a Subsurface Site Investigation (Environmental Compliance Task 210) is needed. However, the Request/Receive Hazardous/Contaminated Materials Screening may indicate that neither activity is needed or that a Subsurface Site Investigation should be conducted without having first performed a Corridor Land Use Evaluation.

The evaluations, when required, are normally performed by an Environmental Compliance consultant, not the design consultant. Reports are prepared and provided to the lead division/designer. The designer provides status and schedule information to the Environmental Compliance section.

626 Integrate Environmental Requirements and Commitments

Throughout the course of project development, the Department may make numerous statements and representations through environmental documents, public meetings, correspondence and permit applications. Review final CEPA/NEPA documentation (CE, EA/FONSI, EIS/ROD), Environmental Reviews and permits for commitments. In addition to requirements that emerge from regulatory processes, the Department may also make other commitments to stakeholders (e.g., town, group). Identify each commitment and how it has been (e.g., the designed alignment avoids a wetland), or will be (e.g., special provision will restrict work hours near noise-sensitive property), fulfilled.

Each version of the Design Report (e.g., Preliminary Design, Semi-Final Design) includes a comprehensive list of commitments and means by which each is fulfilled (e.g., inherent to the design, special provisions with restrictions, inclusion of specific items for mitigation).

628 Prepare Sedimentation and Erosion Control Plan

Prepare Sedimentation and Erosion Controls plans (1" = 40' scale). Details for sedimentation basins and other sedimentation control devices shall be prepared on separate sheet showing all pertinent dimensions and notes.

630 Prepare Turf Plans

Prepare plans indicating:

- Furnishing and placing topsoil,
- Turf establishment, and
- Sodding.

Develop an index plan (1" = 200' scale) and show specific treatments at an appropriate scale (e.g., 1" = 40') plan and typical cross section sheet(s). Include a legend on the first plan sheet.

632 Prepare Detour Plans and Coordinate with Town (if Applicable)

Detours are sometimes established over local roads to complete work on State facilities. Initiate coordination with the municipality owning the detour facility when the need for such a detour is anticipated.

The lead unit should schedule a meeting with appropriate municipal officials (e.g., emergency services, engineering) to brief them on the project and establish points of contact for coordination. The lead unit should explain that State law (CGS 13a-147) requires restoration of any highway or bridge damage caused by traffic detoured from a State highway or bridge project. Following the meeting, a letter to the chief municipal official should be prepared for signature by the lead division manager summarizing the meeting and specifically outlining the State's responsibilities for repairing damage to municipal facilities.

634 Prepare Stage Construction Plans (if Applicable)

When needed to communicate the contemplated order of construction phasing, the designer should prepare Stage Construction plans. The plans should be at a suitable scale and include appropriate details (e.g., typical sections, barrier locations). Through notes and graphics clearly convey the intended work during each phase and phase sequence. Also indicate the method of removing temporary roads and bridges.

636 Execute Public Involvement Plan Elements

Carry out the elements of the Public Involvement Plan (previously developed/updated) identified for the final design phase.

Public meeting notice and content disclosure are currently governed by the State's Freedom of Information Act (Title 1, Chapter 14). Most public meetings related to Department projects (e.g., information meetings, public hearings) are classified as "special meetings" under the statute. Review and comply with current requirements.

638 Execute Approved Subsurface Exploration Program

The proposed Subsurface Exploration Program (SEP) is submitted with the Preliminary Design submission. The lead division transmits the proposed the SEP to the Soils and Foundation section for review and comment. Upon Department approval of the SEP, the consultant sends an invitation to bid and all related contract documents to all test boring contractors (listed in Geotechnical Engineering Manual, Chapter 3 appendix) via email.

After bids are opened, list and review the individual item costs of all bids received. The consultant may proceed with contract award to the low bidder provided the following conditions are met:

- More than one bid is received,
- No irregularities are noted in the bid prices of the low bidder,
- The total cost of the program is within the negotiated direct-cost estimate.

The consulting engineer shall document this process and provide the Department with a copy of their evaluation. If the above conditions are not met, or if rejection of the low bidder is recommended, the consulting engineer will forward to the Department their evaluation of the bids and a recommendation for award. The Department may either approve the award, or require the contract be readvertised for bid.

The consultant geotechnical engineer will supervise execution of the Subsurface Exploration Program and modify the program, as necessary, based on field conditions. Should the field conditions require a significant change to the pilot boring program, the consultant geotechnical engineer will immediately contact the Department and advise them of the necessary changes.

640 Prepare Geotechnical Engineering Reports

Prepare and submit roadway and structure geotechnical report(s) with the Structure Layout for Design, Semi-Final Design and Final Plans for Review submissions and a final geotechnical report as outlined in the Geotechnical Engineering Manual.

642 Prepare/Deliver Structure Layout for Design (SL/D)

Following approval of the Structure Type studies, the designer should prepare the Structure Layout for Design (SL/D) for all bridges, box culverts and retaining walls in accordance with the Bridge Design Manual.

644 Prepare Final Structures Plans

Following SL/D approval, advance the design of structures, in accordance with the Bridge Design Manual, through the Final Plans for Review Final and Final Design Plans submissions.

The plans for individual structures (i.e., bridges and retaining walls) are to be prepared as "self-contained" sets. Details shall be drawn to scale on sheets specific to the various components of the structure. For example, there will be a general plan, a foundation plan, an abutment plan, pier plans, framing plans, etc.

646 Survey Condition of Existing Drainage Facilities to Remain in Use

Conduct a condition survey and analyze existing drainage system elements (pipes, structures, swales, ditches, etc.) for adequacy under proposed conditions. Evaluate durability, hydraulic capacity, structural capacity and pipe materials. Reference Drainage Manual 4.1.3 and Chapter 4 Appendices A (Culvert Inspection Guideline) & B (Drainage Facility Condition Surveys Guideline). If found inadequate, design a replacement system to conform to Drainage Manual criteria.

648 Complete Drainage Design

Advance the drainage design to completion through the Drainage/Semi-Final Design, Final Plans for Review and Final Design Plans submissions as indicated in Drainage Manual 3.6, 3.7 and 3.10 (Drainage Guidelines for Resurfacing Projects), as appropriate.

650 Prepare Drainage Report

Prepare draft (for Drainage, Semi-Final Design submissions) and final (for Final Plan for Review and Final Design Plan submissions) reports as indicated by the Drainage Manual, Chapter 3, Appendix B (Submission Check List).

652 Prepare Hydrologic, Hydraulic, Stream Channel Encroachment Line and Scour Reports

When applicable, prepare draft (for Drainage, Semi-Final Design submissions) and final (for Final Plans for Review and Final Design Plan submission) reports as indicated by the Drainage Manual, Chapter 3, Appendix B (Submission Check List).

All new and existing structures should resist scour-related damage. Specific guidelines have been established for the design and analysis of bridge foundations through a multidisciplinary effort of hydraulic, structural and geotechnical factors as outlined in Drainage Manual Chapter 9 and Bridge Design Manual Section 5.14. Design engineers should also be thoroughly familiar with the FHWA-published reports *Evaluating Scour at Bridges* (HEC-18), *Stream Stability at Highway Structures* (HEC-20) and *Bridge Scour and Stream Instability Countermeasures* (HEC-23).

654 Develop Maintenance and Protection of Traffic Plans and Specifications

Complete the design and prepare associated contract documents to implement the selected Maintenance and Protection of Traffic strategy. This includes all necessary plans and specifications for temporary signals, construction signing, temporary pavement markings and temporary illumination as required to maintain and protect traffic operations. The geometry for all detours should be compatible with the approaching highway and detour plans shall equal or exceed the requirements of MUTCD Part VI. Incorporate applicable "Limitation of Operations" (as developed by the Division of Traffic Engineering) for expressways and associated liquidated damages.

The scale of Maintenance and Protection of Traffic plans shall be established based on project length and complexity. Special provisions for Maintenance and Protection of Traffic (section 9.71) and Prosecution and Progress (section 1.08.04) should be included with the Semi-Final Design and subsequent submissions.

656 Prepare Final Signing and Pavement Marking Plans

Complete design and prepare associated contract documents for traffic signs and pavement markings. Pavement marking plans for non-limited access highways are typically prepared at a scale of 1" = 40' scale or on traffic signal plans. For projects on limited-access highways, the scale of the plans should be established based on length and complexity. Include a legend, dimensions, notes and details to supplement and clarify the plan sheets.

Establish the precise location, legend (text, fonts, colors, symbols) and other requirements for all traffic signs. All signing details and locations shall be included in the contract documents.

658 Prepare Traffic Control Signal Plans, Specifications and Related Information

Prepare a traffic signal plan sheet for each traffic signal. Complete signal plans as outlined in the Traffic Control Signal Design Manual.

660 Complete Transportation Management Plan

Complete the Transportation Management Plan (TMP) as outlined in accordance with the Department's Work Zone Safety and Mobility Policy. A TMP may consist of three components, Temporary Traffic Control (TTC), Transportation Operations (TO) and Public Information/Public Outreach (PI/PO).

All projects require a TMP, with the scope depending on the anticipated transportation impacts. For projects not classified as significant, a TTC plan alone is generally adequate (i.e., the PI and TO components may not be needed). Projects classified as "significant" under the policy require a broader/regional assessment and the potential need for all three TMP components is greater.

Implement the TMP provisions through contract provisions, other service providers (e.g., public information consultants) and coordination with other organizations (e.g., municipalities, transit operators, emergency services, media outlets). Secure approval as indicated in Section 4.3.3.

662 Conduct Constructability Review

Constructability reviews are performed by the Department's Quality Assurance unit as outlined in the Constructability Review Program. The comments and recommendations from these reviews are considered in advancing project development.

664 Conduct and Implement Value Engineering Study

Value Engineering studies are conducted of some projects during development as outlined in the Department's Value Engineering Program, which provides general information on the projects selected and the timing of Value Engineering studies. The Quality Assurance unit (within the Office of Construction) selects the projects and conducts Value Engineering studies, often with consultant support.

The Value Engineering team prepares a report summarizing the study and recommendations, which are reviewed by the designer and various Department units. The project manager determines the final disposition of all recommendation and prepares summary documentation. The lead division provides the summary to the Quality Assurance unit, which in turn notifies the FHWA of the conclusions. The lead unit coordinates implementation of any adopted recommendations with the design consultant.

666 Prepare/Execute Municipal Agreement (if Applicable)

Agreements are needed when a municipality will assume responsibility for a portion of the construction cost or a special responsibility (i.e., not assigned by law or another agreement) related to the project. Various Department policies (e.g., Cost Sharing on Drainage Installations, Fire Suppression Standpipe Systems, Sidewalks) identify conditions for which municipal agreements are required. Several municipal agreement templates are available. The lead division should coordinate with the Bureau of Finance and Administration, Agreements section on the preparation and execution of the municipal agreement for the project. Agreements are executed by the municipality and Department and reviewed/approved by the Attorney General's office.

668 Complete Illumination and Electrical Supply Plans

Prepare the illumination plan and details in accordance with the AASHTO *Roadway Lighting Design Guide* and the National Electrical Code. The Semi-Final Design submission should include plans showing the illumination layout, design criteria, legend, notes and the electrical layout. The submission should also include miscellaneous detail sheets, lighting and electrical calculations and proposed special provisions.

The Final Plans for Review submission should reflect all corrections and completion of the Semi-Final Design submission, plus pay items, quantities, cost estimate, and correspondence with Utilities. Illumination/electrical information must be properly coordinated with all highway, bridge, drainage, signing, and signal designs. Highway and bridge plans shall reflect illumination/electrical appurtenances as required.

670 Develop Utility Milestone Schedule

Based on the design schedule, the designer should establish a schedule of utility activities and milestones dates (e.g., receipt of test pit requests, test pit results, Utility preliminary engineering and construction cost estimates, plans and specifications). The information will be provided at the Design/Utility Meeting, as subsequently described. The target dates should allow ample coordination time to ensure that test pit data is obtained, design adjustments are made where feasible and utility relocations designed, within the overall project development schedule.

672 Provide Utilities with Plans and Hold Design/Utility Meeting(s)

The designer should forward one set of "dated" plans to each Utility, together with cross sections as available in the area of the utility involved. These plans should show drainage layouts and taking and non-access lines. Further, indicate to the Utilities that the plans are preliminary and that drainage has not yet been finalized. The plans provided to the Utilities should indicate the limits of federal participating and non-participating sections. Additionally, identify the limits of the various project numbers and/or contracts on the plans if multiple projects or contracts are planned.

The letter should also establish a Design/Utility Meeting date, time and location. The designer will facilitate the meeting. Test pit requirements and expected impact on each Utility's facilities will be identified.

At the meeting, the designer should provide Utilities with milestone dates and secure their commitment to the schedule.

For some projects, more than one meeting with utilities is required. Subsequent meetings are often needed to provide updated status and track progress of utility plan submittal dates. The designer will coordinate with individual Utility representative, including providing design plans and schedules changes.

674 Obtain Preliminary Engineering Cost Estimates from Utilities

The Utilities section obtains Preliminary Engineering and Test Pits cost estimates from Utilities as outlined in the Public Service Facility Policy and Procedures for Highways, III.

676 Prepare/Execute Utility Preliminary Engineering Agreements

The Utilities section prepares a Utility Preliminary Engineering Agreement as outlined in the Public Service Facility Policy and Procedures for Highways, III and V. After the agreement is executed, the Utilities section requests a purchase order.

678 Identify Long-Lead Utility Material Orders and Operations

Inquire and identify concerns regarding timetables for ordering of materials and utility relocation as described in the Public Service Facility Policy and Procedures for Highways, VII. The Department may, after due considerations, authorize advance utility expenditures (materials purchases, relocations).

680 Utilities Request Test Pits

Utilities identify required test pits as outlined in the Public Service Facility Policy and Procedures for Highways, III.

682 Test Pit and Survey Utility Facilities

Dig the test pits and field survey the utility locations as outlined in the Public Service Facility Policy and Procedures for Highways, III. For projects with survey by State forces, a template for the memorandum requesting test pits is located in the ProjectWise Project Development folder.

684 Provide Utilities with Base Plans

Provide the Utilities with design plans (electronic or Mylar) as outlined in the Public Service Facility Policy and Procedures for Highways, so that the utility relocations may be shown in relation to the proposed construction.

686 Receive and Review Utility Information-Only Plans

Utilities prepare “For Information Only” plans indicating the utility adjustments to be performed by Utility personnel in accordance with the Public Service Facility Policy and Procedures for Highways, III. The plans, special provisions and cost estimates are provided by the Utilities to the designer, which are reviewed for compatibility with the proposed design and construction operations. The designer contacts the Utilities and resolves all concerns. After the concerns are resolved, the designer creates a set of utility relocation plans, special

provisions. This information is provided to the Department's Utilities section to facilitate writing utility agreements.

688 Obtain Construction Estimates from the Utilities

The Utilities section obtains cost estimates for relocations from the Utilities as outlined in the Public Service Facility Policy and Procedures for Highways, III.

690 Prepare/Execute Utility Construction Agreements

The Utilities section prepares a Utility Construction Agreement as outlined in the Public Service Facility Policy and Procedures for Highways, III and V. After the agreement is executed, the Utilities section requests a purchase order.

692 Prepare Documentation for Railroad Regulatory Process (if Applicable)

When a railroad is located within the project limits and the scope has been determined, the lead division will consult with the Bureau of Public Transportation, Office of Rail, Rail Regulatory and Compliance Unit to determine if the project is subject to a Rail Regulatory approval process.

If Rail Regulatory approval is required, meet with Rail Regulatory and Compliance staff and others (e.g., Utilities section, operating railroad) to identify information and coordination requirements. The designer shall prepare a Railroad Regulatory plan and necessary petition and attend any regulatory hearings.

694 Obtain Railroad Regulatory Approval (if Applicable)

The lead division, with assistance from the Utilities section, coordinates submission of the petition and obtains Rail Regulatory approval. The designer shall attend the regulatory hearing(s). See Section 4.7.7.

696 Obtain Railroad Construction Estimate (if Applicable)

Construction work taking place, on, over, under or immediately adjacent to a railroad right of way is subject to review by the affected railroad. If construction-phase involvement by railroad forces is anticipated (e.g., protective services, facility relocation), a Railroad/Highway Agreement will be needed. The Utilities section obtains relocation cost estimate from the Railroad as outlined in the Public Service Facility Policy and Procedures for Highways, III.

698 Incorporate Railroad Protective Provisions (if Applicable)

Construction work taking place, on, over, under or immediately adjacent to a railroad right of way is subject to review by the affected railroad and generally requires special provisions for the specific railroad. The designer should coordinate with the Department's Utilities section to obtain, prepare and incorporate the railroad-related provisions.

700 Prepare/Execute Railroad/Highway Agreement for Construction (if Applicable)

The Utilities section prepares a Railroad Construction Agreement as outlined in the Public Service Facility Policy and Procedures for Highways, III and V. After the agreement is executed, the Utilities section requests a purchase order.

702 Obtain/Integrate Provisions for Contaminated Materials (if Applicable)

The Department's Environmental Compliance section, generally with support from its task consultant, will set the direction and process for identifying, characterizing and remediating project-related hazardous and contaminated materials. Through its investigation, the Environmental Compliance section will determine what provisions, if any, are required in the project documents. There is no set path to this determination but typical post-screening activities include: Corridor Land Use Evaluation (Task 110), Subsurface Site Investigation (Task 210) and Design Summary (Task 310). Coordination is established and maintained as previously described (lead division with Environmental Compliance Studies) and the designer will be requested to furnish certain information.

After contaminated and hazardous materials have been identified, characterized and estimated, implementation provisions, in the form of plans, pay items and specifications are integrated into the transportation project construction contract documents by the design consultant.

704 Define All Permanent and Temporary Property Needs

In advance of preparing property maps, the designer shall review field conditions for agreement with the survey mapping and ground survey file(s) updated to correct any discrepancies.

When the project design has progressed to the point where property impacts are defined and generally finalized (i.e. 50%-70% complete), define the limits and type of required property interest (e.g., total takes, partial takes, slope easements, drainage rights of way, rights) in accordance with the Department's Policies and Procedures for Property Maps.

706 Submit/Review Draft Property Map Formats (Consultant-Designed Projects Only)

For consultant-designed projects, the designer should prepare and submit one draft property map of each acquisition type for format review. Each map should be accompanied by a current plan view drawing (and cross sections if appropriate) for reference purposes. The remaining maps should not be submitted until the format review is complete.

708 Prepare/Submit Property Maps

When the design is advanced to where all property interests can be defined, the designer prepares the property maps as outlined in Policies and Procedures for Property Maps. The lead division transmits paper copies of all maps to the Division of Rights of Way for review.

710 Review Property Maps and Check Titles

The Division of Rights of Way uses the advance (paper) Rights of Way maps to check property titles and review the map's conformance with the project needs and procedural and presentation requirements. Title revisions and other comments are provided to the designer, generally in the form of marked-up maps.

712 Acquire Property Interests

The Department's Division of Rights of Way acquires property interests on behalf of the State. As final design nears completion, the Division of Rights of Way communicates the status of acquisition to the lead division. Normally, all required property interests should be acquired before the Prepare/Deliver Final Design Plans Submission activity. When this condition is not met, the lead unit should consider the Obtain Waiver(s) to Advertise step.

714 Submit Final Mylar Property Maps

The Division of Right of Way notifies the lead division when negotiations with the property owner are complete and requests a "fixed line photographic" matte Mylar property map, stamped with indelible red ink and signed and sealed by the registered land surveyor preparing the map.

716 Modify Scope (if Required)

This is not a planned activity and desirably is not needed. Much of the guidance in this publication is intended to avoid the need for major scope revisions.

Design Approval is the point at which the design scope is considered to be defined (i.e., approved). Prior to that point, activities are intended to evaluate the underlying problem and examine and refine alternative solutions. Post-Design Approval activities (e.g., design, permit applications, rights of way) are intended to implement the defined scope. However, despite these efforts, a number of developments (e.g., public opposition, other transportation improvements, new property development, denial of permits) can lead to scope reassessment and potential change.

The project manager may initiate a scope reassessment or be directed to do so. The reassessment should revisit previous determinations (e.g., defined problem, alternatives considered) in the current context. The need for a major scope change implies that, under current conditions, some previous decisions are considered inappropriate. Before recommending a revised scope, the process, resource and schedule ramifications should be estimated. Portions of the development process will need to be repeated, often on an expedited basis. To propose a major scope revision, the lead unit should develop a summary submit it to the Scope Committee for consideration and decision (approval or disapproval) as indicated in Section 4.7.2. A significant change is one of several developments that necessitate an environmental re-evaluation.

718 Request/Receive Environmental Re-evaluation (if Applicable)

All projects require at least one (initial) Environmental Review, some require several. The initial Environmental Review and documentation are completed prior to Design

Approval. An Environmental Review following the initial review is referred to as an Environmental Re-evaluation. An Environmental Review/Re-evaluation should be requested whenever:

- Subsequent to the initial review, the project characteristics (e.g., limits, scope) and/or impacts changed to a material extent,
- Three years or more have passed since the most recent federal action (authorization of phase, approval of previous NEPA documentation or re-evaluation).

The results of the Environmental Review/Re-evaluation dictate the scope of any additional environmental analysis, permits or other requirements.

720 Prepare Drainage Details

The designer should prepare, on a Drainage Detail Sheet, details for all drainage items, including structures, ditches, channels or a series of items constituting a completed drainage structure, not shown on a standard drawing.

722 Prepare Miscellaneous Details

The designer should prepare, on a Miscellaneous Detail Sheet, details for any feature or system (e.g., guide rail, curbing, special pavements, sidewalk treatment) to be constructed or installed that is not detailed in the standard drawings or elsewhere in the contract plans sheet.

724 Implement Approved Requests for Inclusion of Other Work in State Contract

Non-State entities sometimes request certain work be constructed as part of a Department project. Utilities, railroads and municipalities are the most common requesters. Generally, the design and all related contract documents for non-State work are provided by the requester (e.g., utility, railroad, municipality). Minor amounts of non-State construction may be shown on Department plans. A utility, railroad or municipality that wants its work performed by the Department's contractor should submit a letter of request, signed by an authorized representative, to the Department. A letter response signed by lead division manager is used to approve or disapprove the request. When approved, the designer will ensure that the non-State plans, specifications and estimates are included in the construction contract in a manner consistent with the overall contract documents (plans, specifications and estimate).

726 Estimate/Update Project Cost

Prepare estimates for the Semi-Final Design, Final Plans for Review and Final Design Plans submissions as outlined in the Preliminary Cost Estimating Guidelines.

The estimate submitted with the Final Design Plan submission is referred to as the designer's estimate. The Engineer's Estimate is developed during the contract development phase (Prepare Engineer's Estimate). The engineer's estimate is

confidential as outlined by the Department's "Release of Engineer's Cost Estimate" Policy (E&C-34).

728 Determine Construction Contract Time and Bar Chart

To establish and support the determination of contract time, the designer shall develop a schedule bar chart (Gantt chart) for construction of the project. The information is developed and refined through successive project development submissions. For the Semi-Final Design submission the bar chart should identify all major elements and stages and associated durations, winter shutdowns, long-lead procurements and fabrication, periods of permit restriction and third party (e.g., utilities, railroads) work. Address each structure individually. For subsequent submissions, the designer should develop a bar chart schedule based on contract activities and the anticipated start-of-construction date. Provide a total number of calendar days.

730 Identify Salvage Materials and Determine Salvage Credit

By memorandum, the lead division requests that the Office of Transportation Maintenance identify materials for salvage and the desired transfer provisions (location where material is delivered). The designer should evaluate the cost effectiveness of salvaging requested items/materials. The costs of removal, loading, transportation, unloading/placement and other costs, as applicable, should be included in the analysis. Normally, only items and materials for which salvage is cost-effective will be salvaged and no "credit" to the project is required. When the analysis determines that salvage is not cost-effective and the materials or items are nonetheless salvaged through a FHWA-funded project a credit is required as outlined in the FHWA Contract Administration Core Curriculum Participant's Manual.

732 Obtain Approval of Public Interest Findings

Under certain circumstances, exceptions to standard procurement principles and practices may be granted for:

- Contract award based on other than competitive bidding,
- Designation of mandatory disposal site,
- Specification of patented/proprietary products,
- Use of publicly owned equipment,
- Use of publicly owned/furnished/designated materials.

Insomuch as 'standard procedures' for procurement are generally the preferred method, exceptions should be rare, clearly documented and always serve a compelling public interest. The primary means of justifying and documenting an exception is through a public interest finding. This documentation sets forth: the specific standard procedure from which an exception is sought, the reasons favoring an exception and definitive decision (e.g., approval or disapproval) by an authorized decision maker.

The FHWA Contract Administration Core Curriculum Participant's Manual provides additional background information related to Federal-aid projects. The approval roles (FHWA, Department) for Department Federal-aid projects are identified in the Joint

Stewardship and Oversight Agreement (Stewardship Agreement). The lead unit prepares and obtains approval of public interest findings. See Section 4.6.1.

734 Identify Pay Items and Document Quantities

Identify all pay items consistent with the construction requirements and basis of payment provisions of the specification. An "unassigned" amount may be included within the contract quantity for items for which the total quantity is difficult to compute. However, "token" bid items (establishing an item and quantity without a specified application in the project) shall not be included. Document the quantity determination for each item through detailed calculations and explanatory notes. Prepare Quantity Summary Sheets for each category and the Detailed Estimate Sheets. Pay item descriptions, item numbers and quantities on the Detailed Estimate Sheets, Proposal and Federal Estimate should be in agreement.

736 Identify Applicable Standard Sheets and Include Guide Sheets

Identify, incorporate and list (on title sheet) applicable Department standard sheets. Department Guide Sheets may be used, with review, modification and approval by the designer. Obtain, adapt and sign/seal applicable Guide Sheets for integration within the appropriate discipline drawing set.

738 Prepare Special Provisions

The designer must prepare a special provision for any construction activity or item that is not adequately described by the Standard Specifications, the Supplemental Specifications or plan notes. For some very unique and programmatic special provisions (e.g., those related to contracting policy), Department units may be able to provide useful background and assistance (e.g., background, examples from similar projects) in preparing the special provision. See Section 3.1.2 for guidance and requirements.

740 Incorporate Information-Only Plans

Attach/integrate the Utilities' Information-Only plans in the final plans. The Utility Information-Only plans follow the last sheet of the Department's plans and the designer should add a distinctive letter to the sheet number sequence. For example, if three sets of Utility Information-Only sheets are to be included, use sheet numbers A-1, A-2, ...; B-1, B-2, B-3... and C-1, C-2. To avoid confusing the State's contractor, a note should appear on each Utility's plans stating that the work is to be performed by the named Utility.

If an aerial facility is involved, a note should be made on the affected State plan sheets indicating the voltage and the minimum vertical clearance of wires or cables crossing over the roadways of the project. Other applicable special utility requirements should be noted and flagged on the Department's plans.

Individual Utilities are responsible for the design of their facilities. The Department's designer shall not make any revisions to Utility Information-Only plans.

742 Prepare Design Statement

Prepare Design Statements for the Final Plans for Review and Final Design Plans submissions, as described in Section 3.1.4,

744 Prepare Design Report

Prepare Design Reports for each design submission, as described in Section 3.1.4.

746 Deliver Design Review Submissions

Submit the Drainage (optional), Semi-Final Design, Structure Layout for Design and Final Plans for Review submissions in accordance with the project schedule and Section 3.2.

748 Distribute Design Review Submissions for Comments

When each of the various design review submissions (e.g., Semi-Final Design, Final Plans for Review) is delivered, it should be reviewed for completeness and circulated as outlined in Section 3.2.

750 Evaluate Consistency with Environmental Document and Commitments

Each design submission should be developed/reviewed for consistency with environmental documentation (scope of project, identified impacts) and environmental commitments. The Design Report should include a comprehensive list of commitments and means by which each is fulfilled (e.g., inherent to the design, special provisions with restrictions, inclusion of specific items for mitigation).

752 Compile Written Comments on Design Review Submissions

The lead division assembles the comments from review units and, when applicable, provides them to the consultant designer.

754 Respond to Review Comments

The project team should evaluate comments as they are received. Critical comments should be identified and resolved as a priority. When appropriate, the lead unit/designer should meet with the commenter to discuss comments and their ramifications and resolution. The project manager determines the final resolution and disposition of comments. A compilation of comments and responses on the previous submission are distributed with each submission.

756 Establish Construction DBE/SBE Goal(s)

The Department is committed to effective Disadvantaged Business Enterprise (DBE) and Small Business Enterprise (SBE) programs. In implementing those programs DBE or SBE participation goals are established for specific contracts. A goal for each construction contract is established by the DBE/SBE Screening Committee, upon request and in consideration of a recommendation by the project manager. The DBE/SBE Screening Committee meets monthly. Recommended goals and supporting information are submitted in advance using a format prescribed by the Screening Committee. A

template for this document is located in the ProjectWise Project Development folder. Preparation of background information and the recommended goal are the responsibility of the designer/lead unit. Contact the Chair, DBE/SBE Screening Committee for additional information.

758 Complete Checklist

A checklist is prepared for every engineering project. The checklist is a quality assurance tool wherein individual staff members indicate that a variety of tasks, requirements and outcomes have been accomplished. The checklist is initiated by the lead unit and submitted with the Final Design Plans submission, reflecting the state of completion at that juncture. A template for this document is located in the ProjectWise Project Development folder.

760 Assess/Adjust Administrative and Fiscal Status

Advancing a project to construction requires the approvals indicated by Sections 4.1 and 4.1.1. Funding is needed for the contract and non-contract (construction engineering, design services, utilities) costs. Review previously-approved funding, expenditures and balances relative to approved and anticipated needs through CORE-CT. Initiate and complete the administrative steps needed to prepare for the construction phase.

762 Prepare Final Design Plans Submission

This submission consists of complete plans, specifications, estimates and other information as described in Sections 3.2 and 3.2.7. The Digital Project Development Manual provides detailed guidance on the materials to be transferred and transfer protocols. The Final Design Plan (FDP) submission should not be made until the contract documents reflect resolution of all review comments. A template for this document is located in the ProjectWise Project Development folder.

For projects designed by consultants, the FDP submission should be delivered to the lead unit at least two weeks prior to the Department's FDP date. This allows the Department the opportunity to verify the completeness and satisfactory resolution of comments.

764 Request/Obtain Consultant Supplemental Agreement (if Required) (Consultant-Designed Projects Only)

If the status review indicates the current consultant agreement is not adequate for anticipated future consultant services, initiate a supplemental agreement. Commissioner approval is required to enter into supplemental agreements. To obtain approval, the Bureau Chief, Engineering and Construction submits a memorandum (drafted by the lead division) to the Commissioner requesting approval. The Commissioner's endorsement (for approval or disapproval) documents the decision.

The development/preparation of a supplemental agreement is similar to that for an original agreement, including scope approval, independent price proposals and negotiation.

Consultant supplemental agreements, like original agreements, are drafted by the Department's Agreements section. After the supplemental agreement is prepared, it is

circulated for review/approval signatures by the consultant, Bureau Chief (Engineering and Construction), Attorney General and the Department's EEO Contract Compliance Office. A funding/fiscal review is also made. When the supplemental agreement is fully executed, a copy is provided to the lead division, which then sends the consultant a copy. See Sections 4.4.2 and 4.4.3. When called for by the Joint Stewardship & Oversight Agreement, provide a copy to FHWA.

766 Obtain Waiver(s) to Advertise

Design completion involves completion of all requirements for advertising, not simply completion of the contract documents. Examples of other requirements (i.e., in addition to a complete PS&E) include: receipt of permits, acquisition of property interests (right of way, easements, rights) and approved utility and railroad construction agreements. The lead division coordinates with support units (e.g., Utilities, Rights of Way) to determine and document the status of each requirement on the checklist. When the lead division makes an FDP submission prior to satisfying all requirements, a waiver for each uncompleted requirement must be obtained. The waiver is prepared by the lead division, for signature by the Engineering Administrator, in the form of a memorandum recommending and requesting approval. The request/recommendation is supported by the following information:

- schedule information,
- the specific requirement(s) not satisfied,
- reason(s) for proceeding without requirement,
- anticipated date(s) requirement(s) will be completion, and
- requested limit of advancement without requirement completion (e.g., advertising, award).

A template for this document is located in the ProjectWise Project Development folder and includes an endorsement line for approval/disapproval. See Section 4.6.3.

768 Deliver FDP and Transfer Project to Contract Development

After the Final Design Plans submission is complete and other requirements satisfied or waived, the lead division should schedule a meeting with the Contract Development section in advance of the FDP date. The primary purpose of the meeting is to coordinate transfer of the contract documents and associated materials (FDP submission, waivers), along with primary responsibility for continued development, from the lead unit to the Contract Development section. The transfer is documented by a memorandum from the lead unit. A template for this document is located in the ProjectWise Project Development folder.

2.3.4 CONTRACT DEVELOPMENT PHASE

The general purposes of this phase are outlined in Section 1.5.1. This section provides detailed guidance.

800 Review/Adjust Final Design Plans Information

The plans, special provisions, pay items and notices to contractor submitted by the lead division are reviewed for completeness and consistency with the Department's substantive and format requirements. Apparent inconsistencies are addressed through coordination, primarily with the designer.

802 Establish Contract Time

The contract time is established by the Contract Development section based on the requirements for construction operations, seasonal considerations, the effect of the project on public travel and other constraints (e.g., permit conditions). The contract time is typically specified in calendar days and occasionally specified as a particular completion date.

804 Establish Liquidated Damages

All contracts have liquidated damages associated with contract completion. For most projects, a single liquidated damages daily amount is developed by applying a Department guideline based on the estimated contract value. Additionally, some contracts include liquidated damages for other project milestones (e.g., switching traffic patterns and phases). Occasionally, other provisions relating financial consequences to completion/progress may be used. Incentive-disincentive payments are an example. These provisions (which are not liquidated damages) are rarely employed. Other references should be consulted and management approval secured before including non-standard financial provisions in contracts.

806 Document Status of Right of Way, Utility and Railroad Activities

Via memoranda from the Contract Development section to the Division of Rights of Way and the Utilities section, the status of pre-construction requirements is requested. The response memoranda indicate the requirements and status, such as: no requirements, number of acquisitions required and number acquired; list of impacted utilities, status of each utility agreement. These responses provide updated and documented information used to verify/determine if a Waiver to Advertise is required. As previously noted, the lead division is responsible for securing waivers.

808 Prepare Engineer's Estimate

Each contract pay item, respective units of measurement and quantities are entered (or confirmed) in a proposal-specific Trns•port file. Estimated prices for each unit, lump sum and Department-estimated amount are established and entered into Trns•port. From these data entries, the engineer's estimate is generated. The Engineer's Estimate is confidential as outlined by the Department's "Release of Engineer's Cost Estimate" Policy (E&C-34).

810 Obtain Utility and Railroad Cost Estimates

Upon request from the Contract Development section, the Utilities section provides the estimated cost associated with each utility and railroad agreement.

812 Estimate Other Costs

Costs for construction engineering (e.g., contract administration, materials testing, shop drawing review, etc.) and contingencies are estimated by applying Department guidance (percentage of contract items). Ancillary non-contract services (e.g., state police, Transportation Management Plan/Public Information items) are included and estimated based on project-specific factors. Other miscellaneous costs (e.g., electrical connection for traffic signals) are estimated as applicable.

814 Prepare Cost Data Summary

A total project cost, with category (construction contract, construction engineering, utilities, railroad, contingencies, etc.) subtotals and Federal-aid eligible share is developed and documented in a confidential memorandum between the Contract Development section and Capital Projects section.

816 Prepare Federal Estimate (if Applicable)

Trns•port will generate a Federal Estimate after all the necessary data (cost items and estimated costs) is entered. The electronically-formatted data are used for several purposes. A hard copy of the federal estimate is produced and submitted to FHWA in support of project approval and authorization.

818 Obtain PS&E Approval

Approval of the Plans, Specifications and Estimate (PS&E) is required before a project may be advertised for bids. See Section 4.6.2. The Contract Development section prepares correspondence recommending/requesting approval. Correspondence templates, each with an approval endorsement line, for federal and State oversight projects are located are the ProjectWise Project Development folder.

820 Transfer Project Responsibility to Bureau of Finance and Administration

After PS&E approval (design completion), primary responsibility for advancing to contract procurement (fiscal approval/authorization, advertising for bids, printing production, receiving bids) is transferred to the Bureau of Finance and Administration.

822 Prepare Addenda

Addenda are revisions to the contract documents issued by the Department to prospective bidders between the initiation of advertising and receipt of bids. Addenda are issued for many different reasons and may cover any administrative or technical facet of the contract documents. Addenda may be initiated entirely on Department initiative or in response to bidder questions. Addenda are typically developed by the Contract Development section and distributed by the Contract Administration section.

824 Analyze Construction Bids

After the construction bids are received and opened, a compilation of the bid prices is made available to the Cost Estimating section for review. Bid competition and balance are analyzed. Anomalies and potential risk factors are identified. The analysis conclusions and recommendations (e.g., possible additional inquiries) are provided by memorandum to the Bureau of Finance and Administration.

3.0 DESIGN SUBMISSION REQUIREMENTS

Project development requires the delivery of certain work products at intermediate development points (milestones) and design completion. This section identifies the general requirements for both completed design projects and intermediate milestones leading up to completion.

3.1 Requirements at Design Completion

The Final Design Plan Submission (FDP) is a critical juncture in project development. Primary responsibility for preparing the contract documents is transferred from the designer to the Contract Development section. Although addenda are sometimes required, ideally all design is completed prior to, and reflected in, the FDP submission. The current requirements for FDP submissions are identified in the Digital Project Development Manual.

The following sections elaborate on specific elements of the Final Design Plan submission.

3.1.1 Construction Plans

The construction plans submitted with the Final Design Plans submission should be complete and generally include the types of sheets indicated by Exhibit 33, as appropriate.

3.1.2 Special Provisions

A special provision is required for any construction activity or item that is not adequately described by the Standard Specifications, the Supplemental Specifications or plan notes.

The Department website includes a list of "Owned Special Provisions". When an owned special provision, as written (i.e., without modification), meets the project requirements, it should be included as such. When modification of an owned special provision is considered appropriate, the designer is required to obtain prior consent from the owner. For these cases, contact the owner via email and secure the approval.

All item numbers shall conform to the Department's "Item Master File". To establish a "new" item (needed for a project and not on existing Item Master File), contact the Contract Development section.

The designer should prepare special provisions using the Department's Standard Specifications format and conventions. Additionally, refer to templates and Department guidance for:

- Preparing special provisions,
- Converting existing special provisions,
- Preparing an owned special provision,
- Converting an existing owned special provision.

As an exception to the general format guidance, specifications provided to the designer by third parties (e.g., railroads, utilities, municipalities) may, with concurrence of the lead unit, be incorporated in the special provisions in the format they are provided.

3.1.3 Construction Cost Estimate and Schedule

A summary of construction cost estimate is included in the Design Report, at completion (FDP) and with each milestone submission. Supporting information (e.g., quantities, computations) should be provided separately (i.e., not bound within the Design Report). Beginning with the Final Plans for Review submission, the Design Report should also include a Schedule section. A designer-prepared calendar bar chart should be included within the Design Report, along with a duplicate, unbound copy.

The Department uses cost estimates for various purposes including: system needs studies, project planning and programming, scheduling, cash flow management and bid analysis. As development advances, the estimate is increasingly refined. The Preliminary Cost Estimating Guidelines cover the development of estimates during project development.

The Department's "Release of Engineer's Cost Estimate" Policy (E&C-34) governs the disclosure of construction cost information. All Department and consultant project personnel should be aware of, and strictly abide by, the policy.

The Final Design Plan submission shall include a proposal estimate, and for federal-aid projects, a federal estimate.

A proposal estimate includes both contract and non-contract cost elements. The contract cost includes all work for which the construction contractor is responsible. All contract items, each of which is listed on the Bid Master File should be included along with the corresponding item number, units of measure, quantity, estimated unit cost and extended amount. The items and quantities on the proposal estimate and detailed estimate sheet must agree. At the time of procurement (i.e., prior to any change orders), the contract cost is the bid amount.

The other (non-contract) costs are for items outside the contractor's responsibility. Common examples of non-contract costs are:

- Construction inspection and contract administration,
- Laboratory acceptance testing,
- Railroad protective services,
- State police for traffic control, and
- Work by utility owners to relocate facilities.

The costs of the first two bullet items are accounted for by an estimated "incidentals" amount, generally based on a percent of contract cost. Separate estimates are required for all other non-contract costs. A contingency is to be included as indicated by the Preliminary Cost Estimating Guidelines. For construction contracts with multiple project numbers, a separate estimate is needed for each state project. Additionally, federal

estimates are required for each federal-aid project. The proposal estimate and total of all federal estimates must be for the same dollar value.

A comprehensive set of pay item quantity computations should be included as a standalone bound document.

The construction schedule should be prepared in the form of a bar chart (Gantt), indicating all major elements of the project. Individual structures, associated stages and major components should be indicated. Include winter shutdowns, permit restrictions, specific milestones, long-lead time fabrication and procurement periods and work performed by third parties.

3.1.4 Design Report and Design Statement

Exhibit 29. Design Report outline.

Report Outline Sections and Topics	Comments
Problem definition, purpose and need	
General	
Project limits and length	
Structures	
Detailed description of each facility	Functional class, number of lanes
Location plan (8.5" X 11")	
Typical Sections (maximum 11" X 17")	
Analysis of accident history	
Modifications to concept provided by Department	
Context and Design Controls	
Environmental resources	Identify key features
Land use, development	
Topography and natural features	
Design/Functional classification(s)	
Traffic volumes	ADT, DDHV, turning volumes
Regulatory speeds on affected facilities	
Operating speeds (50^{th} and 85^{th})	
Geometric Design	Tabulate criteria and proposed values
Basis for criteria (functional class, project scope)	
Design speed	
Superelevation	
Maximum used to select specific values (e_{max})	
Criteria and proposed values, each curve	
Transition lengths	
Horizontal curvature	
Grades	
Stopping sight distance	
Intersection sight distance	
Lane width	
Shoulder width	
Vertical curvature	
Climbing lanes (lengths, transitions)	Describe basis for determining location
Features requiring design exceptions	

Exhibit 29. Design Report outline (continued).

Report Outline and Topics	Comments
Traffic Control and Management	
Existing and projected turning volumes	
Existing and proposed intersection control	
Capacity analysis (LOS, projected queues)	
Traffic Management Plan	
Traffic Control Signals	(1)
Existing and Proposed Pavement Structure	
Illumination Conditions and Recommendations	Existing/proposed, ownership
Geotechnical	(2)
ADA Compliance	
Pedestrian and Bicycle Accommodation	
Rights of Way	(3)
Environmental Analysis and Permitting	
CEPA/NEPA documentation type and status	
Permits required and application status	
Commitments and means for fulfilling	
Other coordination/approval requirements	(e.g., Section 4(f), Section 106, etc)
Historic and archeological features and impacts	
Noise and air quality assessment/impacts	
Hydraulics, Drainage and Erosion Control	(4)
Contaminated and Hazardous Materials	Summarize Env Compliance Studies
Utilities and Railroad Involvement	
Cost estimate summary	Complete estimate provided separately
Construction schedule/bar chart	See Sections 3.1.3, 3.2.5, 3.2.6, 3.2.7

Notes:

1. Submission requirements identified in Manual of Traffic Control Signal Design. Include non-plan information as separate attachment or, for Preliminary Design submission only, in Design Report.
2. Include summary results of pilot borings and proposed subsurface exploration program (SEP) as part of, or appended to, the Preliminary Submission Design Report.
3. Include a list of all properties and associated requirements (i.e., takes, easements) and rights.
4. See Exhibit 32 for PD submission. For subsequent submissions, include information not included in other reports (e.g., Hydraulic, Scour), such as diversions, erosion control, etc.

Exhibit 30. Design Statement outline.

Statement Outline and Topics
Date
Federal Aid Project Number
State Project Number
Town(s)
Construction district
Final maintenance responsibility of each road
Description of project
Beginning and ending stations; project length
Other roadway construction
Number of structures
Provisions for future construction, if any
Reimbursable funds (1)
Exceptions to minimum design standards
Public utilities affected
Date each utility was informed of potential impact
Date final design plans were sent to utilities
Utility items included in the State's contract
Special considerations affecting utilities
Salvage items: list materials to be salvaged and delivery locations
Permits (2)
Remarks (3)
Unusual design features including unusual foundation conditions

Notes:

1. Identify items for which the State is to be reimbursed and by whom.
2. List permits and describe restrictions on contractor operations.
3. Recommendations (not in contract documents) for successful project completion. Also, list commitments and major decisions (e.g., geometry/location, utility, mitigation, right of way) and reasons so that construction personnel are aware of background.

3.1.5 Other Documentation

In addition to the items described above, the following items should be included with the FDP submission, when applicable:

Checklist: The current project control checklist with all design-related (i.e., pre-Contract Development) items signed/initialed or noted as not applicable.

Commitment list: Descriptive of all commitments made by the Department in carrying out the project (i.e., established by the CEPA/NEPA process, agreement with municipal officials, individual property owners).

DBE/SBE goal: Documentation of the committee's determination.

Permits: Copies of approved permit applications, including conditions of approval.

Public interest findings: Documented approvals for any required findings (e.g., proprietary products, designated waste sites).

Waivers: If all requirements for advertising have not been satisfied, an approved waiver should be provided.

Additionally, unique project-specific information may also be required.

3.2 Milestone Submissions

Milestones submissions are significant junctures in the project development process. Most are points at which reviews are conducted and comments developed. By critically reviewing proposals at various stages of development, numerous perspectives and substantial expertise are brought to bear. Resources are used most effectively when review comments are raised early and resolved prior to "building additional layers" on the subject of the comment. Ideally, only information not included in previous submissions will elicit comments.

3.2.1 Overview

The submissions consist of information developed by the designer and circulated for review. Most of the reviewers are Department units but other stakeholders, such as municipalities, may also provide input to future project development. The Milestone Submissions are identified in Exhibit 31.

As can be seen, not all projects involve the same sequence of submissions. Projects may involve bridge, highway or both types of submissions. For some projects, a studies subphase is utilized to resolve the project need and to reduce the range of alternatives. Additionally, a drainage submission may be required when the drainage design is particularly complicated (See Section 3.2.4).

Exhibit 31. Milestone submissions.

Bridge	Highway	Approximate % complete
	Studies (Optional)	10
Type/Rehabilitation Studies		
	Preliminary Design	35
	Drainage (Optional)	50
	Semi-Final Design	60 - 70
Structure Layout for Design		
Final Plans for Review		85 - 90
Final Design Plans		100

Distribution of Review Submissions: Design review milestone submissions are distributed to Department units and other stakeholders (e.g., FHWA, municipalities) for review and comment.

Most, but not all, reviewers get plans. Other elements of the submission (e.g., report, cost estimate) are distributed selectively based on the relevance of the submission item to the role and responsibility of the review unit. The lead unit should consult with potential review units and determine specifically which submission materials should be provided for review.

Milestone submissions consist of plans and other information. The early phase(s) (Studies, Preliminary Design) are intended to explore alternatives and make informed decisions regarding the project concept. As development advances, the tasks and products become increasingly implementation-focused. Construction contract documents are a principal product.

The following Department units often review submissions.

Bureau of Engineering and Construction

Office of Construction

Quality Assurance/Constructability section ✓
Construction District ✓
Division of Surveys
Central Surveys section ✓

Office of Engineering

Division of Bridges and Facilities
Bridge Design section ✓
Bridge Liaison section ✓
Bridge Safety and Evaluation ✓
Facilities Design section ✓
Division of Design Services
Project Development section ✓
Environmental Compliance section ✓
Hydraulics and Drainage section ✓
Pavement Management unit ✓
Soils and Foundations section ✓
Utilities section ✓
Division of Highway Design
Landscape Design unit ✓
State Highway Liaison section ✓
Division of Traffic Engineering
Project Design section ✓

Office of Rights of Way ✓

Bureau of Highway Operations

Division of Highway Operations ✓
Division of Transportation Maintenance ✓

Bureau of Policy and Planning

Division of Environmental Planning ✓

This list requires refinement for each submission. For example, Landscape Design should review a project that includes landscaping items but not one that includes only traffic signals. The list above is generic and a starting point for development of a project-specific distribution list. The design project manager should send each submission to units that have relevant knowledge or responsibilities, regardless of their inclusion on the generic list. The distribution memo soliciting comments should include a "please comment by _____" date. Comments should be received prior to the Review Meeting.

Exhibit 32. Items included with highway milestone submissions.

Items submitted	Highway Milestone Submission					
	Studies	PD	Drainage	SFD	FPFR	FDP
Plans (see Exhibit 33)	X	X	X	X	X	X
Studies Report	X					
Design Report		X	X	X	X	X
Construction Cost Estimate	X	X	X	X	X	X
Proposal				X	X	X
Design Statement					X	X
Annotated Display Plans	X	X				
Drainage Design Checklist		X	X	X	X	X
Geotechnical/Soils Report		(1)		(2)	(3)	
Drainage Report (4)		(5)	Draft (6)	Draft (6)	Final	Final
Floodway Report			Draft (6)	Draft (6)	Final	Final
Hydraulic Report			Draft (6)	Draft (6)	Final	Final
Scour Report			Draft (6)	Draft (6)	Final	Final
SCEL Report			Draft (6)	Draft (6)	Final	Final
Special Provisions				(7)	X	X

Notes:
1. See Design Report guidance (Exhibit 29).
2. Roadway Soils Report
3. Soils and Foundation Reports
4. Include a contour map(s) with areas contributing to each inlet
5. Include key hydrology and hydraulics information in Design Report
6. Include a Draft Drainage Report with SFD (if applicable) *or* FPFR submission.
7. Maintenance and Protection of Traffic, Limitations of Operations and Water Handling

Additional guidance on preparation of the various Milestone Submissions follows. Bridge submissions are covered by the Bridge Design Manual, Section 2.

Exhibit 33. Plans included with highway milestone submissions.

Plans/Sheets submitted	Highway Milestone Submission					
	Studies	PD	Drainage	SFD	FPFR	FDP
Title	X	X	X	X	X	X
Detailed Estimate				X	X	X
General Notes and Legend		X	X	X	X	X
Survey Control Plan				X	X	X
Typical Sections	X	X	X	X	X	X
Drainage Details				X	X	X
Miscellaneous Details				X	X	X
Plan/Profile Index Sheets				X	X	X
Construction Plans	X	X	X	X	X	X
Profiles	X	X	X	X	X	X
Intersection Grading				X	X	X
Other Grading				X	X	X
Illumination				X	X	X
Signing Plans		X		X	X	X
Pavement Marking		X		X	X	X
Traffic Signal		X		X	X	X
Turf					X	X
Landscaping					X	X
Sedimentation and Erosion Control		(1)		X	X	X
Cross Sections	(2)	(2)	(2)	X	X	X
Stage Construction/Phasing				X	X	X
Maintenance and Protection of Traffic		X	X	X	X	X
Environmental Compliance					X	X
Information Only (Utility) Plans					X	X

Notes:
1. Conceptual plan
2. Critical/selective cross sections

Exhibits 32 and 33 identify typical elements of highway milestone submissions. Since the scope of each project is unique, the exhibits and narrative descriptions are not universally applicable. The guidance should be adapted to reflect individual project conditions.

3.2.2 Studies Submission

Studies are the most flexible project development phase and the submission requirements are the least prescriptive. This flexibility does not reduce the requirement for rigorous development. On the contrary, it increases the need for thorough, independent analysis and presentation of critical information.

The studies submission is unique insomuch as it usually does not focus on a single alternative. See Section 3.2.1 for general requirements. A Studies Report, rather than a Design Report, is submitted documenting the evaluation and recommendations. The report's scope and format depend on the nature of the project. The following candidate topics are generally applicable and should be considered for inclusion:

- Summary description of assignment,
- Summary of applicable background (previous studies, environmental documents) ,
- Method (assumptions, development of MOEs, cost estimating methods),
- Analytic tools and models used,
- Data (identify sources and quality/adequacy assessment),
- Sources and nature of input (public involvement, agency coordination),
- Analytic results and interpretation (e.g., travel demand, accident rates, conditions),
- Development of Problem/Purpose and Need,
- Alternatives Evaluation Framework,
- Conceptual Alternatives Considered,
- Design Classification and Criteria,
- Context and Critical Controls,
- Evaluation of Conceptual Alternatives,
- Recommendations (Alternatives for Detailed Analysis),
- Critical Considerations and Other Observations,
- Anticipated Environmental Documentation and Required Approvals (permits, findings), and
- Critical Issues and Other Observations.

Plans and profiles are generally at 1" = 200' scale. Judgment and coordination with Department management are needed to determine the extent of coverage and documentation (e.g., plans, depth of analysis) for each alternative and group of alternatives (e.g., considered and dismissed, recommended for detailed evaluation).

3.2.3 Preliminary Design Submission

The Preliminary Design submission should include all information critical to the viability of the selected alternative, including critical design controls, bicycle and pedestrian facilities, environmental resources, proposed geometry, drainage and hydraulics, pedestrian and structures, railroads and major utilities. See Section 3.2.1 for overview of requirements.

Include an assessment of hydraulic crossings with tributary areas greater than one square mile. Plans should indicate the proposed drainage pattern of pipes, ditches and swales. Drainage computation and estimated quantities are not required for the Preliminary Design submission. Include a conceptual Sedimentation and Control Plan.

Annotated display plans are typically required for the Preliminary Design review meeting and should conform to Exhibit 34.

Exhibit 34. Color convention for annotated display plans.

	Feature	Color
Plans	Reconstructed pavement	Yellow
	Climbing lanes	Orange
	Bituminous concrete drive	Dark Gray
	Undisturbed existing pavement	Light Gray
	Fill slopes	Green
	Cut slopes	Light Brown
	Bridges	Orange
	Wetland limits	Blue
	Watercourses with flow arrows	Blue
	Critical controls	Red
	Proposed Right-of-Way line	Red
	Sidewalk	Orange
Profiles and Sections	Existing ground below grade line	Green
	Existing ground above grade line	Brown
	Finished pavement and slope	Yellow
	Critical controls	Red

Include a conceptual Maintenance and Protection of Traffic plan as described in Prepare Preliminary Staging and Maintenance and Protection of Traffic Plan Concepts. In the Design Report, classify and support the "significance" of the project under Work Zone Safety and Mobility policy. Include a draft of the proposed Transportation Management Plan in the Design Report.

A Signing Plan at 1" = 200' scale is generally acceptable for the Preliminary Design submission.

3.2.4 Drainage Submission

This submission may be required if the drainage design is particularly complicated, requires significant right of way and/or is otherwise critical to meeting the project development schedule. See Section 3.2.1 for general requirements.

The information provided should be similar to the Semi-Final Design submission, especially drainage and hydraulics related information and features, such as geometric design and grading.

3.2.5 Semi-Final Design Submission

Review comments should be resolved shortly after each review, desirably prior to the subsequent submission. However, a revision made to resolve one comment will sometimes lead to comments by different reviewers. A primary purpose of the Semi-Final Design submission is to assure that all preliminary design comments are resolved. See Section 3.2.1 for general requirements.

Required rights of way, including all permanent and temporary encumbrances, should be resolved and accurately defined in the Semi-Final Design submission. The construction plans should be consistent with all previously-submitted property maps.

The drainage area, design discharge, size, invert and outlet elevations should be indicated for all culverts and drainage structures. Outlet elevations, channel and ditch treatments and proposed drainage easements should also be shown. Include an updated conceptual erosion and sedimentation control plan.

The Design Report should include condition surveys of existing facilities (pipes, structures, swales, ditches, etc.) that are to remain in use within the project limits. The report should also be updated to address the following items and any others that warrant documentation:

- Site access,
- Transportation Management Plan, including the Temporary Traffic Control Plan, Traffic Operations Plan and Public Outreach Plan,
- Water handling,
- Specialized equipment and/or construction methods,
- Subsurface conditions, and
- Construction cost estimate summary, including discussion of specific differences from previous estimates.

The Schedule section of the Design Report should list the "major elements" of the project, breaking out individual structures and associated stages and major components. Include winter shutdowns, permit windows, specific milestones, long lead time fabrication and procurements, third party work, etc.

The construction cost estimate shall be comprehensive, including both contract and non-contract items. Use computed quantities and estimate unit prices after reviewing current weighted prices.

Include the Maintenance and Protection of Traffic and Limitation of Operations special provisions.

3.2.6 Final Plans for Review Submission

Submit all materials associated with a complete bid package, including all contract plans, specifications and estimates. The highway and structure components should be separate but submitted coincidentally. See Section 3.2.1 for general requirements.

Include a bar chart with the Schedule section of the Design Report. Use the list of contract activities and durations, anticipated start of construction, and various schedule/calendar restrictions (e.g., permits, winter shutdown).

3.2.7 Final Design Plan Submission

The Final Design Plan submission should complete the design process, although addenda and construction changes often necessitate additional design effort. See Sections 3.2.1 for general requirements. Unlike the other submissions identified in Section 3.2, the FDP submission is not distributed for review and comment. It is the planned conclusion of design. All elements (i.e., plans, special provisions, cost estimate, schedule) should reflect comment resolution and current information (e.g., start of construction, permit restrictions).

The submission requirements are outlined in Section 3.1 and the Digital Project Development Manual.

3.3 Other Deliverables

Several critical items are developed and processed separately from the milestone, disciplinary (e.g., structure type studies) and design completion submissions. Key items are identified and discussed in this section. The project manager is responsible for including these items on the schedule and making arrangements for their completion.

3.3.1 Property Maps

The acquisition of property interests, when required, is a potential schedule control. Required property interests are determined by the proposed design features (slopes, drainage structures). Therefore, the designer is responsible for identifying required property interests and preparing property maps. Complete agreement and compatibility between the construction plans and property maps is required as indicated by in Section 2.3.3 (Prepare/Submit Property Maps).

3.3.2 Environmental Analysis/Support

As indicated throughout this guide, environmental impacts are a major consideration in project development. They influence substantive decisions (e.g., alternative selection, geometry), cost and schedule. Regulatory processes and stakeholder coordination often require documentation of various impacts (e.g., community cohesion, historic resources) and mitigation. These focused (resource-specific) analysis/support documents are often (but not always) completed prior to completion of the CEPA/NEPA process.

3.3.3 Permit Applications

Regulated activities cannot begin until the associated permits are issued. Therefore, receipt of permit(s) is required prior to advertising construction contracts, unless a waiver is approved. Permit applications are subjected to rigorous and time-consuming review and only those that meet exacting requirements will be approved. Permit applications should be prepared and processed in accordance with a Policy Concerning the Processing of Environmental Permits and Permit Compliance for all Aspects of Project Development, Construction, and Operations (Policy No. EX.O-29). The project manager is responsible for scheduling and assuring completion of permit applications through the activities described in Section 2.

3.3.4 Design Exceptions

Responsibility for the identification of design exceptions and development of documentation as described in Section 2.3.2 (Develop Design Exception Documentation) lies with the designer. In some cases, reviewers will also comment on a feature that does not meet applicable geometric criteria. Documentation in support of the design exceptions should be prepared and submitted for approval as described in Section 4.7.1 when the geometric design is resolved. Desirably, design exceptions will be approved prior to Design Approval. Design exceptions are considered at meetings of the Design Exception Committee, which are convened periodically. The project manager will determine the schedule for preparation and submission of the documentation to the committee.

3.3.5 Interstate Point of Access Modification

The potential need for this documentation should be made prior to final design as described in Section 2.3.2 (Assess Need for New or Revised Interstate Access). When required, the request and supporting documentation should be submitted as described in Section 2.3.3 (Prepare/Submit Request for New or Modified Interstate Access). A request may be made, but not approved (Section 4.7.4), prior to Design Approval.

3.3.6 Interim/Progress Submissions

In addition to the milestone submissions identified in Section 3.2, submissions are often needed for various purposes, including status and progress meetings with managers, municipal leaders and other stakeholders. The project manager will identify the requirements for these submissions as they arise.

4.0 APPROVALS

Approvals are control points at which decisions are made regarding the sufficiency of completed work and future direction. As used in this section, "approval" means the documented agreement by authorized individuals within the Department official and/or the Federal Highway Administration. Although "approval" can (correctly) refer to actions by other organizations (e.g. permits, sealing plans by consultants), those actions are not addressed by this section.

The approvals covered by this section are recurring, project-level actions and decisions. Other approvals are sometimes needed for non-recurring and unique conditions.

4.1 Initiation of Projects and New Phases

When the Department begins a new project or the next phase of project delivery, the expectation is to continue to completion. Each step increases the level of investment. Numerous checks are performed to ensure that, once started, the necessary resources will be available and that any prerequisites have been satisfied. For major decisions, "approval" actually requires a series of individual approvals. For example, 'approval of construction' could entail:

- Programming funds,
- Securing FHWA authorization (when applicable),
- Executing all the necessary agreements (e.g., utility, municipal),
- Completing the construction contract documents,
- Arranging inspection and design support during construction, and
- Executing and awarding a construction contract.

Each of these approvals is necessary to begin construction but no individual approval should be considered as 'approving construction'. In general, the various individual approvals required to initiate a new project or new phase fall into the following three categories:

Administration, Financial and Programming: This category applies to all projects. It covers all managerial and funding-related actions and requirements, including the identification, programming and commitment of the funds from one or more sources (i.e., specific state and/or federal categories and amounts), including FHWA authorization when applicable.

Design Development Milestone: These requirements represent specific levels of completion that must be attained before beginning a subsequent phase.

Consultant Administration: This category is only applicable to consultant-performed activities. For project-level consulting agreements, an executed agreement covering the scope of services is required to begin the first or any subsequent phase of a project. Original consultant contracts often cover all or several phases (e.g., preliminary design and final design). Written approval from the Department (notice to proceed) is required for each phase.

Approval is needed to begin each major subphase: studies, preliminary design, final design and advertising for construction bids. No separate approval is needed to initiate contract development. Subphases and approval categories are represented as rows and columns respectively in Exhibit 35. To advance to the listed subphase, all applicable requirements (listed in the columns) across the row must be met. The individual requirements, listed under the three category headings are described in this section.

Exhibit 35. Summary of individual approvals required to initiate a project or new phase.

<table>
<tr><th colspan="2" rowspan="2">Phase</th><th colspan="4">Approval Documentation</th></tr>
<tr><th>Administration, Financial and Programming</th><th>Design Development Milestone</th><th colspan="2">Consultant Administration</th></tr>
<tr><td rowspan="3">Engineering</td><td>Studies (optional)</td><td rowspan="2">CORE-CT Initiate (RPM) MOD (1)</td><td>- -</td><td rowspan="4">Agreement</td><td>NTP</td></tr>
<tr><td>Preliminary Design</td><td>- -</td><td>NTP</td></tr>
<tr><td>Final Design</td><td>CORE-CT MOD (1)</td><td>Design Approval</td><td>NTP</td></tr>
<tr><td colspan="2">Advertise for bids</td><td>CORE-CT MOD(1), Advertise</td><td>PS&E, Waiver to advertise (2)</td><td>NTP</td></tr>
<tr><td colspan="6">Notes:
1. A modification (MOD) is required to begin final design; one or more MODs may be needed during preliminary design, during final design and immediately prior to construction.
2. A waiver to advertise is required when any of the advertise-for-bids requirements (e.g., receipt of permits, acquisition of rights of way) is not met.</td></tr>
</table>

The various approvals identified in Exhibit 35 are covered individually in Section 4.

4.1.1 Financial and Programming

Using Section 4.1 as background, this section (4.1.1) addresses approvals under the "Administration, Financial and Programming" heading in Exhibit 35.

Project Memoranda and CORE-CT are used essentially as request and approval mechanisms, respectively. Project Memoranda request funds for specified activities (e.g. PE, RW, CN). Approvals require multi-bureau (Finance and Administration, Engineering and Construction, Planning) coordination and action to budget funds, fulfill programming requirements (TIP/STIP) and obtain FHWA authorization, when applicable. When CORE-CT reflects the availability of specified phase/activity funding, the financial and programming requirements have been satisfied.

Project Initiation/Modification Preliminary Design: A project is initiated by securing approval of the initial Project Memorandum, Recommended (RPM). A template for this document is located in the ProjectWise Project Development folder. This approval also results in a State Project Number being established. Typically, the first phase of a newly-established project is engineering (i.e., Preliminary Engineering). The RPM is prepared by the initiating unit or the lead unit. The requested funds are those needed for preliminary design (including a studies subphase, if applicable). The cost of final design is estimated and noted in the Justification section of the Project Memorandum. The selection/approval of the RPM, as described above, encompasses satisfaction of the programming and funding requirements, including FHWA authorization when applicable. CORE-CT is updated to reflect the status (sources and amounts). During preliminary design, a change in scope or cost-to-complete may necessitate the need for a Modification.

Modification/Final Design: As preliminary design nears completion, the lead unit prepares an updated/current final design cost estimate. This information is provided to the Capital Services unit and used to amend the program (TIP/STIP), if required. The final design cost is noted in the Design Approval documentation. When Design Approval is made, the lead unit provides a copy to the Capital Projects unit, which modifies the project to include final design and the associated funding, including FHWA authorization, when applicable. CORE-CT is updated to reflect the status (sources and amounts). During final design, a change in scope or cost-to-complete may necessitate the need for a Modification

Modification/Construction: During the design phase, the lead unit develops the estimated cost of the construction phase, including inspection, construction-phase design assistance, utilities, etc. The cost and schedule information is used to amend the program (TIP/STIP), if required, and budget the funds. The schedule and cost are monitored (e.g., project status review meetings), and adjusted if necessary. After the PS&E is finalized and approved at the conclusion of the contract development phase (see approval description for "Plans, Specifications and Estimate"), the Bureau of Finance and Administration secures FHWA authorization when applicable, obligates the funds and prepares the contract advertisement. CORE-CT is updated to reflect the status (sources and amounts).

Department Approving Officials: *Managers, Engineering and Construction and Finance and Administration*

FHWA approval required: *FHWA approval, if needed, is secured by the Bureau of Finance and Administration and implicit to its approval.*

4.2 Agreements

This section covers agreements between the State and construction work parties (entities other than the Department and contractor), namely utilities, railroads and municipalities.

4.2.1 Utility Agreements

Agreements with public utilities are required for a variety of purposes. The preparation of agreement is outlined in Section 2.3.3 (Prepare/Execute Utility Preliminary Engineering Agreements, Prepare/Execute Utility Construction Agreements).

Department Approving Official: *Engineering Administrator*

FHWA approval required: *No*

4.2.2 Railroad/Highway Agreements

Agreements with railroad are required for a variety of purposes. The preparation and approval of agreements is outlined in Sections 2.2.2 and 2.2.3 (Prepare/Execute Railroad/Highway Agreement for Preliminary Engineering, Prepare/Execute Railroad/Highway Agreement for Construction).

Department Approving Official: *Engineering Administrator*

FHWA approval required: *No*

4.2.3 Municipal Agreements

As indicated in Section 2.2.4 (Prepare/Execute Municipal Agreement), agreements are required when a municipality agrees to fund a portion of construction and/or assume a special responsibility (e.g., maintenance of certain features) not otherwise specified. Agreements require review by the Attorney General's office and approval by the Department and town.

Department Approving Official: *Bureau Chief, Engineering and Construction*

FHWA approval required: *No*

4.3 Plans (Outside Contract Documents)

Several types of "plans' may be needed, depending on the project characteristics. These plans are different than those that make up the contract documents, although many elements of the Transportation Management Plan are reflected in the contract documents. All of the plans listed in this section are required by FHWA regulation or policy. Two plan types are required only for projects exceeding $100 million.

4.3.1 Financial Plans

Projects receiving FHWA assistance with a total estimated cost exceeding $100 million require a financial plan, updated annually. A financial plan is a special requirement, as outlined in Section 2.3.1. Because of the small number of projects requiring financial plans, preparation guidance is not included in this guide. Current federal guidance should be referenced.

Department Approving Official: *Not applicable*

FHWA approval required: *Yes*, for federal-aid projects if specified by the Joint Stewardship & Oversight Agreement.

4.3.2 Project Management Plans

Projects receiving FHWA assistance with a total estimated cost exceeding $500 million require a project management plan. A project management plan is a special requirement, as outlined in Section 2.3.1. Because of the small number of projects requiring project management plans, preparation guidance is not included in this guide. Current federal guidance should be referenced.

Department Approving Official: *Not applicable*

FHWA approval required: *Yes*

4.3.3 Transportation Management Plans

Carry out the activities as described in Sections 2.3.2 (Begin Transportation Management Plan Development) and 2.3.3 (Complete Transportation Management Plan).

Department Approving Official: *Inherent to PS&E approval; no separate approval.*

FHWA approval required: *Yes*, for federal-aid projects if specified by the Joint Stewardship & Oversight Agreement.

4.4 Consultant Administration

The approvals in this section are related to the consultants performing project development (design) activities, with a provision for continuing design-related activity during the construction phase. This publication does not address construction inspection by consultants.

4.4.1 Retaining a Consultant

When the lead division manager determines a consultant is needed for a particular project as described in Section 2.3.1. (Determine Consultant/State Roles), approval by the Commissioner is requested as described in Section 2.3.1 (Obtain Approval to Retain a Consultant).

Department Approving Official: *Commissioner*

FHWA approval required: *No, except as specified by the* Joint Stewardship & Oversight Agreement *for projects with costs exceeding $500 million.*

4.4.2 Entering a Consultant Supplemental Agreement

When the lead division manager determines a supplemental agreement is needed for a particular project as described in Section 2.3.2 (Request/Obtain Consultant Supplemental Agreement, Request/Obtain Consultant Supplemental Agreement) and Section 2.3.4 (Request/Obtain Consultant Supplemental Agreement), approval is needed prior to preparation and execution of the agreements.

Department Approving Official: *Commissioner*

FHWA approval required: *No, except as specified by the* Joint Stewardship & Oversight Agreement *for projects with costs exceeding $500 million.*

4.4.3 Consultant Agreements and Supplemental Agreements

After the Commissioner has approved the retention of a consultant or entering into a consultant supplement agreement, the agreements are prepared and executed as outlined in Section 2.3.1 (Prepare/Execute Consultant Agreement), Section 2.3.2 (Request/Obtain Consultant Supplemental Agreement, Request/Obtain Consultant Supplemental Agreement) and Section 2.3.4 (Request/Obtain Consultant Supplemental Agreement).

Department Approving Official: *Bureau Chief, Engineering and Construction*

FHWA approval required: *No, except as specified by the* Joint Stewardship & Oversight Agreement *for projects with costs exceeding $500 million.*

4.4.4 Consultant Scope of Services

For consultant-designed projects, a scope of services is prepared, reviewed and approved as outlined in Section 2.3.1. Revisions, as described in Sections 2.3.2 and 2.3.3 are common. Approval is in the form of a letter as described in Section 2.3.1 (Prepare Consultant Scope of Services).

Department Approving Official: *Manager, lead division*

FHWA approval required: *No, except as specified by the* Joint Stewardship & Oversight Agreement *for projects with costs exceeding $500 million.*

4.4.5 Consultant Notice to Proceed

As indicated in Sections 2.3.2 (Authorize Initial Phase, Approve Preliminary Design), 2.3.3 (Authorize Final Design) and 4.1, a notice-to-proceed letter is required for each phase before compensable work by a consultant can begin. A template for this document is located in the ProjectWise Project Development folder.

Department Approving Official: *Manager, lead division*

FHWA approval required: *No*

4.5 Technical

The approvals listed in this section are required in connection with specific technical processes and determinations.

4.5.1 Hydraulic Engineer

For consultant-designed projects, approval of the hydraulic engineer is needed as described in Section 2.3.2 (Obtain Hydraulic Engineer Approval).

Department Approving Official: *Principal Engineer, Hydraulics and Drainage*

FHWA approval required: *No*

4.5.2 Hydraulics/Drainage Programs

For consultant-designed projects, hydraulic and drainage software programs require approval as described in Section 2.3.2 (Obtain Approval for Hydraulics/Drainage Programs to Be Used).

Department Approving Official: *Principal Engineer, Hydraulics and Drainage*

FHWA approval required: *No*

4.5.3 Railroad Clearances

When a project involves a bridge over a railroad, a railroad clearance form should be processed for approval as indicated in Section 2.3.2 (Obtain Approval of Railroad Clearances) and the Bridge Design Manual.

Department Approving Official: *As indicated by the form.*

FHWA approval required: *No*

4.5.4 Structure Type Studies

When a project involves a new structure, the type study requires approval as outlined in Section 2.3.2 (Prepare/Deliver Structure Type Studies) and the Bridge Design Manual.

Department Approving Official: *Principal Engineer, Division of Bridges and Facilities*

FHWA approval required: *No*

4.5.5 Rehabilitation Study Reports

When a project involves rehabilitation of a structure, the rehabilitation study requires approval as outlined in Section 2.3.2 (Prepare/Deliver Condition Survey and Rehabilitation Studies) and the Bridge Design Manual.

Department Approving Official: *Principal Engineer, Division of Bridges and Facilities*

FHWA approval required: *No*

4.5.6 Structure Layout for Design

When a project involves a new structure, the structure layout requires approval as outlined in Section 2.3.3 (Prepare/Deliver Structure Layout for Design) and the Bridge Design Manual.

Department Approving Official: *Principal Engineer, Division of Bridges and Facilities*

FHWA approval required: *No*

4.5.7 Pilot Boring Plans

For consultant-designed projects, a pilot boring plan is developed, approved and carried out as described in Section 2.3.2 (Execute Approved Pilot Boring Plan).

Department Approving Official: *Principal Engineer, Soils and Foundations*

FHWA approval required: *No*

4.5.8 Subsurface Exploration Programs

For consultant-designed projects, a Subsurface Exploration Program is prepared and submitted as outlined in Section 2.3.2 (Prepare Subsurface Exploration Program). The program requires approval prior to its performance as described in Section 2.3.3 (Execute Approved Subsurface Exploration Program).

Department Approving Official: *Principal Engineer, Soils and Foundations*

FHWA approval required: *No*

4.6 Construction Documents and Procurement

The approvals listed in this section are related to construction contracting, including procurement.

4.6.1 Public Interest Findings

The need for and approval of public interest findings is outlined in Section 2.3.3 (Obtain Approval of Public Interest Findings).

Department Approving Official: *Engineering Administrator*

FHWA approval required: *Yes*, for federal-aid projects if specified by the Joint Stewardship & Oversight Agreement.

4.6.2 Plans, Specifications and Estimate

Carry out the activity described in Section 2.3.4 (Obtain PS&E Approval).

Department Approving Official: *Engineering Administrator*

FHWA approval required: *Yes*, for federal-aid projects if specified by the Joint Stewardship & Oversight Agreement.

4.6.3 Waivers to Advertise

When one or more requirement of a complete project has not been fulfilled, a waiver to advertise may be requested as outlined in Section 2.3.3 (Obtain Waiver(s) to Advertise).

Department Approving Official: *Bureau Chief, Engineering and Construction*

FHWA approval required: *Yes*, for federal-aid projects if specified by the Joint Stewardship & Oversight Agreement.

4.6.4 Advertise for Bids

The engineering phase of project development is complete with approval of the PS&E. Following approval of the PS&E, and if applicable a waiver to advertise, the Bureau of Finance and Administration performs fiscal and other administrative reviews and advertises the construction contract for bids.

Department Approving Official: *Manager, Capital Projects unit*

FHWA approval required: *Yes*, for federal-aid projects if specified by the Joint Stewardship & Oversight Agreement.

4.6.5 Addenda

The process of issuing addenda is outlined in Section 2.3.4 (Prepare Addenda).

Department Approving Official: *Manager, Division of Design Services*

FHWA approval required: *Yes*, for federal-aid projects if specified by the Joint Stewardship & Oversight Agreement.

4.7 Other

The approvals in this section are those that do not fit into another category.

4.7.1 Design Exceptions

The need for, and preparation of, design exceptions is carried out as outlined in Section 2.3.2 (Develop Design Exception Documentation). The Design Exception Committee is comprised of senior Department engineering managers that advise the Engineering Administrator on proposed design exceptions. Committee meetings are scheduled periodically. Design exception documentation is submitted in advance of meetings and summarized by presentation at the meeting. Approval (or redesign) decisions follow.

Department Approving Official: *Engineering Administrator*

FHWA approval required: *Yes*, for federal-aid projects if specified by the Joint Stewardship & Oversight Agreement.

4.7.2 Major Scope Revisions

The potential occurrence and process for addressing a major scope revision are outlined in Section 2.3.3 (Modify Scope).

Department Approving Official: *Engineering Administrator*

FHWA approval required: *Yes*, for federal-aid projects if specified by the Joint Stewardship & Oversight Agreement.

4.7.3 Environmental (CEPA/NEPA) Documentation

As outlined in Section 1.4, all Department projects are subject to conformance with CEPA. Federal agencies taking an action (e.g., funding, permit approval) must comply with NEPA. CEPA and NEPA have similar but not identical documentation requirements. Exhibit 36 indicates the Department and FHWA approval roles and OPM role for various types of environmental documentation.

Exhibit 36. Summary of agency roles for different types of environmental (CEPA/NEPA) documentation.

	Documentation	CTDOT	FHWA	OPM
CEPA only (1)	Environmental Assessment/Finding of No Significant Impact	X		
	Environmental Impact Evaluation/Record of Decision	X		(*3*)
CEPA and NEPA (2)	Automatic and Programmatic Categorical Exclusions	X (*4*)		
	Individual Categorical Exclusion		X (*4*)	
	Environmental Assessment/Finding of No Significant Impact	X	X	
	Environmental Impact Evaluation/Environmental Impact Statement/Record of Decision	X	X	(*3*)

Notes:

1. For projects where CEPA is applicable, but NEPA is not.
2. For projects where NEPA and NEPA are applicable.
3. Department's determination is subject to OPM review.
4. Roles defined by Department-FHWA agreement, current agreement (*Programmatic Agreement for Approval Of Certain Categorical Exclusions*), August 1997

Department Approving Official: *Lead division manager* (automatic and programmatic categorical exclusion documentation); *director, Office of Environmental Planning* (others)

FHWA approval required: *Yes*, as noted in Exhibit 36.

4.7.4 Interstate Point of Access Modification

Under the activity described in Section 2.3.2 (Assess Need for New or Revised Interstate Access), determine if this approval is required. When applicable, follow further guidance in Section 2.3.2 (Prepare/Submit Request for New or Modified Interstate Access). The approval request and supporting documentation is identified in Section 3.3.5.

Department Approving Official: *Engineering Administrator*

FHWA approval required: *Yes, as specified by the* Joint Stewardship & Oversight Agreement.

4.7.5 Design Approval

Design Approval is required prior to the beginning final design. The activity associated with this approval is outlined in Section 2.3.2 (Request/Receive Design Approval).

Department Approving Official: *Manager, lead division*

FHWA approval required: *Yes*, for federal-aid projects if specified by the Joint Stewardship & Oversight Agreement.

4.7.6 Value Engineering

The Department's Value Engineering Program and Section 2.3.3 (Conduct and Implement Value Engineering Study) outline when and how Value Engineering studies are conducted and evaluated, including coordination with the FHWA. The disposition and implementation of recommendations are, in essence, the approval actions and also addressed by the Value Engineering Program.

Department Approving Official: *Project manager*

FHWA approval required: *No*

4.7.7 Rail Regulatory Approval

As outlined in Section 2.3.3 (Prepare Documentation for Railroad Regulatory Process, Obtain Railroad Regulatory Approval), Rail Regulatory approval may be needed when a railroad is located within the project limits.

Department Approving Official: *Adjudicator, Bureau of Public Transportation, Office of Rail, Rail Regulatory and Compliance Unit*

FHWA approval required: *No*