Guidebook for Project Management

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College of Engineering, University of Kentucky, Lexington, Kentucky

in cooperation with
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Commonwealth of Kentucky

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Research Report
KTC-24-23

Guidebook for Project Management

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16. Abstract

For the Kentucky Transportation Cabinet's (KYTC) Department of Highways, project development encompasses all the work activities needed to move a transportation project from concept and project initiation to construction letting. Developing projects efficiently requires the adoption of sound project management practices. Although KYTC has a long track record of executing complex projects, doing so is increasingly challenging due to staff attrition and the attendant loss of institutional knowledge. Today's entry- and mid-level project managers have more responsibilities than ever but lack a trusted source of guidance to help them manage projects from development through completion. The objective of this study is to produce a comprehensive *Project Management Guidebook* for KYTC project managers that captures the knowledge of experienced project managers and best practices — from both the Cabinet and other state transportation agencies a guidebook that 1) documents proven strategies for navigating a variety of project types (including bidding methodologies, etc.), and 2) can be used by entry- and mid-level project managers to develop and follow an appropriate project workflow.

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Executive Summary

Project delivery at the Kentucky Transportation Cabinet (KYTC) is becoming more challenging due to staff attrition and the loss of institutional knowledge. Today's entry- and mid-level project managers have more responsibilities than ever but lack a comprehensive source of guidance to help them oversee projects from initiation through the project letting. As staffing and budgets grow more constrained, it is imperative that Cabinet project managers be equipped with the tools necessary to successfully develop and deliver the roadway projects.

KYTC commissioned this study to produce a comprehensive *Project Management Guidebook* that can be used by the Cabinet's project development project managers. Based on a review of project management resources available from other state transportation agencies, input from the KYTC project managers, and existing Cabinet project management resources, the research team developed articles focused on different aspects of project management. The guidebook captures the knowledge of experienced project managers and summarizes project development process best practices. It documents proven strategies for managing a variety of project types (e.g., capital improvement, safety, asset management, maintenance) and describes guidance that entry- and mid-level project managers can follow to successfully fulfill their project management responsibilities.

Table E1 lists articles included in the guidebook. The guidebook is accessible through KYTC's Highway Knowledge Portal. The web-based format allows the articles to be updated as needed.

Table E1 List of Articles in KYTC's *Project Management Guidebook*

• Project Manager Guidebook: Introduction and Overview
• Understanding the KYTC Budget and Highway Plan Process
• Project Identification
• Project Initiation
• Project Scoping
• Project Schedule & Development of Milestones
• Project Cost Estimation and Management
• Assembling a Project Development Team
• Administration of Consultant Contracts (5 articles)
  ○ Managing Consultant Contracts
  ○ Selecting a Consultant
  ○ Understanding a Consultant Contract
  ○ Utilizing Statewide Consultant Contracts
  ○ Reviewing a Pay Invoice
• Organizing and Running Effective Project Development Meetings
• Common Project Team Meetings
• Organizing and Running Effective Project Development Meetings
	• Common Project Team Meetings Effective Communication in Project Management
	• Project Management & Planning
	• Project Management & NEPA
	• Project Management & Preliminary Design
	• Project Management & Final Design
	• Project Management & Right-of-Way Process
	• Project Management & Involvement in the Condemnation Process
	• Project Management & Utility Coordination
	• Project Management & Railroad Coordination
	• Managing Project Risks
	• Monitoring Scope, Budget, & Schedule
	• Public Involvement with Customers and Stakeholders
	• Preparing for Letting
	• Document Management, Storage, and Archival
	• Tools for the Project Manager
	• Project Management Training

Chapter 1 Introduction

The Kentucky Transportation Cabinet's (KYTC's) mission is to provide a safe, efficient, environmentally sound, and fiscally responsible transportation system that delivers economic opportunity and enhances the quality of life in Kentucky. The Department of Highways helps fulfill this mission by maintaining and improving the state's roads and bridges through two legislatively enacted programs — the Highway Plan (a construction program) and a maintenance program. Both programs generate highway projects that are taken through the construction letting process.

In KYTC's Department of Highways, project development encompasses all work activities needed to move a project from concept and project initiation to construction letting. Developing projects efficiently requires the adoption of sound project management practices. Well-rounded project managers have a balanced understanding of how the complex interplay of engineering, environmental, and economic issues affect different stages and facets of project development.

One of the Cabinet's foremost priorities is delivering successful projects. A successful project:

- Meets the defined scope
- Consists of quality solutions and deliverables
- Is on schedule
- Stays within budget

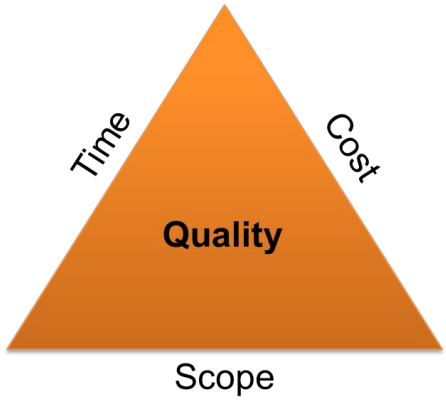


Figure 1.1 Project Management Triangle

KYTC Project Managers (PMs) oversee the development of project solutions and construction documentation. Combining project management tools/techniques with sound application of project management principles is critical for effective project management and delivering successful projects. Recognizing the need for project management guidance, the Cabinet asked Kentucky Transportation Center (KTC) researchers to develop a project management guidebook that reviews effective project management strategies and describes the expectations and responsibilities of KYTC PMs during project development.

Information presented in this report will help KYTC strengthen project management activities so the agency can deliver transportation projects more effectively. Key topics addressed in the guidebook include assembling and developing a project team, improving management of project development, judicious oversight of project budgets,

the relationship between individual projects and delivering KYTC's program, and common obstacles that arise during project development.

Chapter 2 KYTC Project Management and Project Classification

Project management at KYTC may differ significantly based on project type and complexity. Projects range from small, proposal only (no plans) projects with short durations to very complex projects with a full set of construction plans that may take multiple construction seasons to complete. The tasks described in the guidebook may not apply to all projects or may be simplified depending on the complexity and the impacts. For the purposes of this guidebook, KYTC projects are grouped into the four classifications listed in Table 2.1.

Table 2.1 KYTC Project Classifications

Project Type	Description
Capital Improvement 	Projects with larger budgets that usually involve new road or bridge construction or major improvements to higher-traffic routes. They are included in the Highway Improvement Projects Listing in the current Highway Plan.
Safety 	Projects included in the Highway Safety Improvement Program (HSIP) that focus on reducing traffic fatalities and serious injuries on public roads. They are funded programmatically through federal funds designated for the HSIP.
Asset Management 	The primary purpose of these projects is to address the condition of existing highway assets through replacement or repair. They do not typically involve the addition of new capacity or roadway functionality, although minor improvements may sometimes be included. The most common asset management projects are those meant to address pavements or bridges that have deteriorated due to age and traffic impacts. They are included in the Existing Highway System Performance Projects Listing in the current Highway Plan. Examples include pavement resurfacing, bridge replacements, and pavement and bridge preventative maintenance and rehabilitation projects.
Maintenance 	Smaller scale projects that address the condition of existing highway assets, and do not involve the addition of new capacity or roadway functionality. They typically involve the restoration or repair of minor assets that contribute to the overall functionality of the roadway. If they are included in the Highway Plan, they are in the Existing Highway System Performance Projects Listing. Examples include re-striping of pavements, ditch cleaning, pothole patching, guardrail replacement, and minor bridge deck repairs.

Other project management guidance may exist for certain types of projects (e.g., Alternative Delivery Projects). One type of Alternative Delivery Project is design-build. Usually, design-build projects are developed through preliminary design as new or reconstruction projects; much of the guidance in this book will apply to these projects. For guidance specific to managing design-build projects, consult KYTC's Design Build Guidance. Also, project managers for Local Public Agency (LPA) project administered through KYTC should consult KYTC's LPA Guide.

Since the guidebook is comprehensive for a variety of project types, the information it contains may apply to one project classification or to a set of classifications. An effort is made throughout the guidance to identify when project management topics are commonly applicable based on project classification.

Chapter 3 Literature Review

We evaluated how different State Transportation Agency's (STA's) approach project development and project management by examining policy manuals, guidance, best practices, and other resources made available to project managers. Three questions guided our inquiry:

- What activities are project managers responsible for?
- Where are project managers located within an agency's organizational hierarchy?
- What resources are available to project managers?

Although this section does not review the policies and practices of every STA, it provides a representative sample. Some agencies (e.g., Caltrans) have published extensive guidebooks that describe practically every facet of project development and reference laws, agency-specific practices, and permits, among other items. Additional efforts such as *NCHRP's Web Document 137: Guidance for Transportation Project Management* provide project management basics in a guidebook format for practitioners to utilize. Several STA guidebooks for project management discuss management in terms of the project life-cycle workflow (i.e., initiate, plan, scope, design, right-of-way coordination, utility coordination, project letting).

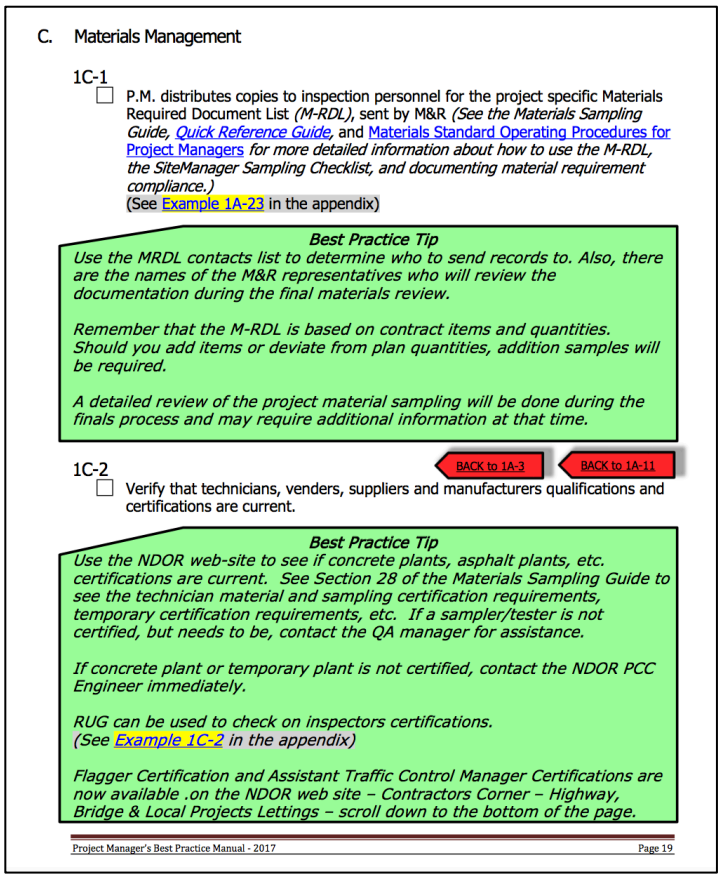
3.1 Nebraska

Project managers at the Nebraska Department of Transportation (Nebraska DOT) are employed in one of eight district-level offices located around the state. Each district has a District Engineer and District Construction Engineer; project managers are located below these positions within the organization's hierarchy. The agency also has Divisions of Project Development and Program Management, but no Division of Project Management. The Division of Project Development was created in 1971, principally to deal with the increased federal requirements that were imposed by the 1969 Environmental Policy Act (e.g., writing environmental impact statements). While there is no Division of Project Management, the agency hosts a webpage for Project Manager Resources. Along with links to agency-specific resources (e.g., approved products list, construction manual, spec book, electronic contract documents), it also contains a best practice manual and a Project Management Best Practice Checklist, which offer project managers step-by-step guidance on what tasks they are responsible for during each phase of a project. Nebraska DOT also holds an annual Project Manager's Conference.

Nebraska DOT project managers have many responsibilities, including 1) maintaining records of work performed, 2) monitoring the performance and progress of work, 3) making sure that contractors perform work as specified in plans and that sufficient documentation is preserved to justify payment. Their efforts stretch from pre-construction and construction through the post-construction phase. Project managers serve as the primary point of contact for project communications involving Nebraska DOT and external project stakeholders. They are not responsible, however, for directing the daily activities of the prime contractor or subcontractors.

To streamline the project management process and establish a stable source of knowledge accessible to all Nebraska DOT project managers, the agency developed the *Project Management Reference Guide*. Written with the input of current and former project managers, the reference guide adopts a checklist format that documents best practices for the activities project managers are responsible for during each phase of a project (i.e., pre-construction, construction, post-construction). Callout boxes located throughout the text contain examples and best practice tips that pertain to specific activities. A sample page (Figure 3.1) from the guide illustrates the guide's structure and concise presentation used. Chapters includes guidance on what steps are necessary to keep a project running smoothly. Topics are wide-ranging; for example, field survey operations, locating potential maintenance issues,

verification of existing signage, materials management, contract management, and final review. Generally, the main text lacks detailed instructions on how to perform or coordinate a specific activity. Rather, the checklist format is designed to help project managers optimize their workflow and offer reminders of when a task should be performed. Appendices, however, include worked examples and templates to facilitate the development of memoranda or project-related documents (e.g., pre-construction agenda request letter, project materials required document list, status of environmental commitments, pre-construction meeting minutes, project information forms, work orders).



C. Materials Management

1C-1

☐ P.M. distributes copies to inspection personnel for the project specific Materials Required Document List *(M-RDL)*, sent by M&R *(See the Materials Sampling Guide, Quick Reference Guide,* and Materials Standard Operating Procedures for Project Managers *for more detailed information about how to use the M-RDL, the SiteManager Sampling Checklist, and documenting material requirement compliance.)*
(See Example 1A-23 in the appendix)

Best Practice Tip

Use the MRDL contacts list to determine who to send records to. Also, there are the names of the M&R representatives who will review the documentation during the final materials review.

Remember that the M-RDL is based on contract items and quantities. Should you add items or deviate from plan quantities, addition samples will be required.

A detailed review of the project material sampling will be done during the finals process and may require additional information at that time.

1C-2 BACK to 1A-3 BACK to 1A-11

☐ Verify that technicians, venders, suppliers and manufacturers qualifications and certifications are current.

Best Practice Tip

Use the NDOR web-site to see if concrete plants, asphalt plants, etc. certifications are current. See Section 28 of the Materials Sampling Guide to see the technician material and sampling certification requirements, temporary certification requirements, etc. If a sampler/tester is not certified, but needs to be, contact the QA manager for assistance.

If concrete plant or temporary plant is not certified, contact the NDOR PCC Engineer immediately.

RUG can be used to check on inspectors certifications.
(See Example 1C-2 in the appendix)

Flagger Certification and Assistant Traffic Control Manager Certifications are now available .on the NDOR web site – Contractors Corner – Highway, Bridge & Local Projects Lettings – scroll down to the bottom of the page.

Project Manager's Best Practice Manual - 2017 Page 19

Figure 3.1 Sample Page from Nebraska DOT's *Project Management Reference Guide*

3.2 California

Caltrans project managers work in one of 12 district-level offices located around the state of California. The Division of Project Management is responsible for the management and delivery of transportation improvement projects throughout the state. Districts are staffed by a District Director, under whom there is a Deputy District Director of Program/Project Management. Project managers are situated beneath the Deputy District Director on the organizational hierarchy. Some districts have also delineated project manager boundaries. Figure 3.2, which is a map of Districts 1, 2, and 3, indicates the territorial assignments for individual project managers in the region. The Division of Project Management has produced several resources to facilitate project managers' activities, including two guidance manuals that define the purview of the agency's project managers and lays out the procedures they must follow during a construction project.

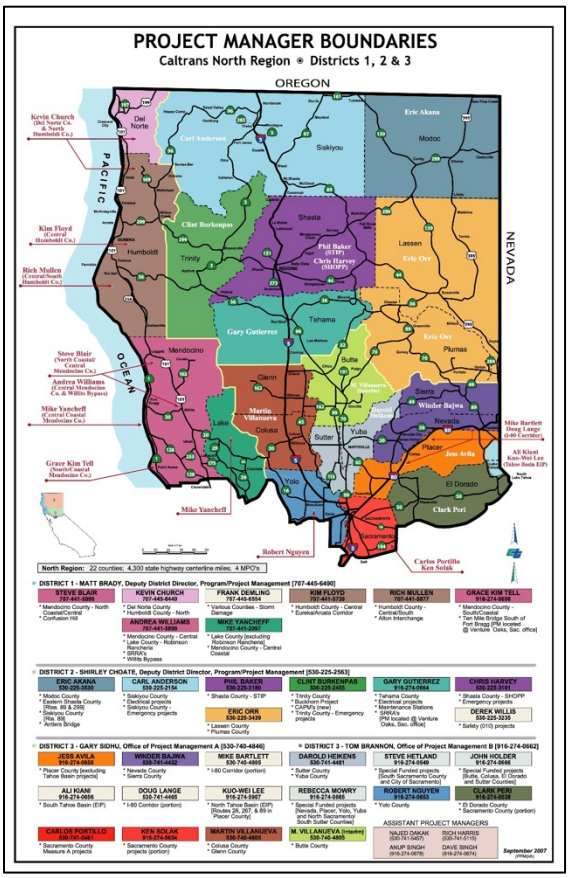


Figure 3.2 Territorial Assignments of Caltrans Project Mangers (Districts 1–3)

Project managers are involved with projects for their entire duration and have the authority to control resources designated for the project and their schedules. They oversee all steps in the project development process, starting with project initiation and extending through closeout of the construction contract. In most cases, project managers receive their assignment before project initiation occurs. The agency's *Project Management Handbook* specifies the activities project managers are responsible for during each project component — these components are Project Initiation Document; Permits and Environmental Studies; Plans, Specifications, and Estimates, Right of Way, and Construction. At the beginning of a project, project managers are expected to identify the needs and expectations of project sponsors. A Project Initiation Document (PID) is a requirement for all major projects on the State Highway System (SHS) to ensure projects are adequately scoped prior to funding approval. They also lead the project team in development of a project management plan, which should define scope, schedule, cost, resource needs, risk, and communication strategies. As a project moves forward, project managers coordinate and facilitate all work; monitor project performance; inform district management of problems encountered by district-level management, sponsors, and other members of the project team; and work to control changes to project scope, cost, and schedule. Project managers are responsible for ensuring on-time completion and once work concludes preparing a final report and documenting lessons learned. Leading up to project approval, an interdisciplinary project development team composed of internal and external stakeholders is assembled to advise and assist project managers, carry out the work plan, participate in meetings and public outreach activities, and oversee early tasks of project activities.

Two published resources can assist project managers with their daily activities. First, is the *Project Development Procedures Manual*, which is a compendium of all information project managers need to know to carry out specific

tasks. Divided into three parts, the manual presents general information (e.g., roles and responsibilities; project cost, scope, and schedule changes), a thorough description of the project development process (covering topics ranging from project initiation and formal project studies to public hearings and permits, licenses, agreements, certifications, and approvals), and details of specific project development procedures (e.g., encroachments and utilities, value analysis, community involvement). Patterned after the *Project Management Body of Knowledge*, Caltrans' *Project Management Handbook* offers guidance on best practices. It discusses each project component (listed above) and instructs project managers on what is expected of them during various phases; individual sections dedicated to each project component also specify what deliverables are required of each. Additionally, the handbook reviews processes associated with each project component. Taking a cue from the *Project Management Body of Knowledge*, the handbook divides project activities into five process groups (Initiating, Planning, Executing, Monitoring and Controlling, and Closing). The handbook also reviews tools and techniques project managers rely on during each stage of a project. Tools and techniques are described for different knowledge areas: managing project integration (e.g., forming the project development team at the beginning of a project's lifecycle, developing a purpose and need statement) and scope, time, cost, quality, human resources, risk, communication, and procurement management. The roles played by project stakeholders are covered as well, with the responsibilities of each project team member carefully itemized. Figure 3.3.3 is a table from the handbook that provides an overview of the project manager's core responsibilities within each process group. The second resource available to Caltrans project managers is the *Project Development Procedures Manual*. This manual painstakingly documents the project development process, from project initiation through the preparation of plans. It also contains numerous chapters that explain specific project development procedures (e.g., encroachment and utilities, value analysis, preparation of cost estimates, community involvement, noise abatement, landscape architecture).

Another helpful resource for project managers is the *Project Communication Handbook.* This document guides project communication at the Department. It assists the project team in identifying internal and external Stakeholders, developing the Project Communication Plan, and enhancing communication among all involved parties.

Role	Process Group	Action
Project Manager *Has full authority, delegated from the DDDPPM, to produce the intended results, on schedule and within budget, and to keep the project sponsors and customers satisfied*	Initiate	Identifies the needs and expectations of the project sponsors
	Plan	Leads the project team in the development of a project management plan that defines the project scope, schedule, cost, resource needs, risk, and communication needs Ensures that the project management plan includes all the work required, and only the work required, to produce the product Assigns resources in the following order: ▸ First, assigns WBS elements to functional managers in his/her own district or region ▸ Second, brokers WBS elements to functional managers in other districts, regions or divisions, if functional managers in his/her own district or region are unable to meet the delivery requirements ▸ Third, uses consultants to produce work elements, if neither local district or region staff nor brokering will meet the delivery requirements Modifies workplans to account for the use of project-specific consultant contracts
	Monitor & Control	Coordinates and facilitates the work performed throughout the project lifecycle Monitors project performance and takes corrective action if necessary Communicates sensitive issues and project progress to district management, the sponsors, and the project team Provides input into the performance evaluation of project team members, and recommends changes to the project team membership when necessary Serves as the single point of contact on matters involving overall project scope, cost, or schedule Resolves problems that affect project scope, cost, or schedule Controls change to the project scope, cost, or schedule throughout the project lifecycle Coordinates communication between task managers and internal customers of project deliverables to verify and document customer expectations Coordinates the efforts of the overall team, including the Division of Engineering Services Chairs project team meetings Controls the project budget (both support and capital)
	Close	Provides timely project completion Ensures that the final product meets the needs of the project customers Discusses the final product with sponsors to gauge their level of satisfaction Prepares a final report on the project, with recommendations for improvement Provides feedback to the team on lessons learned

Figure 3.3 Responsibilities of Caltrans Project Managers by Project Phase

3.3 Georgia

The Georgia Department of Transportation (GDOT) established an Office of Program Delivery in 2009 to facilitate the delivery of projects — from inception to completion. The office coordinates project development and delivery with other Georgia DOT offices and divisions, local governments, staff from metropolitan planning organizations (MPOs), business and community stakeholders, and other state and federal agencies. It prioritizes and encourages the use of codified and proven project management practices, such as those found in the *Project Management Body of Knowledge*. Within the agency's organizational hierarchy, the Office of Program Delivery and Program Control Office fall under the purview of the Division of Program Delivery. The Program Control Office monitors, controls, and reports on project status. It also offers training courses on the plan development process and locally administered projects, encourages GDOT employees to build a collaborative environment throughout the project development

process, recommends lettings to executive management, helps project managers use the agency's scheduling tool, and is responsible for maintaining a balanced work program and reviewing project concept reports. Each district office is staffed by a program manager who supervises the activities of a team of project managers.

Georgia DOT project managers oversee projects from initiation through construction. More specifically, they are "the person in responsible charge of a project who makes the day-to-day scope, schedule, and budget decisions and is responsible for steering, coordinating, and managing a project through the Project Development Process and through the construction phase" (Georgia DOT, 2012). The agency has published a list of the tasks assigned to project managers:

- Meet with Planning, stakeholders, and MPO as required
- Review project justification statement with an assessment of commitments and agreements
- Meet with Program Control to establish schedules, identify critical path and risks
- Identify and monitor resources — team members, stakeholders, and subject-matter experts
- Project Manager's project acceptance into Program Delivery with risk assessment
- Initiate and assign projects with a project charter
- Implement and execute the project management plan with team members
- Conduct meetings, plan, monitor, evaluate, mitigate, resolve, and report
- Deliver the project

Less experienced project managers are assigned a Senior Project Manager mentor. When they confront procedural issues or other problems they feel unequipped to handle, they are instructed to consult with their mentor to achieve a resolution. If this does not solve the problem, they should escalate the issue to upper management.

Georgia DOT has published a project management handbook that presents a view of project management which aligns closely with principles laid out in the *Project Management Body of Knowledge* and gives users practical guidance on different aspects of the project development and delivery process. After reviewing the mission of the Office of Program Delivery, the handbook quickly gestures toward salient policies and procedures project managers should familiarize themselves with, lists formal project manager training activities, discusses methods and software for documenting progress on the project, and describes how to generate project status reports. The handbook's chapter on project management serves as a concise introduction to project management strategies and their application to effective and efficient project delivery. Later chapters run through a series of topics relevant to project management, including work breakdown structures, the administration and organization of GDOT programs, working with consultants and processing invoices, and legal matters. The handbook also discusses and establishes a roadmap for the Project Team Initiation Process, the goal of which is to standardize the roles played by project managers and subject-matter experts when GDOT projects are initiated and reduce the amount of time needed to move from the preliminary engineering funding authorization to the beginning of preliminary design activities. The remaining chapters touch on the project manager's roles during different phases, including preliminary design, final design, and construction — including construction oversight, handling change orders, final inspection, and project closeout. Once a project ends, project managers are expected to hold a meeting with the project team to identify lessons learned and discuss ways to improve future projects.

3.4 Florida

Compared to most other state agencies, the Florida Department of Transportation (FDOT) has adopted a somewhat unique approach to project management. At the state level, FDOT has a Production Support Office, which is located under the Office of Design. The mission of the Office of Design is to support and manage the delivery of the design phase of projects. Within the Production Support Office is the Project Management Section, whose purpose is to supply the tools needed to deliver projects on schedule and within budget and develop and consistently implement project management practices to facilitate transportation project delivery. Additionally, the Project Management

Section hires — when needed — consultant project managers to assist with delivery of the transportation work program. Consultant engineers provide design, construction engineering, and inspection services. What separates FDOT from most other agencies is that project managers generally oversee project phases rather than projects from inception to completion. The Production Support Office has published a comprehensive *Project Management Guide* that has guidelines and recommended practices for Florida DOT project managers and consultant project managers. The guide lists and describes the phase specific of project management:

- Planning Project Management
- Project Development and Environmental Project (PD&E) Management
- Design Project Management
- Right of Way Project Management
- Transportation Systems Management & Operations
- Construction Project Management
- Design-Build Project Management
- Maintenance Contract Management
- Alternative/Special Project Management
- Local Agency Program (LAP) Project Management

Project managers are assigned to oversee work in one of these areas/phases. For example, a Right of Way Project Manager is responsible for managing the right or way phase of a project. After the Right of Way phase concludes, they communicate commitments and transfer purchase agreements and other materials to the Construction Project Manager.

The agency maintains online resources for its project managers. The central website for Project Management contains points of contact, lists project management areas, provides links to the agency's *Project Management Guide* and other agency-specific policies and resources, and lets users access district-level project management websites. The most detailed webpages contain links to manuals, files, documents, and other guidance that can facilitate project management activities.

At FDOT a project manager is responsible for executing and completing a project. As noted, project managers can come from outside consultants, and they preside over a single project phase (e.g., design, right of way). Project managers are also responsible for ensuring that work adheres to the project scope, managing contracts to verify all contractual requirements are satisfied, overseeing budgets, making sure that work is completed on schedule, eliminating or mitigating risks, communicating effectively with stakeholders, overseeing the work of project staff, and confirming that quality standards are met. The agency treats project managers as the "hub of concern and accountability." If a project has project managers from both FDOT and an external consultant, each assumes equal responsibility for the project's success. FDOT project managers are accountable to the management of the department in which their work takes place. Less experienced project managers are also encouraged to identify and work with informal mentors. Table summarizes the responsibilities of agency and consultant project managers.

Table 3.1 Responsibilities of Internal and Consultant Project Managers (Florida DOT)

Area	FDOT Project Manager Responsibilities	Consultant Project Manager Responsibilities
Scope	• Develop the scope of services. Coordinate input from support services and the project team. • Know and understand the scope.	• Completely understand and fulfill the scope of services • Not work beyond the scope of services.

Area	FDOT Project Manager Responsibilities	Consultant Project Manager Responsibilities
	• Be accountable to management for the success of the project. • Approve modifications to the scope and update the document.	• Be accountable to both FDOT and firm management for the success of the project
Contracts	• Thoroughly know and understand the contract and fulfill all contractual obligations. • Understand fiduciary responsibilities to ensure proper expenditure of public funds and to ensure that contracted services are delivered. • Review deliverables, progress reports, and other project monitoring tools to identify problems early. • Take decisive action if monitoring indicates a problem: work products are deficient, the consultant is not responsive, or the project is significantly behind schedule.	• Thoroughly know and understand the contract and fulfill all contractual obligations. • Fulfill all contractual requirements on time, within budget, and of an acceptable quality. • Ensure that all progress reports and deliverables are submitted on time. • Advise FDOT of contractual problems on a time basis and propose reasonable solutions.
Cost	• Stay within the budget • Be concerned about total costs, including design, right or way, construction, and maintenance services. • Process appropriate charges in the contract amount.	• Complete the project within the established budget. • Meet the profit objective set by firm management.
Time	• Approve any change in project schedule. • Be concerned with schedule linkages to other projects in the Work Program. • Identify actions required by FDOT management and ensure timely completion. • Ensure that Department review commitments, as defined in the contract, are met.	• Meet all schedule requirements. • Know which activities are on the critical path and manage these activities aggressively. • Update schedule as needed.
Human Resources	• Ensure that staff is available to perform the project and to review the project team.	• Ensure that the necessary human resources are available to perform the project. • Ensure that the key staff members work on the project as proposed to the FDOT. • Delegate effectively. Coach and train others to become Project Managers

FDOT's *Project Management Guide* presents high-level guidance on many topics salient to project managers. It is divided into four parts. The first part examines generalized project management topics and concepts for all project managers irrespective of what project phase they have responsibility for. The second part describes the general

project process. The third part includes phase (e.g., planning, project development and environmental, survey, design, right-or-way, transportation systems management and operations, construction) specific project information. The fourth part addresses alternative and specific (e.g., major projects) project management. After defining the attributes of successful project managers and discussing ethical principles, the guide outlines procedures to monitor and control projects, explores the role of consultants, and maps the planning process FDOT uses to identify transportation needs. A brief description of context classification is included, as it is the agency's policy to plan, design, construct, and maintain projects in a manner sensitive to the surrounding community and environmental contexts. Chapters in the first portion of the guide deal with other standard items such as developing a scope and schedule, procuring consultants, negotiating contracts, quality assurance and quality control, right of way, public involvement, utility and railroad coordination, and risk management. The guide provides fine-grained descriptions of the activities and responsibilities of project managers assigned to different phases. Most of the content relates to agency procedures and standard practices, laying out all the steps project managers should follow to successfully negotiate their project phase. Throughout, the guide links to FDOT webpages, manuals, specifications, guides, and bulletins project managers will require access to.

3.5 Ohio

The Ohio Department of Transportation (Ohio DOT) lacks a dedicated office or division focused on either project development or project management at the state level, although it does offer resources to facilitate project management. In each district, the Planning and Engineering Department oversees the development and design of all highway construction projects. Located within this department are project managers who work on consultant projects and Local Project Agency (LPA) Projects — LPA Projects are those which move through the Local Letting Process. Ohio DOT adheres to a five-phase Project Development Process (PDP): planning, preliminary engineering, environmental engineering, final engineering/right of way, and construction. Project managers oversee work during these phases. Preliminary Engineering and Environmental Engineering are done in tandem. The agency also has a classification system that is used to categorize projects based on project complexity. Path 1 and 2 projects are minor transportation improvement projects (e.g., maintenance and efforts that require minor structural or roadway work). Path 3, 4, and 5 projects are more complex, ranging from projects focused on existing alignments and significant relocations that do not significantly impact the environment (Path 3) to urban transportation improvements that entail acquiring significant right-of-way, relocating numerous utilities, and demand considerable public input (Path 5). To ensure continuity on more complex projects (Path 3, 4, and 5), Ohio DOT recommends assigning a dedicated project manager to oversee development across the project lifecycle. The agency has a website focused on its PDP that includes links to its *Project Development Process Manual*, a discussion of project paths and their respective milestones, training materials, and worked examples of PDP documents.

After a project manager has been chosen by the project sponsor, the project manager first establishes a project identification number, enters information into the agency's project management system, works with the sponsor to select an appropriate project team, and begins documentation of all project activities and products. To facilitate selection of the project pathway, project managers define project conditions, potential impacts, constraints, and solutions (i.e., alternatives) and report on them to help the Planning and Engineer Administrator make an initial project classification selection. It is also the project manager's responsibility to communicate and coordinate with Ohio DOT's Central Office specialty staff throughout the project. At the outset of a project, project managers organize a kickoff meeting, the aim of which is to identify project stakeholders, define work requirements, develop a preliminary scope and schedule, and determine whether the agency will hire an outside consultant. Project managers are expected to organize project meetings at each PDP phase, and at other times deemed critical, to ensure the project remains on schedule, is not exceeding the scope, and is within budget. If a consultant becomes involved in a project, the agency suggests the project manager participate in development of the pre-Scope of

Services, conducting the scope of services meetings with the consultant, evaluating the consultant proposal, and negotiating the fee. Throughout the project, the project manager is responsible for monitoring and controlling costs and providing routine updates on its status to internal and external stakeholders (e.g. Ohio DOT personnel, FHWA, Federal Transit Administration, MPOs). Project managers are expected perform the following tasks:

- Verify that contract deliverables meet the scope of services requirements and that are deliverables are received
- Coordinate and schedule internal reviews — plan submissions are tendered to the project manager
- Establish and monitor project funding
- Coordinate and schedule plan reviews
- Directly provide technical guidance to consultants (or coordinate its provision)
- Manage and balance project risks
- Regularly hold progress meetings
- Coordinate processing of any needed design exceptions
- On design contracts, manage activities required to certify plans to Ohio DOT's central office (e.g., right of way clearance, utility clearance, acquisition of necessary permits, railroad agreements, cost estimates, and environmental clearance)

Project managers can customize a project's scope by modifying required tasks to address project needs. When a consultant is involved in a project, the project manager also monitors the consultant's work to ensure it complies with Ohio DOT's plan format requirement and the scope of services. After the project has been completed, project managers are required to evaluate a consultant's performance.

Ohio DOT's *Project Development Process Manual* offers detailed guidance for each phase of the agency's PDP. The manual links to references, documents, and other resources located on the agency's website and elsewhere that project manager should consult if they need additional information. The introductory chapter has a high-level review of the PDP, articulates the project manager's responsibilities, and briefly touches on issues such as estimating project costs, scoping, alternative delivery methods, and transitioning a project from one path to another if the need arises. Next, individual chapters offer detailed treatments of each project phase. Each of these chapters, in addition to outlining key processes, includes a section that specifies what activities project managers are responsible for during each phase. The planning chapter walks through issues such as identifying and researching traffic problems that need to be addressed; developing purpose and need statements; and developing a project's scope, budget, and schedule. Following this, the manual goes over the preliminary engineering, during which project managers spearhead detailed investigations to identify appropriate transportation solutions. Topics such as feasibility studies, conducting environmental field assessments, developing an alternatives report, initial (Stage 1) design, and public involvement are reviewed. The environmental engineering phase occurs alongside preliminary engineering. In discussing this process, the handbook reviews environmental field studies in greater detail and discusses value engineering, detailed (Stage 2) design, and preliminary right-of-way plans. For items such as preliminary-right-of-way plans, the manual provides instructions on key items to consider and what to include with deliverables in callout boxes. National Environmental Policy Act documentation and environmental mitigation are covered in this chapter as well. Once preliminary/environmental engineering wrap up, projects transition to final engineering/right of way. The chapter dedicated to this phase examines right-of-way acquisition, completing detailed (Stage 3) design plans, preparing cost estimates, and the advertising and award process. The final chapter delves into construction, including preconstruction meetings, value engineering change proposals, acceptance of materials, construction activities (with an emphasis on which should be monitored and documented), and final acceptance. A post-construction meeting is held to revisit the project and document lessons learned.

3.6 Massachusetts

The Massachusetts Department of Transportation (MassDOT) has a Project Management Section that is housed within its Design and Engineering Department. The mission of this section is to oversee roadway and bridge projects designed by consultant engineering firms. Agency employees are divided among five district offices and a central office in Boston. Project managers have access to many resources, including the *Project Development and Design Guide*, which contains a dedicated chapter on project development and management (see below). The developmental framework MassDOT has created is meant to facilitate successful project execution; encourage the use of sound planning, design, and implementation practices; and promote the long-term success of the agency's projects. It also counsels the use of a collaborative approach to address transportation problems and prioritizes the use of context sensitive solutions. Figure 3.4 presents the agency's project development workflow. Along with the *Project Development and Design Guide*, the Project Management Section website also houses a variety of tools that facilitate the project development process. It includes links to project development tools (e.g., highway design review checklist, project need form, project initiation form, and construction project estimator), contract and invoicing tools (e.g., payment invoice processing procedures, consultant contract closeout procedures), and design manuals and guides. Information on public hearings, Project Review Committee (PRC) activities, and scoping and estimating project costs are available too.

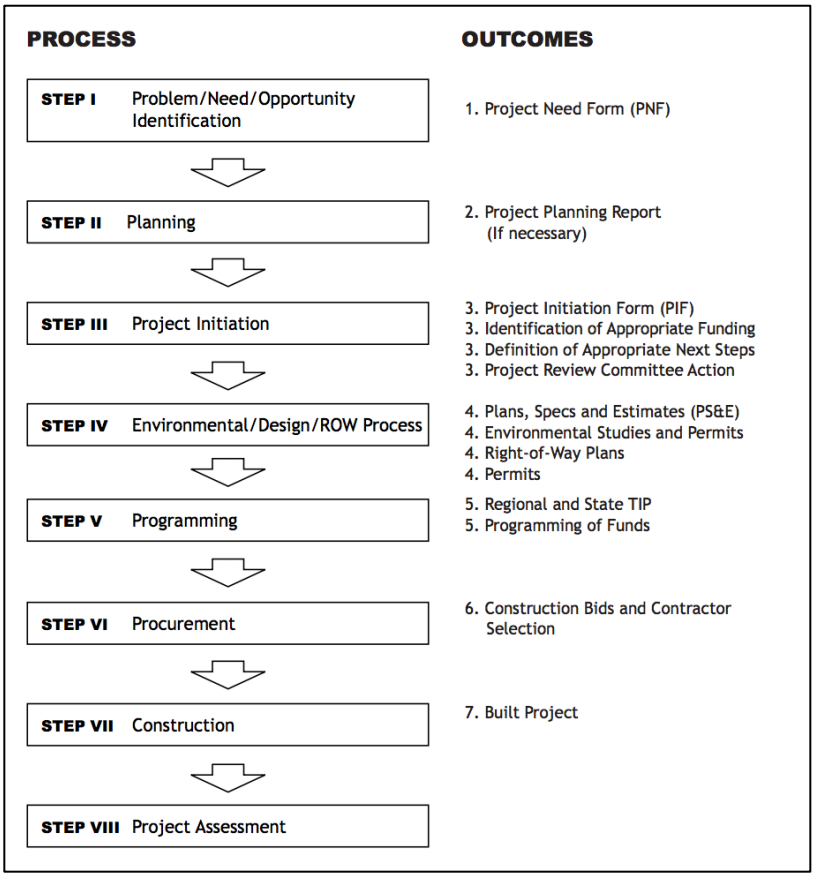


Figure 3.4 Massachusetts DOT Project Development Process

Project managers oversee work during each phase of a project, from initiation through construction. Project proponents are responsible for completing Steps I and II of project development (i.e., problem identification and planning). After a project need has been identified and goes through planning, and the MassDOT district office and

local community agree the project is warranted, the district office submits a project initiation form to the agency's Project Review Committee (PRC). The PRC evaluates proposed projects and decides whether they are both eligible for funding and feasible to undertake. Only after the PRC approves a project is a project manager assigned by the agency. On many roadway projects, cities or towns provide funding, supervise design, and acquire the right of-way. Project managers also coordinate with municipalities during the design phase, when they control the right-of-way and have selected a consultant engineering firm.

As noted, the *Project Development and Design Guide* includes a chapter on project development; we restrict our discussion to this chapter. The first three sections of this chapter discuss project phases in which the project manager has little or no involvement. Needs identification and planning, which the first two chapters explore, occur before a project manager is assigned. However, these would be of use to project proponents needing guidance on the process. The third section examines project initiation, from screening to approval by the PRC. The fourth section outlines the environmental, design, and right-of-way processes, which are concurrent. This section provides instruction on public involvement and specifies when various hearings occur. It also provides guidance for coordinating different facets of the environmental process (e.g., federal and local environmental laws, mitigation, documentation). The next two sections briefly review programming and procurement. Before construction gets underway, the project proponent and contractor must develop a construction management plant; MassDOT recommends closely monitoring and managing construction activities to verify quality standards are met and project expectations are satisfied. Building on previous material, a section offers an in-depth review of public outreach, including a discussion of stakeholder identification, deciding on appropriate public involvement strategies, and tools that are available to communicate with the public about new projects. It includes a matrix that identifies what public outreach approaches are necessary for different project types (Figure 3.5). Two final sections delve into scheduling (including a sample template) and design exceptions.

Source: MassHighway

	Necessary and Recommended Public Outreach Approaches						
	Notify abutters and utilities of construction impacts*	Community notification and involve abutters	Early involvement of Local Boards/ Commissions	Early Local Issues Meeting	Public forums at several stages of Planning and Design	Active communication about project progress	Form an Advisory Task Force
System Preservation**							
Roadways, Sidewalks, and Shared Use Paths							
Maintenance	□		□				
Resurfacing	●	□	□				
Reconstruction/Reconfiguration within Existing Layout	▲	▲	▲	●	□	□	□
Bridges							
Maintenance	□		□				
Rehabilitation	●	□	□				
System Improvement or Expansion							
New Roadway or Shared Use Path	▲	▲	▲	▲	▲	●	●
Widened Roadway or Shared Use Path Widening	▲	▲	▲	▲	●	●	□
Intersection or Roundabout Improvements	▲	▲	▲	▲	●	●	□
New Interchange or Interchange Reconfiguration	▲	▲	▲	▲	▲	●	●
Roadside Safety, Sidewalk or Signage Improvements	▲	●	●	●	●	●	
Traffic Calming, Streetscape, Lighting, or Transit Enhancements	▲	▲	▲	▲	▲	●	□
New or Widened Bridge	▲	▲	▲	●	●	●	
New or Expanded TDM/Park & Ride Lot	▲	▲	▲	□	□	□	
New or Expanded Traffic Management System	▲	▲	●	□			

▲ Usually necessary/recommended.
● Suggested for project types indicated and usually necessary for more complex projects within each type.
□ May be helpful for more complex projects for the types indicated.

* The Public Works Department and other utilities should also be consulted to determine if there are any planned improvements to subsurface utilities and infrastructure

** Public outreach may not be needed for system preservation activities such as routine maintenance and resurfacing; however, these projects may offer opportunities to enhance the accommodation of bicyclists or pedestrians and it may be useful to reach out to specific constituencies as projects are being planned. Examples of these types of projects include restriping, new crosswalks, ADA enhancements, or drainage improvements.

Figure 3.5 Massachusetts DOT Matrix to Select Appropriate Public Outreach Approaches

3.7 Utah

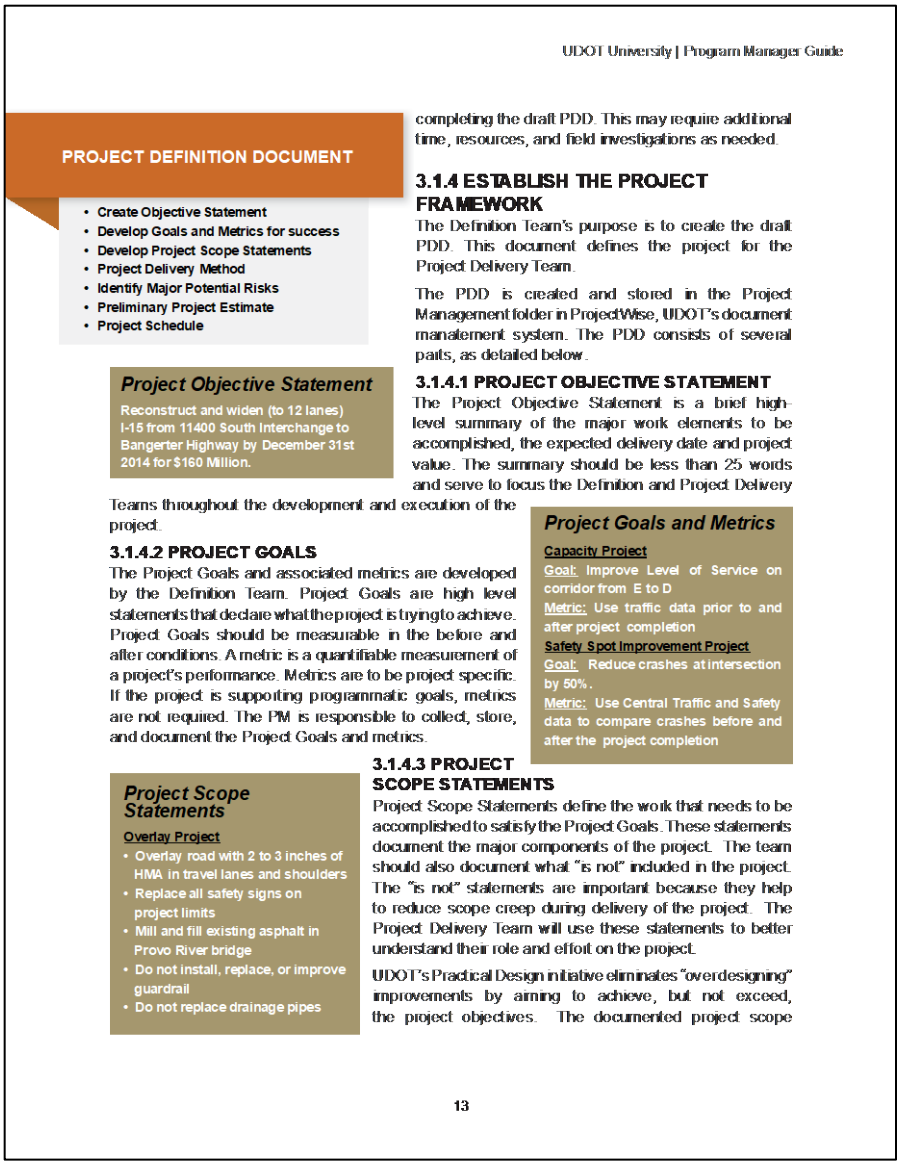
Within the Utah Department of Transportation's (UDOT) Project Development Group there is a Project Management Division whose mission is to provide resources to support the efforts of program managers, project managers, and project teams. Each of the agency's four regions houses a Project Management Division, which is headed by a Region Program Manager who oversees and manages all the projects that are taking place within the region. The program manager is tasked with monitoring the region's performance management system, coordinating all project assignments in design and construction, and working with UDOT Central Planning and Programming Division to prepare and submit budget requests to advance the region's program. Individual project managers work in regional offices and are supervised by Region Program Managers. Program Managers assign project managers to specific projects.

The agency maintains a website on Project Management and Project Delivery Tools, which contains documents and other resources project managers can draw from to facilitate the project management process. Along with UDOT's *Project Manager Guide*, which is comprehensive resource for project managers, the website also links to guidance on financial management, a handbook devoted to team building, project delivery networks (which are templates that map out the project stages — and the activities associated with each one — of successful project delivery), information on Microsoft Project, risk assessment and management, and other assorted tools.

Utah DOT likens the project manager to an orchestra conductor — someone who manages the project at a high level, who although they lack detailed knowledge of every technical area (e.g., construction, quality assurance and quality control) can successfully coordinate, harmonize, and direct the activities of workers with multiple responsibilities to deliver a high-quality transportation product. More specifically, project managers are responsible for delivering every project within a region from concept development through construction and closeout. They oversee delivery of all project types: safety improvements, enhancements, preservation, and reconstruction. Project managers are responsible for keeping project within scope, on schedule, and within budget, as well as ensuring data quality is sufficient. As project team leader, the project manager is accountable for planning, executing, monitoring, and closing a project. The agency views project managers as occupying several roles: project coach, mentor, risk manager, and primary decision maker. Project managers are responsible for ensuring that projects support UDOT's goals, improve nearby communities and the environment, bolster the safety and efficiency of travel, and verifying that the project benefits the agency's entire program. They also collect data on project metrics to determine whether a project is meeting its performance goals.

UDOT developed its *Project Manager Guide* to outline critical project management skills and document resources that are useful for both new and experienced project managers. The guide is divided into chapters. Each chapter — along with the main narrative — includes callout boxes that contain a variety of information, such as noting where different types of information can be found, defining key terms, delineating the roles of stakeholders, and succinctly outlining the steps needed to complete activities (Figure 3.6). The end of each chapter includes a chapter summary, links to guidance and manuals, tools germane for processes discussed in the chapter, key agency contracts, and business systems that are necessary to complete specific tasks. The first substantive chapter in the guide is focused on project creation and the role various agency stakeholders play in bringing a project into being. The next chapter on planning talks about the collaboration between the project manager and Definition Team, which involves defining and documenting the purpose, scope, and goals for a project. It includes guidelines for selecting members of the Definition Team, high-level instructions for determining risks, and the steps required to initiate a project. Following this, the guide addresses project execution. UDOT directs its project managers to adhere to the MITAR management principle. MITAR stands for *Monitor, Investigate, Take Action, Report*. For each phase of project execution, the guide instructs project managers on how to operationalize the MITAR principle. Thus, it describes how to apply the

principle to scope management, schedule management, and project team management. Next, the guide addresses project construction and closeout, outlining the responsibilities of the project manager and resident engineer. The resident engineer is responsible for directly supervising construction activities, while the project manager works to ensure the scope, schedule, and budget are upheld, and that right-of-way acquisitions and other commitments are fulfilled. This chapter provides guidance on meeting attendance, processing change orders, strategies for partnering with contractors, and final inspection and acceptance. The guide then examines contract administration, including the various contract types used, procedures for identifying and selecting consultants, and alternative delivery methods (e.g., design build, contract manager/general contractor). A final chapter discusses UDOT's approach to risk management.



UDOT University | Program Manager Guide

PROJECT DEFINITION DOCUMENT

- Create Objective Statement
- Develop Goals and Metrics for success
- Develop Project Scope Statements
- Project Delivery Method
- Identify Major Potential Risks
- Preliminary Project Estimate
- Project Schedule

completing the draft PDD. This may require additional time, resources, and field investigations as needed.

3.1.4 ESTABLISH THE PROJECT FRAMEWORK

The Definition Team's purpose is to create the draft PDD. This document defines the project for the Project Delivery Team.

The PDD is created and stored in the Project Management folder in ProjectWise, UDOT's document management system. The PDD consists of several parts, as detailed below.

Project Objective Statement

Reconstruct and widen (to 12 lanes) I-15 from 11400 South Interchange to Bangerter Highway by December 31st 2014 for $160 Million.

3.1.4.1 PROJECT OBJECTIVE STATEMENT

The Project Objective Statement is a brief high-level summary of the major work elements to be accomplished, the expected delivery date and project value. The summary should be less than 25 words and serve to focus the Definition and Project Delivery Teams throughout the development and execution of the project.

Project Goals and Metrics

Capacity Project

Goal: Improve Level of Service on corridor from E to D

Metric: Use traffic data prior to and after project completion

Safety Spot Improvement Project

Goal: Reduce crashes at intersection by 50%.

Metric: Use Central Traffic and Safety data to compare crashes before and after the project completion

3.1.4.2 PROJECT GOALS

The Project Goals and associated metrics are developed by the Definition Team. Project Goals are high level statements that declare what the project is trying to achieve. Project Goals should be measurable in the before and after conditions. A metric is a quantifiable measurement of a project's performance. Metrics are to be project specific. If the project is supporting programmatic goals, metrics are not required. The PM is responsible to collect, store, and document the Project Goals and metrics.

Project Scope Statements

Overlay Project

- Overlay road with 2 to 3 inches of HMA in travel lanes and shoulders
- Replace all safety signs on project limits
- Mill and fill existing asphalt in Provo River bridge
- Do not install, replace, or improve guardrail
- Do not replace drainage pipes

3.1.4.3 PROJECT SCOPE STATEMENTS

Project Scope Statements define the work that needs to be accomplished to satisfy the Project Goals. These statements document the major components of the project. The team should also document what "is not" included in the project. The "is not" statements are important because they help to reduce scope creep during delivery of the project. The Project Delivery Team will use these statements to better understand their role and effort on the project.

UDOT's Practical Design initiative eliminates "overdesigning" improvements by aiming to achieve, but not exceed, the project objectives. The documented project scope

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Figure 3.6 Sample Page from Utah DOT's *Project Manager Guide*

3.8 Oregon

The Oregon Department of Transportation (ODOT) lacks a dedicated project development or project management office, however, there are helpful resources available to guide project management activities. Two divisions

participate in project development and delivery. The Transportation Planning Section manages the transportation planning component of program development, which includes activities leading up to project initiation (e.g., identifying potential projects, drafting the statewide transportation improvement program, project scoping). The Highway Division is responsible for the design, construction, operation, and maintenance of roadways. It also performs activities such as right-of-way acquisition, the award of highway construction contracts, supervision of contractors, studying the environmental impacts of proposed projects, and executing other research functions. ODOT has two designations for staff who oversee and manage projects — project leaders and project managers. *Project leaders* are assigned to in-source projects while *project managers* administer outsourced projects. In-source projects are those which follow the design-bid-build process: the agency uses its own resources to design projects and provide construction management. Projects that are outsourced leverage private sector resources for delivery. This method of delivery is common on projects that use design-build and the program management (i.e., a program management firm offers day-to-day direction, organization, implementation, and operational management for a group of related projects) delivery strategies; it is occasionally used for design-bid-build projects as well. The project development phase begins once a project leader or manager has been assigned to a project. However, the agency's *Project Delivery Guide* (explored in greater detail below) states that *project leaders* may contribute to several activities during program development, including collecting data on their regions during the management systems analysis phase, identifying potential projects, and scoping projects for the statewide transportation improvement program. A website devoted to the agency's *Project Delivery Guide* links to numerous resources and tools (e.g., manuals, environmental procedures, design manual) used throughout a project.

Area managers manage and lead regional development and construction programs; they also supervise and mentor project managers, project leaders, and in some cases local agency liaisons. Table 3.2 compares the responsibilities of project managers and project leaders. Note, the roles of project managers and leaders are different. Project leaders manage project development activities on in-house project but do not play a role in outsourced projects. Conversely, project managers are responsible for managing outsourced projects and function as the ODOT representative once an in-house projects transitions to delivery (i.e., construction).

Table 3.2 Roles and Responsibilities of Project Managers and Project Leaders at the Oregon DOT

Project Manager	Project Leader
Represents ODOT in delivering multi-million-dollar in-house transportation projects	Supplies project management leadership for in-house projects during project development
Leads and oversees activities required to develop and administer outsourced consultant contracts for project development and/or construction	Oversees all activities required to ensure all projects move through the project development process successfully
Main point of contact at the region level for the development and implementation of design-build solicitations and contracts	Coordinates and leads all project management processes for all assigned projects, including risk, quality, public involvement, scope, schedule, and budget management
Responsible for contract administration on construction contracts	Spearheads multiple interdisciplinary teams working on project development
Represents the engineer on a project and has authority to enforce contractual provisions	Offers direction to project team members and coordinates the successful completion of the project development phase

Manages engineers, technicians, surveyors, and clerical personnel who facilitate the project manager's efforts	Prepares and manages project work plans
Plans, analyzes, documents, and manages budgets and cash flow for the construction workforce, facilities, vehicles, equipment, training, travel and other resources	Leads scoping teams
Represents the Highway Division's deputy director, chief engineer, and region manager as an ODOT expert on outsourcing highway construction contracts to consultants, contractors, and local communities	
Reviews, approves, and accepts work produces from ODOT's suppliers	

ODOT characterizes its *Project Delivery Guide* as a living web-based document that grew out of presentations originally given in 2008 focused on the project delivery process. It is broken into four sections, with each covering a different phase of project development: program development, project development, awarding the construction contract, and construction management. Several appendices contain information related to project types and project delivery methods; procurement; general project management principles; and tools, resources, and systems that facilitate project delivery. The section on program development covers transportation planning as well as activities required to prepare the statewide transportation improvement plan. As noted, project leaders may occupy a limited role during this phase. Project development begins after a project has been identified and assigned a project leader, project manager, or regional local agency liaison. This phase encompasses everything from project initiation to letting. The guidebook's project development chapter is split into two sections. The first section of the chapter includes ordered task lists that specify activities and deliverables required to complete a milestone (e.g., e.g., project initiation, design acceptance, right-of-way acquisition). Task lists present high-level descriptions of work activities and help project leaders organize their work to ensure all tasks are completed and documents correctly submitted. Following the task lists, the second portion of the chapter describes the steps needed to execute each task. These descriptions outline the purpose of a task, personnel who are involved at each stage, succinct directions for carrying the task out, ODOT resources and offices that can provide support, and activity codes. The lifecycle milestones include project initiation, design acceptance, advanced plans, final plans, PS&E submittal, and project development closeout. From project development, the guidebook moves into the awarding of the construction contract, with it discussing how to move a project from PS&E submittal to bid opening, and then from bid opening to contract award. The final chapter addresses construction management; as such it is most relevant to the project manager, who serves as ODOT's representative during this phase on most design-bid-build projects. It summarizes tasks that must be completed before onsite work begins, construction activities, completion of construction, and project closeout. After a project concludes, project managers must ensure that comments and concerns pertaining to constructability, problems, solutions, and design changes are incorporated into the project narrative. Project managers also organize a post-project critique with project team members and interested stakeholders to document lessons learned and ways to improve processes that were part of the project.

3.9 North Carolina

The North Carolina Department of Transportation (NCDOT) first audited its organizational structure in 2007 with the goal of developing suggestions for areas to improve. The audit found that NCDOT should be more strategic in managing the transportation network, set performance goals and accountability, prioritize projects, and strengthen leadership and talent management (Lindquist et al. 2009). Responding to the audit, NCDOT focused on changing

functional alignments to address challenges such as department silos, lack of accountability, and inconsistent coordination in project delivery and management. Functional alignments are:

- Monitoring, Communication, and Control
- Strategy and Investment Analysis
- Business Administration
- Process Management
- Program and Asset Management

NCDOT undertook a study several years later on the agency's current state, how the organization's goals were aligned with current structure, and pay structures (North Carolina Department of Transportation, 2015). The study objectives were to enhance decision making at the division level, turn to more individual accountability for project delivery, and right-size staffing levels. Reviewing project delivery goals indicated a focus on planning document completion, letting dates, and construction completion dates were needed. Of note was the implementation of a new screening process to determine the delivery of projects, where simpler projects are sent to the Highway Divisions for development while more complex projects are assigned to project delivery teams, or multidisciplinary teams — "Multidisciplinary Teams will eliminate the current silo approach to project delivery, and transition the Department to an integrated organizational structure that increases accountability for project delivery" (p.6).

Figure 3.7 (Figure 2.4, p.6) illustrates how division engineers work with project delivery teams and central office staff during the project development process. Figure 3.8 (Figure 2.5, p.7) provides an overview of multidisciplinary team that assigns project responsibilities to the team lead and design questions to the roadway design team.

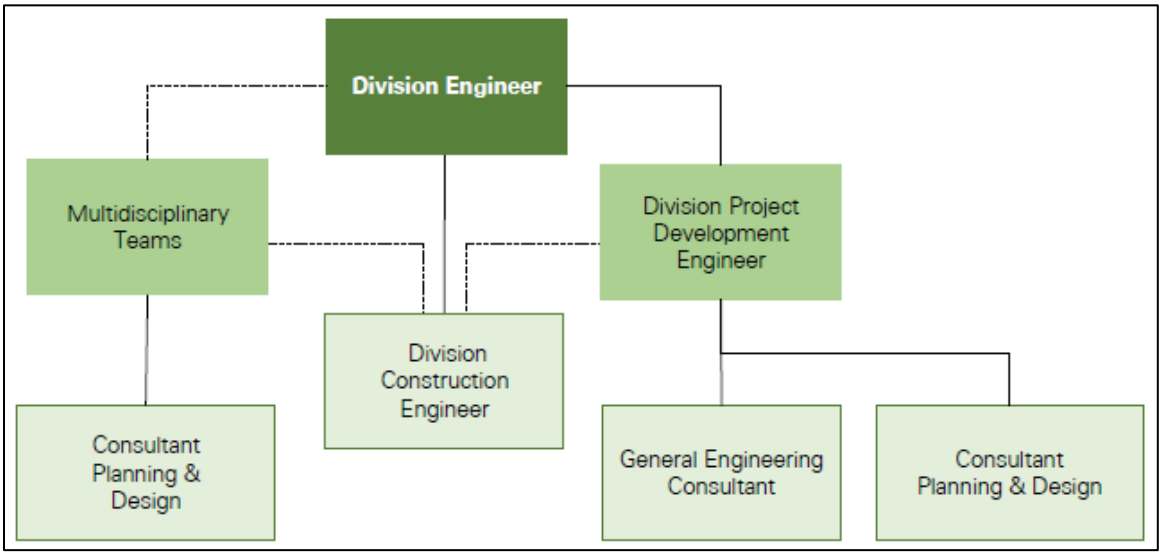


Figure 3.7 Division Engineer Project Development Resources

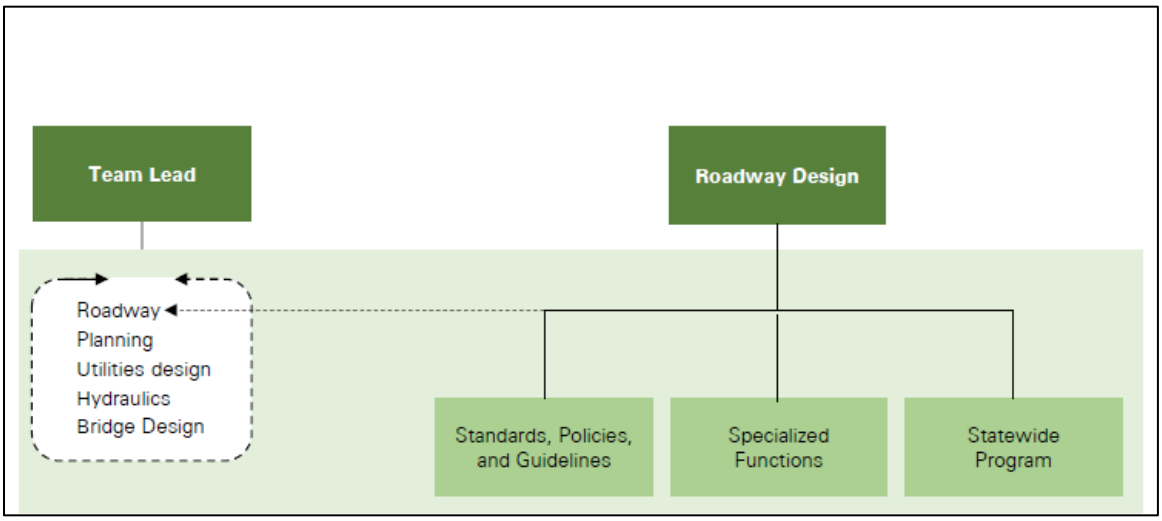


Figure 3.8 Multidisciplinary Team Example

3.10 Indiana

The Indiana Department of Transportation (INDOT) has an Office of Project Management in the Production Management Division (located in the agency's central office). Most project managers reside within one of the agency's six district offices. The Office of Project Management will designate a project manager from its office on major projects, whereas for minor or maintenance projects the project manager is assigned at the district-level office. INDOT has created and adopted the Project Development Process (PDP), a project management and decision-making process for transportation projects. The primary goal of the PDP is to encourage communication among disciplines, ensure there is documentation that describes the reasons underpinning project-related decisions, eliminate duplicated effort among disciplines, identify early in the project development process potential red flag issues (INDOT defines red flag issues as areas of concern that might require additional study coordination, creative management or design approaches, or increased right-of-way or construction costs), and facilitates the completion of work products as early in the process as possible. In doing so, the PDP improves communication among technical disciplines, results in quality plans, and minimizes cost overruns during right-of-way acquisition and construction. INDOT classifies projects based on their size, complexity, and potential impact on the environment. There are three categories — major, minor, and maintenance. Each project type has its own PDP template; Figure 3.9 lists the processes required for different project types. The agency maintains a small website on project management, which contains a brief narrative on INDOT's approach to constructability reviews and several resources, including Gannt chart templates for major and minor projects, the PDP manual, documents pertaining to value engineering, and a link to the cost estimating and cost management program.

Project Classification		
Maintenance	**Minor**	**Major**
Step 1: Project Compilation (Data Management and Inspections)	*Step 1:* Professional Services (Contracts and Agreements)	*Step 1:* Professional Services (Contracts and Agreements)
Step 2: Project Identification (Cost Benefit Analysis)	*Step 2:* Conduct Research and Technical Studies	*Step 2:* Conduct Research and Technical Studies
	Step 3: Identify and Evaluate Conceptual Solutions	*Step 3:* Identify and Evaluate Conceptual Solutions
Step 3: Prioritization of Selected Projects	*Step 4:* Develop Reasonable Alternatives	*Step 4:* Develop Reasonable Alternatives
	Step 5: Identify Preferred Alternatives	*Step 5:* Identify Preferred Alternatives
	Step 6: Stage 1 – Develop Preferred Alternative	*Step 6:* Stage 1 – Develop Preferred Alternative
Step 4: Separate Projects into Project Categories for Submittal	*Step 7:* Stage 2 – Advance Preferred Alternative	*Step 7:* Stage 2 – Advance Preferred Alternative
	Step 8: Environmental Approval	*Step 8:* Environmental Approval
	Step 9: Prepare Final Right-of-Way Plans	*Step 9:* Prepare Final Right-of-Way Plans
	Step 10: Begin Land Acquisition	*Step 10:* Begin Land Acquisition
	Step 11: Stage 3 – Complete Preferred Alternative	*Step 11:* Stage 3 – Complete Preferred Alternative
	Step 12: Prepare Final Tracings Package	*Step 12:* Prepare Final Tracings Package

Figure 3.9 Steps Required to Complete Different Project Types (Indiana DOT)

At INDOT, once project managers are assigned to a project, they generally stay with the project as it moves through the entire PDP. The agency has published a high-level description of project managers' key responsibilities; these include:

- Verifying the project has been entered into INDOT's scheduling and project management system
- Confirming that a project's development funding has been approved in the Transportation Improvement Program and the Indiana State Transportation Improvement Plan
- Producing a business case for the project if the agency anticipates that consultants will be needed for development
- Working with the project sponsor to identify a project design team, which is responsible for completing work specified by the PDP
- Maintaining a project file that documents all project activities and products and communicating and coordinating with designated INDOT staff throughout the project
- Determining the extent of federal involvement in the project

Project managers are responsible for classifying projects, sometimes receiving input from the INDOT's central office. At the outset of each project, project managers organize and lead a kickoff meeting, the aim of which is to convene

all affected stakeholders to discuss specifics about the project, identify the project goals, determine the level of public involvement required, define general work requirements, develop an initial scope of work for planning studies (if necessary), generate an RFP to hire a study consultant, and ensure a consensus has been reached on how a project will move through the PDP. Furthermore, project managers develop and implement public involvement plans (on complex projects INDOT will sometimes assign a dedicated person to oversee this), generate a project-specific Gannt chart from the templates available to them, and establish a project commitments summary. This identifies all commitments that will be made during the PDP. It is a roadmap that provides guidance on information in the project file and documents what stakeholders are responsible for executing commitments made during the process. Project manager responsibilities vary slightly according to project type (i.e., expectations and level of involvement in various tasks differ for major and minor projects), however, project managers do oversee the entire PDP. The *Project Development Process Manual* includes task breakdowns and assignments for different project types. It also contains matrices for major and minor projects that outline the reviewing responsibilities of the INDOT (i.e., internal) stakeholders and external stakeholders that contribute to projects.

INDOT's *Project Development Process Manual* is a comprehensive guide to the agency's PDP. The manual's brief introduction offers an overview of the PDP as it applies to each project type (i.e., major, minor, and maintenance). It then discusses how project managers contribute to the development and delivery of projects by coordinating multidisciplinary project teams. The introduction also reviews how projects are classified (and transitioning a project from one classification to another if needed), federal oversight determinations, public involvement, roles and responsibilities, and links to manuals that are used to inform project development. The manual then includes separate chapters for each project type, with each defining what steps are needed to complete tasks, individual activities, and sub-activities. For each activity, the manual highlights what wok is performed, who the responsible parties are, materials needed to complete the work, activities that must precede work before it can begin, and what deliverables an activity results in. Individual sections within each chapter describe how to execute the processes listed in Figure 3.9. As noted, INDOT has also developed Gannt chart templates for major and minor projects. These templates can serve as a baseline, which project managers can alter to meet their specific needs. The Gannt charts include spaces in which to enter activity IDs, activity names, activity duration, start and finish dates, and predecessor and successor activities, and a graphical timeline.

3.11 Other States

This review sought to provide a representative survey of what responsibilities state DOTs assign to their project managers, where project managers are located within their agency's organizational hierarchies, and what resources have been made available to them to facilitate project management. While not an exhaustive review, the discussion of the eight states' practices captures the major contours of how state DOTs conduct, develop, and manage projects throughout the United States. That said, other states not discussed in the above sections have released tools and guidance that warrant brief mention, as they could potentially serve as a model for KYTC's project development guidebook.

Some DOTs have developed highly technical project development manuals that provide fine-grained information on software packages and systems they use to manage projects — principally, their documentation. The Connecticut Department of Transportation (ConnDOT) has published its *Digital Project Development Manual*, which offers precise guidance on using ProjectWise and preparing key project documents (e.g., plan sheets, contracts, change orders, as-built revisions). For various processes, the manual has step-by-step procedures that guide users in the correct execution of tasks. Because it is software-oriented, the manual includes little on the specifics of project development and management at the programmatic level.

Several of the guidebooks referenced previously adopt a checklist or bulleted format, enabling them to quickly communicate what is to be done during each step of the project management process. The Virginia Department of Transportation (VDOT) has a slightly different, more high-level take on this form (Figure 3.11). For each of the agency's project categories, a table specifies whether an activity is required or should be considered. Eight of the procedures are non-optional irrespective of project category. The table also links to brief guidance documents for 14 of the 17 tasks (indicated in blue). Guidance documents are succinct (averaging between four and six pages) and contain a description of the task, its purpose, steps for completing it, tools and resources that can facilitate work, and sample deliverables. While most of the guidebooks we reviewed link to other resources, VDOT's approach is somewhat unique in that the agency pairs a high-level guidance document that outlines and describes the complete project development process with dynamically linked materials that scrutinize individual processes. Uncoupling the high-level description from narratives of individual processes perhaps makes for a less intimidating manual, one project managers would be more likely to take advantage of routinely.

Project Management Procedures and Checklists	Project Category				
	I	II	III	IV	V
Initiate Project Scope Final Project Scope	**R**	**R**	**R**	**R**	**R**
Project Development Schedules	**R**	**R**	**R**	**R**	**R**
Project Development Budget/Estimates	**R**	**R**	**R**	**R**	**R**
Public Hearing Team Meeting	C	C	**R**	**R**	**R**
Public Hearing	C	C	**R**	**R**	**R**
Field Inspection Team Meeting	C	C	**R**	**R**	**R**
Pre-Advertisement Conference	C	**R**	**R**	**R**	**R**
Prepare for Advertisement and Contract Execution	**R**	**R**	**R**	**R**	**R**
Construction Budget Development & Mgmt	**R**	**R**	**R**	**R**	**R**
Pre-Ad Construction Schedule Development	**R**	**R**	**R**	**R**	**R**
Post Award Construction Schedule Mgmt	**R**	**R**	**R**	**R**	**R**
Pre Construction Conference	**R**	**R**	**R**	**R**	**R**
Progress Meetings	C	C	**R**	**R**	**R**
Financial Management Plan	C	C	C	**R**	**R**
Risk Management Plan	C	C	C	**R**	**R**
Project Communication Plan	C	C	C	C	**R**
Project Management Plan	C	C	C	C	**R**
R = Required			C = Consider		

Figure 3.10 Virginia DOT Project Development Requirements Matrix

Several agencies (e.g. ConnDOT, Washington DOT) have developed process maps that illustrate workflows for different project phases. These vary in size and complexity. Washington DOT, for example, adopted a high-level approach; its maps depict the relationship between and among processes, but omit discussion of specific tasks or documents associated with each. ConnDOT's process maps are highly detailed. Their stated purpose is to expedite the completion of each project task by delineating standardized processes and communicating them clearly and effectively. A second goal of the agency's process maps is that young engineers or consultants should be able to complete tasks accurately and efficiently. They can also be revised to reflect changes to internal processes. Figure 3.11 is a Design-Phase Utility Coordination Process Map. Note that the map includes processes, documents, key decision points, register the beginning and end of processes, and indicate where data are needed or produced.

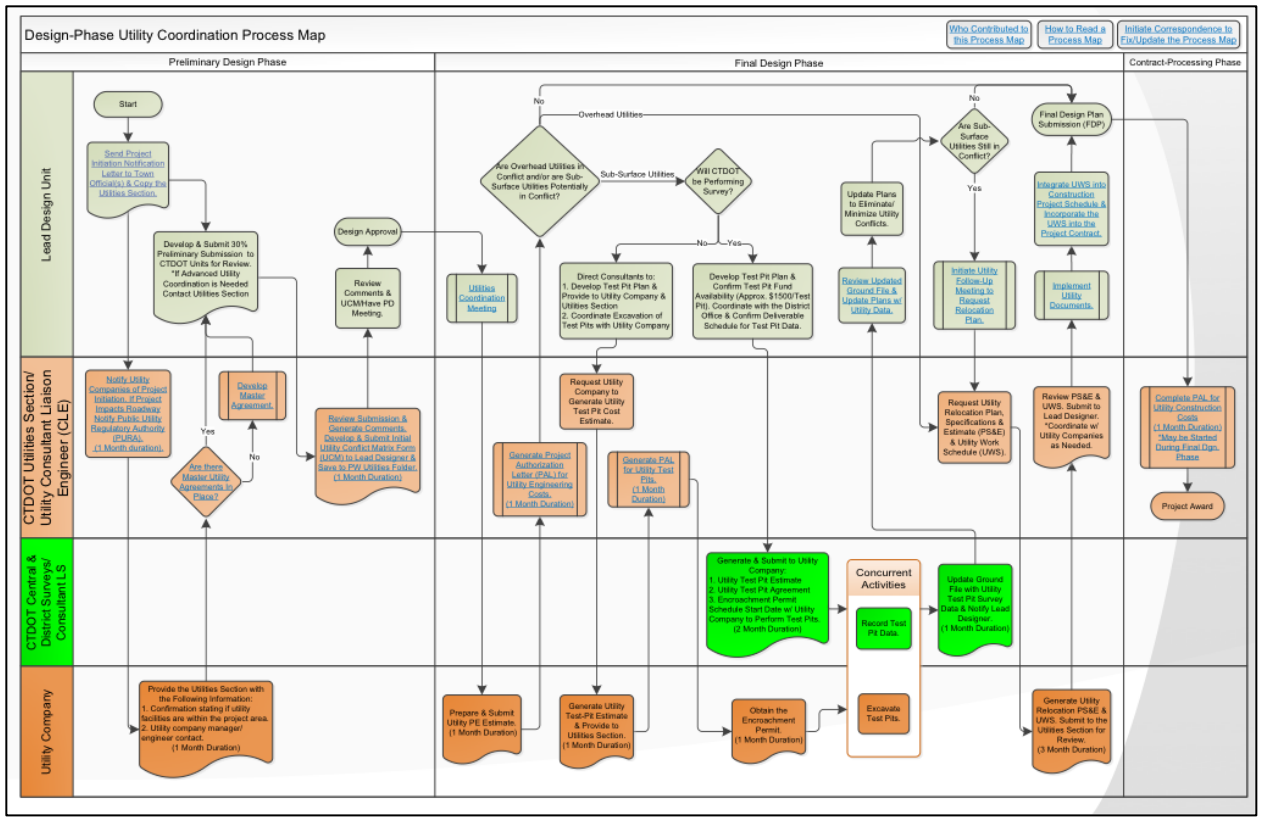


Figure 3.11 Connecticut DOT Design-Phase Utility Coordination Process Map

3.12 Conclusions from Literature Review

Project managers have a wealth of resources to draw upon when managing projects. Many states have published guidebooks that offer a step-by-step narrative of the project management process, specifying what activities their project managers need to complete during each project phase, documents and forms that need to be submitted, agency procedures, software resources, and helpful tips. Guidebooks vary in terms of their length and complexity. Some guidebooks are very text-heavy, differentiating them little from other policy manuals that agencies issue. Others embrace a more intuitive approach, relying more heavily on checklists and graphics while directing project managers to other documents if they require more detailed information. These guidebooks tend to be much briefer than their denser counterparts. Some agencies maintain up-to-date websites that link to key resources, manuals, and other materials that project managers can turn to for instruction.

Appendix A includes a listing of STA project management resources.

Chapter 4 Development of the Guidebook

The *Project Manger's Guidebook* focuses on knowledge entry- and mid-level PMs in Project Development need to effectively manage a highway project. Content for the guidebook was developed by examining current KYTC policies and resources, reviewing project management guidance from other DOTs, and analyzing survey responses and reviews from current Cabinet PMs.

4.1 Guidebook Format

Our research team and KYTC stakeholders decided jointly to make the guidebook available online through KTC's Highway Knowledge Portal (HKP). Individual articles focus on specific topics, and within the HKP articles are grouped together with other project management topics in a Knowledge Book. This lets readers easily find information on a single topic or read through the guidebook from topic to topic. Other considerations informed development of the guidebook's format:

- We avoided avoid cutting and pasting project guidance from current policy manuals. Instead, there are several linked references to sections of KYTC policy manuals (e.g., *Highway Design Guidance Manual* (HDM) Chapter 200 Administrative Procedures).
- Most articles begin with a matrix that lists each section in the article. The matrix indicates which sections contain relevant information for each project type (i.e., capital, access management, safety, maintenance).
  This allows the guidebook to be comprehensive and cover multiple project types, while directing PMs working on less complex project types away from guidance that is not applicable. Articles that lack the matrix may be applicable to all project types.
- Red flags identify points or activities of concern within the project management process that entail additional study, coordination, or action.
- Side notes highlight information that, although not the subject of the article, the PM may find useful when carrying out activities the article describes.
- The end of each article includes links to related HKP articles and reference documentation as well as links to articles that precede and follow in the *Project Management Guidebook*.
- Articles include a hover-over feature that displays key definitions.

4.2 KYTC Project Manager Survey

We distributed a survey to 121 current KYTC PMs and subject-matter experts (SMEs) to get their input on the guidebook's content and how to prioritize topics. Fifty-nine people completed the survey. Project management experience among respondents varied significantly, with over 25% having less than five years (Figure 4.1). Most respondents work in District Offices, with eight other divisions and offices represented (Figure 4.2). Because most KYTC capital projects are managed in District Offices, it was not surprising that a majority of respondents are based in them.

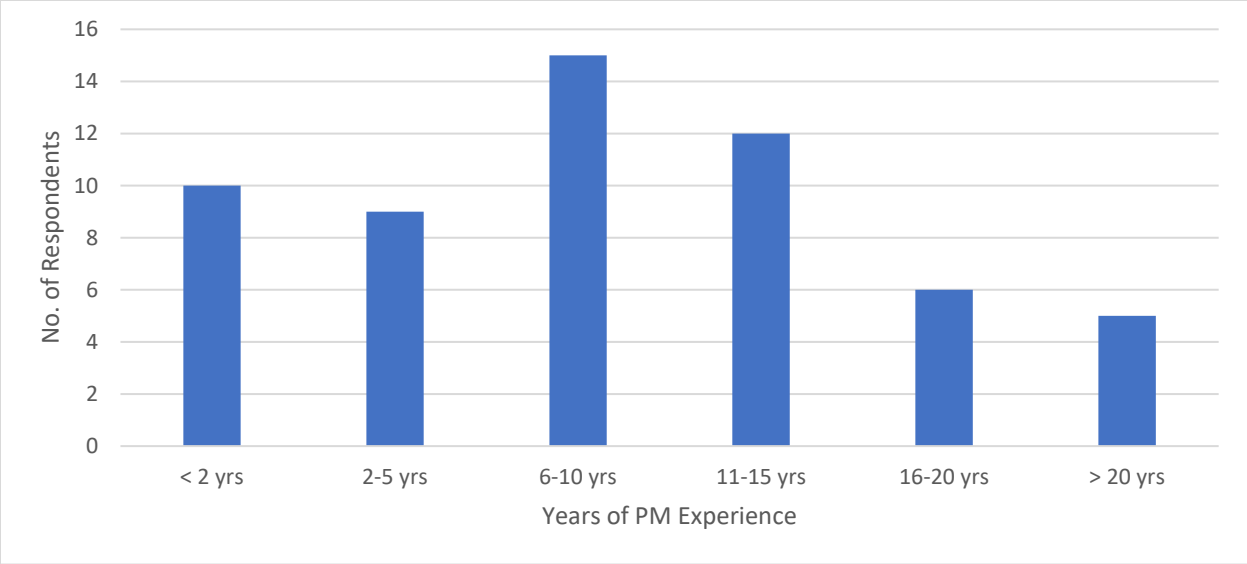


Figure 4.1 Years of PM Experience

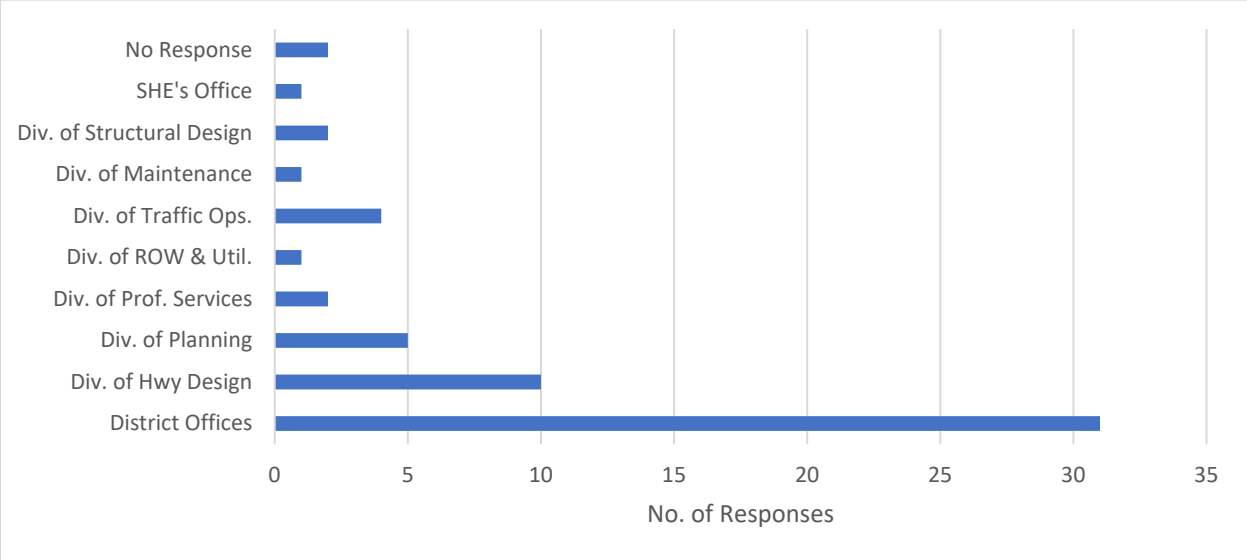


Figure 4.2 PM Work Location

Respondents rated the importance of 24 potential *Project Management Guidebook* articles on a scale of 1 – 10 (1 — least important; 10 — most important). We used this information to determine if an article should be included in the guidebook and assign it a level of priority. Table 4.1 presents results.

Table 4.1 *Project Management Guidebook* Article Ratings

Topics from High to Low (Overall)	Avg. Rating
Project Scoping	8.75
Project Schedule & Development of Milestones	8.71
Monitoring Scope, Budget, & Schedule	8.51
Project Cost Estimating	8.31
Preparing for Letting	8.17

Topics from High to Low (Overall)	Avg. Rating
Understanding the KYTC Budget and 6 Year Highway Plan Process	8.16
Managing Project Risks	8.15
PM & Final Design	8.10
PM & Preliminary Design	8.02
PM & Utilities and Railroads	7.90
Cost Management	7.88
Utilizing Flexibility in Design	7.84
PM & Right of Way	7.81
PM & NEPA	7.64
Project Initiation	7.36
PM Training and Tools	7.10
Public Involvement with Customers and Stakeholders	7.08
Organizing a Team	7.00
Document Management and Storage	6.86
PM Technology and Tech Tools	6.82
Legal Issues	6.78
Holding Effective Meetings	6.67
Project Management Definitions	6.42
Introduction and General Overview	5.98

We also looked at relationships between PM level of experience, work location, and prioritization. Rankings were similar to the overall scores. *Project Schedule and Development of Milestones* and *Preparing for the Letting* ranked the highest for PMs with less than five years of experience. PMs with the most experience ranked *Managing Project Risks* the highest. Respondents were also asked to submit additional topics that should be included in the guidebook but were not listed in the survey. This resulted in the addition of a few more articles.

To identify current project management resources, respondents listed where they source guidance from. They identified 46 sources. The most frequently mentioned were the HDM, experienced PMs, PM Boot Camp Manual, PM Toolbox, and PDP Precon. Other responses included national policy manuals and project management status reports or applications. See Appendix B for survey response details.

4.3 Article Drafting and Review

Most guidebook articles were drafted from scratch, however, a few are updated versions of articles previously published on the HKP. Survey responses, existing KYTC PM Resources, and the subject-matter expertise of the authors and reviewers were critical for developing articles. After internal review at KTC, over 30 KYTC staff reviewed and provided input on one or more of the articles.

Chapter 5 Conclusion

Marshalling information from DOT project management resources, survey responses, and SME knowledge, we developed or updated 31 articles for KYTC's *Project Managements Guidebook*. Entry- and mid-level project managers can use this resource to develop and implement appropriate project workflows, identify coordination needs and deliverables throughout the process, and ultimately deliver successful projects. All articles are available on the HKP and will be updated as needed. Table 5.1 lists articles included in the guidebook.

Table 5.1 List of Articles in KYTC's *Project Management Guidebook*

• Project Manager Guidebook: Introduction and Overview
• Understanding the KYTC Budget and Highway Plan Process
• Project Identification
• Project Initiation
• Project Scoping
• Project Schedule & Development of Milestones
• Project Cost Estimation and Management
• Assembling a Project Development Team
• Administration of Consultant Contracts (5 articles)
  ○ Managing Consultant Contracts
  ○ Selecting a Consultant
  ○ Understanding a Consultant Contract
  ○ Utilizing Statewide Consultant Contracts
  ○ Reviewing a Pay Invoice
• Organizing and Running Effective Project Development Meetings
• Common Project Team Meetings
• Organizing and Running Effective Project Development Meetings
	• Common Project Team Meetings Effective Communication in Project Management
	• Project Management & Planning
	• Project Management & NEPA
	• Project Management & Preliminary Design
	• Project Management & Final Design
	• Project Management & Right-of-Way Process
	• Project Management & Involvement in the Condemnation Process
	• Project Management & Utility Coordination
	• Project Management & Railroad Coordination
	• Managing Project Risks
	• Monitoring Scope, Budget, & Schedule
	• Public Involvement with Customers and Stakeholders
	• Preparing for Letting
	• Document Management, Storage, and Archival
	• Tools for the Project Manager
	• Project Management Training

References

Caltrans Division of Design. 2009. *Project Development Procedures Manual*. Retrieved from http://www.dot.ca.gov/design/manuals/pdpm.html.

Caltrans Office of Project Management Process Improvement. 2007. *Caltrans Project Management Handbook*. Retrieved from http://www.dot.ca.gov/hq/projmgmt/guidance.htm.

Caltrans Office of Project Management Process Improvement. 2007. *Project Communication Handbook*. Retrieved from https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/pids/f0009367-project-communication-handbook-2nd-ed-a11y.pdf

Florida Department of Transportation Production Support Office. 2021. *Project Management Guide*.

Georgia Department of Transportation Office of Program Delivery. 2012. *Project Management Handbook*. Retrieved from http://www.dot.ga.gov/PartnerSmart/Business/Documents/ProjectMgmt/PMHandbook.pdf.

Indiana Department of Transportation. 2007. *Project Development Process Manual*. Retrieved from http://www.in.gov/indot/files/ProjectDevelopmentProcessManual.pdf.

Lindquist, Kathy, Michel Wendt, and Leni Oman. 2009. State DOT and Related Industry Organizational Structures and Best Practices: Synthesis. *Washington State Department of Transportation Report*. Retrieved from: http://www.wsdot.wa.gov/NR/rdonlyres/0C42871A-23BC-4EE4-A7B5-B21BCD1D93EB/0/State_DOT_Organizations_Synthesis__Jerry_Lenzi9213.pdf.

Massachusetts Department of Transportation. 2006. *Project Development and Design Guide*. Retrieved from http://www.massdot.state.ma.us/highway/DoingBusinessWithUs/ManualsPublicationsForms/ProjectDevelopmentDesignGuide.aspx.

Nebraska Department of Transportation. 2017. *Project Management Reference Guide*. Retrieved from http://dot.nebraska.gov/business-center/pm/.

North Carolina Department of Transportation. 2015. *NCDOT Restructure Study and Plan*. Retrieved from: https://www.ncdot.gov/download/about/structure/DOT_REPORT_Restructure_Plan.pdf.

Ohio Department of Transportation. 2016. *Project Development Process Manual*. Retrieved from https://www.dot.state.oh.us/projects/pdp/Pages/default.aspx.

Oregon Department of Transportation. 2010. *Project Delivery Guide*. Retrieved from http://www.oregon.gov/ODOT/ProjectDel/Pages/Project-Delivery-Guide.aspx.

Utah Department of Transportation. 2013. *UDOT PM Guide*. Retrieved from https://www.udot.utah.gov/main/f?p=100:pg:0:::1:T,V:49,.

Glossary

PM Guidebook Introduction and Overview

Asset Management Projects — The primary purpose of these projects is to address the condition of existing highway assets through replacement or repair. They do not typically involve the addition of new capacity or roadway functionality, although minor improvements may sometimes be included. The most common asset management projects are those meant to address pavements or bridges that have deteriorated due to age and traffic impacts. They are included in the Existing Highway System Performance Projects Listing in the current Highway Plan. Examples include pavement resurfacing, bridge replacements, and pavement and bridge preventative maintenance and rehabilitation projects.

Capital Improvement Projects — Projects with larger budgets that usually involve new road or bridge construction or major improvements to higher-traffic routes. They are included in the Highway Improvement Projects Listing in the current Highway Plan.

Design-Build Project — A designer and a contractor working together under a single contract to provide design and construction services.

Maintenance Projects — Smaller scale projects that address the condition of existing highway assets, and do not involve the addition of new capacity or roadway functionality. They typically involve the restoration or repair of minor assets that contribute to the overall functionality of the roadway. If they are included in the Highway Plan, they are in the Existing Highway System Performance Projects Listing. Examples include re-striping of pavements, ditch cleaning, pothole patching, guardrail replacement, and minor bridge deck repairs.

Safety Projects — Projects included in the Highway Safety Improvement Program (HSIP) that focus on reducing traffic fatalities and serious injuries on public roads. They are funded programmatically through federal funds designated for the HSIP.

Understanding the KYTC Budget and the Highway Plan

Biennial Construction Plan — Specifies funding available through the Enacted Highway Plan for authorization during the upcoming two-year period.

Continuous Highway Analysis Framework (CHAF) — An application enabling users to collect, track and analyze identified transportation needs. CHAF also provides a means to sponsor, score and rank projects as part of the Strategic Highway Investment Formula for Tomorrow (SHIFT).

Enacted Highway Plan — The plan provides the framework for advancing transportation projects during the upcoming two-year period (i.e., biennium) and lists recommended projects for the four-year period that follows the upcoming biennium. The plan contains a schedule for proposed projects as well as budgets for the planning, design, right-of-way, utility, and construction (PDRUC) phases. It is approved by the General Assembly and signed into law by the Governor on even-numbered years.

Out Years — Subsequent four-year period after the Biennial Construction Plan that helps to anticipate future funding needs and scheduling of project development and construction phases. Includes project funding not available for authorization.

Strategic Highway Investment Formula for Tomorrow (SHIFT) — KYTC's data-driven, objective approach to compare capital improvement projects and prioritize limited transportation funds.

Project Identification

Program — A group of related projects with a broader scope than individual projects that requires coordinated management.

Program Manager — Manages a group of projects that focus on the overall vision of a program. They may also manage projects within their program.

Project — A temporary endeavor undertaken to create a unique product, service, or result.

Project Management — The discipline of organizing and managing resources in such a way that these resources deliver all the work required to complete a project within defined scope, time and cost constraints.

Project Manager — The individual with the authority and responsibility for delivering the documented project scope and quality requirements within predictable time and budget targets.

Note: All definitions for *Project Identification* originated from Project Management Institute. (2017). *A Guide to the project management body of knowledge (PMBOK® guide)* (6th ed.).

Project Initiation

Data Needs Analysis (DNA) Study — A brief, small-scale study that provides basic planning-level information for smaller projects that do not require lengthy, detailed planning studies. Concise studies with a consistent format that help define the project scope. They are typically completed prior to advertising a project for consultant services.

Project Management and Planning

Area Development District (ADD) — Multi-county planning district that includes a regional transportation committee. ADDs facilitate local input and priorities into statewide transportation planning.

Corridor studies — Evaluates proposed roadway segments, existing roadway improvements, and identifies and prioritizes projects for future funding.

Metropolitan Planning Organization (MPO) — The policy board of an organization established to carry out the metropolitan transportation planning process for each urbanized area with a population of at least 50,000.

Small Urban Area (SUA) studies — Evaluates and provides recommendations for transportation networks in small urban areas.

State Primary Road System — Interstates, parkways, and other long-distance, high traffic volume intrastate routes of statewide significance. State Primary Routes usually link major urban areas within the state or serve major interregional corridors.

Base Studies — Determines the initial environmental status and the potential effects of the alternatives on specific areas of environmental concern (such as historic properties, air quality, socioeconomic, noise, etc.). Performed by environmental Subject Matter Experts.

Categorical Exclusion (CE) — A category of actions which do not individually or cumulatively have a significant effect on the human environment…and…for which, therefore, neither an environmental assessment nor an environmental impact statement is required (**40 CFR 1508.4**).

Communicating All Promises (CAPs) — Project commitments to project participants and stakeholders stored and tracked in a project database.

Environmental Assessment (EA) — Environmental assessment means a concise public document for which a Federal agency is responsible that serves to (**40 CFR 1508.9**):

a) Briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement (EIS) or a finding of no significant impact (FONSI).
b) Aid an agency's compliance with the Act when no environmental impact statement is necessary.
c) Facilitate preparation of a statement when one is necessary.

Environmental Impact Statement (EIS) — An EIS is a full disclosure document for major Federal actions that significantly affect the quality of the human environment. They detail the process through which a transportation project was developed, include consideration of a range of reasonable alternatives, analyze the potential impacts resulting from the alternatives, and demonstrate compliance with other applicable environmental laws and executive orders. The EIS process is completed in the following ordered steps: Notice of Intent (NOI), draft EIS, final EIS, and record of decision (ROD).

Environmental Overview (EO) — Preliminary assessment of possible environmental impacts that may result from the project and may require field evaluation, ranging from windshield survey to full environmental investigation, depending upon project complexity.

National Environmental Policy Act (NEPA) — NEPA is the over-arching environmental policy requiring the assessment of environmental effects prior to making decisions on infrastructure projects involving federal dollars or oversight.

Notice of Intent — A formal announcement of intent to prepare an EIS as defined in Council on Environmental Quality (CEQ) NEPA regulations (40 CFR 1508.22).

Record of Decision (ROD) — A concise public document summarizing the findings in the EIS and the basis for the decision. The ROD must identify mitigations which were important in supporting decisions, such as those mitigations which reduce otherwise significant impacts, and ensure that appropriate monitoring procedures are implemented (32 CFR 651.26).

Significant Impacts — According to the Code of Federal Regulations (CFR), the term "significant" requires consideration of both context and intensity, in relation to short- and long-term potential impacts from project actions. Project context includes impacts to the local area, the affected region, the stakeholders, and potentially,

society. Project intensity relates to the severity of the project action, which could include both beneficial and adverse impacts.

Project Schedule and Development of Milestones

Critical Path Method (CPM) — A method used to estimate the minimum project schedule duration.

Milestone — The completion of a major phase of work.

Statewide Transportation Improvement Plan (STIP) — Each state shall develop a statewide transportation improvement program for all areas of the state. Such program shall cover a period of 4 years and be updated every 4 years or more frequently if the Governor elects to update more frequently. The STIP is to be developed for all areas of the state in cooperation with MPOs and local officials.

Transportation Improvement Program (TIP) — A list of upcoming transportation projects in a Metropolitan Planning Organization area, covering a period of at least four years. Project information such as scope, anticipated schedule, and estimated cost is included.

Project Management and Right of Way Process

Communicating All Promises (CAP) — Promises and commitments made by KYTC during the project development process, e.g. right of way negotiation process outside of compensation for the value of the property being obtained. The Project Manager documents CAPs and includes a report of these in the project letting proposal. In the hierarchy of construction contract documents, the CAP report is the second highest in this order, ranking behind questions and answers from the Division of Construction Website and before Special Notes.

Consent and Release — An agreement between KYTC and property owner(s) that allows KYTC or contractors to enter onto property that is not owned or controlled by the KYTC in order to perform necessary work. All property owners (including tenants, if applicable) must sign the release form with others serving as witnesses to their signature to verify the signor understood what they were signing and voluntarily signed it. The Chief District Engineer approves these forms. A detailed description of the work is included along with the location.

Easement — An easement is an interest in land which permits the owner of the easement to use the land owned by another for a specific purpose or prohibits the owner of the land from doing something that would otherwise be lawful to do, (e.g. plant trees, build structures, etc.). Easements can be public or private. For these purposes an easement refers to a public easement. An easement can be either temporary or permanent. A temporary easement grants the right to use the property for a particular purpose, typically construction, and is extinguished once use of the property for construction (or other purpose) is completed. A permanent easement grants a perpetual legal right to use land owned by others for a specific use (e.g., drainage, utilities).

National Highway System (NHS) — A system of roads designated by the US Department of Transportation in cooperation with the states, local officials, and metropolitan planning organizations that includes the Interstate Highway System as well as other roads important to the nation's economy, defense, and mobility. Maps of the National Highway System in Kentucky can be found on the Division of Planning's website.

Right of Way (ROW) — Property owned by KYTC in fee simple or as an easement interest, within which a highway exists or is planned to be constructed. Examples of what this property can contain include, but are not limited to, the roadway, shoulders and curbing, sidewalks and shared use paths, drainage facilities, traffic control devices, rest areas

and weight stations, fencing, and utilities. Right of Way can also include abandoned roadway and/or their supporting structures.

Project Management and Preliminary Design

Interchange Justification Study (IJS) — Required for a project that proposes to provide a new interchange to an existing interstate facility.

Interchange Modification Report — Required when a project proposes to revise/reconfigure an existing interchange on an interstate facility.

Multimodal Facilities — All modes of transportation are considered (automobiles, commuter trains, public transit, bicycles, and pedestrians.

Public Utilities — Utilities that are publicly owned and non-profit (i.e. Local Municipalities water and sewer).

Private Utilities — Utilities that provides essential services for a profit, which would include common carriers as well as corporations that provide Electric, Gas, Communications, Sewer, and Water.

Stakeholder Meetings — On projects that are anticipated to be controversial, it is a good idea to assemble a group of people from the area and form a group of "Stakeholders" for the project. This could include property owners along the corridor, local officials (county judges, magistrates), and Local Planning and Zoning personnel, along with KYTC representatives. These are sometimes referred to as Citizens Advisory Groups or Committees. These groups can help with the effort by KYTC to be transparent in the project development process.

Managing Project Risk

Critical Path Method Diagram — Identifies project tasks, their time for completion, and their dependence on other tasks. The critical path is the longest sequence of activities that must be completed on time for the project to be complete.

Fatal Flaw — Project location or activity that must be avoided due to the negative impacts it would have on the project.

Monte Carlo Simulations — Risk management technique used to conduct a quantitative analysis of risks using various simulations.

Project Risk — An uncertain event or condition that could arise and change the outcome of a project, for better or for worse. It may have a positive or negative effect on the objectives of the planned work (Project Management Institute, 2004).

Red Flags — Locations or activities of concern within the project area that entail additional study, coordination, design, right of way, utility relocation, or construction costs.

Risk Management Register — A list of the potential risks, critical information about each risk, and impact of the risk that could occur during the project execution phase. It typically provides a description, the risk response, and the responsible party for mitigating and monitoring the risk.

Risk Matrix — Documents project risks and allows for risk prioritization. Risks are often prioritized in order of importance by focusing on those that would have the greatest impact on the project and a higher likelihood of occurring.

Tornado Diagram — A type of bar chart with bars extending horizontally. The data is displayed with the bars from longest to shortest, resembling a tornado.

Project Management and Final Design

Change Order — An amendment to a construction contract that changes the contractor's scope of work. Most change orders modify the work required by contract documents (which, in turn, usually increases the contract price) or adjust the amount of time the contractor has to complete the work, or both. For there to be a valid change order, KYTC and contractor must both agree on all terms.

Environmental Overview — These studies are a preliminary assessment of possible environmental impacts that may result from the project and may require field evaluation, ranging from windshield survey to full environmental investigation, depending upon project complexity.

National Highway System (NHS) — A network of nationally significant highways within the United States approved by Congress. NHS includes the Interstate Highway System and over 100,000 miles of arterial and other roads.

ProjectWise — KYTC's current document management system. It is utilized to electronically manage, find, and share CADD files, geospatial content, project data, and office documents.

Public Involvement Plan (PIP) — For certain KYTC projects a PIP should be developed thru coordination with the district public information office (PIO) and district project delivery and preservation (PD&P) staff to provide accurate and timely information to the public concerning project start dates, road closures, etc.

Strategic Highway Investment Formula for Tomorrow (SHIFT) — KYTC's data-driven, objective approach to compare capital improvement projects and prioritize limited transportation funds. SHIFT helps reduce overprogramming and provides a clear road map for construction in the coming years. The formula applies to all transportation funding that isn't prioritized by other means, such as maintenance work, local government projects and dedicated federal funds.

Subsurface Utility Engineering (SUE) — The SUE process combines civil engineering, surveying, and geophysics. It utilizes several technologies, including vacuum excavation and surface geophysics to determine more precise locations of existing underground utilities.

Traffic Control Plan (TCP) — The TCP should outline specific requirements for proper maintenance and control of traffic during construction. This includes Maintenance of Traffic Detail Sheets and Notes included in the final plans.

Value Engineering (VE) Study — A systematic process of review and analysis of a project, during the concept and design phases, by a multidiscipline team of persons not involved in the project, that is conducted to provide recommendations for:

1. Providing the needed project scope safely, reliably, efficiently, and at the lowest overall cost;
2. Improving the value and quality of the project; and
3. Reducing the time to complete the project.

Leadership — The ability to guide, motivate, and direct a team.

Soft Skills — Personal attributes that enable someone to interact effectively and harmoniously with other people.

Appendix A State Transportation Agency Project Management Resources

General: PM Topics / Concepts		
Chapter Topics	**Description or Examples**	**States**
Introduction	• Orientation and instruction on navigating the PM Guide	FL, GA, ID, NC, UT, VT
PM Guiding Principals	• Best practices for achieving project goals and requirements	ID, NV
Glossary of Terms and Acronyms	• Project management terms and acronyms	GA, LA, NV
Roles and Responsibilities		
Chapter Topics	**Description or Examples**	**States**
Program Manager	• Manages a group of projects that focus on the overall vision of a program.	LA, UT
Portfolio Manager	• Portfolio Managers typically reside at Central Office and manage funding sources for specific types of projects.	UT
PM Roles and Responsibilities	• Drives the project scoping process, directs project core teams across all phases of project development, and is responsible for achievement of project goals within budget and on schedule. (MO) • Organizes a team, manages schedule and budget, promotes multidisciplinary collaboration, coordinating with external stakeholders, monitors project delivery process, reports key metrics of project performance. (NC)	CO, FL, GA, ID, ID, LA, MO, NC, UT
PM Training		
Chapter Topics	**Description or Examples**	**States**
Training Resources	• Project Management Webinar Series (FL) • PM's Boot Camp (KY) • Project Management & Delivery Training (NC) • Transportation Learning Network Video Conference in 2020 Managing the Design Process: Keeping on Schedule, within Budget & Selecting the Right (NDSU, 2020) (ND) • PM Institute Training Program (RI) • Transportation Project Development PM Learning Path (TX) • Transportation Project Management Institute (VA) • Project Management Training (WA)	FL, IN, KY, NC, ND, OH, TX, VA, WA
Legal Matters		
Chapter Topics	**Description or Examples**	**States**
Statutory Responsibilities	• Federal and state statutory responsibility training (VA)	FL, GA, MA, VA
Open (Public) Records	• Defines public records and exempt public records and discusses how to make a request as well as how to respond to such requests (FL)	FL
Issue Resolution Process	• Dispute Resolution	CO, NV, KY, OH
Document Management and Storage		
Chapter Topics	**Description or Examples**	**States**

Staff	• Knowledge Management Strategist, a position which is responsible for formulating and leading agency initiatives for knowledge management, enterprise data, and information governance. (WA)	WA
Project Management Uniform Filing System	• Overview, management and responsibility of filing system. Filing strategy for project history files and electronic files. (NV) • Lays out electronic and physical file system structures naming various file folders. (GA)	GA, NV
Document Management Guide	• Uses COMPASS as its document management system. Provides a single place to display: ROW, Env. Permits, CORE data, Viewpoint data, Composite Project Database, Submittal/Transmittal Application, Project Management Staff, MS project Schedule Integration, Document storage/control, Security/User Management, Project Geospatial Location. (CT) • NEPA (OH) • Document Management Guide 2021 including 'how to" in Setting up Document Library (IA)	CT, OH, IA
Digital Signatures and Seals	• Can be used but must follow a specific process set out in statute. See KRS § 369.101 – 369.120 Uniform Electronic Transactions Act; and 201 KAR 18:104, the Administrative Regulation for KY State Board of Licensure for PEs and LSs. (KY)	KY
Retention of Electronic Documents	• Has a guide on How to transition to Electronic Documents (CO) • See CT in Document Management Guide (CT) • PowerPoint on transitioning to electronic documents (AK) • Statute sets out specific retention rules and requirements. See KRS § 369.101 – 369.120 Uniform Electronic Transactions Act (KY)	AK, CO, CT, KY
Team Meetings		
Chapter Topics	**Description or Examples**	**States**
Meeting Preparation	• Provides information on how to prepare for the meeting, a typical agenda, and how to do meeting notes (NV) • How to Conduct a Kickoff Meeting (ID)	NV Several PM guidebooks include a section on team meetings.
Project Communication Management		
Chapter Topics	**Description or Examples**	**States**
General	• Project Communication Handbook (CA) • Communication Matrix (CO) • Open Data Plan and Open Data Coordinator This plan supports agency efforts to openly share information with citizens, business partners, and community organizations. (WA)	CA, CO, FL, ID, VA, WA, WI
Public Awareness	• Community Awareness Plan: During planning and Project Development & Environmental (PD&E), the emphasis is on participation in the decision-making	

Public Communication Versus Public Involvement Parties to Include in plan	process concerning the need for a project and its basic concepts. In the design phase, the emphasis changes to informing the public of the project. People are much more likely to tolerate the inconvenience of a road project if they understand the need for the work and have good information about the project. Therefore, emphasis during the design and construction phases is on communicating with the community. During design there are also opportunities to work out details of the project to minimize negative impacts. (FL_ • Done within the context of Public Involvement. PM is responsible for developing a Public Involvement Plan, a project-specific sequence list of anticipated contacts with the public. Plan is completed early in the project process. A properly developed plan ensures effective involvement of the affected public in a planned, orderly manner throughout the entire project. (WI) • Project Communication Plan Template and Guidance (VA) • With contractor, project team, local stakeholders, public (ID)	
Public Involvement		
Chapter Topics	**Description or Examples**	**States**
Developing Public Involvement Plans	• Develops a Community Awareness Plan (FL) • Guide to Public Involvement (ID) • PM State Public Participation Process for Transportation Planning has section on Project development including a public involvement strategy. (IA) • Public Involvement Plan (ME) • Public Participation Plan, Public Participation Quick Reference Guide, Outreach Plan, Public Participation during construction (MA) • Public Involvement Plan booklet March 2020 (NC) • Public Involvement Manual. On PM checklist, public involvement is listed under “to be considered” (VA)	FL, ID, IA, ME, MA, NC, VA All states have documentation on doing public involvement.
PM Technology: Tools & Resources		
Chapter Topics	**Description or Examples**	**States**
Communication and Document Management Software	• SharePoint, Transportation, ProjectWise, Project Controls, Bluebeam New Transportation Enterprise Data program. This is a new self-service resource for all things CTDOT. It allows retrieval of data and	CT, FL, IA, LA, NC, TX, WA

	maps of Connecticut's roadways, traffic volumes, crash data, and additional geospatial data. (CT) • What electronic engineering data is need from designers (CT) • Project Development Manual is only in digital form (CT) • ProjectSuite (FL) • Masterworks Project scheduling (IA) • Development Path Task list – web-based but thorough (OH) • SiteManager (LA) • PPMS has a link to Document Management Participant Guide. PPMS provides document management capabilities that allow IA DOT project users to upload, track, and manage project documents. The users can also assign document properties to a document that can be further used to search for documents. User can also manage documents using the attachments control section within a form for record specific documents. The Participant Guide helps you get started with the process of setting up the library for document management and quickly navigate through the various key features of document management. (IA) • ATLAS Workbench. Storage and posting of final documents, supporting clearance memos, determinations, correspondence, and technical studies completed in Stage 1 and 2 of the PDN. SAP. Business and Financial system used to manage contracts, purchase orders, financial data, cost planning, funding requests, official project schedules (major milestones), NCDOT employee services, and reporting of schedule and financial data. MS Project. Scheduling software used to aid the PM and team in organizing, tracking, monitoring, and executing risk and opportunity management through all stages of PDN delivery. SharePoint. Primary project location to store, organize and share all non-CADD project information including quality reviews. (NC) • TXDOTCONNECT - which is a new system for managing the delivery of transportation programs, projects and right of way (TX) • AASHTOWare Project Preconstruction (VA) • Cost Management Using Primavera Scheduler Training (WA)	
IT Resources	• Digital Project Solutions (CT) • Contract Time Determination Tool (TX)	CT, TX
Project Management Tools		
Chapter Topics	**Description or Examples**	**States**

General	• List of Changes Matrix, List of Major Work Elements at Level, List of Major Tasks sorted by Level, Complete List of WBS Showing Proper, WBS Glossary, Common Acronyms, Milestones associated with WBS 13.0 Tasks (CA) • Best Practice Log Template; Communication Matrix; CM Staffing Tool; Change Order Price Analysis; Design Scoping Review Meeting Agenda Environmental Scoping form; Field Inspection Review meeting; Major Deliverables Matrix; Major Project Monthly Status Report; Managed Lands Evaluation tool; Project Control Cost Planner Tool; Project Meeting Agenda; Task Order Tracker (CO) • Process Maps: How to Read a Process Map.pdf; Error! Hyperlink reference not valid.; Error! Hyperlink reference not valid.; Error! Hyperlink reference not valid.. (CT) • Online PM Toolbox and PM web page- (FL) • Project Development Scheduling, Project Phase and Setup Guide, Document Management Guide 2021, Budget Management Guide, Public Participation Guide (IA) • Risk Checklist, Filed Visit Checklist, and How to Conduct a Kickoff Meeting (ID) • Critical Path Method, Program Evaluation and Review Technique (LA) • Project Controls Toolkit (MA) • Template Project Management Plan: (MA, TX) • Construction Project Communication & Decision guide (NE) • Project Flow Chart Generator, Constructability Review, Constructability Review Checklist (NC) • Project Initiation Process form (OH) • Appendix 1.f Master Project Development List (PA) • Project Management Processes, Techniques, Tools and Training Matrix (TX) • Web page that includes plugins for all the software a PM needs available and forms. Publications include: Construction Cost Estimating Guide, Risk Based Cost Estimation Tool (TX) • Schedule Guide for Transportation Projects • Transportation Project Development PM Learning Path (TX) • PM Tools and Project Initiation for a Local Programs workshop Power Point (VA) • Scheduling Initial Schedule Development process (PDF 100KB); Schedule & Cost Management process (PDF 89KB); Construction Schedule Development process (PDF 56KB); Construction Schedule Review & Update process (PDF 56KB) (WA)	CA, CO, CT, FL, ID, LA, MA, NE, NC, OH, TX, VA, WA

	• Internal scope of work agreements Development (PDF 77KB); Management (PDF 64KB) Change Management (PDF 66KB); Contract Change Management process (PDF 51KB) (WA) • Cost control, estimates and earned value Cost Control and Earned Value process (PDF 69KB); Cost to Date Tracking process (PDF 57KB); Project Cost Estimate Creation, Update, Review and Approval process (PDF 85KB); Activity and Project Code Management Process (PDF 60KB); Electronic Content Management (ECM) Process (PDF 686KB) (WA) • Cost Risk Assessment with various guides and templates on risk management (WA)	
Financial Tracking	• Invoicing tools for design services (MA)	LA, MA
Management Reporting	• Gantt charts	LA
Measuring Progress and Performance	• Measures of progress for PMs with 6 major milestones: a. Preliminary Engineering Authorization; b. Concept Report Approval; c. Preliminary Field Plan Review (PFPR); d. Environmental Document Approval e. Right of Way Authorization; f. Final Field Plan Review (FFPR); g. Construction Authorization (GA) • Best Practices Guidebook (ID)	ID, GA, NC
Intelligent Transportation Systems	• Electronics and Information Processing: Is part of the Division of Maintenance and Operations. Implement technologies to better communicate, decrease travel times, and create a safer driving environment. Applies if technology (electronics, communications, or information processing used singly or in combination to improve the efficiency or safety of a surface transportation system) is included in the scope. (CO)	CO
Field Reviews	• Field Visit (ID)	FL, ID, VA
Railroad	• Any encroachment on railroad R/W will require a permit from the railroad company. Any permanent use of railroad R/W will require a Use Agreement. Both permit and Use Agreement will normally require compensation and will often involve lengthy reviews by the railroad company. Railroad coordination and permitting is a very lengthy process that should be initiated as early in the project as possible. (FL)	FL
Public Transportation	• Early coordination can avert design problems such as special Americans with Disabilities Act (ADA) requirements and unique Temporary Traffic Control (TTC) problems associated with bus stops. (FL)	FL
Transportation Planning Process		
Chapter Topics	**Description or Examples**	**States**
PM Guidebook	• Available in states listed in third column	AR, AZ, CA CO, CT, DE, FL, GA, ID, MA, MI,

		MN, MO (in development), NE, NV, NC, OR, PA, RI, TX, UT, VA, VT
Project Development Process (PDP)	• PDP Manual (IA, IN, OH) • Preconstruction Project Development Process document (SC) • The Project Development Process is the use of multi-disciplinary concurrent efforts to develop transportation projects from inception to construction. (VA) • Project Development Process manual begins with their planning initiative which requires public involvement process for all transportation activities. The intent is to ensure that the public, communities, and Regional Planning Commissions (RPC's) play a significant role in determining which problems are to be addressed, as well as the scale of those improvements. (VT) • Project Development Flowchart (VT)	IA, SC, VA, VT
PM Plan	• Workplans Standards Guide by the Division of Project Management. Basically, a walk-through of what needs to be done for a project from initiation to end. • Preconstruction Project Delivery Plans now required on all capital construction projects. (PowerPoint on PM) (CO) • The PM Plan is an internal document and answers these questions: What must be done? Who will do it? How will it be done? How long will it take? How much will it cost? What are the deliverables? How will quality be maintained? What is the schedule? (FL) • Template for a PM Plan. (AK, MA, TX)	AK, CO, FL, MA, TX, VA
Planning Project Management	• Schedule, Budget, Risk Management Plan, Communication Plan, Quality Plan, Transition to Closure plan (NV) • Project Management Plan Template (MA, TX)	FL, NC, NV
Quality Management Plan	• Working on a Quality Management Manual to provide PMs and roadway designers with guidance on how to properly execute quality control (QC) and quality assurance (QA) activities for a project. (NC) • Quality Review Flow Chart (NC)	ID, NC
Project Life-Cycle Workflow		
Chapter Topics	**Description or Examples**	**States**
General	• [Initiate, plan, and scope; manage, adjust, and execute your team plan; See the project realized through construction] (ID) • Development Path Task list – web-based but thorough (OH) Project Flow chart generator (NC)	ID, MA, NC, WA

Milestones	• Initiation, Designer selcetion and assignment, Engineering assessment, Design survey, Hydraulics, Stage I plans, Preliminary field check, Stage 2 plans, Red flag investigation, Waters report, Environmental document, Public hearing, Design approval, Utility coordination, Railroad coordination, Geotech. investigation, Pavement design, Permits, Right of way: plans, engineering, appraising, buying and certification; Final field check, Stage 3 plans, Final tracings, Ready for contracts. (IN)	GA, ID, IN, UT
Stages	• Feasibility, planning and environment, funding, final design, letting, construction, operation (LA)	LA
Project Management by Phases	• [Phases: K-PID Project Initiation Document, 0-PA&ED Project Approval and Environment Document, 1-PS&E Plans, Specifications, and Estimate, 2-RWS Right of Way, and CS Construction] (CA) • Project Team Initiation Process, Concept Stage, Preliminary Design, Final Design, Design Guideline Exceptions/Variances, Construction (GA) • Project and Phase Setup Guide (IA) • Phase Chart (OH) • [Scoping, Development, Construction] (ID) • Form Scoping Team and Conduct Scoping Meeting; Engage Environmental; Engage ROW; Engage Bridge if needed; Draft Scoping Charter (ID) • I. Project Scoping and Preliminary Design, II. Final Design, and III. Construction (NM) • Initiation Planning, Executing, Monitoring & Controlling, and Transition and Closing (NV) • Planning, Preliminary engineering, Environmental Engineering, Final Engineering / ROW, Construction (OH) • Initiation, Development, Delivery, and Closeout (VA) • Selection, Authorization, Project Definition (Purpose and need) Scoping, Conceptual Design, Informational Hearing, NEPA documentation), Project Design (Preliminary plan, Semifinal plan), Construction, (Waste, staging areas, mitigation, pre-construction conference, inspections, changes orders, ROW changes, Permit for storm water run-off, and final inspection) (VT)	CA, FL, IA, ID, IN, NM, NV, OH, VA, VT
Work Program	• Understanding Work Program (FL) • Work Program Instructions (FL)	FL
Project Selection / Initiation		
Chapter Topics	**Description or Examples**	**States**
Project Initiation	• Uses a Project Initiation Document PID (CA) • Has project initiation template (OH) • Project Description, Project Title, Team Mission/Assignment, Major Milestones, Boundaries,	CA, GA, OH, NV, VA,

	Major Success Factors, Identify Technical Support, Aligning the Team, Identify the Team, Team Mission Statement, Roles and Responsibilities, Review Major Milestones, Measures of Success, Review Boundaries Team Operating Guidelines, Review and Verify. (NV) • Project Sponsor guides the project through the initiation phase. During this phase, the concept of the project is defined, decisions are made regarding funding sources, and the project is prioritized in relation to other projects competing for the same funds. This is usually the phase where the project is added to the 6-Year Improvement Plan. The initiation phase is complete when Preliminary Engineering is authorized, and the PM is assigned. (VA)	
Federal and Local Funding	• PM coordinates the Federal Authorization Request. For projects containing local funding, the local funded design should be identified in the project scope phase. The PM executes a Joint Project Agreement with the local government. (FL)	FL
Project Development and Environmental Studies (PD&E), NEPA Assignment	• Environmental Document begins at time of project approval (CA) • Phase O begins at time of project approval (CA) • Environmental Guidance Manual. Has various guidance and accountability forms useful to preconstruction responsibilities related to environmental analysis, but no guidance manual per se for all preconstruction activities. (KY) • Environmental Document resources (NC) • Assignment is made in the Project Definition process which happens after a need for a project has been identified and before design begins. It is used primarily for Categorical Exclusion projects. Includes: Engaging stakeholders, Creating a Purpose and need, Understanding the project context, Defining Alternatives, Evaluating Alternatives, Selecting and Approving a preferred alternative, Creating a final Project Definition Report. (VT)	CA, FL Webinar, ID, KY, MA, NC, VT
Developing a Scope of Work	• Define the problem, need, and opportunity (MA)	FL, CO, ID, MA, NV, WA, WI, VA
Scoping Charter	• At the outset, clearly define the reason for the project, what the project includes, and what the project does not include. Stick to that scope throughout the project's development. Remember to include SMEs when establishing these items. Many budget increases during development and cost overruns during bidding and construction are a direct result of undocumented or late changes to project scope that are inconsistent with the project's charter. (ID)	CO, ID

Design		
Chapter Topics	**Description or Examples**	**States**
Design: General Elements	• Context Based Design, Complete Streets, Intersection Control Evaluation, Design Closeout (FL) • Access Management (FL, MA, NV) • Traffic Calming and Traffic Management, Shared Use Paths and Greenways (MA) • Landscape and Aesthetics (MA, NV)	FL, MA, NV
Design Project Process	• Highway Design guidance manual 2017 and Interim Guidance Manual memorandum on design issues overruling the previous design guidance manual unless permission is granted (KY)	FL, ID, ID, KY, MA
Consultant Contract Management		
Chapter Topics	**Description or Examples**	**States**
General	• Contract Administration Handbook (ID)	CA, ID, MA
Contract Management	• Sets out requirements for the PM to follow in managing the design consultant contract. The procurement office serves as a resource for the PM. (FL) • PE Firm Management Guide (NC)	CT, FL, NC
Contract Amendments	• Provides best practices and guidelines to assist PMs to better understand contract amendments. (FL)	CA, FL
Invoicing	• Invoicing tools for design services (MA)	FL, MA
	• Project Controls Manual (MA)	MA
Scope Management	• Project Baseline (NV) • Project Scoping checklist (MA)	CO, FL, ID, MA, NV, VA, WA, WI,
Budget Management	• Project Baseline (NV) • Budget Management Guide 2021 (IA) • Cost Estimating Guide and Risk Based Cost Estimation Tool (TX)	CO, FL, GA, ID, IA, MA, MN, NV, TX, VA, WA (training), WA, WI
Schedule Management	• Project scheduling manual providing guidance to Department staff and their consultants and contractors on how Elecosoft Powerproject tools should be used for design, pre-bid, and construction scheduling. (PA)	CO, FL Webinar, IA, PA, VA, WA
Scheduling Basics	• Project Development Scheduling (IA) • Project Baseline (NV) • Schedule Guide for Transportation Projects • Transportation Project Development PM Learning Path (TX)	IA, FL Webinar, NV
Quality Management	• Quality Review Flow Chart (NC)	TX, NC
Change Management		
Chapter Topics	**Description or Examples**	**States**
General	• Change Order Management Policy (IN)	CO, IN (training), NV, VA, WA (training)
Risk Management	• RM Handbook (CA) • RM Lifecycle (CO) • RM General, Glossary, and Tools (FL) • RM Process (FL, NV)	CA, CO, FL Webinar, ID, IA, NV, TX, UT, VA, WA (training etc.), WI

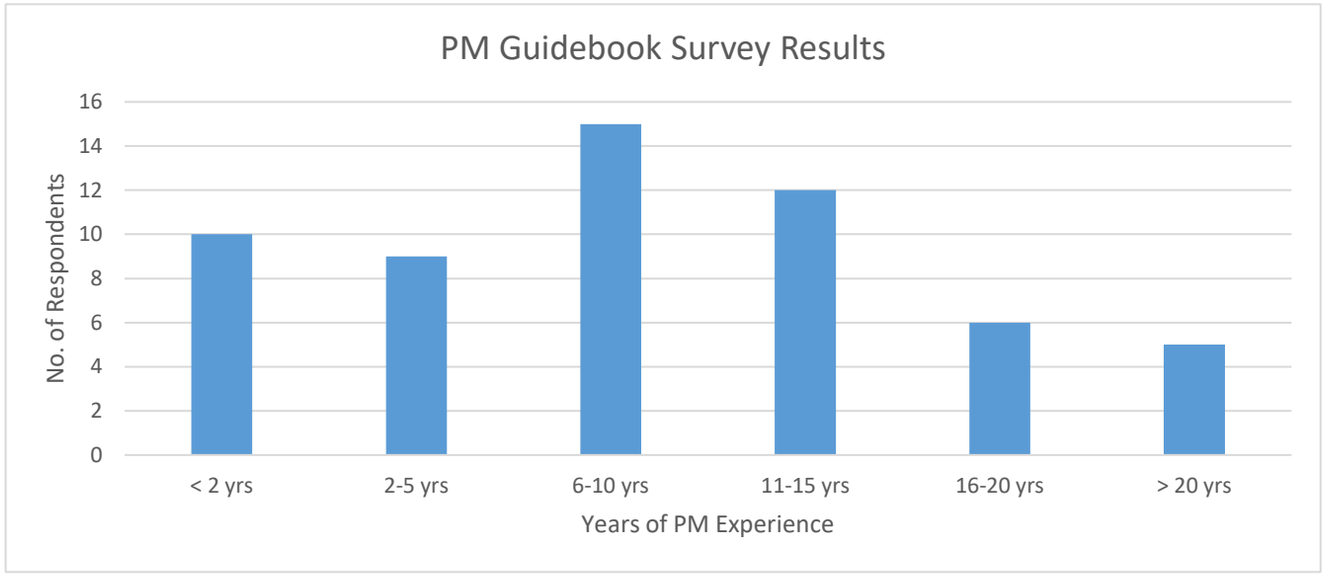
	• RM Plan (FL, NV) • Contingency and Risk Reserve Approach (NV) • Risk Management Guide (WA) • Risk Checklist (ID) • Training (FL, TX, WA) • Cost Risk Assessment with various guides and templates on risk management (WA) • Risk Based Cost Estimation Tool (TX)	
General	• Quality Review Flow Chart (NC)	CO, ID, NC, NV, WA
Value Engineering	• Includes VE in Design and Construction Project Support (CO)	CO, FL Training
Constructability Control and Change Order process	• Constructability Review Checklist (CT) • Multiple pages of links to constructability review sites, documents, and templates (IN) • Construction Management and Monitoring (MA) • Constructability Review and Constructability Review Checklist (NC)	CT, IN (training), MA, NC
Measuring Project Performance	• Paper on Earned Value Management which is a management methodology for integrating scope, schedule and resources, and for objectively measuring project performance and progress. Performance is measured by determining the budgeted cost of work performed (i.e., earned value) and comparing it to the actual cost of work performed (i.e., actual cost). Progress is measured by comparing the earned value to the planned value. (WA)	WA
Transition to Construction		
Chapter Topics	**Description or Examples**	**States**
General	• Transition to Construction web page (CO) • Project Construction and Close out (UT) • Post Letting Claims form (IA)	CO, IA, UT
Design-Build		
Chapter Topics	**Description or Examples**	**States**
General	• Guidebook for Design-Build Project Development 2005 (AK) • Resources for Design Build, including a manual (CO)	AK, CO
Design-Build Project Management	• Design Build and contract manager (CO) • Design Build Guidance contains sections on pre letting Guidance (KY) • Website with Design Build PM page (NY)	CO, FL, KY, NY
Design-Build Procurement Phase	• Design Build and Contract Manager (CO)	CO, FL

Appendix B KYTC PM Survey Results

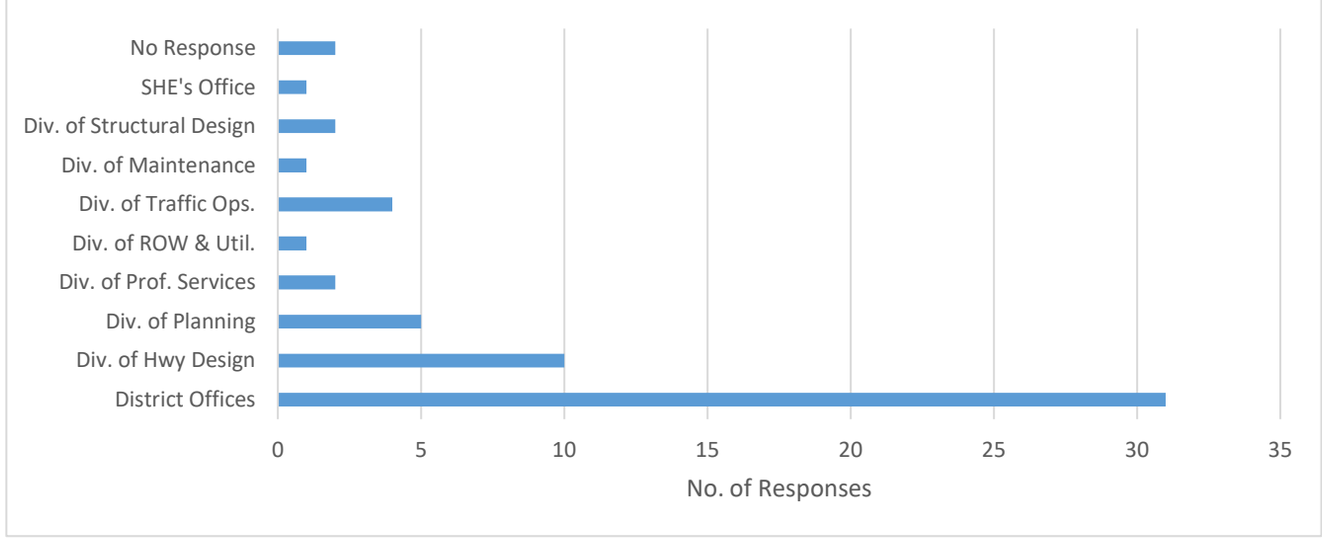
SURVEY RESPONSE DATA

Survey was initially sent to 121 KYTC staff on 9/21/2022. The survey was closed on 10/10/2022. There were 59 respondents which is approximately a 49 % response rate.

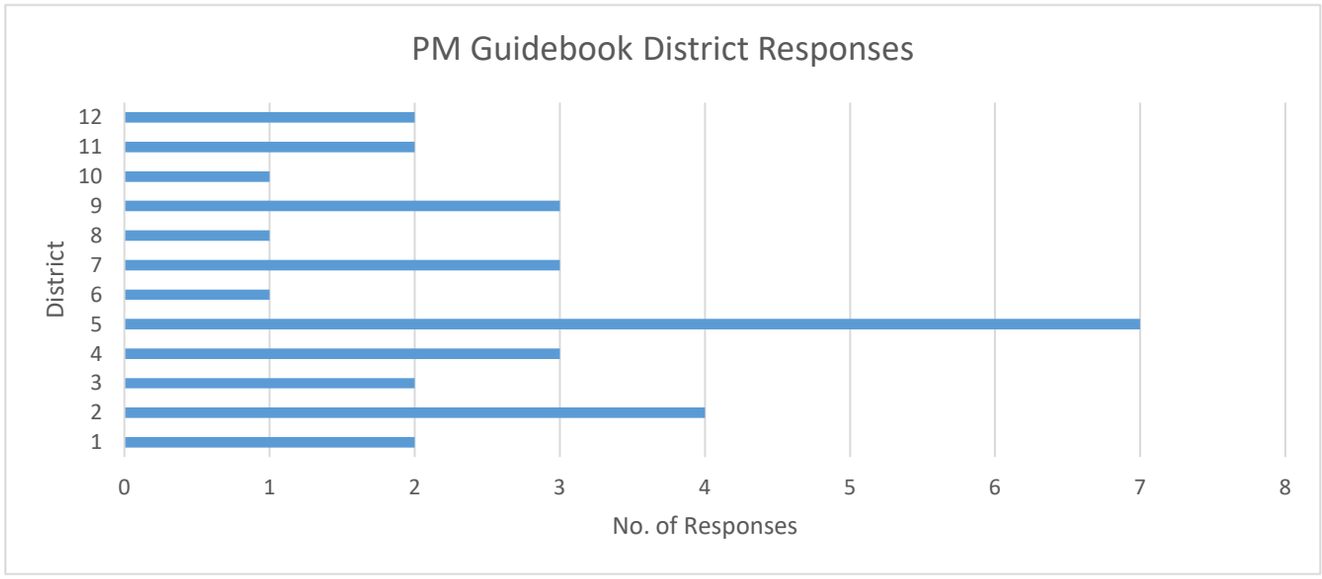
Yrs. of Experience as PM	No. of Respondents
< 2 yrs	10
2-5 yrs	9
6-10 yrs	15
11-15 yrs	12
16-20 yrs	6
> 20 yrs	5
No Response	2



Where do you work?	No. of Respondents
District Offices	31
Div. of Hwy Design	10
Div. of Planning	5
Div. of Prof. Services	2
Div. of ROW & Util.	1
Div. of Traffic Ops.	4
Div. of Maintenance	1
Div. of Structural Design	2
SHE's Office	1
No Response	2
	59



District Office	Responses	No. of Respondents
	1	2
	2	4
	3	2
	4	3
	5	7
	6	1
	7	3
	8	1
	9	3
	10	1
	11	2
	12	2



PRIORTIZATION DATA

Q1 - Rank each of the topics below for inclusion in the Guidebook on a scale from 1 to 10, with 1 being least important and 10 being most important.

Field	Minimum	Maximum	Mean	Std Deviat	Variance	Count
Introduction and General Overview	1	10	5.98	2.81	7.88	57
Project Management Definitions	1	10	6.42	2.46	6.07	57
Understanding the KYTC Budget and 6 Year Highway Plan Process	3	10	8.16	1.58	2.51	58
Project Initiation	2	10	7.36	1.96	3.86	59
Project Scoping	5	10	8.75	1.32	1.75	59
Project Schedule & Development of Milestones	4	10	8.71	1.39	1.93	59
Project Cost Estimating	4	10	8.31	1.52	2.32	58
Organizing a Team	2	10	7	1.95	3.8	59
Holding Effective Meetings	1	10	6.67	2.26	5.12	58
PM & NEPA	4	10	7.64	1.41	1.99	58
PM & Preliminary Design	4	10	8.02	1.42	2.02	59
PM & Final Design	4	10	8.1	1.42	2.02	58
PM & Right of Way	4	10	7.81	1.44	2.08	58
PM & Utilities and Railroads	4	10	7.9	1.34	1.78	58
Legal Issues	1	10	6.78	2.28	5.19	59
Managing Project Risks	4	10	8.15	1.49	2.23	59
Monitoring Scope, Budget, & Schedule	4	10	8.51	1.46	2.14	57
Cost Management	4	10	7.88	1.44	2.07	58
Utilizing Flexibility in Design	4	10	7.84	1.63	2.65	58
Public Involvement with Customers and Stakeholders	2	10	7.08	1.63	2.65	59
Preparing for Letting	4	10	8.17	1.42	2	58
Document Management and Storage	1	10	6.86	2.3	5.27	59
PM Technology and Tech Tools	1	10	6.82	2.21	4.88	57
PM Training and Tools	1	10	7.1	2.13	4.53	59

Topics from High to Low	Avg. Rating
Project Scoping	8.75
Project Schedule & Development of Milestones	8.71
Monitoring Scope, Budget, & Schedule	8.51
Project Cost Estimating	8.31
Preparing for Letting	8.17
Understanding the KYTC Budget and 6 Year Highway Plan Process	8.16
Managing Project Risks	8.15
PM & Final Design	8.1
PM & Preliminary Design	8.02
PM & Utilities and Railroads	7.9
Cost Management	7.88
Utilizing Flexibility in Design	7.84
PM & Right of Way	7.81
PM & NEPA	7.64
Project Initiation	7.36
PM Training and Tools	7.1
Public Involvement with Customers and Stakeholders	7.08
Organizing a Team	7
Document Management and Storage	6.86
PM Technology and Tech Tools	6.82
Legal Issues	6.78
Holding Effective Meetings	6.67
Project Management Definitions	6.42
Introduction and General Overview	5.98

Prioritization Breakdown by Yrs of PM Experience						
Topic	< 2 yrs	2-5 yrs	6-10 yrs	11-15 yrs	16-20 yrs	> 20 yrs
Introduction and General Overview	7.1	4.8	5.3	6.2	7.8	5.7
Project Management Definitions	8.1	5.2	6.5	5.7	7.0	6.1
Understanding the KYTC Budget and 6 Year Highway Plan Process	8.3	8.4	7.8	8.1	8.8	7.9
Project Initiation	6.3	7.3	6.9	8.2	8.5	7.4
Project Scoping	8.3	8.3	9.0	9.2	9.0	8.4
Project Schedule & Development of Milestones	8.8	8.2	8.7	9.2	9.2	8.0
Project Cost Estimating	8.6	7.6	8.3	9.0	8.2	7.9
Organizing a Team	6.2	6.6	6.8	7.6	7.8	7.4
Holding Effective Meetings	5.8	6.6	6.9	6.9	7.6	6.4
PM & NEPA	7.3	7.2	7.7	7.6	7.7	8.4
PM & Preliminary Design	7.8	8.2	7.7	8.6	7.7	8.0
PM & Final Design	7.8	8.3	8.0	8.7	7.6	7.9
PM & Right of Way	7.6	7.7	8.0	8.0	7.4	7.9
PM & Utilities and Railroads	7.4	7.4	8.3	8.4	7.4	7.7
Legal Issues	6.3	7.3	6.7	6.3	7.3	7.3
Managing Project Risks	7.7	7.2	8.6	8.1	8.5	8.9
Monitoring Scope, Budget, & Schedule	8.7	7.8	8.4	9.3	8.8	8.0
Cost Management	7.8	7.4	7.8	7.8	9.0	8.0
Utilizing Flexibility in Design	6.7	7.8	8.0	8.5	8.4	7.7
Public Involvement with Customers and Stakeholders	6.8	8.0	6.7	6.5	8.5	7.0
Preparing for Letting	8.4	8.7	8.1	7.4	8.2	8.6
Document Management and Storage	7.8	6.8	7.0	5.9	8.5	5.6
PM Technology and Tech Tools	7.9	6.4	7.1	5.6	8.8	5.7
PM Training and Tools	7.9	6.7	7.5	6.1	8.5	6.3

Prioritization - District and C.O.		
Topic	District	C.O.
Introduction and General Overview	5.7	6.3
Project Management Definitions	6.1	6.7
Understanding the KYTC Budget and 6 Year Highway Plan Process	8.1	8.2
Project Initiation	7.4	7.3
Project Scoping	8.5	9.0
Project Schedule & Development of Milestones	8.7	8.7
Project Cost Estimating	8.2	8.4
Organizing a Team	6.8	7.2
Holding Effective Meetings	6.9	6.4
PM & NEPA	7.8	7.5
PM & Preliminary Design	8.1	7.9
PM & Final Design	8.0	8.2
PM & Right of Way	7.8	7.8
PM & Utilities and Railroads	8.0	7.8
Legal Issues	7.1	6.4
Managing Project Risks	7.8	8.5
Monitoring Scope, Budget, & Schedule	8.4	8.6
Cost Management	7.8	8.0
Utilizing Flexibility in Design	7.7	8.0
Public Involvement with Customers and Stakeholders	7.2	6.9
Preparing for Letting	8.2	8.1
Document Management and Storage	7.1	6.6
PM Technology and Tech Tools	6.9	6.8
PM Training and Tools	7.3	6.9

ADDITIONAL TOPICS?*

*Several of the topics suggested in the survey are subtopics of the topics listed above. This will be noted in the response.

Topic	# of	Response
Exec. Summary, index or TOC	1	
References & links to current	1	
LPA project mgmt.	1	
Understanding the MPO process	1	How much is needed for a PM? Include need for projects to be in the TIP when applicable.
Use SPR research for Integrating Design and Utilities	1	Will reference for the PM & Utilities article.
How Effective Planning benefits	1	Will include an article on PM & Planning
Consultant Project Management	7	Will include the consultant management articles as part of this guidebook.
Project Closeout	2	Included in Consultant Management.
What to check on pay estimates	2	How to address administrative problems that can arise with funding (encumbrances, eMARS/PMToolbox issues, etc.). Include step-by-step info on how to review pay estimates. Include in consultant management articles.
Define errors/omissions versus	1	Include in Consultant Mgmt.
Effective Communication	2	With team members and SMEs. How to communicate expectations, schedule, status, etc. to the team throughout the project.
Instead of "Organizing a Team" I would call it "Organizing & Leading a	1	"Leading" could include a lot of things. Could include in a separate section with effective communication and other soft skills?
Project Team Member Roles & Responsibilities	2	Include in Organizing a Team.
When and how to pull in other	3	Also, when to seek out help with your Location Engineer, Professional Services or Program Management. Include in Organizing
SME contacts in each division	1	This would be an actual name and not a position. Versions of this exist, but are probably incomplete.
In the overview section, explain all the different divisions, branches, etc.	1	Put in overview or in organizing a team?
Quality Control/Quality Assurance of	1	Does KYTC have a documented or standardized method of QC/QA?
Instead of "Monitor Scope, Budget, & Schedule" call it "Managing Scope, Budget, & Schedule"	1	
Managing Resources	2	Included "evaluation of resources" within Organizing a Team. Should this be a separate topic or is it addressing in-house vs.
Project Goals	1	Included in P&N discussion of the Project Scoping article.
Submittals, when to submit and who gets them	1	Need to include in each article.
Requirements for federal vs. state funded projects	1	Where to put this? Each article? Federal project requirements for ADA, environmental, etc. Stewardship agreement.
Role of context in design, right-sizing	2	Include in Utilizing Flexibility in Design.
Complete Streets check list	1	Is there a Complete Streets committee to send this to yet? Include in Preliminary Design.
Project Program Mgmt. - SHIFT, SYP, overall project scheduling and	1	Not sure how to include this.
When to conduct VE studies	1	Noted to include this in PM and Preliminary Design
Best time for constructability reviews	1	Include in PM in Final Design
Managing conflicts in design	1	Environmental, ROW, Utility to be mentioned in each article. Considerations for time, project costs, and fees.

Hierarchy of decision-making process	1	For example, if the project scope doesn't change, but the budget falls short, should the scope be reduced to bring the project
Commitments in the environmental document and to the public	1	Reference CAP in which article? Environmental, ROW, and Public Involvement?
Preliminary Project Estimating class	1	Outside the scope for guidebook.
Standardized "cradle to grave" filing system	1	Outside of scope for guidebook. They suggested ProjectWise with view access to everyone including people outside of KYTC. Would be a resource for lessons learned.
Tools/websites used to fill out a DNA	1	Include in project scoping article. Is there still a DNA instruction sheet we can reference?
When to break projects into separate parts.	1	Include in project scoping article.
How far in advance to schedule	1	Include in Effective Meetings article.
PM & Planning	1	Will add a PM & Planning article.
Re-starting older or inactive projects	1	Best place for this? Project scoping?
Provide updated project timeline	1	Do we have an updated flowchart or timeline of the whole process, from initiation to letting?

CURRENT PM RESOURCES

Resource	No. of Responses
Hwy Design Manual	13
Experienced PMs	6
PM Bootcamp (manual)	6
PM Toolbox	5
PDP Precon	5
Roadside Design Guide	4
Greenbook	4
Status Reports	3
TEBM	3
Manuals	2
LPA Guide	2
Location Engineer	2
CADD Standards	2
SYP	1
Low Volume Guide	1
Memos	1
Planning Manual	1
DEA's NEPA manual	1
FHWA CACC Manual	1
Public Involvement Process Guidance	1
FHWA Stewardship Agreement	1
Structures Manual	1
Drainage Manual	1
Prof. Serv. Resources on production hours	1
FHWA Seminars	1
TRB Access Management Manual	1
Complete Streets Manual	1
NACTO	1
Flexibility in Highway Design	1
ROW Manual	1
Pavement Design Guidance	1
CO SME	1
Bike/Ped	1
Critical Path research project	1
Attending Meetings	1
Gantt chart resources	1
PR1 Viewer	1

EATS	1
KURTS	1
Standard Drawings	1
Letting Schedule	1
Planning How-to documents	1
ProjectWise	1
Professional Services Portal	1
KYTC website and intranet site	1
List of acronym definitions	1
"what we did last time" emails	1

Appendix C Project Management Guidebook Articles

1.0 Introduction

KYTC's Project Management Guidebook (PMGB) defines a common approach for application of project management techniques that can be applied to all KYTC highway projects through the project development process - which is normally the preconstruction stage of a project from the planning report to the project letting. Effective management is achieved by combining Project Management tools/techniques with sound application of project management principles. Key topics addressed in the guidebook will include assembling and developing a project team, improving management of project development, judicious oversight of project budgets, the relationship between individual projects and delivering KYTC's program, and common obstacles that arise during project development. Practical guidance on addressing these challenges will also be provided.

Fundamental to an understanding of what project management is, is an understanding of the interrelationship between scope, quality, schedule, and budget. These three elements form the sides of a triangle and as in any triangular relationship a change in any element will result in a change in the other two sides.

A change in the scope may impact budget and schedule. A reduced budget will impact scope and quality. A reduced delivery timeline may result in increased cost and possibly reduced quality and scope changes.

The definition of a successful project would be:
- meets the defined scope
- with quality solutions and deliverables
- on schedule
- within budget

Throughout project development, program and project managers should be mindful that every project is a promise and has a constituency. Adhering to the above principles helps to ensure that public and Cabinet expectations are met.

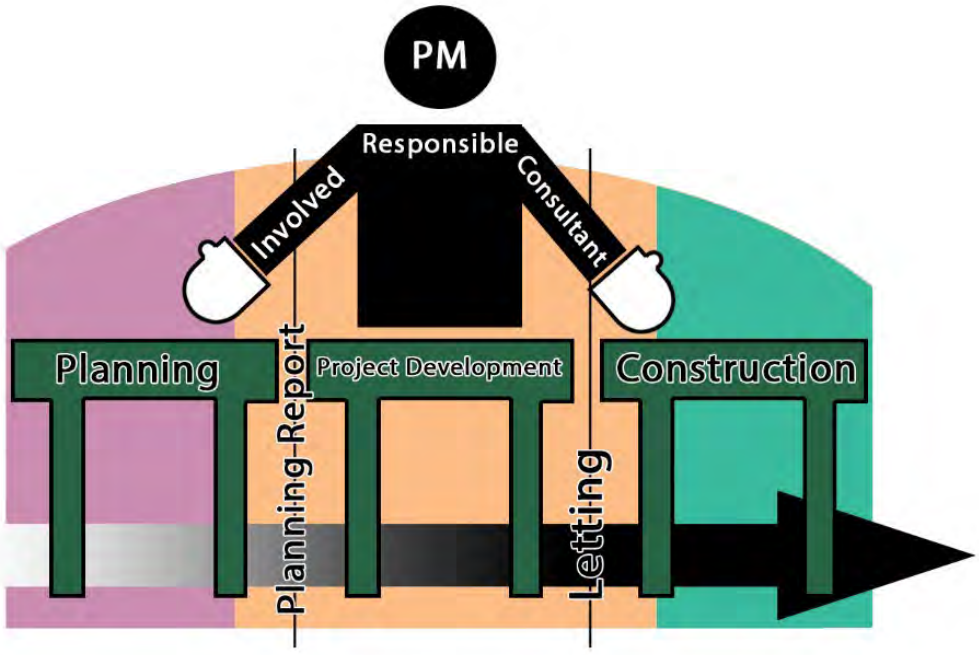
2.0 PMGB Articles

The main purpose of the KYTC PMGB is to provide an easy-to-use overview of situations that might be encountered during the management of a highway project. The guidebook includes information on the following topics:

-
- Understanding the KYTC Budget and Highway Plan Process
- Project Identification
- Project Initiation
- Project Scoping
- Project Schedule & Development of Milestones
- Project Cost Estimation and Management
- Assembling a Project Development Team
- Administration of Consultant Contracts
- Holding Effective Meetings
- Effective Communication
- Project Management & Planning
- Project Management & NEPA
- Project Management & Preliminary Design
- Project Management & Final Design
- Project Management & Right-of-Way
- Project Management and Involvement in the Condemnation Process
- Project Management & Utility Coordination
- Project Management & Railroad Coordination
- Managing Project Risk
- Monitoring Scope, Budget, & Schedule
- Public Involvement with Customers and Stakeholders
- Preparing for Letting
- Document Management Storage, and Archival
- Project Management Tools and Technology
- Project Management Training

For each of these topics, best practices, deliverables, pro tips, and potential red flags will be discussed as applicable.

3.0 Project Management at KYTC



Project management at KYTC may differ significantly based on project type and complexity. Projects range from small, proposal only (no plans) projects with short durations to very complex projects with a full set of construction plans that may take multiple construction seasons to complete. The tasks described in the guidebook may not apply to all projects or may be simplified depending on the complexity and the impacts.

For the purposes of this guidebook, KYTC projects are grouped into the following four classifications:

- **Capital Improvement Projects** – Projects with larger budgets that usually involve new road or bridge construction or major improvements to higher-traffic routes. They are included in the Highway Improvement Projects Listing in the current Highway Plan.

- **Safety Projects** – Projects included in the Highway Safety Improvement Program (HSIP) that focus on reducing traffic fatalities and serious injuries on public roads. They are funded programmatically through federal funds designated for the HSIP.

- **Asset Management Projects** - The primary purpose of these projects is to address the condition of existing highway assets through replacement or repair. They do not typically involve the addition of new capacity or roadway functionality, although minor improvements may sometimes be included. The most common asset management projects are those meant to address pavements or bridges that have deteriorated due to age and traffic impacts. They are included in the Existing Highway System Performance Projects Listing in the current Highway Plan. Examples include pavement resurfacing, bridge replacements, and pavement and bridge preventative maintenance and rehabilitation projects.

- **Maintenance Projects** – Smaller scale projects that address the condition of existing highway assets, and do not involve the addition of new capacity or roadway functionality. They typically involve the restoration or repair of minor assets that contribute to the overall functionality of the roadway. If they are included in the Highway Plan, they are in the Existing Highway System Performance Projects Listing. Examples include re-striping of pavements, ditch cleaning, pothole patching, guardrail replacement, and minor bridge deck repairs.

Other project management guidance may exist for certain types of projects. One type of Alternative Delivery Project is design-build. Usually, design-build projects are developed through preliminary design as new or reconstruction projects; much of the guidance in this book will apply to these projects. For guidance specific to managing design-build projects, consult KYTC's Design Build Guidance. Also, project

managers for Local Public Agency (LPA) project administered through KYTC should consult KYTC's LPA Guide.

Many of KYTC's projects involve contracting with consultants to perform one or more project development services. For more information on the project management tasks and responsibilities required for the management of consultant contracts see the Administration of Consultant Contracts Knowledge Book.

4.0 Information by Project Classification

Since the guidebook is a comprehensive *Project Management Guidebook* for a variety of project types, the information it contains may apply to one project classification or to a set or classifications. An effort is made throughout the guidance to identify when project management topics are commonly applicable based on project classification. Reference the table, like the one below, at the beginning of each article for applicable classifications.

Knowledge Article	Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1.0 Topic 1	x	x	x	x
2.0 Topic 2	x	x		x
3.0 Topic 2	x	x	x	x
3.1 Subtopic	x	x	x	
4.0 Topic 4	x	x	x	
4.1 Subtopic	x	x	x	
4.2 Subtopic	x	x	x	
4.3 Subtopic	x	x	x	
x = Information from the topic may be applicable for the project classification.				

Understanding the KYTC Budget and the Highway Plan	Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1.0 Overview	x	x	x	
2.0 Estimating the Project Budget	x	x	x	
3.0 Highway Plan Funding	x	x	x	
4.0 What is the Highway Plan?	x	x	x	x
5.0 What Happens after the Highway Plan is Signed into Law?	x		x	
x = Information from the topic may be applicable for the project classification.				

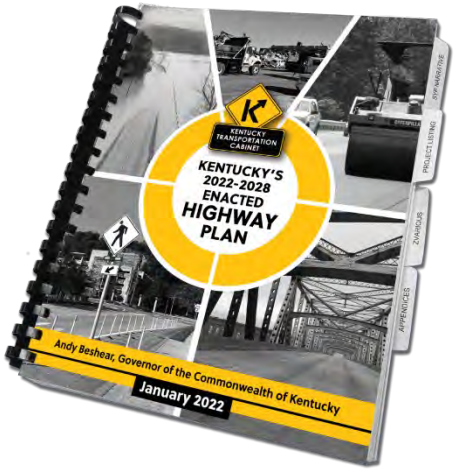


Photo Source: https://transportation.ky.gov/Program-Management/Pages/2022-Enacted-Highway-Plan.aspx

1.0 Overview

In even-numbered years, the General Assembly approves a new *Enacted Highway Plan*, which the governor then signs into law. Each plan provides the framework for advancing transportation projects during the upcoming two-year period (i.e., biennium) and lists recommended projects for the four-year period that follows the upcoming biennium. The plan contains a schedule for proposed projects as well as budgets for the planning, design, right-of-way, utility, and construction (PDRUC) phases.

Once a project appears in the biennium of the *Enacted Highway Plan*, funding may be authorized for designated phases. The plan also serves as a legislative tool to monitor highway project funds and schedules.

Projects in the Highway Plan are promises to their constituency and KYTC Project Managers (PMs) are responsible for delivering projects to letting.

2.0 Estimating the Project Budget

Before a project appears in the *Enacted Highway* Plan, an initial estimate must be prepared. This estimate provides a foundation for budgeting and establishes a baseline for future estimates. This process often occurs before a PM is assigned.

Initial estimates typically originate from the following sources:

- Planning study recommendations
- Continuous Highway Analysis Framework (CHAF) project estimates, usually prepared by District Project Development staff
- Legislative-requested estimates, usually prepared by District Project Development staff

Currently, KYTC District Offices use different methods to prepare initial estimates for each phase. For example, several use tailored spreadsheets and historical per-mile costs or other high-level estimating practices.

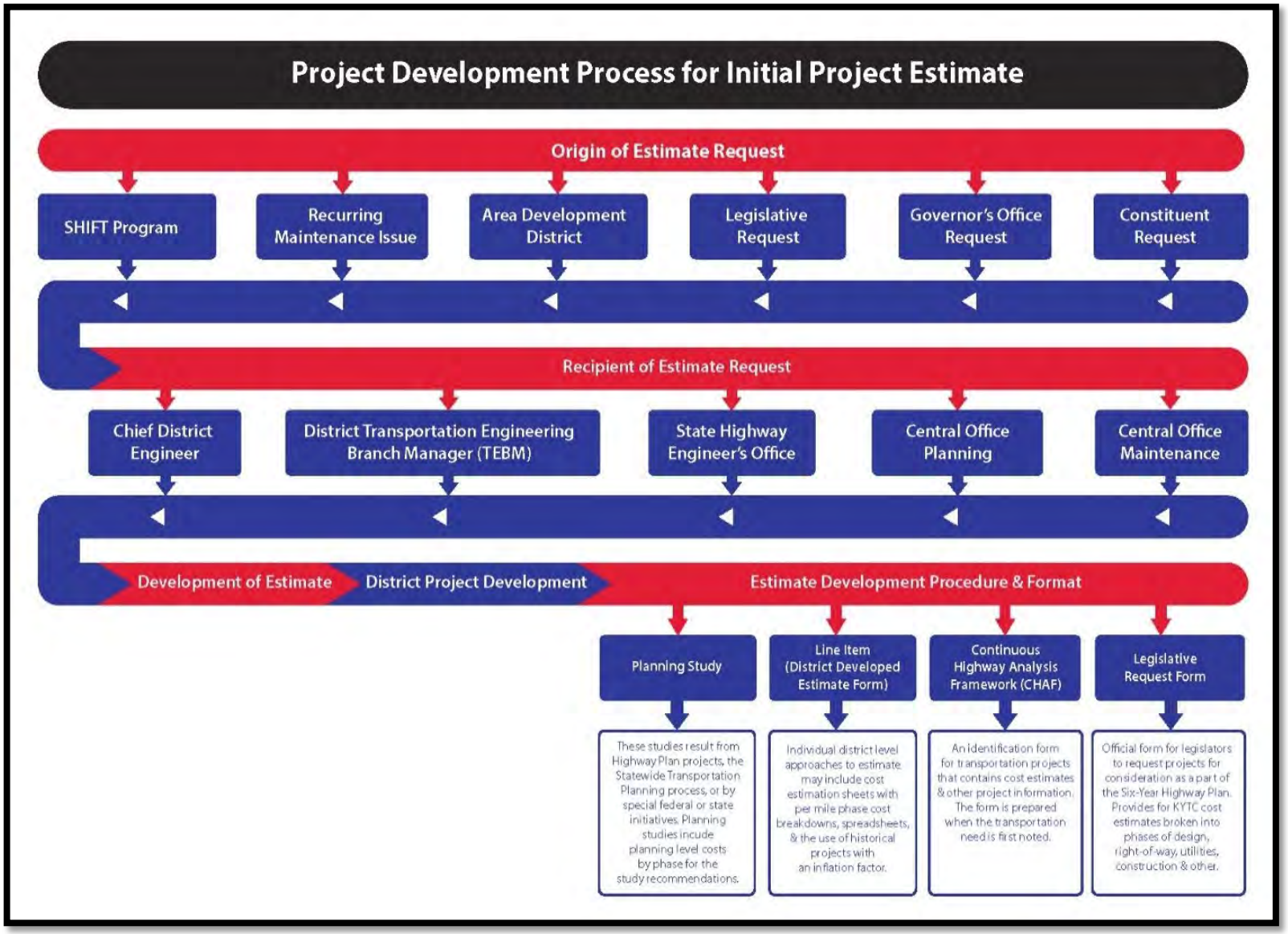
Initial cost estimates usually become the project budgets in the *Enacted Highway Plan*. Because the project budget is legislatively enacted, it is imperative that every effort is made to keep project costs within the budget. Exceeding a budget puts other projects at risk by reducing the limited amount of funds available for them. If the costs on one project increase, schedules and budgets for other projects listed in the *Enacted Highway Plan* can be directly impacted. As impacts accumulate, KYTC is forced to eliminate or delay projects to compensate for the cost increases.

Sometimes revising budgets is unavoidable. For example, in the following situations a PM may need to update an estimate so the budget can be revised:

- Approval of a scope change
- Prior to a new *Enacted Highway Plan* being adopted
- Upon request

A PM must inform the State Highway Engineer's (SHE) Office of proposed changes that will impact costs and request authorization to make those changes. The request can occur during the quarterly review meeting, through the Location Engineer, or through direct communication with the SHE's Office.

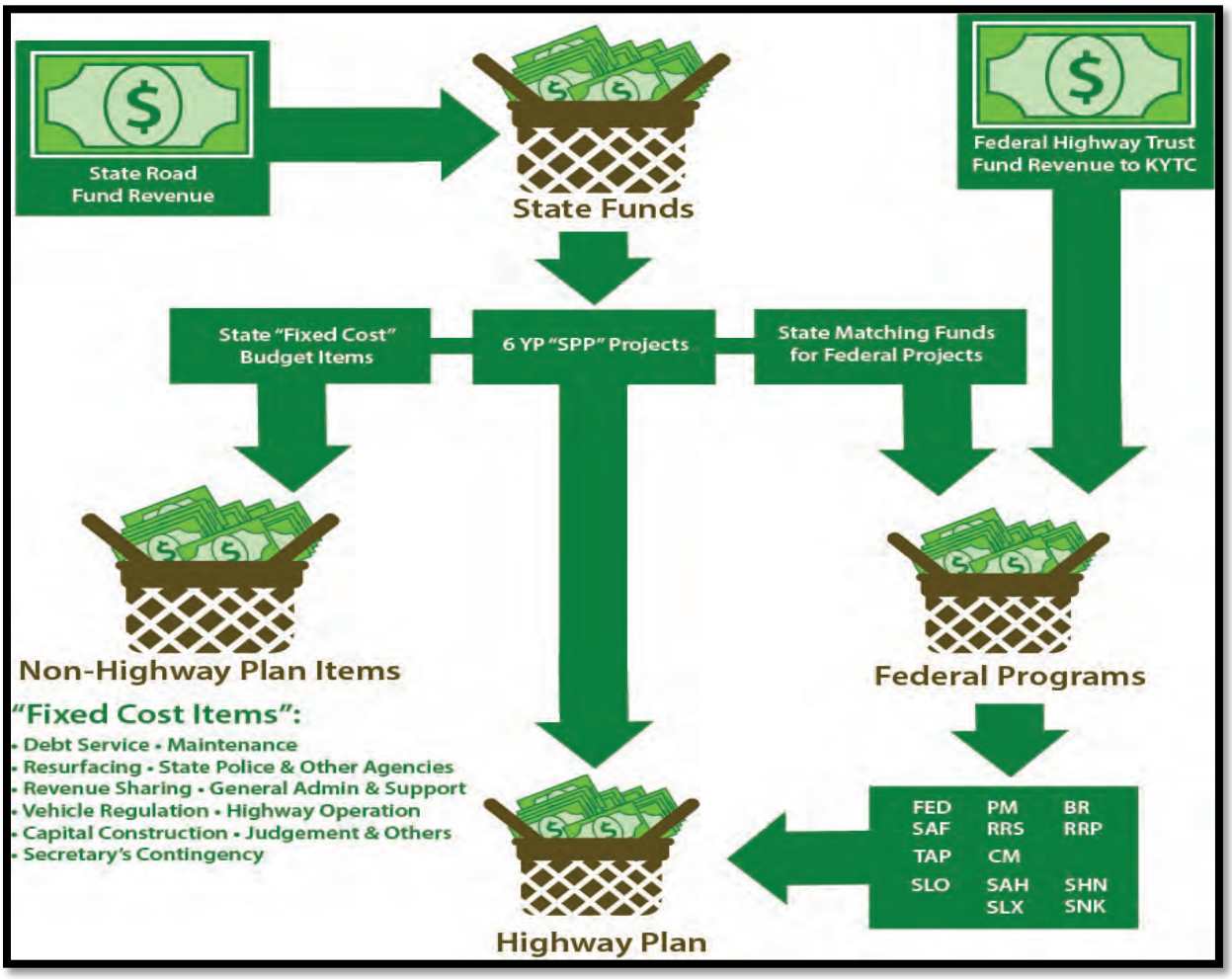
For more information on developing a project estimate and how estimates evolve throughout project development, see the PMGB article *Project Cost Estimation and Management*.


Project Development Process for Initial Project Estimate
Origin of Estimate Request
SHIFT Program
Recurring Maintenance Issue
Area Development District
Legislative Request
Governor's Office Request
Constituent Request
Recipient of Estimate Request
Chief District Engineer
District Transportation Engineering Branch Manager (TEBM)
State Highway Engineer's Office
Central Office Planning
Central Office Maintenance
Development of Estimate
District Project Development
Estimate Development Procedure & Format
Planning Study
Line Item (District Developed Estimate Form)
Continuous Highway Analysis Framework (CHAF)
Legislative Request Form
These studies result from Highway Plan projects, the Statewide Transportation Planning process, or by special federal or state initiatives. Planning studies incude planning level costs by phase for the study recommendations.
Individual district level approaches to estimate may include cost estimation sheets with per mile phase cost breakdowns, spreadsheets, & the use of historical projects with an inflation factor.
An identification form for transportation projects that contains cost estimates & other project information. The form is prepared when the transportation need is first noted.
Official form for legislators to request projects for consideration as a part of the Six-Year Highway Plan. Provides for KYTC cost estimates broken into phases of design, right-of-way, utilities, construction & other.

3.0 Highway Plan Funding

The *Enacted Highway* Plan funding is based on the most recent federal and state revenue estimates. Typically, the total value of projects for the six years covered in a plan ranges from $8 to $10 billion.

KYTC's ability to provide federally-required state matching funds (typically 20% of the total project cost) and to undertake major projects that use only state funding is contingent on the amount of cash available in the Road Fund and requires the Cabinet to carefully manage Road Fund expenses. Fixed Cost Items (e.g., maintenance funding) do not appear in the *Enacted Highway Plan*.



Source: Day 2 PM Bootcamp Presentation: Costs and Schedules, Who really cares and why?

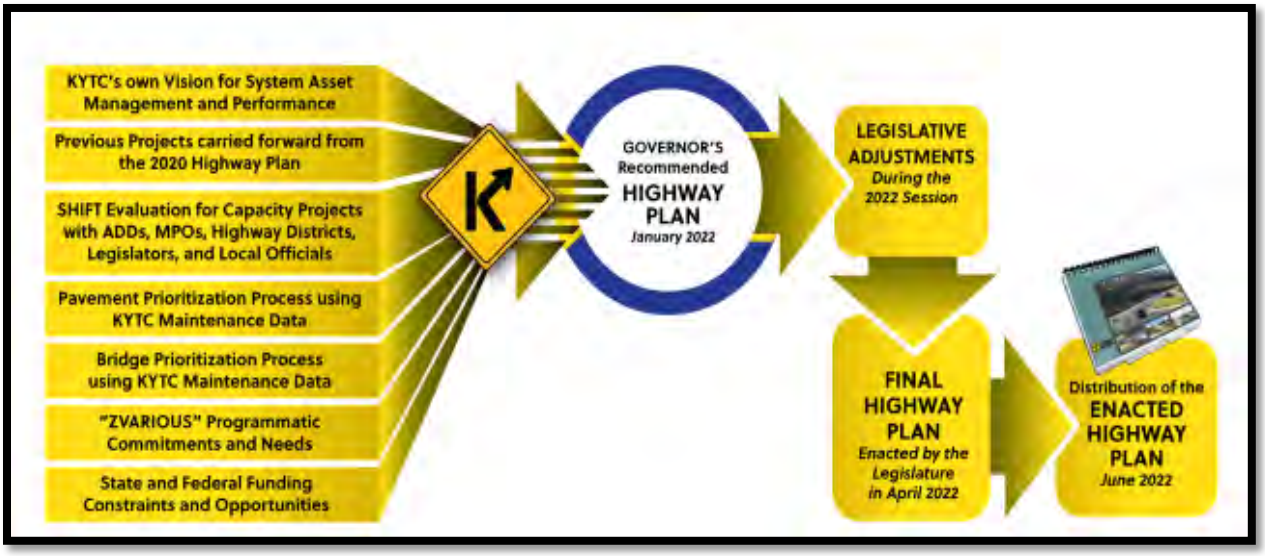
4.0 What is the Highway Plan?

The *Enacted Highway Plan* details how KYTC will spend taxpayer money on transportation project activities in the biennium. It is developed through the Cabinet's transportation planning process and with input from elected officials, District Offices, Area Development Districts, and Metropolitan Planning Organizations (MPOs). The Plan includes the Biennial Construction Plan, which specifies funding available for authorization during the upcoming two-year period. It also lists project funding levels for the subsequent four-year period (referred to as *Out Years*). *Out Year* funding is not available for authorization. Including the *Out Years* helps to anticipate future funding needs and scheduling of project development and construction phases. Historically, funding estimates for these years have exceeded total annual budgets.

A new *Enacted Highway Plan* is developed and approved every two years during the legislative budget session. A plan typically goes through four iterations:

- The Governor's Recommended Plan
- The House Plan
- The Senate Plan
- The *Enacted Highway Plan*

How is the HIGHWAY PLAN put together?



Source: Highway Plan narrative.
https://transportation.ky.gov/Program-Management/2022%20Enacted%20Highway%20Plan/5_Enacted%20Highway%20Plan%20Narrative%20from%20updates%20to%20Recommended%202022%20Hwy%20Plan%20Narrative%20accepted%20June%2016.pdf

For more information on how projects originate, including the SHIFT process and requesting funding authorization, see the PMGB article *Project Initiation*.

The *Enacted Highway Plan* includes:

- A narrative that explains how the plan was produced, revenue estimates and assumptions, details on current mega projects, and historical construction awards.
- An interpretive key that explains how to read individual project entries. Each entry contains high-level project information (e.g., county, route, description, item number) and indicates the amount of funding budgeted for each phase as well as the year(s) phases are budgeted.
- Lists of Existing Highway System Performance Projects, Highway Improvement Projects, and ZVARIOUS Projects.

5.0 What Happens after the Highway Plan is Signed into Law?

KYTC's Division of Program Management distributes the *Enacted Highway Plan* to project development staff once the governor signs it into law. The Division also updates the State Transportation Improvement Program (STIP). The new STIP incorporates federal projects found in the plan. To receive Federal-aid program funding, the STIP must be (1) fiscally constrained and (2) approved by the Federal Highway Administration (FHWA). The process of distributing the *Enacted Highway Plan* and updating the STIP usually takes several weeks.

Districts should coordinate with the SHE's Office and the Division of Program Management to discuss and prioritize project funding authorizations. For more information on funding authorization, see the PMGB article *Project Initiation*.

Red Flag:

It is not uncommon for projects that received funding in a previous *Enacted Highway Plan* to have funding for future phases deferred beyond the upcoming biennium or to be programmed with state funds, which are not fiscally constrained and rarely used for large authorizations.

Funding deferrals could result from the reprioritization of needs within the budget or changes in legislative representation. Since these projects cannot move to future phases without funding, the PM must find a good time to pause them. Options include a project delivery milestone (e.g., right-of-way plans) or a selected alternative with an approved Environmental Document. If these projects receive funding in the future, the PM determines whether project documents require updates. Environmental documents must be reevaluated prior to the project going into the next phase of development, and plans may require updates to ensure consistency with current standards.

6.0 Associated Articles

Project Manager's Guidebook – Knowledge Book

Project Initiation

Project Cost Estimation and Management

Project Schedule and the Development of Milestones

Project Management Tools and Technology

7.0 Reference Documentation

Kentucky's *Enacted Highway Plan*

Statewide Transportation Improvement Program (STIP)

Initial Project Estimates for Design, Right of Way, Utilities and Construction, KTC-21-01/SPR17-545-1F

Project Identification	Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1.0 Overview	x	x	x	x
2.0 Project or Program?	x	x	x	x
3.0 Capital Improvement Projects	x			
4.0 Safety Projects		x		
5.0 Asset Management Projects			x	
6.0 Maintenance Projects				x
x = Information from the topic may be applicable for the project classification				

Illustration Source: PMBC Presentation Project Management 101, Jeff Jasper.

Overview

Understanding how highway projects are identified helps the Project Manager (PM) to better establish the scope, schedule and budget of the project. The type of project usually determines

if it is identified individually in the *Enacted Highway Plan* or as part of a program. This article discusses the difference between project and program management and the identification of four types of highway projects: capital improvement, safety, asset management, and maintenance. For more information on the *Highway Plan* process, see the PM Guidebook article *Understanding the Budget and the Highway Plan Process*.

Also of importance to the PM is the funding sources of their projects. The funding source may be identified in the *Highway Plan* or it may be determined from the program that identified the project. For a list of budget programs and their codes (e.g., Federal Aid - FD52) see the bottom scroll-down list under *Highway Project Info Center → SYP Project Info* in the PM Toolbox.

1.0 Project or Program?

A project manager manages projects with unique scopes. These projects (e.g., capital improvement projects and asset management projects) are usually identified individually in the *Highway Plan* and include a budget and funding source.

Other projects are identified through a separate process (e.g., network screening, an emergency need) and receive funds from a program such as the Highway Safety Improvement Program (HSIP) or the funds allocated for maintenance activities. Program managers manage a group of projects that focus on the overall vision of the program. They may also manage projects within their program. Table 1 compares project and program management.

Illustration Source: PMBC Presentation Project Management 101, Jeff Jasper.

Table 1 Project and Program Management Comparison

Area	Project Management	Program Management
Focus	Straightforward objective	Business strategy
Scope	Narrow	Wide-ranging, cross-functional
Deliverables	Few, clearly defined	Many, from many projects contributing to the whole
Timescale	Clearly defined	Loosely defined, continuous
Change	To be avoided	Regarded as inevitable
Success Factors	Time, budget, scope	Mission, cash-flow, ROI
Plan	Specific, detailed, bounded	High-level and evolving

Illustration Source: PMBC Presentation Project Management 101, Jeff Jasper.

The key difference for managers is where they focus their efforts. Project managers focus on delivering a project as efficiently as possible. Program managers focus on maximizing the overall benefits to the Cabinet.

3.0 Capital Improvement Projects

Capital improvement projects usually involve new road or bridge construction or major improvements to higher-traffic routes and have larger budgets than other types of projects. They are included in the Highway Improvement Projects Listing in the current *Highway Plan*.

Capital improvement project needs and conceptual scopes of work most often emerge through KYTC's Statewide Transportation Planning Process. Federal law requires each state to carry out a continuing, cooperative, and comprehensive statewide multimodal transportation planning process to identify its most important transportation needs. Kentucky's process is described in Chapters 7 and 8 of the KYTC Division of Planning's Annual Work Program. Through this process, the Division of Planning coordinates with entities across the state, including Area Development Districts (ADDs), metropolitan planning organizations (MPOs), and Highway District Offices (HDOs), to continually identify and prioritize Kentucky's most important needs. Through coordination and data-driven tools (e.g., Continuous Highway Analysis Framework (CHAF) project database, Strategic Highway Investment Formula for Tomorrow (SHIFT) project selection methodology), the process provides meaningful input used to develop Kentucky's biennial highway spending plan.

Projects may first be proposed by highway officials, members of the public, legislators, or local governments (e.g., Long-Range Plans, Regional MPO Plans, ADD plans). Since implementation of the SHIFT process, the CHAF project database has been used to house project data for unscheduled *and* scheduled project needs. Division of Planning staff prioritize unfunded and

funded projects separately by examining projects in coordination with state highway officials, ADDs, MPOs, elected officials, and others.

A project usually originates with a roadway need. Project ideas are submitted to either an ADD, MPO, or HDO for inclusion in the CHAF project database. A project description consisting of the purpose, location and limits is entered into the database. For more information, see *Highway Plan Project Descriptions* (coming soon).

Data may be entered into CHAF by the ADD, MPO, or HDO. HDO personnel later verify all project data. Cost estimates are normally developed by HDO personnel. Once data is entered and verified, projects are scored through the SHIFT process. SHIFT scoring informs the Recommended Highway Plan development. Table 2 includes the typical SHIFT schedule of activities. Visit the SHIFT website for more information on SHIFT scoring.

Table 2 SHIFT Schedule

SHIFT Kentucky Ahead *Strategic Highway Investment Formula for Tomorrow*			
	Timeline (odd years)	**Action**	**Acting Party**
Sponsorship	Mid Feb. - Late April	Projects are sponsored for consideration in SHIFT.	Area Development District (ADD), Metropolitan Planning Organization (MPO), Highway District Office(HDO)
Project Data Review and Updates	Early May - Late June	Data is verified, travel time and economic modeling is conducted, project costs and schedules are updated.	Central Office, HDO, ADD, MPO
Statewide Priorities	Late June- Late July	Statewide projects (generally, interstate and parkway projects) are scored in the SHIFT model. Statewide priorities are established through a balance of SHIFT scores, project schedules, and available funding.	Central Office and HDO
Local Boosting	Late July - Mid Sept.	Statewide projects that did not make the Statewide Priority List are scored in the SHIFT model for Local Priorities. ADDs, MPOs, and KYTC Districts determine which projects in their areas to boost.	Central Office, ADD, MPO, and HDO
Local Priorities	Mid Sept.- Mid Oct.	District / Local (ADD/MPO) Priority Plans are submitted outlining how boosting determinations were made.	ADD, MPO, HDO
Recommended Highway Plan	Mid Oct. - Late Dec.	KYTC develops Recommended Highway Plan (includes SHIFT and non-SHIFT elements)	Central Office

Some projects added by the legislature receive *Highway Plan* funding without going through the CHAF/SHIFT selection process. These are incorporated into the *Highway Plan* during the late stages of the approval process in the biennial budget legislative session. Often, these projects are later added to the CHAF database to compete for future *Highway Plan* funding.

Capital projects may receive funding from several sources. Usually, they are funded through federal aid (FD52) and state construction (FD04) programs. For projects using federal funds, see *PM & NEPA* (coming soon) for environmental requirements.

4.0 Safety Projects

The Highway Safety Improvement Program (HSIP) is a Federal-aid highway program, established in 2005 focused on reducing fatalities and serious injuries on all public roads through the implementation of infrastructure-related highway safety improvements. The HSIP is a Federally-funded, state-administered program that is legislated under 23 United States Code (U.S.C.) 148, 23 U.S.C. 150, and 23 U.S.C. 130 and regulated by 23 Code of Federal Regulations (CFR) Part 924 and 490. The HSIP regulations under 23 CFR Part 924 require HSIP projects (1) to be identified and prioritized through a data-driven process, (2) to be aligned with Kentucky's Strategic Highway Safety Plan (SHSP), and (3) to improve safety.

Guided by the SHSP, HSIP's initiatives encompass several types of projects, including:

- Roadway Departure Corridors
- Intersection Improvements
- Friction Treatment
- Enhanced Delineation

The HSIP uses the most current Highway Safety Manual (HSM) methodologies to identify, prioritize, and analyze safety projects. This includes:

- Screening Kentucky's network of roads, called Network Screening, to identify locations that are experiencing more crashes than expected, and
- Prioritizing the corridors, intersections, and sites to study further by using the magnitude of excessive crashes

HSIP project teams include staff from the Traffic Safety Branch within the Division of Traffic Operations, and HDO staff with expertise in traffic, design, and planning. While Network Screening identifies and prioritizes the "need" for a project using historic crash data, the local knowledge of district staff is critical to correlating this information with roadway characteristics and features contributing to the historical crashes, and determining potential improvement options that can be implemented to mitigate the identified safety challenges.

KYTC's HSIP receives approximately $50 to $60 million annually and allocates the funds according to the major crash types and patterns occurring in Kentucky. For example, Roadway Departure crashes account for 65% of roadway fatalities. Accordingly, approximately 70% of the HSIP funding is allocated to Roadway Departure (RD) initiatives such as RD Corridor Projects and Cable Barriers. Furthermore, each KYTC district is allocated HSIP funds proportional to the fatalities and serious injuries occurring within each district. HSIP projects typically focus on low-cost safety improvements such as:

- Roadway and roadside improvements, including improving roadway superelevation, extending culverts and widening shoulders, adding rumble strips, removing and/or relocating roadside obstructions, and updating guardrail.
- Intersection improvements, including installing retroreflective backplates, improving signal timing and phasing, constructing offset left turn lanes, and improving pedestrian accommodations.
- Enhanced delineation, including signing and striping.
- Friction improvement treatments.

5.0 Asset Management Projects

The primary purpose of these projects is to address the condition of existing highway assets through replacement or repair. They do not typically involve the addition of new capacity or roadway functionality, although minor improvements may sometimes be included. The Central Office and HDOs perform the condition assessments that underpin the identification of highway asset management needs.

Bridge needs are identified through the National Bridge Inspection System (NBIS), which contains data collected during routine inspections by KYTC and contract staff. Bridges may be prioritized through the Enhanced Bridge Prioritization Index described in the Bridge Project Prioritization research report.

Projects slated for inclusion in KYTC's annual pavement preservation program are identified through a two-step process that includes visual evaluations performed by pavement management engineers and analysis of automated distress data captured using KYTC's pavement data collection vehicles. Pavements are prioritized based on a composite score — the pavement distress index (PDI). Each year, Pavement Management staff prepare a prioritized list for each District based on anticipated funding levels. They share this list with District Project Delivery and Preservation (PD&P) staff to obtain input on local concerns (e.g., conflicting highway plan projects, anticipated changes in traffic generators, safety issues, the impacts of upcoming project). Projects may be delayed, advanced, or modified based on this feedback.

The CB06 pavement resurfacing program for Rural Secondary Road Aid relies primarily on visual assessments performed by District staff who coordinate with local officials to prioritize projects for Rural Secondary routes. And once the annual CB06 resurfacing program is determined, as a courtesy the District staff presents it to the Fiscal Court of corresponding county. CB06 funds can also be used for Maintenance projects.

6.0 Maintenance Projects

Maintenance projects are smaller scale projects that address the condition of existing highway assets, and do not involve the addition of new capacity or roadway functionality. District staff

are primarily responsible for identifying and prioritizing daily maintenance needs and assigning in-house labor to carry out day-to-day activities. Central Office Division of Maintenance staff help establish defined bid contracts and master agreements for maintenance work.

Regardless of the mechanism used to perform the work, prioritization of maintenance activities is based on how an issue will impact highway network operations. Issues causing an immediate closure (e.g., crash, roadway collapse) must take priority over those that may cause a closure in the near future. Similarly, potential future problems must be prioritized based on their level of impact and likelihood of occurrence.

The Maintenance Rating Program (MRP) uses annual highway infrastructure performance data to inform maintenance planning and budget allocation for twelve highway districts. It helps assess past decisions, identifies resource needs, supports consistent customer service, guides budget requests, informs policymakers, and facilitates sharing of best practices among districts to improve performance.

Funding sources for maintenance projects include FE01 Maintenance, FE02 Bridge Maintenance, FE03 Maintenance Revolving, FE04 Traffic, FE06 Maintenance Capital Improvements, and FE07 Rest Area Maintenance.

7.0 Associated Articles

Project Manager's Guidebook - *Introduction and Overview*

Understanding the Budget and the Highway Plan Process

Project Initiation

Project Management and NEPA (coming soon)

8.0 Reference Documentation

PM Toolbox

KYTC Division of Planning's Annual Work Program

Strategic Highway Investment Formula for Tomorrow (SHIFT)

US Code

Strategic Highway Safety Plan (SHSP)

Gibson, B., Van Dyke, C., Palle, S., Griffith, R., & Kreis, D. (2022) Bridge Project Prioritization. Kentucky Transportation Center. https://uknowledge.uky.edu/ktc_researchreports/1748/

Maintenance Rating Program

Project Management Institute. (2017). A Guide to the project management body of knowledge (PMBOK® guide) (6th ed.).

Project Initiation	Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1.0 Overview	x	x	x	x
2.0 Project Assignments	x	x	x	x
3.0 Design Funding Authorization	x	x	x	x
3.1 Requests for Authorization	x		x	
3.2 Programmatic Authorization		x	x	x
4.0 Collecting Existing Project Data	x	x	x	x
4.1 CHAF and SHIFT Data	x			
4.2 Planning Study Results	x			
4.3 Record Plans	x	x	x	x
4.4 Traffic Data	x	x	x	x
4.5 Crash Data	x	x	x	x
4.6 Project Mapping	x	x		
4.7 Right of Way	x	x		
4.8 Preliminary Budget	x		x	
4.9 Existing Geotechnical Information	x		x	
4.10 Utilities	x	x		
4.11 Agency Coordination	x			
4.12 Modal Considerations	x	x	x	
4.13 Asset Management - Pavement			x	
4.14 Asset Management - Structures	x		x	
4.15 Environmental	x	x	x	
x = Information from the topic may be applicable for the project classification.				

1.0 Overview

Highway project initiation typically occurs after the project is identified and funding becomes available. This article walks readers through project initiation and reviews the following topics:

- Project manager (PM) assignment
- Initial funding authorization
- Collection of existing data and how they are used to refine the project scope

2.0 Project Assignments

KYTC's *Enacted Highway Plan* lists projects and programs. These are assigned by the State Highway Engineer (SHE) or his designee to individual PMs and program managers based on project origin and funding type. Historically, the SHE delegates the task of assigning capital improvement project managers to the District Project Development Branch Managers for projects within their districts. The PMs oversee project development and are responsible for getting projects to letting.

PMs play a key role in interpreting *Enacted Highway Plan* entries, which includes a description, funding levels, and a general timeframe for each project. Sometimes, the SHE Office assigns a PM who is located outside of the District where the project is being undertaken (e.g., another District PM, a Central Office PM, a Consultant PM). If project management responsibilities are delegated to other personnel, this should occur as early as possible. The PM enters this information into the PDP-Precon Database. See HD-202.2 for more information on the assignment of capital improvement projects

On projects implemented with programmatic funding, program managers usually manage several projects with similar scopes. KYTC program managers may not oversee individual projects listed by Item Number in the *Highway Plan*. The *Highway Plan* describes programs that receive appropriated funds for specified transportation needs. Program managers, through their program's planning and scoping processes, identify projects to fulfill the program's focus and mission.

KYTC project and program managers reside in several different areas of the Cabinet and manage a variety of projects, some in-house and others through consultant contracts. Below is a simplified list of the primary locations of KYTC's project and program managers and the types of projects they typically manage. It is not an all-inclusive list; there are certainly outliers when it comes to project management.

KYTC PM Location	Type of Projects	Project Classification
Division of Planning/District Planners	Corridor or other Planning Studies, Data Needs Analysis (DNA) Studies, SHIFT	Usually Capital Improvements, but short-term solutions may fall into another classification
Division of Highway Design	Pavement Rehabilitations (Program)	Asset Management
District Project Development Staff	New Construction, Reconstruction	Capital Improvements
Division of Maintenance/District PD&P Staff	Pavement Resurfacing and Preventative Maintenance (Program)	Asset Management
Division of Maintenance/District PD&P Staff	Re-striping of pavements, ditch cleaning, pothole patching, guardrail replacement, and minor bridge deck repairs (Program)	Maintenance
SHE's Office	Bridge Replacements, Rehabilitations, and Preventative Maintenance, Major Projects	Asset Management
Division of Traffic Operations, HSIP	Safety Improvement Projects (Program)	Safety Projects
Division of Construction Procurement/District Staff	Alternative Delivery Projects (Design-Build, Progressive Design Build, CMGC, GEC)	Capital Improvements
SHE's Office/District Staff	Major Projects	Capital Improvements

Except for planning studies, the PM is responsible for project development from project initiation to letting. Once assigned, a PM should review, further develop, and refine the project objectives, scope of work, budget, and schedule to verify they have a clear understanding of what is expected.

Note: On projects where consultants have responsibility for project management tasks, there is a KYTC PM assigned with decision-making authority.

3.0 Design Funding Authorization

3.1 Requests for Authorization

For projects listed in the *Enacted Highway Plan*, a PM must request funding authorization from the Division of Program Management. For information on capital project authorizations see HD-

202.5. Highway System Performance Projects in the *Enacted Highway Plan* also must be individually authorized by the Division of Program Management. **Only funds within the biennium listed in the *Enacted Highway Plan* are eligible for authorization.**

State funding and Federal-aid highway funding requires a signed TC10 form by the Secretary of Transportation and by the State Highway Engineer. Federal-aid highway funding also requires a federal programming document (PR-1) signed by designated KYTC and FHWA staff before the federal funding can be made available in the accounting system.

On Federal-aid design-bid-build projects, only planning or preliminary design funds may initially be authorized for projects that will require an environmental document of a Categorical Exclusion (CE) Level 3 or higher. Final design funds may be requested and authorized after the environmental document is approved. Authorization of Right-of-Way (ROW), Utility, and Construction funds also requires environmental document approval on federally funded projects. To expedite the development of the project, some ROW and utility tasks may be performed in preliminary design, prior to the approval of the environmental document. For more information, see the PMGB article *Project Management and Preliminary Design*.

Red Flag: *From the initial request to approval, design funding authorization may take several months, especially at the beginning of a new biennium and new Highway Plan. The Central Office must conduct organizational planning to prioritize projects based on risk, funding, and the Cabinet's strategic plan. When sending multiple Design Funding Requests, the PM should work with Central Office to prioritize projects and communicate needs and risks. If a project is time sensitive (e.g., a work activity on the critical path must begin otherwise on-time delivery of the project is endangered), the PM should inform the Division of Program Management that the Design Funding Authorization process needs to be expedited. Federal-aid projects require FHWA approval for funding requests, which adds review time.*

Projects in a MPO area *must be included in the MPO's Transportation Improvement Program (TIP) to be eligible for federal funds. Contact the Division of Planning's MPO Team for questions about eligibility.*

3.2 Programmatic Authorization

In general, shorter-duration project types are programmatically listed and funded in the ZVARIOUS section of the *Enacted Highway Plan*. Programs such as the Highway Safety Improvement Program (HSIP) or Pavement Management prioritize and implement projects based on their available funding.

Pavement preservation projects are the largest category of asset management projects awarded each year. These are funded through KYTC's FD05 and CB06 programs, which are administered by the Division of Maintenance and the Department of Rural and Municipal Roads, respectively. The Division of Maintenance administers bridge repair, rehabilitation, and preventive

maintenance projects through the FE02 maintenance program. Major rehabilitation and bridge replacement projects are administered through a variety of funding mechanisms and programs.

For information on the authorization and use of programmatic funds, contact the Division of Program Management and/or the Program Coordinator.

4.0 Collecting Existing Project Data

The PM must collect as much existing data as soon as possible before beginning a project. They must also review the *Enacted Highway Plan* to plan for information and complete data collection before a project enters the design phase. HD-202.3 describes the data typically required prior to the design phase. Image source: Adobe Stock.

KYTC's Highway Information System (HIS) is a key source for data on existing facilities.

The HIS database stores information on roadway systems throughout the state and includes data on location, roadway feature type (e.g., mainline, ramp), pavement, traffic, and bridges. PMs may need to request more specific project-related data during project development.

Red Flag: Data should be gathered as soon as possible to keep data collection off the critical path. PMs should not wait for Design Funding Authorization to begin this process. Alternative funding sources (e.g., planning study funds, overhead) may be used for data collection.

4.1 CHAF and SHIFT Data

Initial documentation for projects listed in the *Enacted Highway Plan* is likely held in the Continuous Highway Analysis Framework (CHAF) database, an application that lets users collect, track, and analyze identified transportation needs. The CHAF database provides the means to sponsor, score, and rank projects as part of the Strategic Highway Investment Formula for Tomorrow (SHIFT), the Cabinet's data-driven, objective approach for comparing and prioritizing capital improvement projects.

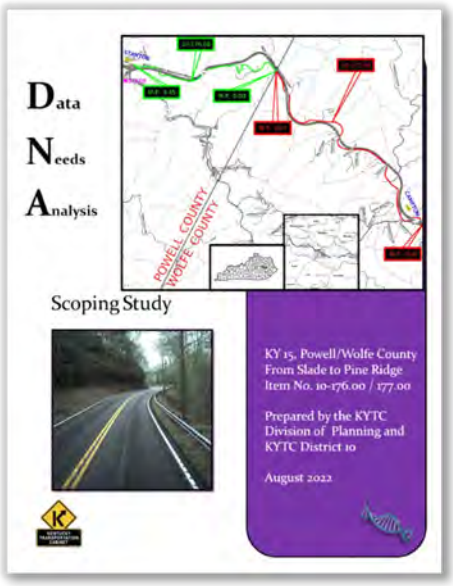
CHAF data include county, route, milepoints, project status, project location, bridge details, cost estimates, project characteristics, initial purpose and need statement, and — for the SHIFT cycle — project sponsorship, scoring data (administered by the Division of Planning), and local scoring input. The SHIFT process uses network-level screening to estimate excess expected crashes (EECs) and vehicle hours of delay (VHD) across Kentucky's highway network. This information contributes to the scaled objectives measured for five key attributes — safety, congestion, asset

management, economic growth, and benefit/cost. CHAF and SHIFT data can be obtained from the Division of Planning or District planning staff.

4.2 Planning Study Results

PMs should request from the Division of Planning information from previous planning studies. Planning studies focus on feasibility and priority issues, typically the corridor scale. Intermediate planning studies address the conceptual and preliminary engineering aspects of a project.

Much of the data described in this article is gathered as part of and included in planning studies. Studies should also contain initial cost estimates, or similar documentation. Completed studies are available on the Division of Planning's website.



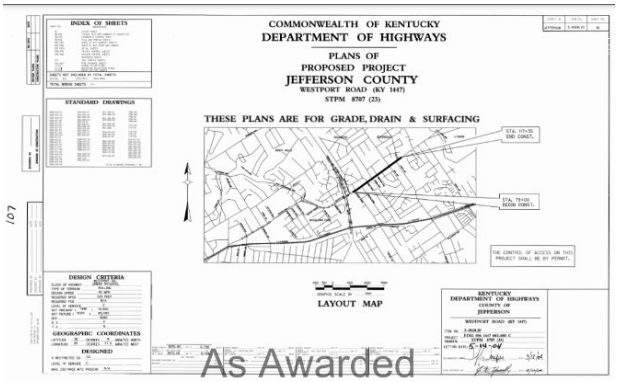
The Data Needs Analysis (DNA) study is brief and small in scale. It is primarily used to: 1) gather basic existing data; 2) identify potential project development concerns; and 3) verify or refine definitions of the project purpose, need, and scope. DNAs provide basic planning-level information for smaller projects that do not require lengthy, detailed planning studies. DNAs are available on the Division of Planning's website.

DNAs are usually developed after the project is included in the Highway Plan, but before the advertisement of the project for consultant services.

Red Flag: DNAs include scope statements, the project development schedule, and cost estimates for design, ROW, utilities, and construction. The PM should review the DNAs and use it to establish the project baseline. In completing a DNA, the PM and project team members develop a more complete understanding of a project's purpose and scope. Once a DNA study is complete, the project scope should align with the schedule and budget. However, if the scope, schedule, and budget do not align, the PM should revisit the project definition with KYTC leadership to properly define a new scope and obtain input and buy-in from all affected stakeholders.

4.3 Record Plans

The PM should obtain copies of the record roadway plans in the area of the new project. KYTC maintains record plans of previous highway projects on the Project Archives GIS website.



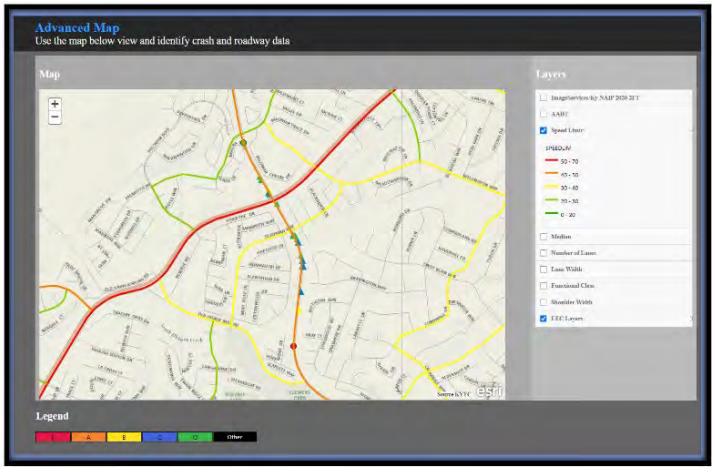
Plan sets may also be maintained in the Highway District Office (HDO) and Central Office (CO). Contract plans of recent projects may be available on ProjectWise in the project folder.

Red Flag: The Project Archives GIS website includes access to As-Built and As-Awarded Plans. As-Awarded Plans may not contain changes that occurred during construction and may need field verification.

4.4 Traffic Data

The Division of Planning website includes historical traffic counts and current data. Vehicle classification counts are also available for most routes. PMs should request traffic forecasts using the form on the Traffic Forecasting website when needed.

4.5 Crash Data



See HD-203.3.4 for information on crash data.

Sources of crash data include:

- Kentucky's Open Portal Solutions (KyOPS) database
- Kentucky Collision Analysis for the Public website
- Highway Information and View Extract Secure Interface (HIVEi)
- Crash Data Analysis Tool (CDAT)

For more information on sources of crash data, levels of accessibility, and CDAT training videos, see the Data Driven Safety Analysis (DDSA) website.

4.6 Project Mapping

Project mapping can incorporate aerial survey data, ground data collected using traditional methods (e.g., surveying), remotely sensed data, LiDAR data, and data collected using other

techniques. Existing mapping (e.g., terrain, topographic, hydrologic) may be available. For the most recently published map data, visit KyFromAbove. PMs can use data from this site for planning, preliminary engineering, and supplemental mapping.

After project authorization, a PM should assess available project mapping and determine if additional data or mapping is needed. Existing mapping may be sufficient, rendering additional data collection unnecessary for preliminary design. The PM often collects supplemental data (e.g., LiDAR) during later stages of project development. They can do so through KYTC's Survey Coordinator, the District's in-house survey crew or a consultant. Using existing mapping can help sustain project momentum and circumvents the seasonal limitations of aerial survey.

When additional data or mapping is needed for preliminary design activities, the PM may submit a request to the Survey Coordinator. The PM and Survey Coordinator first evaluate the project area and available information. Next, they select the type of data to collect and extent of coverage. PMs should request data for the designated project area and include some extra allowance as a buffer. The goal of collecting mapping data in buffer areas is to avoid needing to collect further data during later stages of project development.

PMs also need to review floodplain maps for local conditions. FEMA provides these maps through its online Flood Map Service Center. Maps may also be obtained through the Kentucky Flood Hazard Portal.

Red Flag: *PMs should ensure that collected mapping data have sufficient coverage to avoid subsequent data collection. It is less expensive and quicker to acquire extra data at the project's outset than for aerial or field survey crews to make extra data collection trips.*

Aerial surveying is only performed during certain times of the year. Aerial survey requests are typically made prior to the December – March period, which is the window of opportunity for conducting aerial surveys. When scheduling aerial mapping, it is important to consider season, sun angle, vegetation, and other factors that can impact the quality of data collected, and are critical considerations for scheduling aerial mapping. See the ***HD-202.6.6*** *for details.*

4.7 Right of Way

PMs can obtain existing ROW limits using the Project Archives GIS website, visiting Property Valuation Administrator's (PVA) offices or County Clerk offices, from DOs, and from other sources. Property deed descriptions are housed at the local PVA office. PVA mapping may be used at the planning level and not relied upon to establish Right of Way lines.

4.8 Preliminary Budget

The *Highway Plan* establishes the preliminary budget for individual system performance and improvement projects. This budget should be based on the initial project scope.

Requests for additional funds should be made through the Division of Program Management as early as possible. These requests should be dealt with in the same manner as described in Section 4. The *Highway Plan* also includes funding for programmatic needs and commitments that may be used for some types of projects but without specifying a schedule or budget.

4.9 Existing Geotechnical Information

The Geotechnical Branch's online database houses results from completed KYTC geotechnical investigations. Additional geotechnical mapping and information (e.g., soil types found in the area, preliminary fill slope recommendations for estimating earthwork quantities) may also be obtained from the Geotechnical Branch in the Division of Structural Design.

4.10 Utilities

PMs can retrieve utility information from the Kentucky Water Resource Information System (WRIS) and other GIS websites. WRIS provides geospatial data and information on drinking water systems, wastewater treatment systems, project development, emergency response, regulations, and planning. Google Earth Streetview (or similar) and BUD One Call (Kentucky811) are valuable sources of information as well. If necessary, work with District utility staff to coordinate with local utility providers.

See HD-202.3.9 for more information on utility data.

4.11 Agency Coordination

If an earlier planning study involved agency coordination, this should be collected and reviewed.

4.12 Modal Considerations

Throughout the design process, PMs should obtain and examine studies and information on other transportation modes. Examples include:

- Transit bus stops
- Local master plans
- Connections to nearby destinations
- Inter-state modal routes (e.g., bicycle routes)
- Existing modal facilities (see KYTC's interactive map of Bike and Pedestrian Facilities)

The Complete Streets Planning Checklist can help PMs determine whether a project should include bicycle, pedestrian, or other Complete Streets facilities.

4.13 Asset Management - Pavement

KYTC's Pavement Management staff collect pavement surface data and visually survey pavements to determine recommended treatments. Interstate and parkway data are collected annually, while data collection on state primary and state secondary routes occurs every three years. This strategy helps KYTC prioritize preservation and preventive maintenance projects. Data collected by the Division of Maintenance include automated pavement distress, rutting, cross slope, international roughness index (IRI), faulting, curve and grade, GPS data, and roadway images. Pavement data are available through Photo Log information.

4.14 Asset Management - Structures

Image Source: KTC Photo

Bridges and large culverts are routinely inspected and given National Bridge Inventory (NBI) condition ratings. Ratings for structures can be viewed through the Bridge Data Miner. Bridge inspection reports can be requested from the Bridge Maintenance/ Preservation Branch in the Division of Maintenance or from District bridge engineers.

Library. 4.15 Environmental

The Environmental Overview map highlights environmental resources of significance, potential jurisdictional features, and other environmental areas of concern within Kentucky that should be considered during project development and maintenance work. It includes potential sensitive water areas, deed restricted properties, managed areas, Indiana Bat Habitat (endangered species), and special use waters. The PM should be aware of potential environmental red flags.

5.0 Associated Articles

Project Manager's Guidebook – Knowledge Book

Project Management and Preliminary Design

Understanding the KYTC Budget and the Highway Plan

Project Identification

6.0 Reference Documentation & Links

KYTC's Highway Design Manual

KYTC's Metropolitan Planning website

KYTC's Highway Information System (HIS)

Strategic Highway Investment Formula for Tomorrow (SHIFT)

KYTC's Planning Studies & Reports website

KYTC's Data Needs Analysis Studies website

KYTC's Project Archive (As-Built & Record Plans) Interactive Map

KYTC's Traffic Counts website

KYTC's Traffic Forecasting website

Kentucky's Open Portal Solutions (KyOPS) database

Kentucky Collision Analysis for the Public website

Highway Information and View Extract Secure Interface (HIVEi)

Crash Data Analysis Tool (CDAT)

Data Driven Safety Analysis (DDSA) website

KyFromAbove

Flood Map Service Center

Kentucky Flood Hazard Portal

KYTC's Enacted Highway Plan

KYTC's Geotechnical Data website

Kentucky Water Resource Information System

KYTC's Complete Streets, Roads, and Highway Manual

KYTC's Pavement Conditions Interactive Map

KYTC's Bridge Data Miner

KYTC's Environmental Overview Interactive Map

Project Scoping

Project Scoping	Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1.0 Overview	x	x	x	x
2.0 KYTC Transportation Project Scoping	x	x	x	x
2.1 Capital Improvement Projects	x			
2.2 Safety Projects		x		
2.3 Asset Management Projects			x	
2.4 Maintenance Projects				x
3.0 Defining the Project	x	x	x	x
4.0 Project Coordination	x	x	x	x
4.1 Scope Verification Meeting	x	x	x	
4.2 Value Engineering	x		x	
5.0 P&N Development	x	x	x	
5.1 How is P&N Developed?	x	x	x	
5.2 Who Develops the P&N Statement and When?	x	x	x	
5.3 Why is the P&N Statement Developed?	x	x	x	
6.0 Performance Measures	x	x	x	x
7.0 Additional Resources	x	x	x	x
7.1 Additional Mapping	x	x		
7.2 Environmental Overview	x	x	x	
8.0 Public Involvement	x	x	x	

x = Information from the topic may be applicable for the project classification.

1.0 Overview

When a project begins, the Project Manager (PM) collects and reviews existing project information (see HKP article on *Project Initiation*) to gain a basic understanding of the project's objectives and identify knowledge gaps. Once these data are in hand, the PM can begin the scoping process. The goal of project scoping is to investigate the situation and develop a project description that addresses the project's need(s). If the project scope is not clearly defined, revisions may be needed after the project has begun, leading to delays or overpromises of what can be delivered. Ideally, a reliable, decisive project scope is defined in the early phases of project development. The scope should include a project definition that clearly communicates the project scope's framework and specifies what the project *will and will not* deliver. Successful project scoping:

"The scope should include a project definition that clearly communicates the project scope's framework and specifies what the project *will and will not* deliver."

- Defines project boundaries
- Identifies project components
- Develops key design parameters
- Estimates a budget and schedule to an adequate level of detail for planning purposes

The PM is responsible for tracking the project scope throughout project development — from early scoping through letting. The project scope may be refined during preliminary design. During the last stage of scoping, the project scope, budget, and schedule are finalized. The budget developed at the end of the scoping phase is the Preliminary Line and Grade Estimate prepared after the design of the alternatives is complete. At this point, enough information is available to firmly establish the project parameters, including final design, right-of-way needs, existing utilities, environmental impacts, broadly accurate cost estimates, schedules, and staffing demands. Final scoping work is passed along to roadway and structure designers, and other subject matter experts depending on project complexity, to guide their efforts. At each milestone the PM should compare the initial project scope to the scope captured in previous project documentation. Scope refinement occurs throughout project development, but PMs should take special care to ensure the scope does not expand (i.e., scope creep). The ability to influence the final characteristics of the project's product, without significantly impacting cost, is highest at the start of the project and decreases as the project progresses towards completion. The following figure illustrates the idea that the cost of changes and correcting errors typically increases substantially as the project approaches completion.

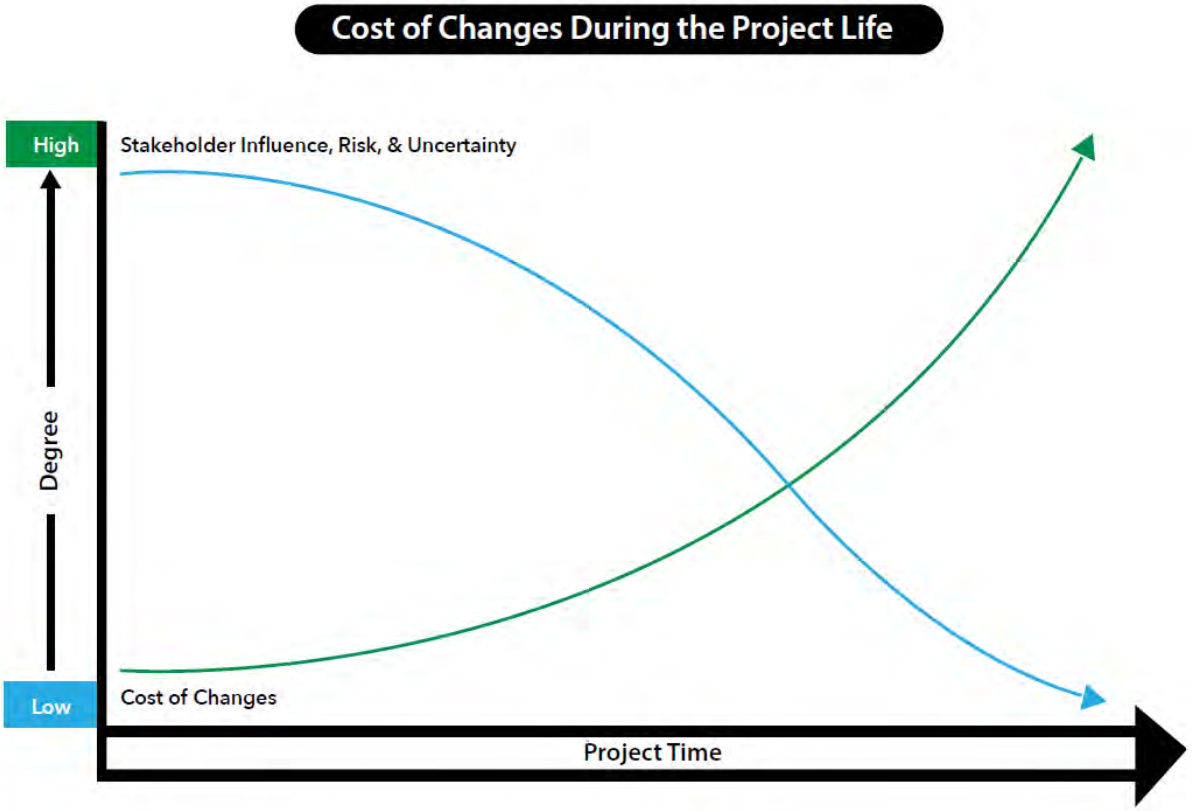


Image Source: PMBC Presentation On Your Mark! Get Set! Scope! Jeff Jasper.

Inadequate scoping often results in significant cost increases, completion delays, and the constructed project performing poorly or being of substandard quality due to development constraints imposed by inaccurate estimates. Dedicating resources to robust scoping work is a proactive approach to project development and helps avoid unexpected problems that can jeopardize project completion. For more information on project scoping see KTC's report *Best Practices for Highway Project Scoping*.

Red Flag: If a project requires further definition or a clearer scope, work with the Chief District Engineer (CDE) and Central Office subject matter experts (SMEs) to understand the project purpose and identify knowledge gaps. Consulting with the project sponsor may also help to clarify the project scope.

2.0 KYTC Transportation Project Scoping

2.1 Capital Improvement Projects

A project usually starts with a problem or roadway need identified through the Continuous Highway Analysis Framework (CHAF) with a high-level scope and a compiled rating through SHIFT

(see the HKP article *Project Initiation*). Most legislatively added projects receive *Enacted Highway Plan* funding without going through the CHAF/SHIFT selection process.

The District Office (DO), often in collaboration with Area Development District (ADDs) and Metropolitan Planning Organizations (MPOs), typically provide a scope and cost estimate for these projects. If the projects are programmed into the *Highway Plan*, they are further scoped through the planning and preliminary design phase. See PL-702 and HD-202.6.3 for more information. The *Project Time Management* article includes flowchart examples of project scoping activities.

During the scoping process, it is important to right-size the potential project solutions, keeping in mind the context and the needs of the statewide transportation system. For more information see the PMGB article *Flexibility in Design* (coming soon).

2.2 Safety Projects

A range of project types are funded through the Highway Safety Improvement Program (HSIP). Projects are categorized according to how much scoping work is needed (i.e., number of hours) and the level of coordination among team members (Table 1).

Table 1 Relationship Between Scoping Effort and Time Commitment

Level of Scoping Effort	Time Commitment
Low	1 – 2 months
Medium	3 – 6 months
Medium-High	6 – 12 months

In general, *administrative scoping* (project evaluation, coordination, and refinement) increases with project difficulty. Some projects that need a medium – high level of scoping also involve *engineering scoping*, which may include investigating potential treatments to determine their impacts, benefits, costs, and other factors. When scoping requires more effort, PMs may need to conduct field visits or review conditions via PhotoLog. PMs should also review the crash data and other information described in the article *Project Initiation*.

Projects that Require a Low Level of Scoping (1-2 months)

The Central Office Traffic Safety Branch typically handles projects that entail the least amount of scoping. The Division of Maintenance provides matching funds. Project types in this category include:

- Systemic Intersection Improvements – This program uses *Highway Safety Manual* (HSM) methods to identify correlations between intersection characteristics and severe crashes. Low-cost improvements are identified and primarily include sign and signal changes.
- High Friction Surface Treatments – HSM methods are used to identify locations that can benefit from high friction surface treatments due to frequent crashes in wet conditions. These treatments apply high-quality aggregate to the pavement using a polymer binder.
- New Guardrail (FE06) Matching Funds – This program provides matching funds for the New Guardrail Program (FE06). The Maintenance Rating Program (MRP) identifies guardrail improvement locations based on severity of conditions.
- Cable Barrier – Delivered by the Central Office Division of Highway Design, this program evaluates interstates segments that do not have longitudinal barriers. Project locations are prioritized using a data-driven approach.

Figure 1 summarizes the process for scoping projects that require a low level of effort.

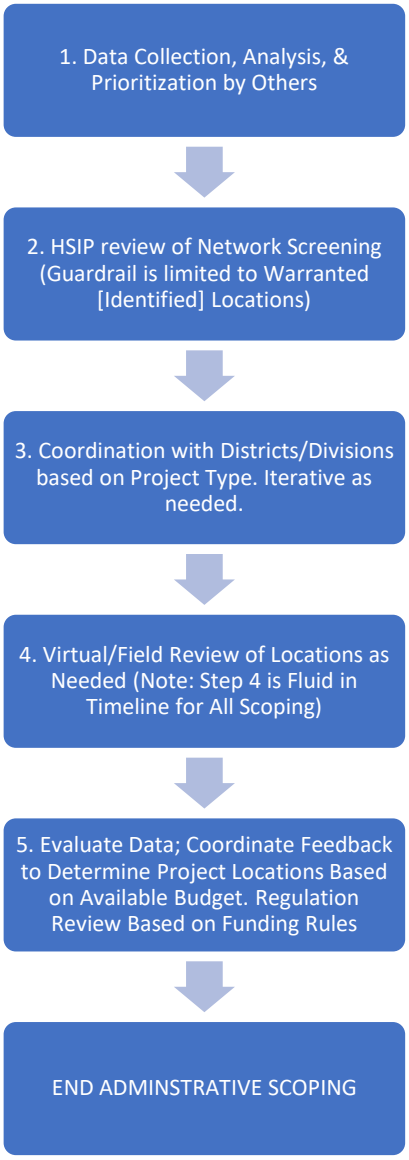


Figure 1: Process Map for Projects with a Low Level of Scoping

Projects That Require a Medium Level of Scoping (3-6 months):

Intersection Emphasis projects require a medium level of scoping and rely on DO knowledge of the local system. Often, the Divisions of Traffic Operations, Highway Design, and Planning participate at this level of scoping. HSIP's biggest focus is Intersections and Roadway Departure Corridors, which account for more than 80% of the annual budget.

Highway Safety Manual (HSM) methods are used to evaluate the safety performance of intersections in each District. Generally, 5 – 10 intersections are selected in each District for further evaluation. This process includes field reviews, reviewing existing conditions, crash analysis, and identifying potential improvements.

Figure 2 summarizes the process for scoping projects that require a medium level of effort.

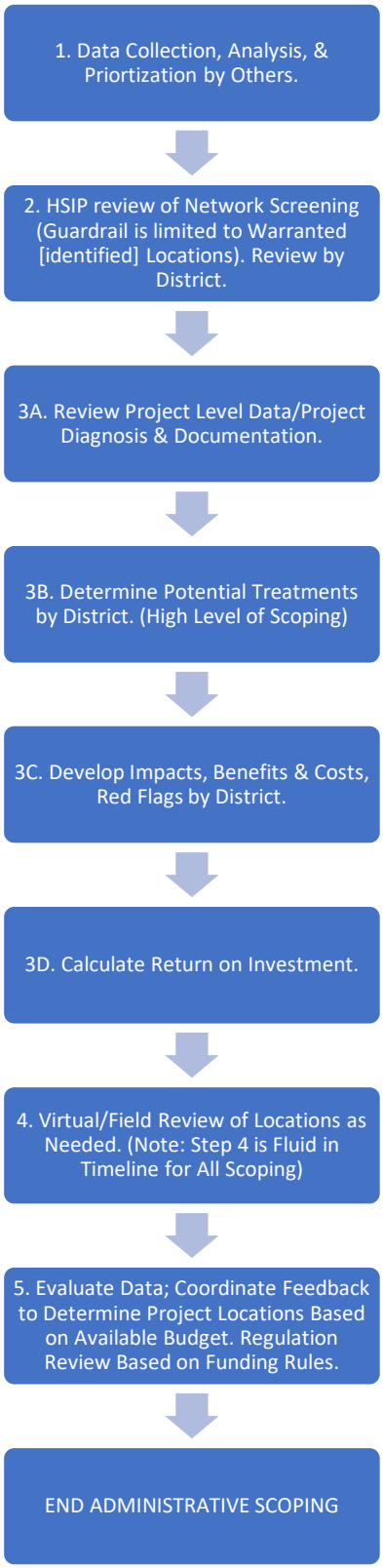


Figure 2: Process Map for Projects with a Medium Level of Scoping

Source: Jasper, Jeff; Wright, Samantha; Wilcoxson, Jon; Baskette, Robin; and Van Dyke, Christopher, "Best Practices for Highway Project Scoping" (2022). *Kentucky Transportation Center Research Report*. 1761.

Projects That Require a Medium – High Level of Scoping (6-12 months):

Projects that need a medium – high level of scoping are considered under the Roadway Departure Emphasis Program. Roadway Departure Emphasis improvements are studied within each KYTC District, including priorities and preliminary costs. Emphasis area studies include crash data review, GIS analysis, and virtual review (i.e., PhotoLog, StreetView) to identify locations where improvement projects have the greatest potential to reduce crashes.

The Roadway Departure Emphasis studies generally take 6-12 months, although planned modifications to the process should reduce the timeframe to 6-8 months. The studies will be repeated biannually. HSIP project types included in the studies include:

- Roadway Departure — This program focuses on rural, two-lane, roads with speeds over 50 mph. HSM methods are used to identify and prioritize locations for safety improvements (e.g., shoulders, rumble strips, slope, superelevation, culverts, ditching, signage, delineation).
- Shoulder Widening — Potential projects are identified using the Highway Information System (HIS), along with resurfacing priorities or the Roadway Departure Emphasis project list. Improvements include establishing or widening shoulders and evaluating projects for centerline and edgeline rumble strips.
- Horizontal Alignment Signing — This program identifies curves that would benefit from enhanced horizontal alignment signage, including fluorescent yellow sheeting. Project locations may be submitted by District staff for recently resurfaced corridors or for local routes with complete engineering studies.
- National Highway System End Treatments — Replacement of outdated guardrail (turn-down style) on National Highway System (NHS) routes is included in this initiative, but new barrier installations are not permitted. Districts research and document project locations.

Figure 3 summarizes the process for scoping projects that require a medium – high level of effort.

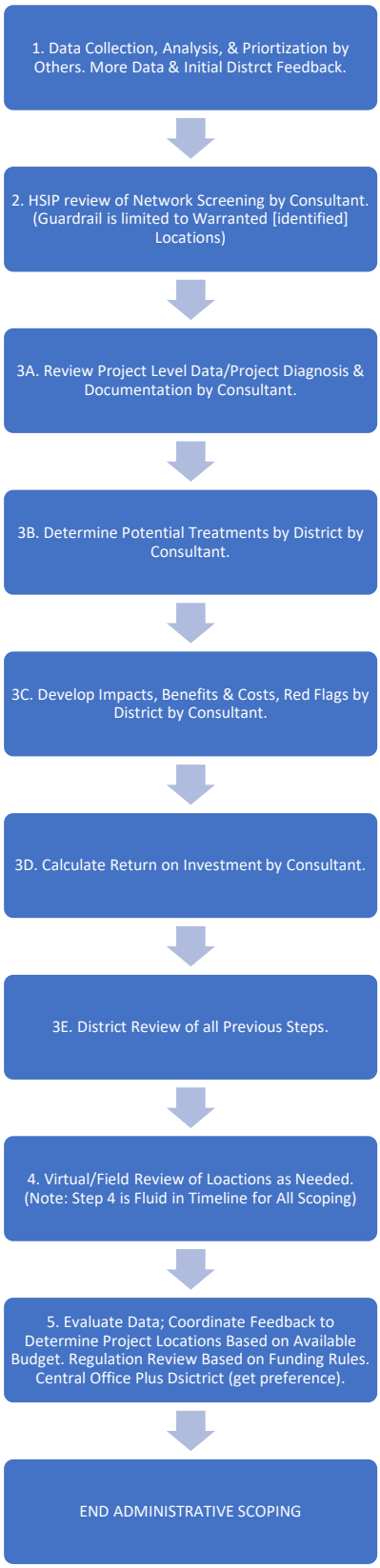


Figure 3: Process Map for Projects with a Medium – High Level of Scoping

Source: Jasper, Jeff; Wright, Samantha; Wilcoxson, Jon; Baskette, Robin; and Van Dyke, Christopher, "Best Practices for Highway Project Scoping" (2022). *Kentucky Transportation Center Research Report*. 1761.

2.3 Asset Management Projects

Scoping for asset management projects is generally constrained by the funding mechanism utilized. Projects that can be completed within a given program's constraints receive priority. Those that cannot be completed with program constraints are analyzed as part of a separate prioritization process. This lets KYTC provide a streamlined process for projects that can be addressed with a reduced scope.

Pavement preservation projects funded through the FD05 or CB06 programs are typically limited to a single surface layer no more than 1.5" thick, with some allowances for minor base failure repairs and leveling material to address rutting or other cross-section deficiencies. Additional items included in pavement preservation projects are limited to those required to reestablish roadway functionality or to comply with federal-state agreements (e.g., striping, signal detection loops, pavement markings, ADA-compliant sidewalk ramps).

Scope constraints for bridge projects funded through the FE02 bridge maintenance budget are less strict than those applied to the FD05 and CB06 pavement programs. No definitive rule is in place that limits the type of work that can be performed with FE02 funding. But projects funded with FE02 are generally limited to maintenance and minor rehabilitation (e.g., deck rehabilitation, scour mitigation, painting, and low-cost preventive maintenance work). Bridges that require more significant rehabilitation or replacement are programmed through the *Highway Plan* process and prioritized and scoped through the bridge program.

KYTC's asset management programs focus on maintaining and improving the condition of existing highway assets. To address the greatest number of assets with available funding, KYTC limits the breadth of individual project scopes. This strategy lets KYTC award a much larger number of asset management projects each year than would otherwise be possible, thereby providing greater value to the overall highway network.

Asset management projects utilizing federal funds require an approved National Environmental Policy Act (NEPA) document. In most cases, impacts are minimal and apply to Categorical Exclusion (CEs). For more information on the level and scope of CE documentation, consult with the District Environmental Coordinator and see KYTC's *Categorical Exclusion Guidance Manual*.

2.4 Maintenance Projects

While the capital improvement program adopts a more forward-looking view that emphasizes projects which improve mobility and economic development, the maintenance function focuses on the entire highway network's immediate operational needs. The do-nothing option is rarely available if mobility has been compromised due to roadway damage or deterioration. When combined with the budgetary limitations of maintenance programs, this emphasis on network-

level response encourages maintenance practitioners to constrain individual project scopes to maximize the impact of work performed.

KYTC maintenance projects primarily address immediate operational issues and make minor repairs to highway assets. To maintain mobility across the roadway network, maintenance staff must address emergency issues as soon as possible. To accomplish this, KYTC uses a tiered approach that encourages Districts to use the least complex scope which meets a project's needs.

KYTC uses three mechanisms to address maintenance needs — in-house staff, master agreements, and defined-bid contracting. This framework constrains projects by simplifying the implementation of activities that have narrower scopes. While District maintenance staff can be deployed quickly to address urgent needs when they arise, the range of projects that in-house staff can perform is limited by the availability of requisite skilled personnel and equipment. At the other end of the spectrum, defined-bid contracts can be used for an almost unlimited range of projects. But they require more time, effort, and funding to carry out. Master agreements provide a middle ground, with a predefined set of activities at a known cost that are deployed relatively quickly but with some limits on speed and scope.

When faced with an operational challenge, District maintenance engineers are authorized to initiate a response using in-house staff or a master agreement if an applicable agreement exists within the geographic area of concern. The primary limitation in these cases is the availability of enough maintenance funding at the District level. If a District cannot perform the required work with its staff or a master agreement contractor, a defined-bid contract may be pursued. These cases require the involvement of Central Office staff to help develop a project proposal and identify necessary funding. In this way, project scopes are expanded only when a less complex method is insufficient for the task at hand.

3.0 Defining the Project

Because potential projects have a variety of origins, not all projects have a thoroughly developed initial project definition when they are authorized. Early in the project, the PM must attain a clear definition of the project's needs, purpose, goals, and scope.

A project definition should be established to clearly communicate the framework of the project's scope. The definition should specify what the project *will* deliver and what it *will not* deliver. An unclear or inaccurate scope may require significant revisions once the project has been programmed, which can delay the project or cause KYTC to overpromise what it can deliver.

HD-202.6.3 lists items to help define the project. For many projects, the *Enacted Highway Plan* also provides the initial scope. The *Enacted Highway Plan* entries outline a project's expectations, funding, schedule, and budget.

Note: Scope of work (SOW) describes the required processes and resources to complete a work. It is how a work group (usually a consultant team) plans to achieve project objectives. SOW outlines the tasks, expected deliverables, milestone schedule, work and work units, production hours, and is described in more detail in Section 2 of Managing Consultant Contracts. The SOW impacts project scoping, but they are different concepts.

Red Flag: When defining the project, clearly document the purpose and the limitations of the project and share this information with the internal and external project stakeholders. Scope creep is usually a result of not properly defining, documenting, or controlling the scope.

4.0 Project Coordination

Once a project is authorized (see Project Initiation), the PM and other project team members (see Organizing a Team – coming soon) should review issues confronting the project. This early coordination focuses on the project scope. Depending on how complex the issues are and the availability of team members, coordination can be done with a scheduled meeting, phone call, or email.

The PM should also check with other areas in the Department (e.g., Maintenance, HSIP) to determine if other types of identified projects at or near the location could be combined with their project. For example, a pavement preservation project and a safety improvement project could be combined into one project for the letting.

If FHWA selected the project to have federal oversight, the PM should coordinate with FHWA to accommodate their involvement activities. KYTC's Division of Highway Design keeps a current list of projects with FHWA oversight.

4.1 Scope Verification Meeting

On federal projects with an anticipated CE Level 3 or above, PMs should organize a scope verification meeting in concert with Division of Environmental Analysis Environmental Project Mangers (EPMs) and Division of Highway Design's Location Engineers. This meeting should be held before the pre-design conference to discuss the scope and potential environmental impacts. Identifying the anticipated type of environmental document informs the PM of the level of effort expected for the environmental process and facilitates contract negotiation. Participants should include the PM, FHWA representative, and other team members. HD-202.6.7 lists items that may be discussed.

If the project will modify interstate access, this meeting also presents an opportunity to discuss with FHWA the need for an Interchange Justification Study (IJS) or an Interchange Modification Report (IMR) and the level of traffic engineering analysis required (see HD 203.3.10 for more information).

4.2 Value Engineering

A VE study is an independent, systematic, creative analysis to analyze a project's design or reduce its cost while still meeting the purpose and need of the project. If the total cost of a federally funded roadway project exceeds $50 million or the total cost of a bridge project exceeds $40 million, a Value Engineering (VE) study is required. A project manager may request a VE study on projects not meeting the cost thresholds to optimize designs and project costs. VE study recommendations are most beneficial shortly after the preferred alternative has been identified. Projects with narrower scopes may benefit from VE studies during final design. VE studies are administered through the Quality Assurance Branch (QAB) in the Division of Highway Design. The PM should coordinate with the QAB to schedule and implement the study.

Red Flag: If smaller projects are breakouts of a larger project with one environmental document, and the larger project meets the cost threshold for the VE study, consult the QAB early in the project to determine the need for a VE study.

Red Flag: Consider coordinating a VE study for projects with total initial cost estimates near but not exceeding the VE cost thresholds. As the project develops and cost estimates are updated the total cost may increase and exceed the threshold requiring VE studies during later phases of the project when study recommendations are more difficult to implement. For more information on cost escalation, see Project Cost Estimation and Management.

5.0 Purpose and Need Development

A project's Purpose and Need (P&N) Statement establishes the foundation for successful decision-making and the basis for evaluating and comparing reasonable alternatives. The P&N Statement is used to establish the project scope.

5.1 How is P&N Developed?

To develop the P&N Statement, project data (see *Project Initiation*) are analyzed to determine project needs. The purpose of the project should be to efficiently address the need(s). For more information on the development of the P&N Statement, see HD-202.6.2, PL-702.2, and the Commissioner of Highways memorandum on *Purpose and Need Statement Guidance and Instructions*. Other resources include:

- AASHTO's *A Policy on Geometric Design of Highways and Streets*, 7th Edition, 2018. Section 1.2 Project Purpose and Need.
- KYTC's Division of Environmental Analysis Project Management Website
- AASHTO's Practitioner's Handbook-Defining the Purpose and Need and Determining the Range of Alternatives for Transportation Projects
- FHWA's Environmental Review Toolkit, The Importance of Purpose and Need in Environmental Documents

- FHWA Environmental Review Toolkit, NEPA Transportation Decisionmaking

Project elements beyond identified needs may be included as project goals and objectives, which may address issues such as quality of life, environmental goals (e.g., avoidance and minimization of impacts and enhancement opportunities), the project's schedule, cost, quality, cultural resources, habitat, or public input.

5.2 Who Develops the P&N Statement and When?

The project type usually dictates who prepares the P&N Statement and when it is developed. For capital projects, initial P&N Statement development usually occurs during planning.

As potential projects are identified, KYTC planners should identify apparent needs in the CHAF database as a starting point for the draft P&N Statement. Planners generate a draft P&N Statement alongside the initial project concept and document it in planning studies and Data Needs Analysis studies (DNAs).

If a draft P&N Statement is not developed during the planning of a capital project, the project team prepares one during preliminary design. The P&N Statement is refined throughout project development but is considered final after the environmental document is approved and preliminary design is complete. If there are changes to a project and its P&N statement during the final design phase, the environmental document will need to be re-evaluated. The purpose of a reevaluation is to determine whether a completed environmental document or decision requires supplemental analysis.

HSIP and asset management project needs are identified through network screening. Screening is based on a specific performance measure. Most HSIP-funded projects attempt to reduce serious injury and fatal collisions. Road segments with poor pavement ratings are identified annually and pavement preservation and/or rehabilitation projects are developed based on identified needs. Structures are also inspected regularly and assigned structural ratings that are considered when identifying potential structural rehabilitations or replacements.

Most operational and maintenance activities and projects do not require individual purpose and need statements if identified through a program that evaluates the system infrastructure, quantifies the problem, and prioritizes the needs. Individual purpose and need statements may be needed on these types of projects if they involve U.S. Army Corps of Engineers permit applications, historic bridge rehabilitation, and interstate rehab and resurfacing. For more details see the Commissioner of Highways memorandum regarding Purpose and Need Guidance for Maintenance and Operations.

5.3 Why is the P&N Statement Developed?

The purpose directly informs the project scope (and range of alternatives). This, in turn, directly influences the level of effort, cost, and anticipated schedule. All projects that include NEPA documentation must have a P&N Statement.

A clear, well-justified P&N Statement explains funding expenditures to the public and decision makers. For capital improvement projects, the Design Executive Summary (DES) must contain a P&N Statement. If the P&N Statement changes after an environmental document is approved, the environmental document may need to be updated. The PM should coordinate this with the District Environmental Coordinator.

Red Flag: The P&N Statement should **not** articulate a specific solution to address project needs. It should diagnose the concerns and state what a project should accomplish so that a range of alternatives can be considered to address the need(s).

Image Source: PMBC Presentations

6.0 Performance Measures

Performance measures, or measures of effectiveness (MOEs), are quantitative estimates on the performance of a transportation facility, service, program, system, scenario or project relative to policies, goals, and objectives. For more information on the use of performance measures, see HD-202.6.1.

One way to assess an improvement's effect is to perform a benefit – cost analysis of the improvement that accounts for initial and life-cycle costs.

When establishing a project scope, PMs must gather data on quantitative performance measures (e.g., safety, traffic, structural condition) to assess a facility's current performance and identify issues affecting the project. To understand the benefits an improvement will confer, PMs should

develop forecasts of future facility performance with improvements and without improvements. To analyze current and future performance, PMs need to coordinate with the project team's SMEs and consider this effort when completing the tasks for the scope of work.

Table 2 provides examples of performance measures that could be identified in the scoping process.

Table 2 Performance Measures Identified During Scoping

	Potential Project Performance Measures
Mobility	• Volume-to-Capacity Ratio • Vehicle-Miles of Travel • Throughput • Duration of Congestion • Queue Length • Travel Time • Average Delay • Total Delay (Vehicle Hours of Delay)
Travel Time Reliability	• Travel Time Index Truck Travel Time Reliability (TTTR) Index
Level of Service (LOS)	• Motorized Vehicle Level of Service • Bicycle Level of Service • Pedestrian Level of Service
Accessibility	• Accessibility for Motorized Vehicles, Pedestrians, and Bicyclists
Safety	• Excess Expected Crashes (EEC) • Level of Service of Safety (LOSS) • Number of Conflict Points • Expected or Predicted Crash Frequency (by severity) • Crash Rate • Access Spacing
Structural	• National Bridge Inventory (NBI) Condition Ratings
Pavement	• Pavement Distress Index, • International Roughness Index (IRI), • Other factors described in *Pavement Management in Kentucky*
Infrastructure	• Network Connectivity and System Completeness

Red Flag: Non-compliance with geometric design criteria is not, in itself, a performance issue for an existing roadway. A non-compliant geometric design only needs to be addressed in the P&N Statement if the performance assessment indicates poor performance could be addressed with a specific geometric design improvement. For example, if the lane width is narrower than the recommended design criteria, but the roadway isn't experiencing high crash rates or issues with traffic operations, addressing the roadway width would be unnecessary.

7.0 Additional Resources

During the initial phase of each project, PMs need to determine what additional resources are needed to contribute to the development of the project scope and to complete the project.

7.1 Additional Mapping

PMs must submit requests for additional mapping to the Division of Highway Design's Survey Coordinator. Typically, the Survey Coordinator needs to know the project footprint and the scale of mapping needed. The PM and Survey Coordinator will evaluate the area to determine the type and extent of coverage needed. Making sure enough area is covered significantly reduces the likelihood of needing follow-up mapping. Requests for aerial surveys are submitted before the data collection season, which runs from December through March. Factors such as season, angle of the sun, vegetation, and other issues are critical considerations when scheduling aerial mapping.

Contact the Survey Coordinator if questions arise. HD-308 provides further details on aerial mapping. The District may also have the resources to collect additional mapping.

7.2 Environmental Overview

As soon as possible following project authorization, the PM and District Environmental Coordinator should examine the project area for environmental impacts. These include but are not limited to:

- Air quality
- Aesthetics
- Cemeteries
- Cultural resources (e.g. archeology, historical)
- Endangered species
- Federal lands
- Floodplains
- Groundwater resources
- Hazardous materials and underground storage tanks (Hazmat/UST)
- Noise
- Section 4(f) resources
- Section 6(f) resources
- Socioeconomic concerns and environmental justice
- Streams
- Wetlands

If environmental concerns are detected or perceived, the District Environmental Coordinator should submit a request for investigation to the Director of the Division of Environmental Analysis. The Division of Environmental Analysis provides the results of its investigation and recommendations for consideration. The project team is then responsible for evaluating this information and incorporating recommendations into the project.

HD-400, HD-500, and *NEPA Process for Project Manager* (coming soon) provide additional information on environmental considerations and permits and certifications. Additional information may also be found in the KYTC's Environmental Analysis Guidance Manual.

8.0 Public Involvement

Public involvement is an essential component of project development. Community voices must be factored into the development of the project's scope. The PM and the District Public Information Officer (PIO) should discuss how public involvement will be conducted on the project as early as possible during project development. If KYTC needs to hold public meetings or hearings, the number and timeframe of these meetings need to be established. HD-600 contains additional information on public involvement.

KYTC's Public Involvement Plan (Section 5.1 Project Development) includes information that may be helpful when developing the scope for public involvement activities during project development. It addresses public involvement for planning studies, design, right-of-way acquisition, and utility relocation. Section 5.2 includes considerations related to operation and maintenance activities.

Other deliverables that may need to be considered are a project Public Involvement Plan (PIP) and documentation of public hearings or meetings (Public Involvement Notebook). For more information on PIPs and documentation see HD-600.

9.0 Associated Articles

Best Practices for Highway Project Scoping

Project Manager's Guidebook – Knowledge Book

Project Initiation

Managing Consultant Contracts

Project Time Management

NEPA Process for Project Managers (coming soon)

10.0 Reference Documentation

KYTC's *Highway Design Manual*

KYTC's *Planning Guidance Manual*

KYTC's *Environmental Analysis Guidance Manual*

KYTC's *Categorical Exclusion Guidance Manual*

KYTC's DEA Project Management website

AASHTO (2018) A Policy on Geometric Design of Highways and Streets, 7th Edition. The American Association of State Highway and Transportation Officials, AASHTO Green Book, Washington DC.

AASHTO's Practitioner's Handbook-Defining the Purpose and Need and Determining the Range of Alternatives for Transportation Projects

FHWA's Environmental Review Toolkit, The Importance of Purpose and Need in Environmental Documents

FHWA Environmental Review Toolkit, NEPA Transportation Decisionmaking

Project Schedule and Development of Milestones

Image Source: KTC Stock Images Photo Library

Project Schedule and Development of Milestones	Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1.0 Is My Project on Schedule	x	x	x	x
2.0 Project Schedule	x	x	x	x
3.0 Project Milestones	x			
3.1 Common Milestones Applicable to Most Capital Projects	x			
3.2 Other Project Types		x	x	x
4.0 Time Management for Highway Project Development	x			
5.0 Track and Manage Work Progress	x			
6.0 Sources of Project Delays	x			
x = Information from the topic may be applicable for the project classification.				

1.0 Introduction

The application of sound time management principles helps preconstruction Project Managers (PMs) and Project Development Teams (PDTs) develop accurate project timelines and deliver projects to the letting on time and on budget. Activities that PMs are responsible for include sequencing project development activities, which entails collecting project requirements and defining a scope, and estimating activity resources and durations to establish a realistic schedule and keep activity sequences flowing smoothly and without interruption. Failing to meet a project's schedule lowers KYTC's success rate in delivering the *Enacted Highway Plan* and hampers the agency's ability to fulfill its mission.

2.0 Project Schedule

A successful preconstruction project meets the defined scope with quality solutions and deliverables on the schedule given and within the budget specified in the *Enacted Highway Plan*. At the start of a project, once the scope is developed, the PM develops a schedule that includes anticipated milestones to illustrate the sequencing and allocation of project tasks.

When developing a schedule, the PM needs to account for project type and complexity. Items found on a schedule include planned start and finish dates, assignments, and the resources needed to complete the plan development process. A good starting point for developing a schedule is to review the fiscal years a project is programmed for in the *Enacted Highway Plan*.

The PM also needs to develop the project development critical path. The critical path is the longest sequence of activities in the project schedule. These activities must be completed within the estimated time for the project to be finished on time. If any task on the critical path is late, the entire project will be delayed. Identifying the critical path lets the PM prioritize all essential steps, milestones, and risks on the schedule as well as pinpoint interconnections between all project activities.

When estimating the duration of each task, the PM should draw on:

- Experience and knowledge of the PM and the subject-matter experts (SMEs). PMs should discuss tasks with SMEs to get an idea of how long they might take. Good communication is essential!
- Knowledge of the project corridor and potential issues.
- Historical data
- For large or complex activities, it is beneficial to break down them into smaller tasks.

3.0 Project Milestones

A project milestone denotes the completion of a major phase of work. Milestones must be completed for the project to progress into the next phase of project development. During project initiation, the PM should identify anticipated milestones.

Because all projects are unique, the PM must assess the project scope, budget, and fiscal years programmed in the *Enacted Highway Plan* to develop a set of milestones and a schedule. Refer to the Interactive Project Process Maps in the HKP article *Project Time Management* for more detailed information.

3.1 Common Milestones Applicable to Most Capital Improvement Projects:

PM uses milestones to measure progress on a project. Milestones that are applicable to most Capital Improvement Projects include:

- Design Funding Authorization (usually Phase I Design only/then a Contract Modification for Phase II Design after Preliminary Line and Grade [PL&G])
- Scope Verification Meeting (when needed to determine proposed environmental document type)
- Notice to Proceed (for consultant projects)
- PL&G/Identify Selected Alternative
- Design Executive Summary Approval
- Environmental Approval
- Design Funding Authorization for Phase II Design
- Contract Modification Approval for Phase II Design (for consultant projects)
- Final Joint Inspection
- Right-of-Way (ROW) Plan Submittal
    - -ROW Funding Authorization
    - -ROW Official Order, Notice-to-Proceed and Notice of Acquisition
- Utility Funding Authorization
    - -Engineering Agreements and Authorizations
    - -Utility Relocation Agreements and Authorizations
- Environmental Clearances
    - -Finalize Archeology, Permits Issued, HAZMAT (if applicable)
- ROW Certification
- Utility and Rail Certification Note
- Final Contract Plans and Documentation Submitted for Letting.
- Letting

Additional milestones may be added based on project complexity. Some milestones listed above may not apply to smaller projects, such as a bridge replacement, where you may want to combine the preliminary and final inspections into one meeting. See the HKP Article *Time Management* and various chapters within KYTC's *Highway Design Manual* for more details. Section 8 also links to agency guidebooks and HKP articles that provide more information.

Red Flag: Where a PM locates milestones on a timeline will vary based on project type. Seek guidance from SMEs and the PDT when developing project milestones and a schedule.

Roadway Plans should be at an approximate percentage complete stage when reaching some of the more common milestones in order to make an informed decision concerning the goals and objectives set for

each milestone. Below is a guide to what should be included in the roadway plans, along with supporting documents, at various percentage complete stages.

Milestone	Approximate Plans % Complete
Planning:	0-15% Includes initial project identification, screening, prioritization, planning studies, draft P&N statement, and planning-level estimates for P, D, R, U, and C.
Scoping/PL&G/Identify Recommended Alternative:	30% Develop the project alternatives in order to define scope and estimate and establish a baseline cost. The PM or consultant, if applicable, should submit enough information for the PDT to make an informed decision on a recommended alternative. The selected alternative information will be updated in PDP (Program Delivery Platform) and added to the STIP (Statewide Transportation Improvement Plan). The baseline cost approved here will be used as the project budget. Preliminary alternatives presented should address the project purpose and need. At a minimum alternative's should include: • Traffic operations and safety data. • Typical Sections for each alternative. • Horizontal and vertical alignments. • Critical cross sections. • Preliminary ROW, including existing ROW and property owners. • Location of existing utilities and possible impacts. • Potential environmental issues for each alternative. • If a public meeting has been conducted, a discussion of public comments. • A discussion of potential traffic control schemes for each alternative along with possible issues or concerns. • Preliminary R, U, and C estimates for each alternative.

Design Executive Summary Submittal/Approval:	30-40% Once the PL&G has been held and changes or additional studies from the meeting have been completed, the PM should submit the DES for review and approval. Estimates created throughout final design should be used to manage project budgets against the baseline established when the final alternative was selected.
Environmental Studies and Approvals:	15-40% The environmental process begins prior to the PL&G Inspection with an overview of the area impacted and identification of environmental constraints. These should be discussed for each alternative presented at the PL&G. When alternatives are evaluated and an alternative is recommended, the District Environmental Coordinator or consultant, if applicable, submits a draft environmental document for review and approval. This document records the project decision-making process. Scope of project impacts dictates which of the following environmental documents is prepared, pursuant to NEPA: • Categorical Exclusion (CE) • Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) • Draft and Final Environmental Impact Statement (DEIS and FEIS) and Record of Decision (ROD)
Request Geotechnical Investigation	This should occur as early as possible in the project development stage. If a project corridor has known geological features, such as Karst areas, the PM needs to get Geotech involved

	early in the process. Typically, the Geotechnical Branch needs plan/profile sheets in order to develop their boring layout.
Final Joint Inspection/Drainage Inspection:	80% Plans should contain more detailed information on the recommended alignment, including: • Typical sections that reflect the template and other approved decisions from the DES. • Changes and/or additions from the PL&G Inspection. • General notes. • Summary of quantities sheets. • Detailed plan and profile sheets for the roadways involved, along with detailed cross sections and pipe sections. • Proposed ROW and easements, along with relocations. • ROW summary sheets and strip maps. • Erosion control plans. • Detailed traffic control and maintenance of traffic plans. • Permanent signing and pavement marking plans. • Detailed plans for drainage ditches, pipes, and structures. • Further discussion of utility impacts and whether any utility plans will be included with the final roadway plans. • More detailed estimates for R, U, and C. • Advanced Situation Folders should be submitted by the drainage engineer for any structural designs once changes from the inspection have been made. • The PM or consultant working through the PM should submit critical cross sections to Geotechnical Branch to obtain backslope recommendations.
ROW Plan Submittal:	80-85% Once comments and changes from the Final Joint Inspection have been addressed, ROW Plans are usually submitted. These plans should include:

	• Layout sheet • Typical sections • Plan sheets with existing and proposed ROW and easements. • Profile sheets • ROW strip maps and summary sheets • Coordinate Control Sheet (when available) • A set of cross sections NOTE: Under special circumstances and with the approval from Director of the Division of Highway Design, ROW Plans can be submitted prior to the Final Inspection to accelerate the process. If this is considered, ensure plans are at a stage where the impacts are mostly worked out, in particular side slopes, utilities, drainage ditches, and pipes running along a parcel.
Final Contract Plans and Documentation Submitted for Letting:	90-100% The PM submits detailed contract plans and estimates that include roadway, structures, traffic, and/or utility relocation plans. Along with this the project CAP, Project Development Checklist (PDC)(for federally funded projects only) and a Google Earth (.kmz or .kml) file should also be submitted. Submitting the final plans on time is essential to meeting the established project letting date. The PM advises the Plan Processing Branch of outstanding information not included in the submittal and what will need to be inserted into the plans when they are available. Appropriate permits and/or certifications are required prior to construction.

3.2 Other Project Types:

In addition to Capital Improvement Projects, KYTC undertakes:

- Safety Projects
- Asset Management Projects

- Maintenance Projects

These projects require different forms of project management oversight. However, because their schedules emphasize streamlined delivery, the milestones listed in Section 3.1 do not apply or would apply on an abbreviated basis. For instance, on Maintenance Projects schedules and milestones are measured in days (rather than months or years) because they must be completed quickly. For more information on the four project types, see the PMGB Article *Intro and General Overview*.

Safety Projects: These are typically Highway Safety Improvement Program (HSIP) projects. The intent is for these type projects to be designed and constructed expeditiously. They can require proposal-type work or the development of construction plans, which is usually done by District design personnel or a consultant. If plan development is necessary, HSIP staff establish the schedule and milestones. Typically, HSIP projects include the common milestones listed in Section 3.1. Figure 1 shows a typical HSIP project life cycle:

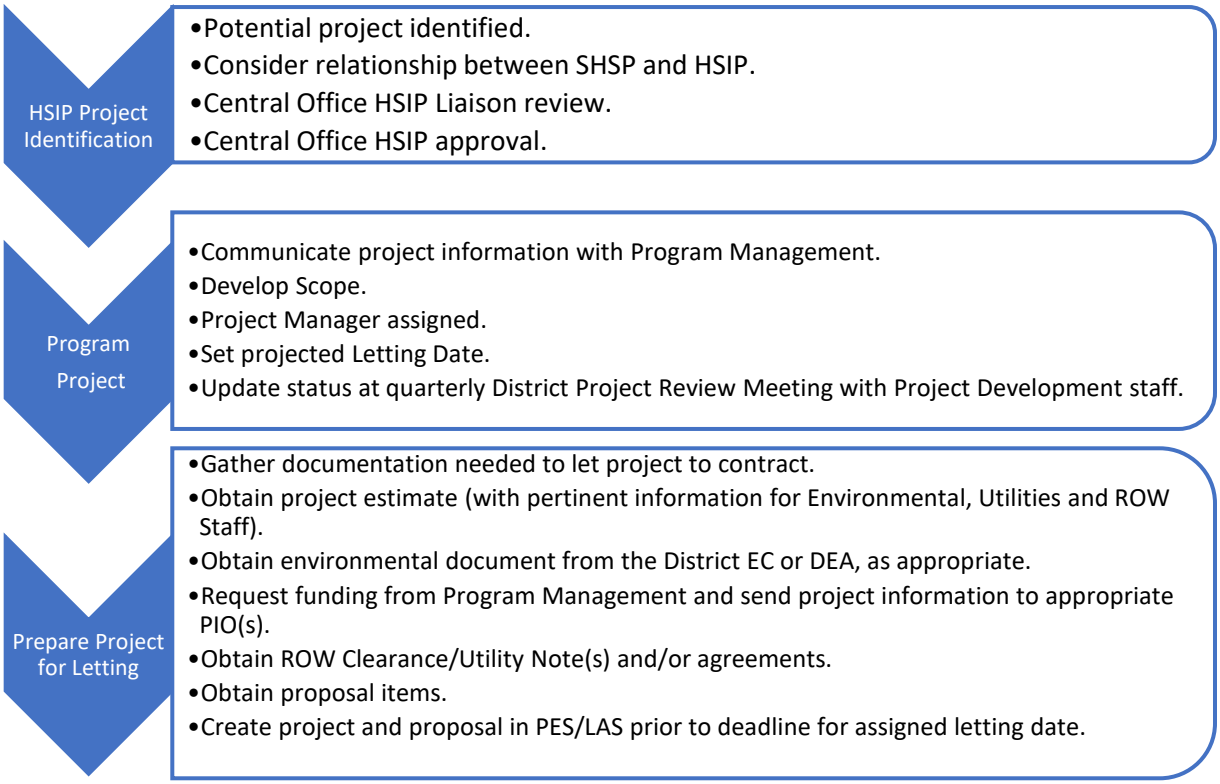


Figure 1 Typical HSIP Project Life Cycle (Recreated from the KYTC Traffic Operations Manual Section TO-301, Exhibit 2)

Asset Management Projects: KTYC has adopted a *Fix It First* philosophy that prioritizes using available funds to invest aggressively in the maintenance and preservation of pavements and bridges. Projects listed in the *Transportation Asset Management Plan* are selected based on performance monitoring and

reporting. Projects that fall under this heading include pavement preservation and bridge preventive maintenance. They are generally contained within the Cabinet's existing ROW. Figure 2 shows a flowchart for a typical Asset Management Project:

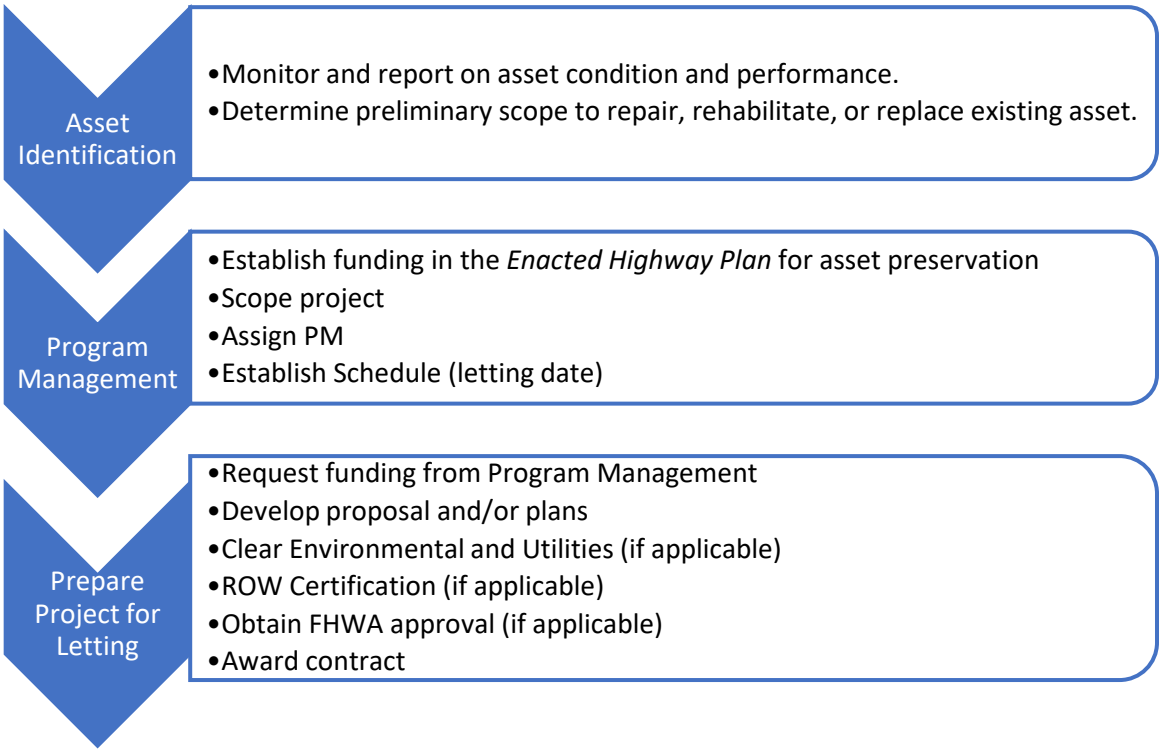


Figure 2 Typical Asset Management Project

Maintenance Projects: The Maintenance Division houses five branches:

- Permits
- Bridge Preservation
- Operations and Pavement Management
- Roadside Maintenance
- Roadway Maintenance

Maintenance Projects maintain — but generally do not improve to a significant degree — roads, streets, and bridges on the State Highway System. The executive budget allocates funds for critical maintenance activities (e.g., patching potholes, removing snow and ice, removing roadway obstructions, fixing bridge or pipe failures) and preventive maintenance (e.g., pavement resurfacing, ditching, pipe clean outs). Many maintenance tasks are urgent and must be completed quickly to keep roadways open. Thus, most project schedules last just a few days. Figure 3 is a flowchart for a typical Maintenance Project.

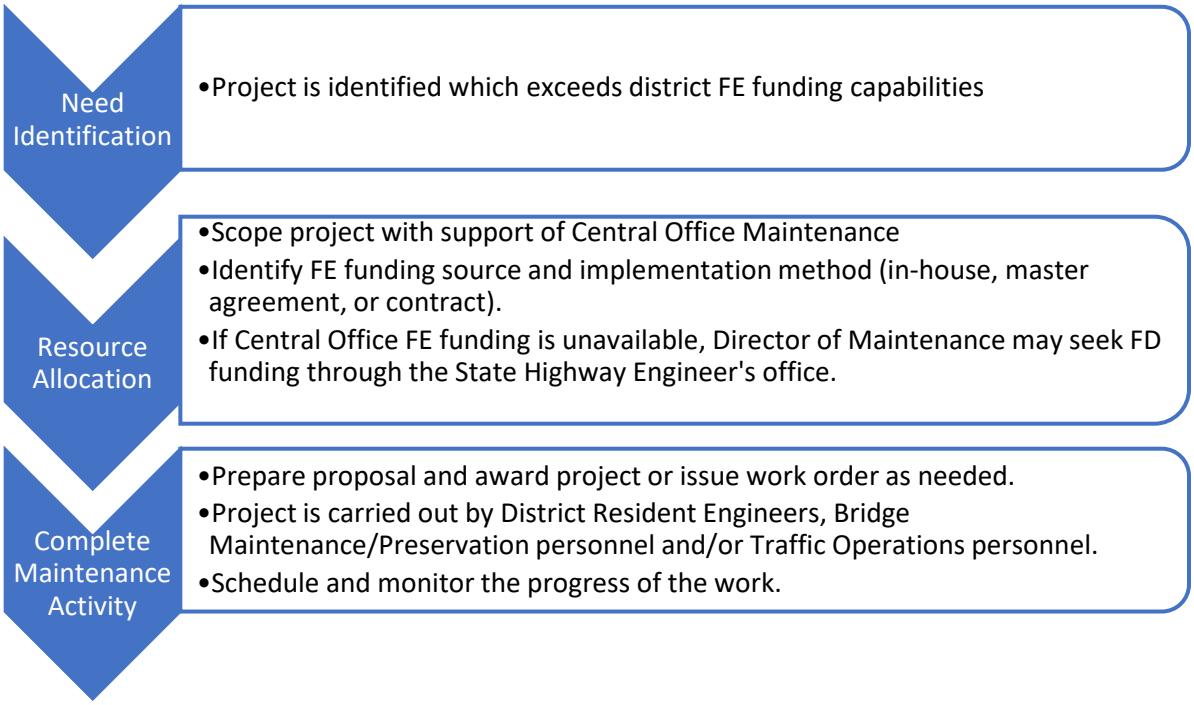


Figure 3 Typical Maintenance Project

For more information on these project types, see the PMGB article *Project Management Intro and General Overview* and relevant KYTC guidance manuals.

4.0 Time Management for Highway Project Development

PMs must use project time management tools (e.g., Gantt Charts, PDP PreCon System, Project Managers Toolbox) to schedule and track project development. To facilitate scheduling, critical path method (CPM) templates have been created for typical project contexts and common project phases. For more information see the HKP article *Project Time Management*, Section 6 of this article, the PMGB article *Tools and Technology* (coming soon), and the KYTC *Project Managers Toolbox.*

To determine a project's duration, the PM identifies the critical path. The CPM schedule is normally created using Microsoft Project. PMs must create a project schedule which (1) includes required project activities and (2) meets the legislatively prescribed schedule. If a consultant is used for design, verify hours are included for development of the CPM diagram.

Red Flag: Environmental issues may require significant time to study and address. Communicate with Division of Environmental Analysis staff early and continuously throughout project development. PMs may also need to dedicate significant time coordinating with the Divisions of Right of Way and Utilities to ensure that all tasks can be completed within the project schedule.

5.0 Track and Manage Work Progress

The PM and PDT should use the CPM schedule to track and manage work progress. The CPM schedule helps the PM allocate resources to work activities and provide updates on the schedule status and progress to the PDT and KYTC management. Monitoring and reporting work focuses the team on getting work done on the scheduled timeline. The more projects a PM has in their portfolio, the more important CPM schedules become for time management across all their projects. The PM and PDT must frequently review and discuss the project schedule. Conducting reviews and discussions is especially critical when preparing for District Quarterly Project Reviews and at each Project Milestone Meeting, where any variance from the baseline schedule should be recorded.

The PM must continuously monitor the critical path. Any changes to work-activity durations on the critical path will affect a project's finish date. The critical path informs the PM of where they do and do not have flexibility. The PM should also monitor activities located *off* the critical path to determine if potential delays would shift them onto the critical path.

If a work-activity duration begins to slip and exceed the baseline, the PM (and appropriate members of the PDT) must investigate the root causes. Possible sources of delay include overscheduled resources or complexity in an activity that was not originally detected. In some cases, original schedule estimates may have been inaccurate.

To resolve a problem, the PM and PDT must understand the actual root cause(s) of a schedule delay. Once the root cause(s) of a delay are identified, the PM and PDT brainstorm solutions (e.g., acquiring additional resources, improving coordination between team members, extending the project schedule). Major schedule modifications that change the project milestone dates must be approved by the appropriate Central Office cabinet personnel, depending upon the project type.

Project delays that result from KYTC's priorities shifting do occur. If possible, projects should be paused at a completed milestone. For example, if a project can be paused at the end of the PL&G milestone, the alternative chosen at this milestone can be carried forward once the project recommences.

On Federal-aid projects, PMs should build additional time into the schedule for FHWA reviews and approvals of activities the agency oversees.

When developing a project timeline, PMs can build in flexibility, save time, and increase the likelihood of a project remaining on schedule by:

- Adding resources to critical path activities.
- Starting activities on the critical path earlier, shortening their duration, and overlapping them where possible.
- Eliminating activities that add time but not value.
- Allowing some flexibility in the work schedules of activities not on the critical path.
- Gathering existing project data before project funds are authorized (if overhead funds allow).
- Avoiding changes in project scope during project development. It is acceptable and common to refine the scope as the process unfolds, but changing the scope will most likely cause delays.

- Combining the Preliminary and Final Inspections into one meeting on small projects (e.g., bridge replacement). Discuss this possibility with the PDT early in the process so plans can be developed accordingly.
- Considering the time and effort involved in utilities and rails coordination and utility relocations. Utility coordination and relocations can be included in the construction contract as an option to meet the established letting schedule. This places additional risk on the contractor and thus increases construction costs.

6.0 Sources of Project Delays

When developing a project schedule and establishing milestones, PMs should be mindful of activities that could result in delays.

*When consultant services are needed on a project, submit the appropriate information as soon as possible to allow time for the advertisement, selection, and negotiation process. For more information refer to **HD-205** in the Highway Design Guidance Manual.

*Design Funding Authorizations require time for approval. Since approval dictates when consultant contracts can proceed (Notice to Proceed), submit the funding request as soon as possible.

Red Flag: If the project is in a Metropolitan Planning Organization (MPO) Area and requires the Transportation Improvement Program (TIP) to be modified, this will take some time and must be done prior to funding authorization.

*Determine early in project development whether additional aerial mapping is needed. Aerial surveys can only be flown from December through March.

* The environmental process can be drawn out. Table 1 lists the amount of time required to complete different environmental documents.

Table 1 Timeline for Environmental Documents

Environmental Document	**Timeline for Completion**
Categorical Exclusion (CE) for Minor Projects	Several days up to 2 – 3 months
CE Level 1	2 – 6 months
CE Level 2	6 – 24 months
Environmental Assessment (EA)	18 – 36 months Finding of No Significant Impact (FONSI): Additional 6 – 15 months after EA
Environmental Impact Statement	Minimum 3 years (2 additional years possible)

Obtaining a US Army Corps of Engineers Nationwide Permit (NWP) requires up to 6 months, while an Individual Permit (IP) takes 12 – 18 months.

On state-funded projects, if any project activity will impact features such as streams or wetlands, endangered species habitat, or historic or culturally significant properties, PMs need to work through processes related to Section 404 of the Clean Water Act, Section 7 of the Endangered Species Act, Section 4(f) for park and recreational lands, Section 6(f) of Land and Water Conservation Funds, or Section 106 of

the National Historic Preservation Act, respectively. For more information refer to **HD-500** of the *Highway Design Guidance Manual*.

Red Flag: Some threatened and endangered species can only be identified during a short window, and this could potentially slow the environmental process if they are found in the project area.

For more information on the environmental process, refer to **HD-400** of the *Highway Design Guidance Manual*, *Environmental Analysis Guidance Manual*, *KYTC Environmental Handbook*, and the following HKP articles: *Division of Environmental Analysis*, *Hazmat/Additional Archaeology*, *Biological Assessment*, and *Environmental Approval*.

Involve the Geotechnical Branch as early as possible in the design process. Geotechnical investigations and drilling take time to prepare and initiate in the field. See the HKP article *Geotechnical Requests* for more information (coming soon).

Red Flag: Geotechnical Reports must be completed before design work on structures can begin. When a project includes structures, make sure the Advanced Situation Folder is submitted in a timely manner to initiate this process.

*Public Involvement: Public meetings, public hearings, stakeholder meetings and citizens advisory groups (when needed) take time to set up, schedule, and convene. Account for public involvement for when developing the project schedule. For more information refer to **HD-600** of the *Highway Design Guidance Manual*.

*ROW Process: Complications related to ROW acquisition (e.g., suits, unknown heirs, cemeteries, federal lands, railroad involvement) can stretch out the timeline for the ROW Clearance Milestone. For more information refer to **HD-1300** of the *Highway Design Guidance Manual*. Also refer to the following HKP articles: *Division of Right-of-Way & Utilities* and *Right-of-Way Acquisition*.

*Utility Coordination/ Relocation and Rails: Begin this process as early in the project as possible. Historically, utility relocation has taken a long time to complete. The PM and Utility Supervisor must verify which utilities are located on the project. Gas transmission lines in rural areas warrant close attention.

Red Flag: Notify the Central Office Railroad Coordinator of railroad involvement early in the project as coordinating and communicating with the railroad companies can take an extended period.

For additional information refer to **HD-1400** in the *Highway Design Guidance Manual*, the *Utilities and Rails Guidance Manual* and the HKP article *Utility Engineering and Coordination*.

7.0 Associated Articles

KYTC Manuals and Information:

Design Manual (HD-205, HD-400, HD-500, HD-600, HD-1300, HD-1400)

DEA Guidance Manual

Environmental Handbook

Project Managers Toolbox

Professional Services Guidance Manual

Utilities and Rails Guidance Manual

HSIP Program and Investment Plan

Transportation Asset Management Plan

Operations and Pavement

Maintenance Guidance Manual

Roadside Maintenance

Roadway Maintenance

Bridge Maintenance

Highway Knowledge Portal Articles:

PMGB *Intro & General Overview* (coming soon)

PMGB *Tools and Technology* (coming soon)

Time Management

Selecting a Consultant

Managing Consultant Contracts

Understanding a Consultant Contract

Division of Environmental Analysis

HAZMAT/Archaeology

Biological Assessment

Environmental Approval

Right-of-Way Acquisition

Right-of-Way & Utilities

Utility Engineering and Coordination

8.0 Reference Documentation

KYTC Design Manual:

https://transportation.ky.gov/Organizational-Resources/Policy%20Manuals%20Library/Highway%20Design.pdf

KYTC *DEA Guidance Manual*:

https://transportation.ky.gov/EnvironmentalAnalysis/Environmental%20Resources/DEA%20Guidance%20Manual.pdf

KYTC Environmental Handbook :

https://transportation.ky.gov/EnvironmentalAnalysis/Pages/KYTC-Environmental-Handbook.aspx

KYTC Project Managers Toolbox: http://www.pmtoolbox.kytc.ky.gov/

KYTC Professional Services Guidance Manual: https://transportation.ky.gov/Organizational-Resources/Policy%20Manuals%20Library/Professional%20Services.pdf

KYTC Utilities and Rails Guidance Manual:

https://transportation.ky.gov/Organizational-Resources/Policy%20Manuals%20Library/Utilities%20and%20Rails.pdf

KYTC HSIP Program: https://transportation.ky.gov/TrafficOperations/Pages/Highway-Safety-Improvement-Program-(HSIP).aspx

KYTC HSIP Investment Plan: https://transportation.ky.gov/TrafficOperations/Documents/HSIP%20FAST%20Act%20Investment%20Plan%20with%20Memo%20to%20FHWA.pdf

KYTC Asset Management Projects (The Transportation Asset Management Plan):

https://datamart.kytc.ky.gov/DM_docs/048_kentuckytc.pdf

KYTC Operations and Pavement: https://transportation.ky.gov/Maintenance/Pages/Operations-and-Pavement-Management.aspx

KYTC Maintenance Guidance Manual: https://transportation.ky.gov/Organizational-Resources/Policy%20Manuals%20Library/Maintenance.pdf

KYTC Roadside Maintenance: https://transportation.ky.gov/Maintenance/Pages/Roadside-Maintenance.aspx

KYTC Roadway Maintenance: https://transportation.ky.gov/Maintenance/Pages/Roadway-Maintenance.aspx

KYTC Bridge Maintenance : https://transportation.ky.gov/Maintenance/Pages/Bridge-Preservation.aspx

Highway Knowledge Portal Articles:

PMGB *Intro & General Overview:* (coming soon)

PMGB *Tools and Technology:* (coming soon)

*Time Management***:** https://kp.uky.edu/knowledge-portal/articles/projecttimemanagement/

Project Time Management, Section 6: https://kp.uky.edu/knowledge-portal/articles/projecttimemanagement/

Selecting a consultant: https://kp.uky.edu/knowledge-portal/articles/administration-of-consultant-contracts-02-selecting-a-consultant/

Managing Consultant Contracts: https://kp.uky.edu/knowledge-portal/articles/managing-consultant-contracts/

Understanding a Consultant Contract : https://kp.uky.edu/knowledge-portal/articles/administration-of-consultant-contracts-03-understanding-a-consultant-contract/

Division of Environmental Analysis:

https://kp.uky.edu/knowledge-portal/articles/technical-support-resources-division-of-environmental-analysis/

Hazmat/Archaeology:

https://kp.uky.edu/knowledge-portal/articles/hazmat-additional-archaeology/

Biological Assessment:

https://kp.uky.edu/knowledge-portal/articles/time-management-12-biological-assessment/

Environmental Approval :

https://kp.uky.edu/knowledge-portal/articles/time-management-8-environmental-approval/

Right-of-Way Acquisition :

https://kp.uky.edu/knowledge-portal/articles/time-management-10-right-of-way-acquisition/

Right-of-Way & Utilities:

https://kp.uky.edu/knowledge-portal/articles/technical-support-resources-division-of-right-of-way-utilities/

Utility Engineering and Coordination:

https://kp.uky.edu/knowledge-portal/articles/time-management-for-highway-project-development-15-utility-engineering-and-coordination/

9.0 Glossary

Milestone – the completion of a major phase of work

Statewide Transportation Improvement Plan (STIP) - Each state shall develop a statewide transportation improvement program for all areas of the state. Such program shall cover a period of 4 years and be updated every 4 years or more frequently if the Governor elects to update more frequently. The STIP is to be developed for all areas of the state in cooperation with MPOs and local officials.

Critical Path Method (CPM) – a method used to estimate the minimum project schedule duration

Transportation Improvement Program (TIP) – A list of upcoming transportation projects in a Metropolitan Planning Organization area, covering a period of at least four years. Project information such as scope, anticipated schedule, and estimated cost is included.

Project Cost Estimation and Management	Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1.0 Introduction	x		x	
2.0 KYTC Project Development Process	x		x	
3.0 KYTC Project Estimation Process	x		x	
4.0 Identifying Risks and Establishing Contingencies	x		x	
5.0 What Happens after the Legislature Enacts the Highway Plan?	x		x	
x = Information from the topic may be applicable for the project classification.				

1. Introduction

The goal of project cost management is to control costs through estimation, budgeting, and continuous monitoring of project expenses. Sound project cost management plays a critical role in helping project managers (PMs) complete projects within approved budgets. First, it is important to distinguish between estimates and budgets and to define their relationship to cost management.

An estimate approximates the amount of funding needed to complete a project. Estimates are generated and revised throughout project development, from planning through letting. A budget represents the funding authorized for project expenditures. It serves as a cost baseline and facilitates program management. Project budgets for capital projects and some asset management projects usually appear in the *Six-Year Highway Plan* (SYP), a legislative document approved and enacted by the Kentucky General Assembly during its biennial budget process. The SYP is intended to be fiscally balanced, making it critical that projects remain within budget. If a project exceeds its budget, less funding is available for other projects throughout the Commonwealth, potentially resulting in delays. Delayed projects reduce the public's confidence in the Cabinet's ability to meet project and program commitments. Robust project cost management processes help to ensure projects stay within budget and on schedule.

1.1 Estimating Project Costs

Developing estimates and progressively refining their accuracy throughout project development is integral to project cost planning and management. For each type of estimate, **Table 1** (Page 6) identifies the point in the project development process it occurs, its designation and purpose, method(s) used, and anticipated accuracy. Accuracy improves as a project moves through the development process and the scope becomes better defined.

AASHTOWare Project Estimation can be used to develop estimates, facilitate project cost management, and store highway construction bid history. Currently, KYTC only uses the software for the *Engineer's Estimate.* Section 6 provides more information on this software. For highway project expenditures such as Right-of-Way Acquisition and Utility Relocation, the PM works with subject-matter experts (SMEs) to create estimates, track costs, and make payments. SMEs have access to historical pricing used to prepare estimates. PMs should consult SMEs when compiling project estimates for all phases.

The Cabinet uses three methods for estimating project costs: 1) parametric, 2) historical bid-based, and 3) cost-based.

Parametric Estimation

- Cost parameters are developed and used to price a standard section of a given unit (e.g., linear mile, square feet, acre). This method produces estimates that can vary greatly from the actual costs incurred as a project moves through the project development process since a minimal amount of information is available. Estimates for Design, Right-of-Way Acquisition, Utility Relocation, and Construction are developed separately based on

standard, high level pricing. SMEs in the various sections within KYTC District Offices should be included in the process.

Historical Bid-Based Estimation

- Unit prices and quantities from previously let construction projects are available to generate estimates and improve accuracy. Prices are adjusted according to factors such as location, market conditions, scheduling, materials availability, and quantities. This method is first used in the latter stages of Planning and continues throughout the rest of project development.

Cost-Based Estimation

- Cost-based estimation is a process of estimating unit bid prices by summing the costs of materials, equipment, and labor required for the unit of work. Cost-based estimates account for factors such as event sequencing, production rates, and contractor overhead and profit. Reliable cost-based estimates demand a solid working knowledge of construction industry practices and current market trends.

Methods can be used in combination to prepare a single estimate. For example, to incorporate current prices, the PM may develop a cost-based estimate for items that account for a larger portion of the project's overall cost while adopting historical bid-based estimating for less expensive items. Estimates completed in this manner may be more accurate than estimates created using a single method.

2. KYTC Project Development Process

The project development process consists of four phases – Planning, Scoping, Design, and Letting (**Figure 1)**. These phases may overlap. Scoping may also be referred to as *"Preliminary Line and Grade"* or *"Phase 1 Design"*. Similarly, Design may be called *"Final Design"* or *"Phase 2 Design"*.

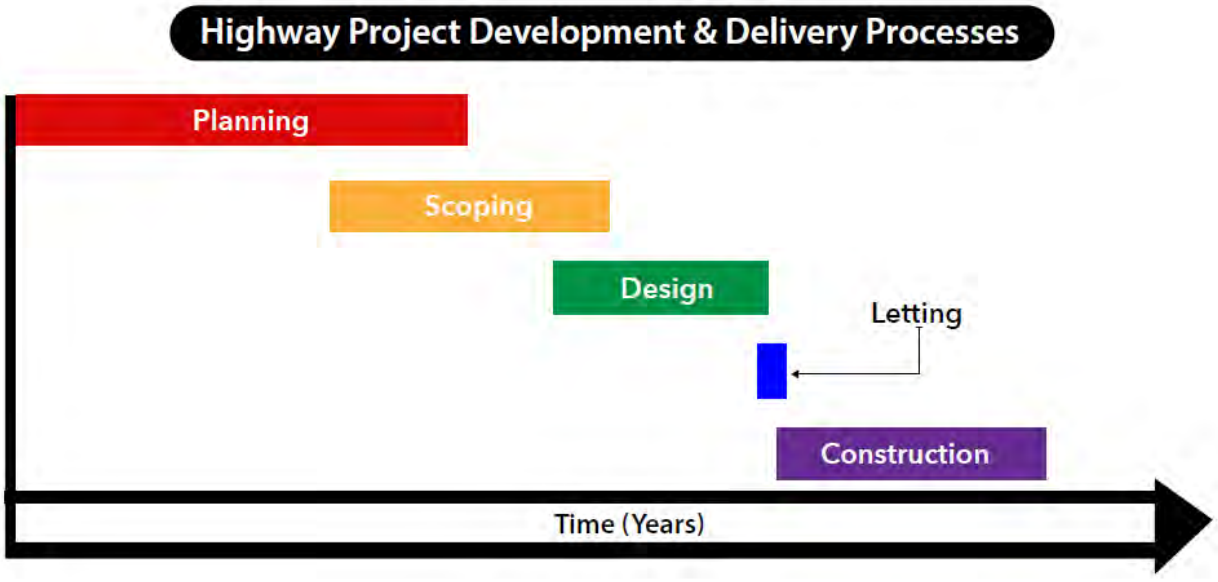


Figure 1 – KYTC Project Development Phases Sequencing (After MnDOT (2008), Figure II.1-1). While not shown, the Right-of-Way Acquisition and Utility Relocation Phases normally begin near the end of or just after the Design Phase and can overlap into the Letting Phase.

2.1 Planning Phase – Highway system needs and deficiencies are identified during the Planning Phase to determine which projects can advance a region's long-term goals. Area Development Districts (ADDs), Metropolitan Planning Organizations (MPOs), District Offices, local officials, and other entities can propose projects to address safety, operational, or other transportation system needs. Needs are prioritized based on available funding and level of importance to the system. Typical Planning Phase activities include:

- Develop a draft purpose and need statement
- Define a general project scope and develop *Project Identification Estimate*
- Identify potential risks or uncertainties
- Identify environmental red flags
- Initiate public involvement
- Study improvement concepts that meet the draft purpose and need statement
- Develop a *Conceptual Project Estimate*

2.2 Scoping Phase – During Scoping, alternatives that satisfy a defined need are investigated by the Project Development Team (PDT) to understand issues that could affect a project's quality, cost, and schedule. Typical Scoping Phase activities include:

- Refinement of project requirements and risks
- Forecast traffic growth
- Surveying
- Applicable environmental investigations
- Public involvement
- Analysis of improvement alternatives
- Preliminary identification of right-of-way and utility impacts
- Development of *Preliminary Line and Grade Estimate*

The Scoping Phase should result in selection of a preferred alternative in accordance with guidance in the *Highway Design Manual* (Section 203, Preliminary Design).

2.3 Design Phase – During Design, the PDT prepares detailed design plans for right-of-way acquisition and utility relocation as needed, and project construction. Environmental permitting may also be initiated and completed. By the end of the Design Phase, construction plans are complete and used to prepare the final documents for project letting. *Design Estimates* are prepared and updated as needed throughout this phase. The *Joint Inspection Estimate* is prepared as a major milestone during the Design Phase.

2.4 Letting Phase – Letting immediately precedes construction. Key activities include preparing bid documents, completing the *Final Plans Estimate* and *Engineer's Estimate*, advertising the project for construction procurement, evaluating submitted bids, and awarding the contract.

Figure 2 depicts the general timeline from project conception to project construction.

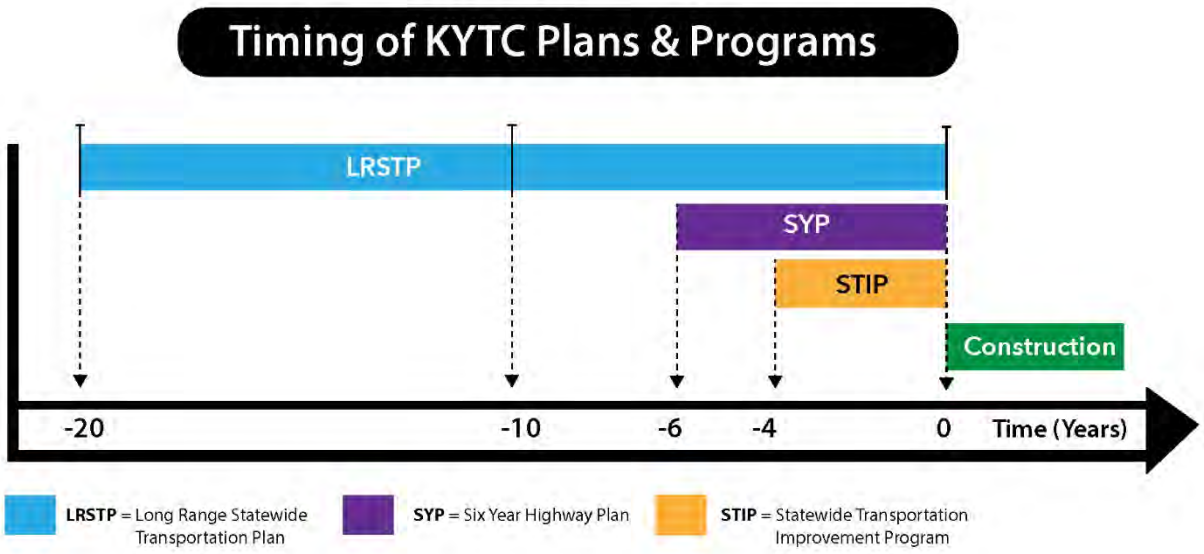


Figure 2 – Timeline of KYTC Planning and Program Activities (After MnDOT (2008), Figure II.1-3)

The amount of time needed for Planning and Scoping depends on a project's complexity and magnitude. **Figure 3** approximates the duration of each phase for different project types. For minor, less complex projects, the Design Phase may be shorter and longer for large, complex projects.

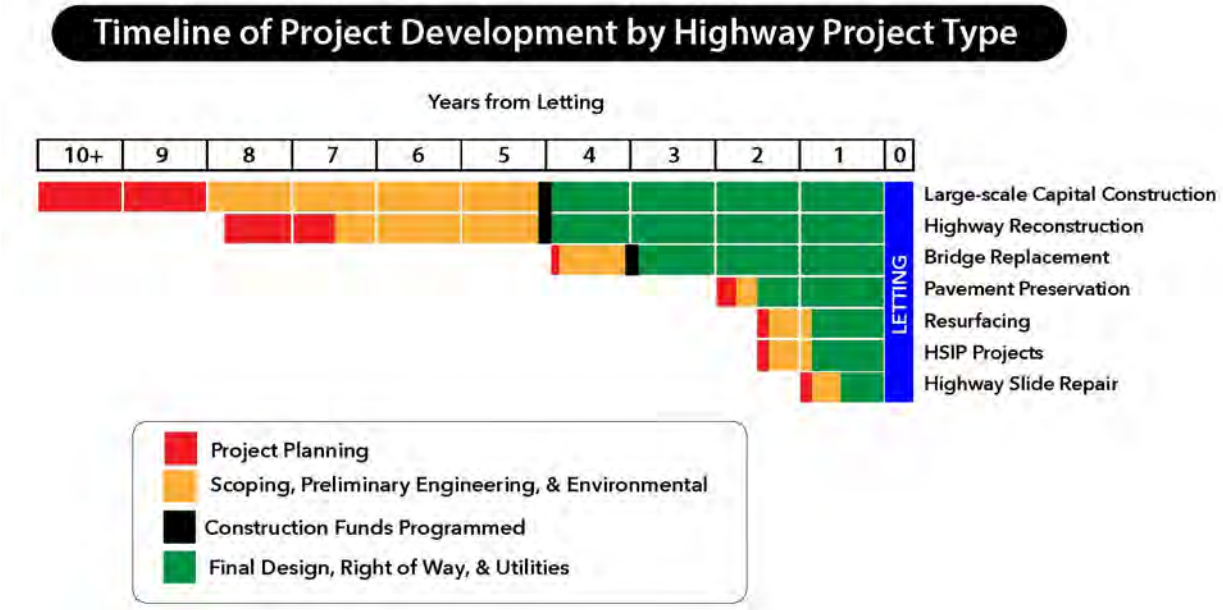


Figure 3 – Typical Project Development Timelines (After MnDOT (2008), Figure II.1-4)

3. KYTC Project Estimation Process

Project estimation and cost management is a continuous process that lasts throughout a project's life cycle. The project development process typically requires several years to move from the Planning Phase to the Letting Phase. The first step is an initial request for a project estimate that sets the stage for budgeting and establishes a baseline for future estimates. **Figure 4** depicts the initial project cost estimation process from request to development of the estimate.

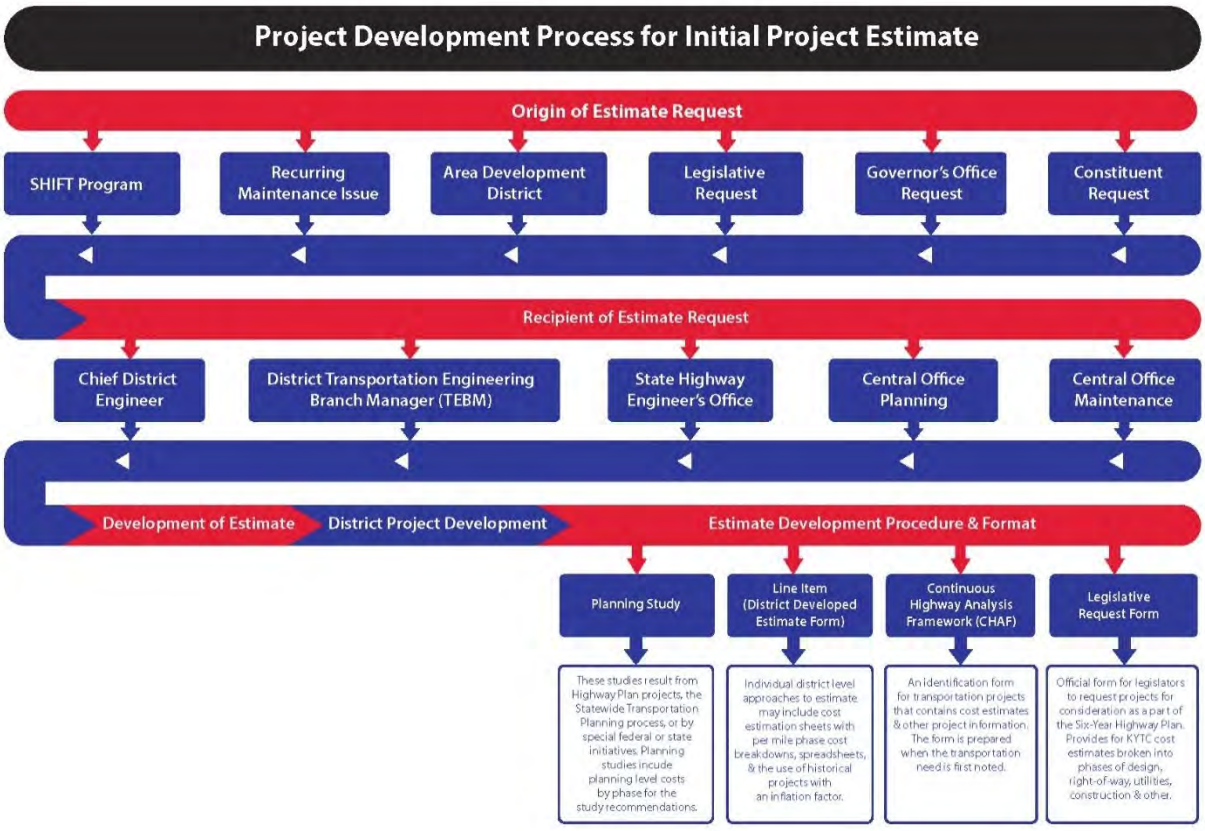


Figure 4 – Flowchart of KYTC's Process for Developing Initial Project Estimates

3.1 Cost Estimating Throughout the Project Development Process

Projects are initiated when transportation system performance needs are identified and prioritized. Planning Phase estimates gauge the cost to deliver a solution that meets the project needs. When project development begins, a project is not well-defined and specific work items are unknown or unquantifiable. Consequently, generating detailed cost estimates at this stage can be challenging. Cost data from previous projects can serve as the basis for estimates. To prepare a reliable estimate for a new project, the PM should identify similar projects designed, constructed, or recently completed. Characteristics important to consider when deciding if a project is similar enough to be relevant include:

- Proximity to the new project
- Rural or urban context
- Number of lanes
- Topography and landscape configuration
- Amount of right-of-way that needs to be acquired
- Typical roadway cross section
- Number and lengths of bridges
- Number and types of utility relocations

Table 1 identifies points in the project development process where estimates are required, their designation and purpose, the probable method(s) used, and the anticipated accuracy.

Project Development Phase	Level of Design Completion	Project Estimate Type	Purpose of Estimate	Typical Estimating Methodology	Estimate Range	
Planning	0 to 5%	Project Identification Estimate	Screening, Feasibility, Baseline Cost for Program Management	Parametric	-50% to +200%	Project Cost Planning
	3% to 15%	Conceptual Project Estimate	Prioritize Needs for Long Range Plan	Historical Bid-Based with some Parametric	-40% to +100%	
Scoping	10% to 30%	Preliminary Line and Grade Estimate	Update Baseline Cost for Project	Historical Bid-Based or Cost-Based with some Parametric	-30% to +50%	Project Cost Management
Design	30% to 90%	Design Estimate As needed: Right of Way Estimate and Utility Relocation Estimate	Control Project Estimate Against Baseline Budget	Historical Bid-Based or Cost-Based	-10% to +25%	
Letting	90% to 100%	Final Plans Estimate and Engineer's Estimate	Program Construction Funds and Compare with Bid	Cost-Based or Historical Bid-Based	-5% to +10%	

Table 1 – KYTC Project Cost Estimation through the Project Development Process

In terms of scope adjustments, PMs are most able to influence project costs during Planning and Scoping. Making changes early in the project development process is less expensive and introduces fewer risks than introducing modifications later. **Figure 6** illustrates the general impact of design changes on cost and risk as a project moves through project development. Changes are more readily absorbed into existing budgets at the early stages due to the typical ranges of estimate accuracy shown in **Table 1**.

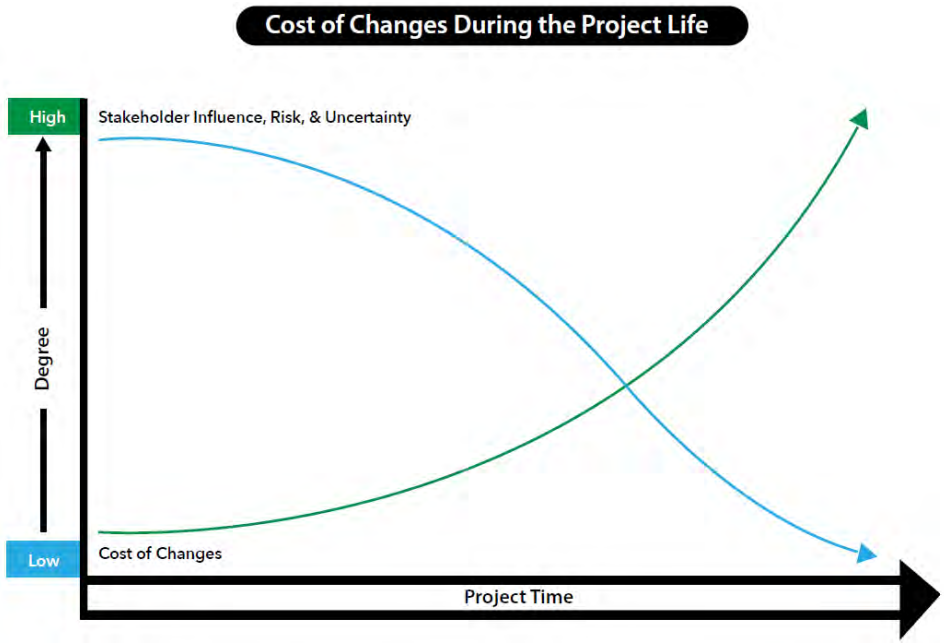


Figure 6 – Relationship Between Stakeholder Influence, Risk, and Uncertainty of Change Costs (Source: PMI (2008), Figure 2-2)

PMs should be mindful of the different project phases that can be required and funded on a project. The SYP contains a budget and schedule for Design, Right-of-Way Acquisition, Utility Relocation, and Construction (DRUC). A DRUC budget represents the total project cost along with permitting and environmental mitigation fees as applicable. The PM and PDT should always be evaluating design changes that could reduce project costs while still fulfilling the purpose and need. Reducing overall project costs may increase cost in another functional area. For example, a suggested change may increase right-of-way costs but reduce construction costs by a greater amount, lowering the overall project cost.

The PM manages project costs by:

- Reviewing and approving significant work items and project milestones
- Communicating estimates to District and Central Office leadership, as appropriate
- Monitoring the scope and project conditions
- Evaluating the impact of changes
- Mitigating project risks
- Revising estimates when necessary

A PM should continuously monitor the dynamic relationships between the project scope, estimates, and budget. If the project scope is modified, the estimate and/or budget will likely require updating. A PM must evaluate and document through meeting minutes and other official project documentation the degree that scope changes will influence the estimate and/or budget. To ensure a PM is aware of the impact of scope changes on project cost, updated cost estimates are required at specific milestones within the project development process.

3.1.1 Planning Phase

Two estimates are created during Planning: (1) *Project Identification Estimate* and (2) *Conceptual Project Estimate*. Typically, the District Planning Engineer and the Project Development Branch Manager oversee Planning Phase estimates, with the Division of Planning serving as a source of information and support. The Division of Planning collaborates with the State Highway Engineer's Office and Division of Program Management to generate project information that informs the SYP when needed. A preconstruction PM is typically not assigned until the end of Planning. However, during Planning, a PM should be involved and provide input. Planning Phase estimates, specifically the *Conceptual Project Estimate*, are typically the outcome of a planning study. The scope and level of effort are usually commensurate with project size.

Planning occurs before a budget is authorized. After a project budget appears in the SYP, scope changes affect the estimate and potentially the budget if funding is insufficient to deliver the project based on the new estimate. Establishing a well-defined scope as early as possible improves estimate accuracy and reduces the potential for costly scope changes in the future.

Project Identification Estimate – The *Project Identification Estimate* is the first cost estimate generated after a potential project is identified. The need for a potential project provides a basis for developing general project concepts and understanding the level of complexity. Since projects are not well-defined at this phase, parametric techniques are generally used to prepare estimates. The basis for this estimate could be an abbreviated planning study or a project definition with estimated costs based on similar past projects. The project definition and this estimate establish a baseline for consideration and prioritization in the appropriate KYTC program.

Conceptual Project Estimate – Before a *Conceptual Project Estimate* can be prepared, a project must undergo concept development. The purpose of concept development is to investigate project concepts and needs, determine whether it is feasible to advance the project, and establish programmatic assignments (e.g., major construction, reconstruction, resurfacing, safety, bridge, operations).

The *Conceptual Project Estimate* should use the highest level of detail available for quantity takeoff with the most recent bid information. The estimate accounts for the future project funding needs, including non-construction expenses such as Right-of-Way Acquisition and Utility Relocation. When estimating non-construction expenses, a PM should consult with the SMEs for each area. To identify high risks, assumptions that underpin this estimate should be documented.

Project conceptualization can help identify whether the environmental, social, or economic impacts are sufficient to require a Categorical Exclusion (CE), Environmental Assessment – Finding of No Significant Impact (EA-FONSI), or Environmental Assessment - Environmental Impact Statement (EA-EIS). By the end of Planning, the concept and basic project construction scope are in place.

3.1.2 Scoping Phase

The most critical project needs are carried forward into the Scoping Phase. During this phase, the *Preliminary Line and Grade Estimate* is prepared after the design of alternatives is complete. Near the end of this phase, the PM and the Project Development Branch Manager complete estimates for all alternatives considered, including Right-of-Way Acquisition, Utility Relocation, and Construction. The roadway design team prepares the roadway construction cost estimate. SMEs should be consulted to provide estimates for their respective areas, offer input on risks and contingency, and participate in reviews.

Preliminary Line and Grade Estimate – A *Preliminary Line and Grade Estimate* may be the most critical estimate developed during the entire project development process. It is used to determine the cost of each alternative. The PDT relies on these estimates to aid in selection of the preferred alternative, which moves forward into the Design Phase. The *Preliminary Line and Grade Estimate* is also typically used to program funding in the SYP for Right-of-Way Acquisition, Utility Relocation, and Construction.

3.1.3 Design Phase

The Design Phase focuses on developing detailed roadway and structure design for construction plans. Final right-of-way plans are developed so that right-of-way acquisition can commence if funding is available. Utility impacts are coordinated with utility owners who may use their own staff or design consultant to prepare relocation plans or may allow the relocation design to be included in the project Design Phase. The Right-of-Way Acquisition and Utility Relocation Phases regularly overlap with the Design Phase. Environmental permitting processes are usually completed during the Design Phase.

Throughout the Design Phase, a PM should monitor ongoing design work to ensure unnecessary additions to the scope of work are not included. Project cost management involves monitoring costs in response to (1) additions to or deletions from the project baseline definition or (2) changes resulting from development of the design or from changed site conditions. As a project moves through Design and becomes better defined, changes will likely need to occur. *Design Estimates* are updated to reflect the potential cost impacts of changes and reviewed to identify significant deviations from the budget.

Typically, the PM and Project Development Branch Manager are responsible for *Design Estimates*. The roadway design team prepares roadway construction cost estimates while SMEs from other divisions update estimates for their respective functional areas, including Right-of-Way Acquisition, Utility Relocation, environmental permitting, structures, and others as needed. The PM is responsible for identifying the needed disciplines and coordinating their contributions.

***Design Estimates* –** While detailed design work is ongoing, the PM continuously oversees the design to identify any deviations from the baseline project definition and estimate. Current *Design Estimates* should be maintained and compared to the project budget to ensure that project costs stay within the programmed budget. If the PM and PDT decide the scope should be modified, appropriate justification and request for approval of the change should be provided to the State Highway Engineer's Office. If a change request cannot be justified, the change and its associated costs should be removed.

Design Estimates, including those for other functional areas, are prepared (1) when the SYP is produced every two years, (2) at project milestones such as Joint Inspection, (3) when the project scope changes, and (4) upon request. Project budgets are typically updated when the project (1) is in the SYP, (2) has not been constructed, and (3) will remain in the next SYP. Potential reasons for a budget revision include:

- A scope adjustment not reflected in the previous SYP estimate
- Fluctuations in material and labor costs
- Cost variations for Right-of-Way Acquisition or Utility Relocation
- Inflation

3.1.4 Letting Phase

In the Letting phase, responsibility for project oversight shifts to Central Office Construction and District Project Delivery and Preservation personnel. The PM and PDT are responsible for delivering Final Contract Plans, including the *Final Plans Estimate*. The PM is also responsible for establishing the construction contract time in coordination with the Division of Construction and PDT. A PM should be aware that the contract time allowed for construction can significantly impact project costs.

After the Final Contract Plans and *Final Plans Estimate* have been submitted to the Division of Construction Procurement, its Estimating Branch prepares the *Engineer's Estimate.* When construction bids are opened, they are compared to this estimate. If major differences exist between the *Final Plans Estimate* and *Engineer's Estimate*, they are reconciled before the *Engineer's Estimate* is finalized. Upon completion, the *Engineer's Estimate* is sealed until bid opening day.

Letting phase estimates are developed to mimic contractor bids as closely as possible. Those responsible for preparing the *Final Plans Estimate* and *Engineer's Estimate* should be aware of factors that influence pricing. Some examples are shown in **Table 2**. Many of these factors increase costs. For example, extensive environmental mitigation or material shortages increase prices. Conversely, some factors can reduce costs such as decreasing commodity prices. The factors listed in **Table 2** tend to only be considered in the later stages of the project development process because it may be difficult to anticipate most conditions years in advance.

Table 2 – Factors Influencing Estimates and Bids

• Restrictions on work hours
• Material shortages
• Timing of advertisement
• Need for handwork
• Need for specialty work
• Extent of environmental mitigation
• Constructability issues
• Restrictions on maintenance of traffic methods
• Provision of work area for contractor staging
• Contractor availability and concurrent operations
• Pricing trends

- Market competition

Final Plans Estimate – Also referred to as the *Field Estimate*, the *Final Plans Estimate* is based on definitive contract documents that reflect the project's final design. This estimate is used to finalize project funding prior to soliciting bids and is compared to the *Engineer's Estimate*. The *Final Plans Estimate* is created by the PDT, which has the most knowledge of the project. This estimate should be reasonably accurate, given the level of design it is based on. Prior to letting, the Division of Program Management may check for discrepancies between the *Final Plans Estimate* and the programmed construction amount documented in the SYP.

Engineer's Estimate – This estimate is developed for the evaluation of contractor bids. It reflects the project definition presented in the final contract plans and specifications. This independent estimate is developed by staff specialized and knowledgeable of the current bidding environment and is sealed until the bids are publicly announced on letting day. Intended to mimic contractor bids, current market conditions play an important role in its preparation. The *Engineer's Estimate* represents the fair and reasonable cost to construct a project using the best available information on current material, labor, and equipment costs including overhead and profit. KYTC's Awards Committee uses the *Engineer's Estimate* as a benchmark for analyzing bids and determining whether to award a construction contract. The estimate is an essential element in the Construction Procurement process.

3.1.5 Escalation

Many years can pass between project conceptualization and construction. Inflation can significantly increase the construction cost of a project in just a few years. Historically, the amount of funding available has not typically kept pace with inflation. KYTC escalates cost estimates for inflation based on the expected year of construction. During the Planning Phase, it is likely a construction year will not be set. As a result, the basis for escalation of a project at that time is difficult to determine. As projects transition into Scoping and Design, the desired year of construction generally becomes known, or is narrowed down to a short time range. Estimates developed during the Scoping and Design Phases should be escalated based on the best estimates of future inflation rates. It is important for program management purposes that PMs use all information available to provide the best possible cost estimates for the year of expenditure and the Division of Program Management identifies appropriate escalation rates for use. This enables KYTC to better forecast expenditures in relation to anticipated future funding amounts.

3.2 Project Cost Management and the Role of Budgets

Project cost management techniques are applied throughout Scoping, Design, and Letting. A cornerstone of project cost management is continuous oversight of the project's definition. A PM cannot let scope creep alter a project and increase cost. If the original purpose and need remains unchanged, the project definition should not change, and estimated project costs should be measured against the project budget programmed in the approved SYP. Because that project budget is legislatively enacted, it is imperative that project costs remain within the budget. Exceeding a budget imperils other projects by reducing the limited amount of funds available for them. If the costs on one project increase, schedules and budgets found in the SYP are directly impacted. As these impacts accumulate, KYTC is forced to make tough decisions about which projects receive funding, resulting in delays and cancellations. Failure to deliver projects erodes the public's trust in KYTC.

Sometimes, revising budgets is unavoidable. Situations in which a PM may need to prepare an updated estimate to revise the budget include (1) when a scope change has been approved, (2) before a new SYP is issued, and (3) upon request. A PM must inform the State Highway Engineer's Office of proposed changes that will impact costs and formally request authorization to make those changes.

Before requesting a budget increase, a PM should determine whether the original budget includes sufficient contingency to pay for the proposed changes, if costs can be reduced in another phase area (R, U, or C phases) to accommodate the proposed changes, or if the project design can be modified elsewhere to reduce project costs and absorb the increased expenses without compromising the project's ability to meet the purpose and need.

4. Identifying Risks and Establishing Contingencies

Understanding project contingencies is critical for developing accurate estimates. Contingencies are incorporated into estimates to account for 1) exposure to risks and uncertainties that influence project costs, 2) minor work items that are not quantified when the estimate is created, and 3) inaccuracies introduced when broad-based

assumptions are necessary, especially during initial stages of the project development process. The magnitude of contingency as a percentage of a project should decrease as a project moves through the development process.

For highway projects, the following contingencies are typically included:

- A planning or design contingency based on project maturity (i.e., the percentage of the project completed)
- Risk contingencies to account for perceived potential risks and potential changes due to changed conditions (i.e., environmental concerns, utilities, challenging right of way)
- Construction contingency for work completed by KYTC during construction
- An overall Program Management contingency to help leadership with cash-flow management

The *Highway Design Manual* (HD-204.16.1) specifies fixed percentages to add to the overall project cost for Construction Engineering and Inspection (CE&I). CE&I is added to the construction estimate to cover services required for:

- Construction contract administration
- Construction engineering and inspection
- Materials sampling and testing

For projects with construction costs less than $1 million, a 15% contingency is added for CE&I. For projects with construction costs greater than $1 million, a 10% contingency is added. CE&I funds are used to pay for KYTC construction management and minor construction change orders that may arise. Reserving these funds within the construction-phase budget provides some fiscal margin without having to request additional money or reallocating funds from other projects.

All PMs should be in the habit of identifying and managing risks. Risks are uncertain events that can influence, positively or negatively, the attainment of a project's goals and objectives. When a project begins, a PM must identify and document risks that may affect project delivery and account for them by adding contingencies to the estimate and time to the project schedule, as applicable. **Table 3** identifies some potential risk factors for PMs to consider.

Table 3 – Potential Sources of Risk Influencing Contingency Magnitude

• Project Setting o Project location and characteristics (e.g., isolated rural areas, urban landscapes, narrow corridors, mountainous terrain)
• Availability of contractors and materials
• Project complexity and size
• Issues related to traffic control, railroads, right-of-way, utilities, and geotechnical factors
• Environmental issues and mitigation
• Changed conditions and the potential for associated change orders
• Inaccuracies due to level of design completed
• Incorrect quantities or unit costs

PMs can use a risk register to document, monitor, and manage risks. A risk register is a tool in risk management and project management used to identify potential risks and document the nature of the risk, the level of impact the risk could have, the party that can best manage the risk, and the appropriate risk response mitigation measures. A risk register should include the following information for each risk:

- A description of each risk
- Probability of occurrence
- Potential impacts to cost and schedule
- Party responsible for mitigation of the risk
- Measures to mitigate the risk

On minor projects, it may be sufficient to address risks by applying a standard contingency without developing a comprehensive risk register. As project complexity increases, keeping an updated risk register assumes greater

importance and is critical for organizing work activities. On complex projects, a PM can benefit by categorizing contingencies (e.g., structures, utilities, right-of-way) to generate a clearer picture of risk distribution across the project.

Identifying risks on each project can be challenging. PMs benefit from studying known completed and ongoing projects with similar characteristics to get a sense of risks they are likely to encounter. Other strategies for identifying potential risks include speaking with other PMs and SMEs in the District and Central Office and conducting detailed site visits to acquire firsthand knowledge of factors that could increase costs. The latter includes topography, traffic volumes, utilities, accessibility, and challenges contractors may confront with staging and operating equipment. Because no universally applicable formula exists for determining appropriate contingencies, a PM should dedicate time and effort to build their knowledge of risk factors and how interactions between risk factors can affect the delivery of different project types.

The amount allocated for contingencies should decrease as a percentage of overall project cost as a project moves from Planning to Letting, and as risks are unrealized, mitigated, or eliminated. **Table 4** lists approximate percentages for contingencies for medium to high-risk projects at each project phase. Percentages are usually smaller on lower-risk projects such as safety, pavement rehabilitation, or maintenance projects. When a specific risk is no longer a concern, it should not be factored into contingencies developed for future estimates or be used to expand the project scope.

The percentages in **Table 4** are a general guide. PMs should consider their knowledge of a project and use engineering judgment to identify risks, potential impacts, and appropriate contingencies for each project.

Table 4 – Typical Contingency Percentages by Project Phase

Project Phase	Contingency (% of Overall Project Costs)
Planning	25% – 30%
Scoping	15% – 20%
Design	10% – 15%
Letting – Contingency shown is primarily for construction engineering and inspection costs. It is included here since it is intended to cover minor change orders that may arise. It may be prudent for a PM to include additional contingency for the Construction Phase.	Project Construction Cost < $1 million – 15% Project Construction Cost ≥ $1 million – 10%

4.1 Examples

Figures 7 and **8** on the following pages depict two examples of total project cost estimation during the early stages of the project development process. For most projects, certain construction items can be defined at any stage. For example, pavement quantities for a road widening project can be estimated with an appropriate pavement design based on similar completed projects. These items are “Defined Construction Items”.

The project in Example 1 is expected to require relocation of a 12-inch ductile iron water line. While cost for the length of water line can be easily estimated based on historical prices, factors such as related facilities within the corridor or special requirements of the utility company may be unknown. Likewise, mitigation costs for the existing stream or tree removal can be estimated but could vary significantly pending further design decisions and additional information acquired from outside agencies as the project development process continues. These costs are defined as “Allowances Added”.

Finally, potential risks should be identified. In Example 1, an early project cost estimate may be completed without a field visit. As a result, the unknown condition of the existing culvert that is to be extended is an “Identified Risk”. Without a site visit, a PM should assume that replacement of the entire culvert may be necessary. The summation of estimated costs assigned to each potential identified risk is the contingency. The sum of estimated costs for “Defined Construction Items”, “Allowances Added”, and “Identified Risks” results in the total project cost estimate.

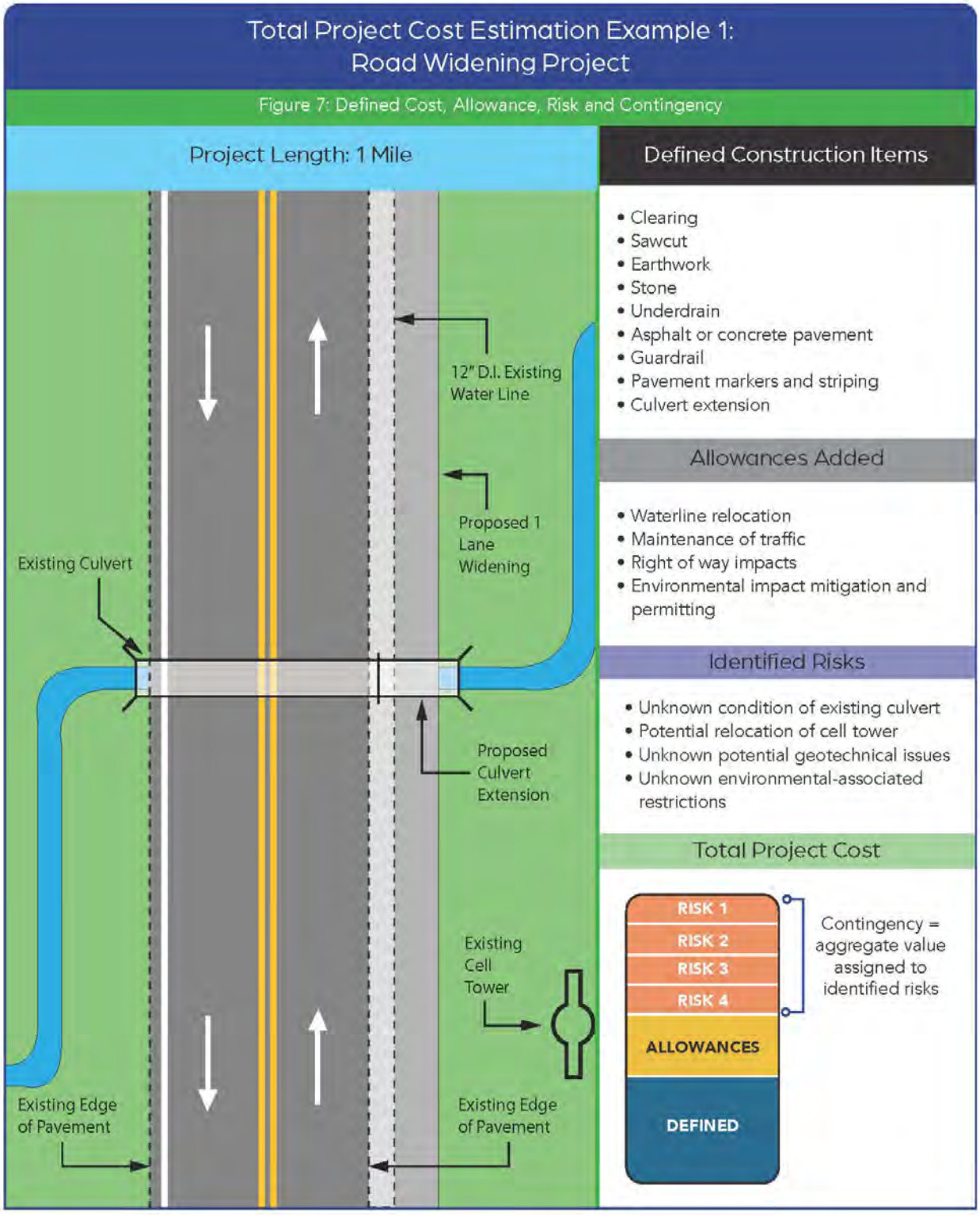


Figure 7 – Example 1 – Total Project Cost Estimation (Source: Virginia Department of Transportation, *Cost Estimating Manual,* (2021), Figure I-1a)

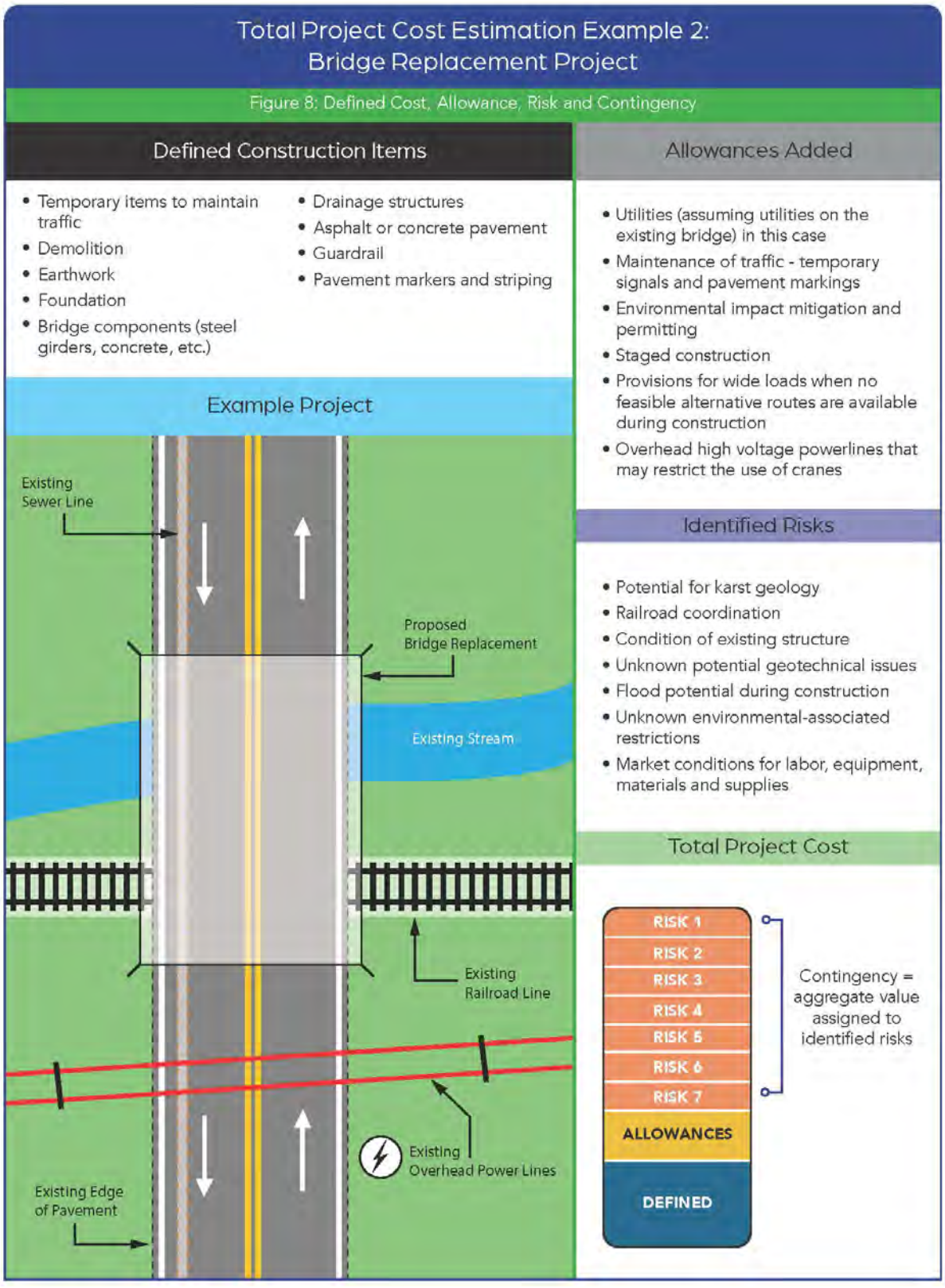


Figure 8 – Example 2 – Total Project Cost Estimation (Source: Virginia Department of Transportation, *Cost Estimating Manual,* (2021), Figure I-1b)

6. AASHTOWare Project Estimation

AASHTOWare Project Estimation is a web-based application that streamlines, simplifies, and improves the organization of project-related data and project cost management activities. Because the software consolidates bid histories, users can view information on historical pricing trends. AASHTOWare Project Estimation can be used throughout the project development process. Currently, the *Engineer's Estimate* is being developed with the software while the remainder of estimates are typically developed with AASHTOWare Project Estimator. Appendix D of a Draft Guidance Manual published by the Cabinet reviews the features and layout of the more robust software platform, provides step-by-step directions for navigating its interface, explains how to populate project files with data, and defines the categories and fields that users encounter. A video tutorial is also available on YouTube at this Link.

AASHTOWare Project Estimation holds several advantages over the traditional methods of preparing estimates such as spreadsheets and the AASHTOWare Estimator software. In some cases, a PM may need to rely on those conventional procedures, especially when an estimate is needed on short notice. However, automating the estimation process through AASHTOWare Project Estimation will minimize errors and improve uniformity. As always, to be successful, PMs must strive to collect quality data for input in the estimation process.

References

American Association of State Highway and Transportation Officials (AASHTO). (2013). *Practical Guide to Cost Estimating*. AASHTO.

Connecticut Department of Transportation. (2019). *Connecticut Department of Transportation 2019 Estimating Guidelines*.
https://portal.ct.gov/-/media/DOT/documents/AEC/Cost_Estimating/CTDOT_Est_Guide_2019_June.pdf

Georgia Department of Transportation. (2014). Inter-Department Correspondence on Cost Estimates.
http://www.dot.ga.gov/PartnerSmart/DesignManuals/EngineeringServices/Guidance%20on%20Updating%20Cost%20Estimates.pdf

Gransberg, D.D., Jeong, H.D., Craigie, E.K., Rueda-Benavides, J.A., Shrestha, K.J. (2018). *Estimating Highway Preconstruction Services Costs — Volume 1: Guidebook*. NCHRP Report 826. Transportation Research Board.

Minnesota Department of Transportation (MnDOT). (2008). *Cost Estimation and Cost Management Technical Reference Manual*.
https://edocs-public.dot.state.mn.us/edocs_public/DMResultSet/download?docId=1846457

New Jersey Department of Transportation. (2019). *Cost Estimating Guideline*.
https://www.state.nj.us/transportation/capital/pd/documents/Cost_Estimating_Guideline.pdf

Project Management Institute (PMI). (2008). *A Guide to the Project Management Body of Knowledge (Fourth Edition)*.

Virginia Department of Transportation (VDOT). (2021). *Cost Estimating Manual.*
https://www.virginiadot.org/business/resources/Cost_Estimation_Office/VDOT_Cost_Estimating_Manual.pdf

KYTC PM Guide Book: Assembling a Project Development Team

Assembling a Project Development Team	Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1.0 The Project Development Team	x	x	x	x
2.0 Project Development Team Members	x	x	x	x
2.1 Core Team Members	x	x	x	
2.2 Subject Matter Experts	x	x	x	
2.3 External Team Members	x	x	x	
3.0 Project Development Team Member Selection	x	x	x	x
3.1 Project Needs	x	x	x	x
3.2 Project Scope Breakdown	x	x	x	x
3.3 Project Development Team Member Identification	x	x	x	x
3.4 Resource Determination	x	x	x	x
4.0 Project Development Team Checklist	x	x	x	x
5.0 Associated Articles	x	x	x	x
6.0 Reference Documentation	x	x	x	x
x = Information from the topic may be applicable for the project classification.				

1. The Project Development Team

The Project Manager (PM) assembles a Project Development Team (PDT) for each project they are assigned. The PDT is a multidisciplinary team that collaboratively supports the KYTC PM throughout the project development process. The PDT's primary functions include:

- Provide support to the KYTC PM
- Attend and participate in project team meetings
- Provide professional opinions about different subject-matter areas
- Help resolve issues that arise
- Prepare documentation and work products needed for the project
- Complete work tasks
- Provide feedback to the KYTC PM by reviewing plans, documentation, and deliverables
- Help perform oversight during project development

The PDT is established during project scoping when the project is assigned and maintained through the construction letting. Because every project is unique, PDT's should be constructed based on specific project needs. Project success depends heavily on the effectiveness of the team delivering it.

Although the PDT is most closely associated with capital improvement projects, it can be adapted to fit the needs of safety projects, asset management projects, and maintenance projects. The configuration and size of the team will be different between the four project types.

2. Project Development Team Members

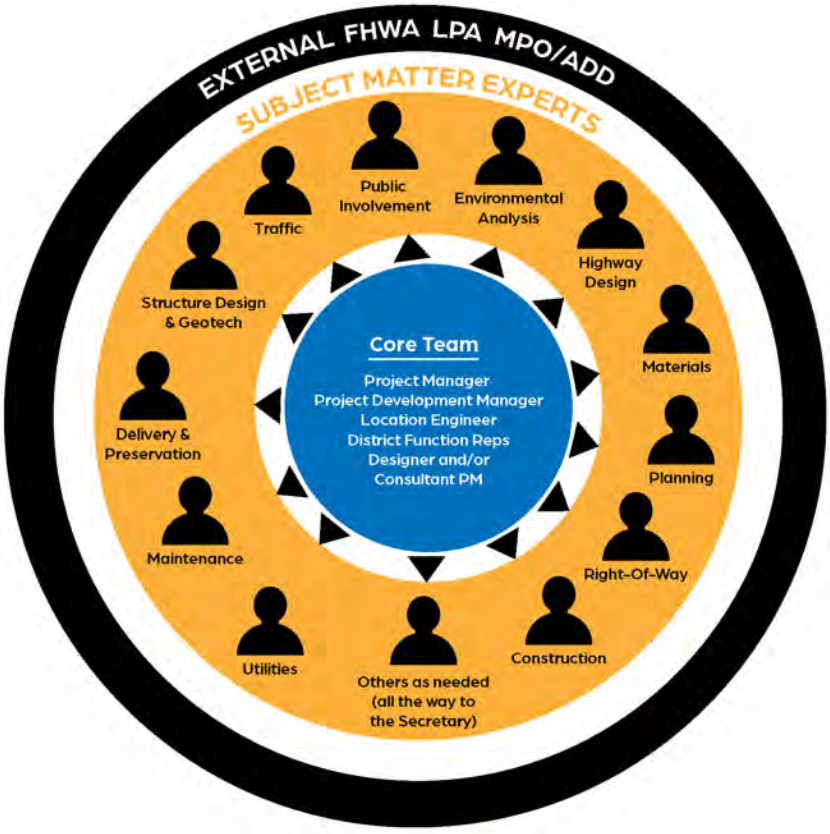
The PDT consists of core team members, subject-matter experts (SMEs), and external members (Figure 1). Exact team composition will depend on project specifics. The PDT can also include consultants.

Although the PDT stays active throughout the life of the project, its members and composition can change over time as the project moves through different phases. For example, on an urban corridor project once the project moves out of final design into right-of-way (ROW) acquisition, traffic modeling subject-matter experts (SMEs) may no longer be needed, but ROW specialists (appraisal, acquisition, relocation, property management) could be added to the team.

It is of utmost importance for the Project Manager to recognize that the Project Development Team works for them to deliver the project.

the project.

Figure 1: Project Development Team Components



2.1. Core Team Members

Core members are usually part of the PDT throughout project development. They include:

- KYTC PM
- District Project Development Branch Manager (PDM)
- Location Engineer
- Representatives from other divisions and branches within the District
  - Planning
  - ROW
  - Utilities
  - District Environmental Coordinator
  - Project Delivery and Preservation Section Engineer
  - Engineering Support
- The designer(s), whether KYTC staff or a consultant.

2.2. Subject-Matter Experts

SMEs provide knowledge and expertise in specific subjects or technical areas. They can be KYTC staff or consultants. Some SMEs are involved in the approval of project deliverables or documents. SMEs typically are not part of the PDT for the entire project lifecycle. Rather, they join the team when their expertise and guidance are needed. While SMEs are part of the team delivering the project, some do not attend project team meetings. Examples are archeologists and cultural historians who coordinate with the Kentucky Heritage Council (the State Highway Preservation Office (SHPO)) and oversee archeological investigations (if required). They are an essential part of the PDT, but typically would not participate in project team meetings.

Central Office SMEs can be contacted through the District representative section or Location Engineer. Table 1 outlines the responsibilities and capabilities of divisions, branches, and SMEs. When PMs assemble PDTs, Table 1 can serve as a useful reference point and help them determine who they should contact for assistance.

Table 1: Subject-Matter Experts by Division

Division of Construction	
Branch/SME	Responsibilities, Capabilities, Expertise
Construction District Liaison	• Operational representative assigned to a specific geographic area. Works with District Section Engineers.
Alternative Delivery Program Manager	• Helps when alternative project delivery is used (design-build, General Engineering Consultant (GEC), Construction Manager/General Contractor (CM/GC)).
Division of Construction Procurement	
Branch/SME	Responsibilities, Capabilities, Expertise
Plans, Specifications, and Estimates (PS&E) Branch	• Before letting, assembles bid documents. • Can help if unique bidding requirements are needed. Facilitates the answering of contractor questions during bidding.
Division of Environmental Analysis	
Branch/SME	Responsibilities, Capabilities, Expertise
Project Management Branch (Environmental Project Managers)	• Responsible for overall management of the environmental process, including coordinating information between Districts, SMEs, and consultants. • Assists with noise, underground storage tanks (UST), and hazardous materials (Hazmat). • Manages the statewide Environmental Studies Services Contract.
Ecology and Permitting Branch (Biologist, Ecologist)	• Coordinates with US Fish and Wildlife and Kentucky Department of Fish and Wildlife. • Coordinates with US Army Corps of Engineers Permitting and Kentucky Division of Water (on Water Quality Certifications). • Assists with Kentucky Pollutant Discharge Elimination System (KPDES) Construction Stormwater Permits. • Manages the statewide Biology and Permitting Services Contract.
Cultural Resources Branch (Archeologist, Cultural Historians)	• Coordinates with the Kentucky Heritage Council (SHPO). • Manages the statewide Environmental Cultural Historic and Archeological Studies Services Contract.

Table 1 (Continued): Subject-Matter Experts by Division

Division of Highway Design	
Branch/SME	Responsibilities, Capabilities, Expertise
Pavement Branch	• Assists with pavement design technical support and approval. See *Highway Design Manual* **(HD-1001)** for levels of approval.
Technical Support Branch	• Offers technical support for highway design software (Bentley products) and equipment.
Drainage Branch	• Reviews and approves drainage folder and provides drainage-related support. • Each District is assigned a Drainage Branch SME representative.
Quality Assurance Branch	• Performs constructability reviews (can assign a Constructability Reviewer**)** and value engineering studies, if applicable.
Roadway Design Branch	• Location Engineer serves as a liaison between the District and Central Office and coordinates with Central Office and outside agencies (e.g., FHWA).
Plan Processing Branch	• Reviews biddability and buildability of plans from check print submittal to contract plans.
Division of Maintenance	
Branch/SME	Responsibilities, Capabilities, Expertise
District Permits Engineer	• Typically assists with encroachment permits if an ongoing permit is in process.
Division	• Assists with roadside-related elements if landscaping or rest areas are involved. • Assists with bridge preservation if an existing structure will be rehabilitated. • Oversees master agreement contracts that could be used to accomplish project goals (e.g., Guardrail Components, In-Place Asphalt, In-Place Concrete, Slide Repair).
Division of Planning	
Branch/SME	Responsibilities, Capabilities, Expertise
District Planning Supervisor	• Will help in requesting traffic counts, including intersection turning movement counts. • Will help in requesting a traffic forecast. • Coordinate with Metropolitan Planning Organizations (MPO) and Area Development Districts (ADD).
Division	• If the project disrupts a permanent traffic count station will provide plans and estimate for replacement.

Table 1 (Continued): Subject-Matter Experts by Division

Division of Right of Way and Utilities	
Branch/SME	Responsibilities, Capabilities, Expertise
Appraiser	• Establishes a fair value for the properties acquired as part of a project. Typically, consultants serve as appraisers.
Acquisition Agent	• Responsible for purchasing properties. Can be District staff or a consultant.
Review Appraiser	• Reviews each appraisal on a project to judge format and acceptability. Typically review appraisers come from other Districts.
Relocation Agent	• Provides relocation assistance and delivers relocation checks. Can be District staff or a consultant.
Utility Agent	• Helps review utility relocation plans and estimates as well as writing agreements. Can be District staff or a consultant.
Statewide Railroad Coordinator	• Assists on projects with railroad involvement.
Division of Structural Design	
Branch/SME	Responsibilities, Capabilities, Expertise
Geotechnical Services	• Develops geotechnical reports in-house and reviews geotechnical reports prepared by consultants.
Structural Design	• Designs structures (bridges, box culverts, retaining walls, miscellaneous structures) and reviews/approves structure plans developed by consultants.
Division of Traffic Operations	
Branch/SME	Responsibilities, Capabilities, Expertise
Traffic Engineering	• Assists with traffic signals, beacons, lighting, and panel signs.
Systems Operations Branch	• Assists on projects where coordinated signals are present.
Traffic Design Services Branch	• Designs and reviews electrical plans and the statewide Design of Electrical Devices Contract.
Traffic Safety Branch	• Assists on HSIP projects and provides safety guidance for all project types.
Public Information Officers	
Branch/SME	Responsibilities, Capabilities, Expertise
District Public Information Officer	• Provides information to the public on projects and Cabinet activities. In some cases a consultant can be used to fulfill PIO responsibilities.

2.3. External Team Members

Some PDTs need to have members from outside of KYTC or the consultant(s) working on the project. Examples include representatives from:

- Federal Highway Administration (FHWA)
- Metropolitan Planning Organizations (MPO)
- Area Development Districts (ADD)
- Local Public Agencies (LPA)
- Other stakeholders as needed

On federally funded projects, decisions about including a FHWA representative on the PDT are contingent on the level of risk (see Risk-Based Project side note), whether the project modifies access to the Interstate System, and the type of environmental document. The PM should coordinate with the Location Engineer to determine if FHWA needs to be represented on the PDT.

Red Flag: If the PDT will include external members from outside KYTC or the consultant(s) working on the project, clearly define their roles and responsibilities.

Side Note: FHWA identifies projects classified as Risk-Based Projects as carrying a project risk that may benefit from its oversight. Oversight can occur at any stage in the project development process. Throughout the year, FHWA assesses Federal-aid program projects and compiles a list of projects that have this designation. The PM should coordinate with the Location Engineer to determine if a project has this designation.

Side Note: Changes in access to the Interstate System must follow the current FHWA Policy on Access to the Interstate System. They also require an Interchange Justification Study (IJS) if new access is proposed or an Interchange Modification Report (IMR) if existing access is being altered. IJS/IMR guidance can be found in section HD-203.3.10 of the *Highway Design Manual*. The PM should also coordinate with the Location Engineer to determine if an IJS or IMR is needed. If required, the PM should (a) factor into the budget the cost to develop this study/report and (b) factor into the schedule the time needed to develop the study/report and receive FHWA's approval.

3. Project Development Team Member Selection

PDT composition depends on the project needs and resources required to execute the project. This means the PM must find the *right* people with the *needed* skill sets who are *available* to deliver the project. To identify PDT members, PMs can follow the four-step process described below.

Step 1: Identify project needs.

Step 2: Break down project scope into smaller units and determine deliverables, milestones, and approvals needed.

Step 3: Identify project development team members (core team, SMEs, external) needed based on Steps 1 and 2. Specify who is responsible for approving different parts of the project.

Step 4: Determine whether team members identified in Step 3 are to be KYTC staff (District and/or Central Office) or consultants. This is based on availability and the expertise needed.

3.1. Step 1 — Project Needs

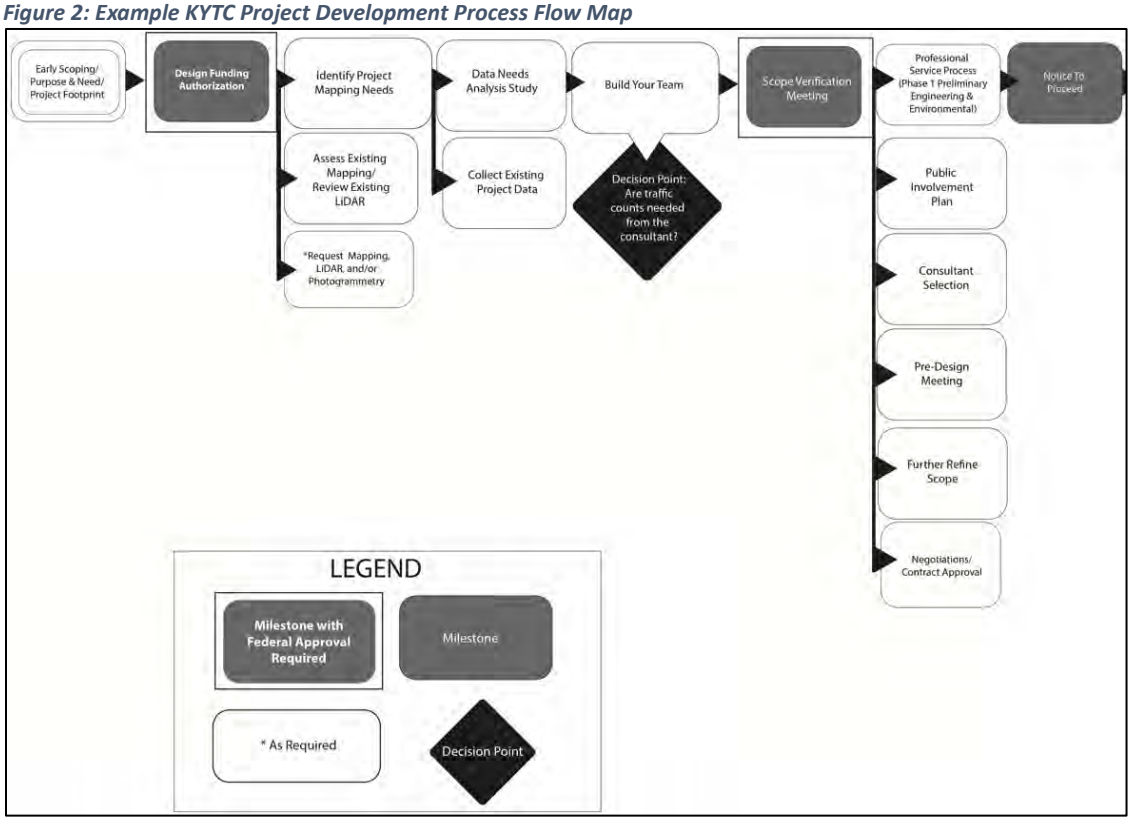
The PM must understand the entire project's needs and build their team accordingly. Below are factors that should influence the selection of PDT members.

- Project schedule and milestones
- Project budget and funding source
- Project complexity
- Identified performance issues
- Difficulty obtaining right of way
- Environmental impacts and mitigation
- Utility relocations, including railroad involvement
- High profile project (*potentially politically sensitive or controversial*)

3.2. Step 2 — Project Scope Breakdown

Once PMs understand project needs, they develop and break down the project scope. Process flow maps are valuable tools for helping PMs assemble PDTs. These maps break down the project scope and deliverables into smaller pieces, illustrate how they fit into the project development process, and show relationships between them. Project milestones, including those needing federal approval, can also be shown. The PM can use the process flow map to list PDT members needed to deliver each piece of the scope and achieve milestone approvals. Figure 2 is an example process flow map for a KYTC project.

Figure 2: Example KYTC Project Development Process Flow Map



Example process flow maps for typical KYTC capital improvement project types can be found on the Kentucky Transportation Center's website: Typical KYTC Project Process Flow Maps.

3.3. Step 3 — Project Development Team Member Identification

Once the PM has a good knowledge of the project needs, deliverables, milestones, and approvals, they can begin listing PDT member positions. During this process, the PM must communicate with different user divisions and SMEs to determine if their expertise will be required. Staff (e.g., Location Engineer, District Environmental Coordinator) can help facilitate these discussions.

3.4. Step 4 — Resource Determination

With PDT members identified, PMs can identify the resources needed for specific activities. PMs have several options for accomplishing this work, including:

- Use of in-house KYTC staff (from within the District, another District, or Central Office)
- Statewide consultant service contracts
- Consultant services obtained through the Division of Professional Services

When deciding on which resources to use, PMs need to consider staff availability (i.e., do they have the bandwidth to take on work when needed), project schedule, and level of expertise needed for a particular task or work unit. For more information on using consultants, refer to the PMGB articles *Utilizing Statewide Contracts* and *Selecting a Consultant*.

Red Flag: Because many projects take several years to progress through the project development process, staff availability and commitments can change over time. It is important for the PM to keep communication open with PDT members, even if their services are not needed until some point in the future, since their inability to execute work can put pressure on the project schedule and impact the project budget (e.g., if the budget did not account for retaining a consultant to accomplish the work).

4. Project Development Team Checklist

Though not required, PMs can use the *Project Development Team Checklist* (insert hyperlink to the Excel file) when they assemble PDTs. The checklist breaks the PDT down into its three components (core team, SMEs, and external members), lists typical PDT members for a capital improvement project, and provides space for additional team members. PMs can also use it to identify what resources are needed, including District Office staff, Central Office staff, or consultants.

5. Associated Articles

PMGB – Project Schedule and Development of Milestones (In progress)

PMGB – Utilizing Statewide Consultants (In progress)

PMGB – Selecting a Consultant (in progress)

6. Reference Documentation

PM Bootcamp: Building the Right Team and Managing Consultants Presentation

WSDOT Project Management Guide, Assemble the Team: https://wsdot.wa.gov/engineering-standards/project-management-training/project-management/project-management-guide

WSDOT Initiate and Align Worksheet: https://wsdot.wa.gov/sites/default/files/2021-10/ProjectManagement-InitiateAlignWorksheet.docx

Highway Knowledge Portal, Division of Construction

Highway Knowledge Portal, Division of Construction Procurement

Highway Knowledge Portal, Division of Environmental Analysis

Highway Knowledge Portal, Division of Highway Design

Highway Knowledge Portal, Division of Maintenance

Highway Knowledge Portal, Division of Right-of-Way and Utilities

Highway Knowledge Portal, Division of Structural Design

Highway Knowledge Portal, Geotechnical Investigations – Where to Begin and How to Proceed

Highway Knowledge Portal, Division of Traffic Operations

Highway Knowledge Portal, Build Your Team

KYTC Highway Design Manual Guidance Manual, HD 202.4

"Is My Project on Schedule?" Critical Path Project Templates

List of Terms

Project Manager

Project Development Team

Project Development Process

Subject Matter Expert

District Project Development Manager

Location Engineer

Constructability Reviewer

Managing Consultant Contracts	Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1. When Does KYTC Use Consultants	x	x	x	x
2. Scope Determination	x	x	x	
3. Other Scope Items	x	x	x	
4. Consultant Management During Project Development	x	x	x	
5. Pay Estimates	x	x	x	x
6. Consultant Evaluations	x			
7. Close Out and Final Pay Estimate	x	x	x	x
8. Quality of Provided Services	x	x	x	x
x = Information from the topic may be applicable for the project classification.				

1. When Does KYTC Use Consultants?

KYTC uses consultants when it lacks in-house resources and/or expertise to complete work. Collaborating with consultants helps the Cabinet deliver more projects on schedule and with greater technical expertise. Successful completion of projects is only possible if KYTC and consultants build partnerships founded on strong cooperation, robust communication, mutual support, trust, and confidence, and the integrity of the selection process. An understanding of how to effectively manage consultants helps Cabinet Project Managers (PM) deliver projects.

This series of articles review key activities associated with consultant management, including:

- Differentiating PM responsibilities and consultant responsibilities to ensure the project purpose and need is met
- Determining the scope of work and understanding contract documents
- Advertising for professional services and selecting consultants
- Managing consultants as they deliver project requirements

Additional guidance can be found in the *Professional Services Guidance Manual*, the *Highway Design Guidance Manual* (HD-205) and the *Planning Guidance Manual* (PL-206).

2. Scope of Work Determination

The first and perhaps most important dimension of project delivery is determining the scope of work and communicating to prospective consultants how much effort is needed to deliver the scope. Establishing the scope of work sets expectations related to the project's schedule and deliverables and is used to determine the approximate consultant fee.

Definition: The scope of work is all the products, services, and results delivered as part of a project (Project Management Body of Knowledge, p. 561). The PM develops the scope. The following information should be included in a project scope (*Highway Design Guidance Manual,* HD-202.6.3):

- Project type, description, and limits
- Aspects of roadway performance that need improvement
- Draft purpose and need statement
- Roadway characteristics
- Options that may be considered
- Design criteria
- Proposed access control
- Project estimate, programmed budget, and possible funding types
- Potential environmental impacts and constraints
- Right-of-way requirements
- Utility impacts
- Constructability and maintenance of traffic
- Number and types of structures
- DNA Studies, Planning Studies, or other relevant available studies
- Necessary prequalification services
- Schedule of proposed deliverables and milestone dates
- Area map

The *Planning Guidance Manual* (PL-206.3) includes a similar list for scoping planning studies.

Establishing a complete and clear scope of work before initiating a project ensures KYTC and the consultant understand expectations and can accomplish project goals within the expected timeline while reducing the potential for misunderstandings and conflicts.

The initial scope for most capital improvement projects is typically defined in the *Enacted Highway Plan*, which outlines a project's expectations, funding, schedule, and budget. A project in the *Enacted Highway Plan* is commonly referred to as a *promise*.

On some projects the scope of work may support the use of single or multiple statewide contracts. Whether statewide contracts are used typically depends on the project schedule and budget, and whether the required prequalification services were included in the advertisement. If the schedule is time-constrained, statewide contracts let the PM issue the notice to proceed for a consultant faster. However, some limitations with this approach must be considered (see the HKP article *Utilizing Statewide Consultant Contracts*).

The scope of work in the consultant advertisement expands on the initial scope that appears in the *Enacted Highway Plan*. It typically details engineering services requested by KYTC. Examples of scope items within a preliminary engineering and environmental services project may include:

- Gantt chart with scheduled milestones
- Preliminary Line and Grade plans
- Existing ground survey

- Conduct public involvement
- Traffic and safety analysis
- Develop construction cost estimates
- Identify right of way and utility impacts
- NEPA documentation
- Develop Design Executive Summary
- Risk Analysis Matrices
- Prepare Drainage Folder/Advanced Situation Folder

For capital improvement projects, a best practice is to include a statement in the advertisement that indicates a contract modification may be used to advance the project to final design after preliminary engineering is finished. This affords the project development team (PDT) the flexibility to continue with the current consultant, perform work in-house, utilize a statewide contract, or advertise for a new consultant to deliver the final design deliverables.

3. Other Scope Items

Because many sources of knowledge are needed to develop an initial scope, the PM must anticipate what types of expertise are required to deliver the project. For example, on a typical roadway design project, a consultant specializing in roadway design is needed. KYTC will also likely require expertise on geotechnical issues, environmental concerns, traffic, and structures to deliver all aspects of the project. The PM must communicate with different User Divisions and subject-matter experts (SMEs) to determine if their expertise will be required.

In-house capacity and expertise dictate how KYTC completes the work. Options include:

- Performing the work in-house
- Utilizing a Division's on-call contracts (statewide contracts)
- Including work in the project advertisement

The PM may choose more than one of these options on a project. For example, a PM may elect to use in-house services for the geometric design and geotechnical investigations but opt for statewide contracts to perform services for which there may be limited resources, such as traffic modeling.

The PM determines required prequalifications for work included in the project advertisement (see Selecting a Consultant). Some scope items may be included in the initial advertisement as contingent prequalifications. These prequalifications are not required within the initial proposal as it is uncertain as to the extent practicable if they are necessary. Should the need for these services arise during current or future phases of project delivery, the selected consultant team must obtain the required qualifications before providing those services or bring on a prequalified subconsultant at that time. If that requires the addition of a subconsultant to the team, the subconsultant must be approved by KYTC.

As project complexity and difficulty increases, PMs should consider whether to retain other types of professionals. Decisions about what forms of expertise are needed should be made in consultation with user divisions and SMEs. For example, communication with the public is critical on many projects. If the PDT decides a project warrants special attention to communication (e.g., social media, outreach), KYTC should consider using public involvement and/or communication professionals to leverage the power and

reach of different media outlets. Advertisements must describe all the specialized engineering resources needed (e.g., traffic modeling and simulation, visualization techniques, tolling expertise).

Red Flag: Any prequalified service which is not included in the advertisement will not be permitted on the contract. If it is possible that a prequalified service will be needed for the project, it should be included in the advertisement. However, including prequalified services that are not needed could limit consultant competition. It is imperative that the PDT and Professional Services balance the merits of bundling prequalification services while not overburdening consultant's response.

4. Consultant Management During Project Development

Once the KYTC PM and the PDT are in place and a consultant has received a notice to proceed, KYTC's foremost goal is project delivery. The PM is responsible for delivering the overall project. Consultants are team members who deliver the scope of work agreed upon in their contract and must appease the PM. A PM should not ask consultants to deliver more effort than they are obligated to under the terms of their contract and should allow reasonable production-hours to complete the services. A good consultant provides deliverables on time and at the level of quality that has been agreed to in the contract and within an expected fee for engineering services.

Clear and consistent communication between the PM, PDT (including all SMEs (i.e., environmental, structural, planning, traffic)), and consultant is imperative for ensuring all parties deliver products on schedule and meet project milestones or scheduled deliverable dates. Managing milestones is a key part of project delivery and maintaining the project's critical path. The HKP article *Project Schedule and Development of Milestones* lists common milestones that apply to most capital improvement projects. PMs can use one of KYTC's milestone lists, but they also have the authority and flexibility to add/subtract specific milestones.

A good resource for managing consultants and milestones is the *Consultant Monthly Report (CMR).* Consultants submit this report each month and attach it to all pay estimate submissions. The first *CMR* for a project must include a milestone page which lists all milestones specified in the consultant's contract along with departmental obligations and other items on the project's critical path (e.g., timeframes for outside review). A milestone page should also be included in the *CMR* when milestone dates are changed or have been met. Milestones must specify a date, unless the milestone is not required — in which case, indicate the date is *Not Required (NR)*.

The consultant provides statements that report progress and mention actions required of KYTC (e.g., *Conceptual Design Report submitted June 10 – awaiting approval*.) PMs should issue a response to this information within one week of receiving it and indicate actions the consultant needs to perform. A chronological order of events should be provided in the History and Project Documentation listing at the back of the *CMR*. If necessary, the consultant or the PM can include attachments on additional pages. Once both parties address outstanding items, the PM approves the *CMR* and sends copies to the consultant, Location Engineer, and relevant KYTC divisions and branches (e.g., submit the discussion of environmental issues to the Division of Environmental Analysis).

The Cabinet PM must prioritize building a strong relationship with the consultant PM. A good relationship — combined with direct and routine communication — is just as valuable as a *CMR* for managing consultants. Maintaining good communication is critical for making progress, hitting milestones on schedule, and determining whether KYTC staff are meeting their responsibilities.

Cabinet PMs oversee many projects at the same time, which makes it challenging for them to provide the level of attention individual projects need. Making the consultant responsible for as much of the project as possible is an advantageous strategy. However, this may not be possible if KYTC needs to use in-house resources. A reliable consultant PM facilitates the Cabinet PM's job and works to ensure projects are delivered on time, within budget, and at the expected quality as promised. The consultant PM must understand their responsibilities and demonstrate they can deliver on their obligations. The Qualifications Based Selection (QBS) process helps ensure this occurs. For more information, see *Consultant Evaluations* below.

Red Flag: The consultant PM is a key member of the project team. Often, KYTC selects a particular consultant based on the consultant PM. A consultant should not change their PM without Cabinet approval. However, KYTC or the consultant may strengthen the consultant team by adding a new subconsultant if the Cabinet PM approves the change and the new firm is prequalified in the necessary service area(s).

5. Pay Estimates

The consultant routinely submits pay estimates as progress is made (typically every month) using the *Engineering and Engineering Related Services Pay Estimate (TC 40-408)* form. The form includes specific pay estimate instructions. The Personal Service Contract (PSC) invoice form must be submitted with each invoice.

The *CMR* is attached to the pay estimate. The original contract and subsequent contract modifications specify maximum payment percentages at corresponding project milestones. The PM is responsible for determining if the pay estimate is consistent with progress described in the report and project milestones. The pay estimate should only be approved for the portion of work completed. If the pay estimate is consistent with the *CMR* and PSC, the PM emails the pay estimate and supporting documentation with appropriate signatures and statements of approval to KYTC's consultant estimate accounts group for further payment processing. For more information see the HKP article *Reviewing a Pay Invoice*.

6. Consultant Evaluations

Throughout project development PMs should communicate performance-related concerns or issues to the consultant. This gives the consultant the opportunity to adjust and improve. PMs overseeing capital improvement projects formally evaluate consultant performance at designated milestones (e.g., conceptual design approval, joint inspection approval, contract plan submittal).

To facilitate continual communication and evaluation, PMs may reasonably expect to receive partial products and intermediate design details in formats that allow for timely review and feedback. Each Division has its own methods for evaluating consultants. The Location Engineer and PM, possibly with input from the SMEs, complete independent evaluations for consultants working in different disciplines at different stages of project development. When completing evaluations consider items such as:

- Consultant pay estimates and monthly reports
- Design Executive Summary
- Value Engineering Studies
- Quality and timeliness of required submittals
- Adherence to project budget
- Meeting documentation

Evaluation forms and instructions are available on the Division of Highway Design's intranet website.

The PM can justify and contextualize scores (e.g., degree of project complexity) in the evaluation's comments section. Once the consultant receives the evaluation, if they disagree with the assessment, they may request an appeal within 30 days through the director of the Division of Highway Design. The director then discusses the evaluation with the PM, Location Engineer, and/or appropriate SMEs to determine whether a reevaluation is warranted. If applicable, the director communicates reevaluation results to the consultant.

Performance evaluations are also submitted for some projects developed through statewide contracts. Depending on the type of contract, they may be completed at the conclusion of each Letter Agreement or at the end of the contract term. These scores provide valuable feedback to the consultant and greatly assist future selection committees by demonstrating the strength of incumbent consultant(s) currently providing services on similar contracts.

Red Flag: One evaluation factor used in the QBS process is past performance. Consultant selection committees can access all relevant performance evaluations, which can significantly impact consultants' abilities to win new projects. It is extremely important that a PM provides honest and constructive feedback during project development to ensure that consultants deliver products whose quality meets KYTC expectations. This also provides opportunities for consultants to improve the overall quality of their deliverables and services.

7. Closeout and Final Pay Estimate

For projects with construction lettings, the closeout process may begin when the construction contract is awarded. On projects with different final deliverables (e.g., bridge inspections), the closeout process begins with the agreed-upon final submittal. The PM may leave the contract open during construction if design tasks are possible during construction.

Some contracts may automatically close based on their end date in the eMARS accounting system, which is one year after the final milestone. Contracts will also close each fiscal year if the remaining balance in eMARS is less than $1,000. When a contract requires additional work, the PM must tell the consultant to maintain a balance of $1000, if possible.

Once a project is complete, the PM submits final pay estimates with documentation to the Location Engineer so they can complete the Consultant Closeout Form. The Location Engineer uses this form to check that all deliverables have been submitted and that all necessary approved documents (Final Drainage folder and Pavement Design folder) are in ProjectWise. The Location Engineer reviews and submits the final pay estimate to the Division of Professional Services for final closeout.

If remaining encumbrances are not spent, the consultant should send a letter that states all work is complete and that no additional charges will be made. This may not apply to most lump sum contracts, but the situation is more common with cost-plus-fixed-fee, estimated unit price, or specific rate of compensation contracts. For example, if a project's geotechnical work is not billed at 100 percent in a lump sum contract, a copy of the final geotechnical project charges and work performed should be submitted with the letter.

If the budget has a negative balance the PM must submit a funding request to the Division of Program Management before the final payment can be made. The funding request should be enough to cover the negative amount. This situation typically arises due to in-house charges because the consultant contract had funding encumbered when contract was signed. For more information, refer to the HKP article *Project Cost Estimation and Management, Section 3.2 (Project Cost Management and the Role of Budgets).*

Upon receipt of the final pay estimate, the PM and Location Engineer must submit final consultant evaluations. For project-specific highway design contracts, the consultant's final rating is the average of PM and Location Engineer's scores. The Transportation Engineering Branch Manager of the Roadway Design Branch sends the Final Consultant Evaluation to the consultant along with a letter noting the average rating.

The Roadway Design Branch also notifies the Division of Professional Services of the scores, that the consultant has completed all project work, and that no further charges are needed. Each statewide letter agreement is reimbursed, although statewide master agreement contracts are not closed until all assignments under the contract are complete. When applicable, PMs should request that the design phase program be closed once payment is made. Before cost-plus contracts are closed out, the Division of Professional Services must advise the Office of Audits External Audits Branch Manager to audit the contract for any necessary cost adjustments. Although not required, the Office of Audits also currently provides audits for some lump sum contracts. These post-audits help understand trends across the Cabinet and for specific firms, provide a sense of accuracy of previous negotiations, and help negotiate future services.

Use the following checklist to close out a consultant contract.

Criteria	Complete? (Y/N)
All work has been accomplished and products delivered • Determination made by the PM and/or Location Engineer after conferring with all appropriate Central Office divisions (e.g., Highway Design, Structural Design, Environmental Analysis, Geotechnical Branch).	
All necessary consultant evaluations	
Audit of cost-plus contracts by Division of Professional Services	
All payments processed	

8.0 Quality of Provided Services

KYTC has adopted several practices to ensure that consultants and subconsultants provide high-quality service. A prequalification process (see the HKP article *Selecting a Consultant*) verifies that a consultant has the experience and resources needed to perform a service. The RFP, consultant's scope of work, consultant's contract, pre-design conference or scoping meeting minutes, and other meeting minutes should inform the consultant of the standards and expectations. Regular communication throughout project development between the KYTC PM and the consultant PM also helps to ensure the Cabinet receives the expected quality of service.

In addition to the project team's review, a Constructability Review (CR) of plans and estimates may minimize the need for expensive change orders that result from design errors and omissions and to evaluate the buildability of record plans before letting.

To maximize the benefits of Constructability Reviews, the review should occur at key stages of the design process. The PM may contact the Quality Assurance Branch in the Division of Highway Design to request a review. The Quality Assurance Branch also facilitates post-construction reviews, the goal of which is to better understand how the design process and design standards can be improved so that errors and omissions are minimized.

A consultant evaluation completed by the Cabinet PM should accurately reflect the quality of service provided by a consultant. PMs can reference a database of consultant evaluations when deciding on a consultant for future projects.

9.0 Associated Articles

Project Manager's Guidebook – Knowledge Book

Administration of Consultant Contracts – Knowledge Book

Project Schedule and the Development of Milestones

Project Cost Estimation and Management

10.0 Reference Documentation

KYTC'S *Professional Services Guidance Manual*

KYTC's *Highway Design Guidance Manual*

KYTC's *Planning Guidance Manual*

Selecting a Consultant	Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1. Prequalification	x	x	x	
2. Advertise	x	x	x	
3. Selection Process	x	x	x	
x = Information from the topic may be applicable for the project classification.				

1. Prequalification

A consultant must meet KYTC's prequalification requirements for the engineering and engineering-related services it will provide. Consultants apply for and maintain prequalification status through the Division of Professional Services (see *Professional Services Guidance Manual*, PS-15-03). The Division of Professional Services website maintains a current list of prequalified firms in 15 service areas (e.g., roadway design, geotechnical services) and over 70 prequalification categories.

Based on the resource determination and identified project needs, the Project Manager (PM) should assemble an appropriate Project Development Team (PDT). Building a PDT whose expertise and availability can accomplish project goals in a timely manner will help identify the prequalification requirements. For more information, see the HKP article *Build Your Team* and Highway Design Guidance Manual (HD-205, *Consultant Contract Administration*).

Red Flag: A consultant must be prequalified in a given service area to perform work for KYTC in that area.

Red Flag: Any modification to an existing service contract is limited to services for which the prequalification was sought in the original advertisement. If services were not included within the original advertisement, the Cabinet must either perform the services in-house, assign the services under a statewide contract, or readvertise for additional services.

Red Flag: If a prequalified service is potentially needed but uncertainty remains over whether it will ultimately be required, include the following note in the advertisement:

> *These prequalifications are not required with the initial proposal as it is uncertain to the extent practicable if they are necessary. Should these services become necessary during the delivery of the project in this or future phases, the selected Consultant team must obtain the required qualifications before providing those services or bring on a prequalified subconsultant at that time.*

2. Advertise

KYTC hires consultants when in-house staff cannot perform work due to unavailability, time restrictions, or lack of specialized skills. After the project is scoped and a decision is made by the District Project

Development Branch Manager or the PM to use a consultant, the first step is to advertise with a bulletin issued by the Division of Professional Services. Bulletins are typically released on the second Tuesday of each month at 9am ET. These monthly collections of advertisements are also referred to as Requests for Proposals (RFPs). Their purpose is to educate consultants about the scope, schedule, and approximate fee of the advertised project(s).

The Cabinet uses a Qualifications Based Selection (QBS) process as defined by the Brooks Act of 1972 to select the consultant best qualified to deliver the requested services. A QBS process employs evaluation criteria such as:

- Relative experience of consultant personnel assigned to the project team
- Capacity to adhere to the project schedule
- Past record of performance on projects of a similar type and complexity
- Project approach and proposed procedures to deliver the services
- Special or unique expertise
- Special or unique equipment
- Knowledge of the locality and familiarity of the general geographic area

The PM, in conjunction with the division the consultant will work on behalf of (i.e., the user division), may recommend different evaluation factors and assign relative weights to these factors. If this occurs, the evaluation factors and their relative weights must appear in the advertisement.

Red Flag: KYTC uses a QBS process to select the firm best qualified to perform the work on a project based on demonstrated competence and qualification for the required type of professional services. As regulated by the Federal Brooks Act of 1972, 23 CFR § 172.7, the Kentucky Model Procurement Code (KRS 45A), and Title 600 KAR Chapter 6, the fee for the service is negotiated independently of the selection and should not be a criterion for choosing the most qualified firm.

Red Flag: The number of projects that can be advertised each month is limited. The Division of Professional Services works with the State Highway Engineer's Office, District Project Development Branch Managers, and User Divisions to publish a biennial list of potential project advertisements which is constantly updated. These lists are posted on the Division of Professional Services website. Districts routinely advertise for project-specific contracts, which are funded by the Enacted Highway Plan, while Central Office Divisions typically offer statewide service contracts for specific services. PMs should contact the Division of Professional Services when they know consultant services are needed and work with division staff to start the process. Otherwise, a project could be delayed by the advertisement and selection process. Typically, four months elapse between advertisement and KYTC issuing a notice to proceed.

The Division of Professional Services prepares the procurement bulletin with input from the PM and user divisions. The bulletin may contain one or more advertisements for services. The advertisement must include:

- The general project scope
- Procedures to follow when submitting a proposal
- An anticipated project schedule
- Any requirements for DBE utilization
- Deadline for filing a response

- Evaluation factors and their relative weights selection committee members will use to evaluate responses
- An anticipated procurement schedule, including a timetable for the selection committee's meetings
- Prequalification requirements, including a list of services the consultant must be prequalified in by the response due date
- A list of selection committee members

The PM should provide, at a minimum, the following information for the advertisement as it helps communicate the project scope:

- County
- Route
- District
- Item number (if known)
- Project description
- PM name
- User Division(s)
- Approximate fee or maximum fee, if applicable
- Type of contract
- Purpose and need
- Scope
- Method of design
- Available pertinent KYTC studies
- Funding source
- Deliverables
- Special instructions
- Project schedule milestones
- Environmental information
- Evaluation factor recommendations (when appropriate)

Sample Procurement Bulletin Listing

3. Selection Process

Once consultants submit their responses, the selection committee proceeds with the selection process. The selection committee has five voting members:

- Two (2) professional engineers from the Secretary's pool
- Two (2) professional engineers from the User Division (the PM is typically one of these)
- One (1) member from the Governor's pool

In addition, a merit employee from the Office of the Auditor of Public Accounts may serve as a non-voting member of the committee.

Red Flag: Consultants shall have no contact with selection committee members concerning the projects advertised once the bulletin is made public. Selection committee members must sign a Certification of Confidentiality for each project to affirm they have had no contact with respondents.

At a minimum, the selection committee usually meets twice. These meetings are now typically held virtually. During the first meeting, the PM presents a brief overview of project details that will help the group evaluate proposals, answers questions from committee members, and explains the requested services. Division of Professional Services staff are available to answer procedural questions from the committee and to document the process. Committee members receive a link through the Consultant Portal to each consultant response when the deadline closes. They also receive a rating sheet with qualification factors and relative weights as well as Confidentiality (TC 40-4) and Ex-Parte Disclosure (TC 40-6) forms.

Before the second meeting, each committee member reviews proposals and develops a preliminary evaluation with a numerical rating for each consultant. During the second meeting, the committee discusses the responses and their evaluations in an executive session. Each member submits their top three (3) firms and any ties. For statewide contracts where the committee will select multiple firms each member submits the total number of firms to be selected plus their next two firms. After all necessary discussions and voting concludes, the committee identifies and ranks the winning firm(s), the runner up, and the second runner up. Next, the committee chair notifies the Director of Professional Services or their designee of the selection results. The chair or their designee notifies the selected consultant(s) of their selection. The PM and PDT next begin negotiating the contract.

Note: The process described in this article applies to the typical consultant advertisement and selection process for project-specific and statewide contracts. The process differs for alternative delivery projects. KYTC's *Design-Build Guidance* includes information on advertising for and selecting a design-build team. Consult the Alternative Delivery Program Manager in the Division of Construction for more information on other types of alternative delivery projects.

Breakout box: Tips for evaluating consultant responses:

- Consider weighted evaluation criteria when evaluating and rating firms.
- Each selection committee member's vote is weighed equally. However, PMs are contractually bound to the selected consultant for the life of the contract. When evaluating a response, it is important to be aware of past consultant performance.
- Develop justifications for consultant(s) endorsements to share with the committee. Remain open to other perspectives and give them an impartial hearing. Selection committee members may need to adjust their top selection(s) based on discussions at the final meeting.

- If selections for other projects have been made prior to the selection committee meeting, determine which firm(s) were selected, the project complexity, and how it would affect the capacity of the selected firm(s) to carry out the work on the project under consideration.
- Secretary's Pool and Governor's Pool members serve to support the User Division and ensure the PM is satisfied with the selected consultant(s) although the User Division is strictly forbidden from lobbying for any firm(s).
- Consultants that are not selected may request a debriefing with the selection committee. Questions from the consultant are provided in advance to the committee and are limited to the consultant's capabilities and the proposal being addressed. Be prepared to discuss potential concerns with consultants.

4. Associated Articles

Project Management Guidebook Intro and Overview (coming soon)

Knowledge Book – Administration of Consultant Contracts

Build Your Team

5. Reference Documentation

KYTC's *Highway Design Manual,* HD-205

KYTC's *Professional Services Guidance Manual*, 15-03

23 CFR 172

Understanding a Consultant Contract	Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1. Contracting Methods	x	x	x	x
2. Contract Process	x	x	x	x
3. Subconsultants	x	x	x	x
4. Contract Modifications	x	x	x	x
x = Information from the topic may be applicable for the project classification.				

1. Contracting Methods

Selecting a contracting method is critical for developing a scope and managing expectations to ensure a project meets KYTC's anticipated fee and schedule. Contracting methods KYTC uses for design-bid-build projects are described below. For more information on contracting methods for alternative delivery projects (e.g., traditional and progressive design-build, CM/GC, General Engineering Contracts (GECs)), contact KYTC's Alternative Delivery Program Manager in the Division of Construction Procurement. KYTC's Design-Build Guidance is also available through the Division of Construction Procurement's website.

Lump Sum

KYTC pays the consultant a fixed price for all negotiated work inclusive of all direct costs, indirect (overhead) costs, subconsultant fees, and a 15% profit margin on all direct and indirect costs for projects with fees less than $2 million. The profit margin for all direct and indirect costs for each firm on projects which exceed $2 million drops to 10%, with the exception of Disadvantaged Business Enterprises (DBEs). Other components of the consultant fee may include subconsultants, equipment, materials, cost of money, and any other direct costs.

It is critical that KYTC and the consultant agree on expected work products and price before work begins. Lump sum contracts are the best option when the scope and level of effort to complete engineering services is understood. KYTC uses lump sum contracts extensively because they require less project supervision, clearly identify a project budget, include well-established scope requirements project milestones and deliverables, and improve consultant efficiency.

KYTC reimburses consultants based on actual physical percent complete. The Office of Audits conducts post-audits on lump sum contracts, which serve as a basis for future contract negotiations. The KYTC PM often participates in this process by answering project-related questions. An annual summary of post-audits provides an opportunity to analyze trends across the board or on specific types of contracts or firms. This analysis leads to further adjustments to future negotiations or to provide guidance to the industry.

Cost Plus Fixed Fee

KYTC reimburses the consultant for all approved project expenses and pays a fixed fee for the consultant's services. The fixed fee profit margin for direct and indirect costs is capped at 10% and cannot be exceeded without prior approval. Project expenses include labor, overhead, subcontractors, equipment, materials, cost of money, and any other direct costs. The contract is negotiated in the same process as lump sum contracts, but the 10% fixed fee applies to direct labor and overhead costs.

The fixed fee incentivizes consultants to earn a profit while ensuring the Cabinet does not overpay for expenses. Consultants are reimbursed as work is completed. This arrangement gives KYTC maximum flexibility in assigning work.

This type of contract is the best option when it is difficult to determine the scope upfront. However, this contracting method has some drawbacks. Administration costs, internally and externally, can prove cumbersome and time-consuming. The consultant should advise the Cabinet when invoices reach 90% of the contract total to ensure that funding is available to process invoices if the contract exceeds the total. The Office of Audits performs a post-audit of cost-plus-fixed-fee contracts to determine cost adjustments to or from the consultant.

Specific Rates of Compensation

KYTC pays direct salary costs, salary additives, indirect costs, and a net fee. This form of contacting is typically used for specific types of engineering and/or engineering-related tasks where the Cabinet pays for a specific position (e.g., construction inspector). Calculations are typically provided as a loaded hourly wage rate per classification. This often includes hourly wages of the individual's pay rate, plus overhead, travel expenses, per diem expenses, profit, and all other direct and indirect costs incurred.

Cost Per Unit of Work

KYTC pays the consultant based on units of work completed. This method is appropriate when KYTC cannot define the extent of work but can accurately determine in advance the cost of work units. An example is the cost of geotechnical drilling, which is paid for by linear foot. While an amount is estimated to establish the anticipated cost, the actual amount of drilling necessary may vary. Nonetheless, the unit cost of drilling is well-defined.

2. Contract Process

After a consultant is selected, the Cabinet negotiates with the consultant and establishes a contract, adhering to policies in Kentucky Revised Statutes 45A (the Kentucky Model Procurement Code). The Cabinet attempts to negotiate fair and reasonable prices for all engineering and engineering-related services.

Following the consultant selection, the Project Manager (PM) arranges a pre-design conference or a scoping meeting. Before meeting with the consultant, the PM should have a solid understanding of project requirements. This ensures the scope of work, tasks, performance measures, and schedule are in accordance with KYTC goals (see HD-202.6). PMs should invite appropriate subject-matter experts (SMEs) because the conference provides an opportunity for KYTC and the consultant to clarify and document a scope, agree on work units and a schedule, and communicate expectations based on the established budget. Early coordination between all parties (e.g., Divisions of Environmental Analysis and Structural Design) can provide significant time savings during the estimation process. Key activities include:

- Reviewing project data to refine the purpose and need
- Reviewing the consultant's scope of work, anticipated level of effort, and tasks assigned to in-house personnel
- Discussing proposed work units for the consultant contract
- Discussing the selected consultant's Project Approach
- Determining key milestones, deliverables, and a project schedule

The consultant is responsible for drafting meeting minutes, which must be approved by attendees. A pre-design conference template is available on the Division of Professional Services website. The consultant is responsible for submitting work units for KYTC approval directly in the Consultant Portal for all project-specific contracts. The KYTC PM and the consultant PM should agree on units prior to entering them into the portal. Upon Cabinet approval of the units, the consultant and KYTC PM are each responsible for submitting their independent production-hour estimates. Currently, production-hour estimates for statewide contracts are still submitted via email using Excel worksheet templates. The PM should verify that the most recent versions of the production hour worksheet and descriptions are used. These can also be found on the Division of Professional Services website.

Each task required to deliver the project is defined in terms of a unit of measurement (e.g., linear feet, number of occurrences). Each discipline has a list of standard tasks associated with performing work. The PM can also work with individual Division SMEs to develop work units that will address their project needs. Examples of roadway design activities and their associated work units include:

- Study and develop horizontal alignments (miles)
- Study and develop vertical alignments (miles)
- Pre-size pipes (number of pipes)
- Study and development of intersection (each)
- Study and develop typical sections (each)
- Establish property and ownership (number of parcels)

Descriptions are important for clarifying what is included and what is not included in delivery of a specific work unit. Descriptions for individual work units have also been developed. The Division of Professional Services website provides access to a Production-Hour Descriptions document.

Side Note: The PM can add project-specific work units and associated descriptions not included on the Cabinet's standard list if the Project Development Team (PDT) determines additional tasks are needed to complete the scope of work. Additionally, they can adjust the descriptions for standard work items to better communicate the expected level of effort.

Side Note: The Division of Professional Services has developed a range of production hours typically accepted for most work units. PMs can use this information to develop their production hour estimate.

- If a consultant's production hour estimate for a discipline is **less than 500 hours**, the PM and SMEs can negotiate directly with the consultant without developing independent production hour estimates.

- If a consultant's production hour estimate for a single discipline **exceeds 500 hours**, the PM and SMEs as well as the consultant submit independent production hour estimates to the Division of Professional Services.

The consultant is responsible for submitting the consultant team's estimate for each work area directly in the Consultant Portal. The Division of Professional Services then determines what types of negotiations are appropriate and coordinates negotiations with the PM/SMEs and consultant.

Each KYTC division involved in the project prepares independent production hour estimates. The KYTC PM or SME is responsible for submitting the independent KYTC estimate for each work area directly in the Consultant Portal. For example, the Division of Traffic Operations generates production hour estimates for striping and signing plans, signal plans, and lighting plans. The PM and the User Division coordinate to ensure estimates are completed. The Division of Professional Services gathers production hour estimates from each division involved in the project.

Using the agreed-upon work units, the consultant submits its proposal and fee estimate. The fee must include a breakdown of the fee for performing the work ***and*** the following:

- A statement that the payment shall be based on the percentage of work completed
- The proposed project milestones and corresponding maximum percentage payments

The breakdown of the estimated fee must include:

- Cost of materials
- Direct salaries
- Overhead
- Payroll activities
- Other direct costs
- Indirect costs (such as travel and lodging if required)
- Operating margin (i.e., profit)
- Payout schedule
- Subconsultant costs (if applicable)
- Classifications and percentages for design
- Use of DBEs (if applicable)
- Facilities Capital Cost of Money (FCCM)

The Division of Professional Services compares the consultant's proposed hours with KYTC's estimate to:

(a) determine if the production-hour estimate is reasonable and

(b) identify areas of substantial difference that may require further negotiation

Negotiations focus on providing the consultant with adequate resources to deliver the project at KYTC's anticipated level of effort within the available budget. An additional meeting can be held if necessary to ensure all parties agree upon the scope of work.

After the production-hours, personnel splits, and other costs are approved the Division of Professional Services prepares an agreement or contract that describes the scope of services to be provided, method and amount of payment, milestones, partial payment percentages, deliverables to be completed, and

special provisions. The contract must be approved and signed by several parties including the Secretary of Transportation after acceptance by the consultant. The contract is then established and processed for eMARS approval. KYTC Division of Professional Services then submits to the consultant, and copies the KYTC PM, a notice to proceed. This indicates the consultant may begin work and bill for services. The Legislative Research Council (LRC) Government Contract Review Committee reviews the contract as well to verify it is acceptable. Typically, 3 - 4 months elapse between advertisement and KYTC issuing the notice to proceed.

3. Subconsultants

Many projects use subconsultants. Prime consultants retain subconsultants to provide required prequalification services they are not approved to perform or specialized services. KYTC and the Federal Highway Administration (FHWA) also have a specific goal to support the growth of smaller companies, specifically DBEs. Subconsultants must be prequalified with KYTC to perform the services they are assigned. Fee proposals submitted by prime consultants must include the amount of proposed subcontracted work. The subconsultant fee proposal must be based on the subconsultant's audited overhead and wage rates.

On any project, the prime consultant should perform at least 50% of the dollar value of the work. However, the Director of the Division of Professional Services may, upon recommendation of the User Division, waive the 50% requirement. This occurs frequently on large projects where a wide variety of services are needed, or additional resources are required (e.g., GECs).

Red flag: Typically, subconsultants are listed in a consultant's response to the announcement. However, they may be added later as well. Specific services may be added by contract modification if the initial advertisement permits doing so. The prime consultant may choose to bring on a subconsultant to provide these services. KYTC may also require a prime to supplement its team with a subconsultant to deliver specific services that will benefit the project. In all cases, subconsultants added to the team must be prequalified to perform those services and must be approved by the PM and Division of Professional Services.

3. Contract Modifications

PMs must understand how scope changes affect milestones, project delivery, and project budgets. Based on this knowledge, they must diligently manage the scope throughout project development. SMEs, public officials, interested parties, and the consultant may attempt to influence a project's outcome by changing and/or increasing or reducing the scope. Although unforeseen developments can warrant a change in scope, the PM should resist scope changes. Significant scope changes should be approved by the State Highway Engineer's (SHE's) office.

If the amount of work or time allotted for a project is adjusted, a contract modification may be necessary. Due to the nature of the engineering services, some deviations in the original scope of work may be inevitable as the project progresses. However, the PM and Location Engineer should be judicious when considering additional work because additional services may demand a contract modification. Modifications are permitted under the following conditions:

- Change in termini or typical section
- Addition of major phases of work to project scope (i.e., moving from preliminary engineering to final design)
- Modification of previously approved work resulting from factors beyond the consultant's control

- Modification of a major item if (a) the item is designated as a basis of the original negotiations and (b) the conditions for a contract modification consideration are identified in the original contract
- Delay by the Cabinet as outlined in each contract
- Use of a subconsultant for services previously slated to be done by the prime firm or other subconsultant
- Availability of current audit
- Direction from the Cabinet to a new initiative (e.g., OpenRoads Design, digital delivery)
- Formally document items which were previously contracted but not completed, resulting in a net negative contract modification fee

After discussing contract modifications with the PM, consultants must formally request contract modifications directly through the Consultant Portal. They can also be requested by the KYTC PM, Division of Professional Services, District Office, or User Division.

Contract modifications that change the consultant's fee must be negotiated using the same procedure employed to negotiate the original contract. Other modifications (e.g., time extensions) should be justified in writing. PMs coordinate with Divisions affected by a proposed contract modification and must be cognizant of whether additional funds are needed. If the current funding is insufficient to cover added expenses, a PM must initiate a *Project Authorization* request to indicate additional funds are needed. Typically, modifications require an increase in consultant production hours. But modifications to reduce the tasks and effort required by the consultant, which lower the fee, may also be applicable.

Red Flag: 90 days must elapse between Notice to Proceed of subsequent contract modifications. The consultant should maintain a chronology of all project modifications and submit this chronology with each request.

Red Flag: PMs are often challenged with delivering a project within limited budgetary constraints. Before authorizing a contract modification for additional services, PMs should reconcile all previously agreed items to determine if some services were not required. All unused items and their associated costs should be deducted from the modification at the previously authorized rates to lessen KYTC's increase in cost from new services. This tactic may be employed to deliver required services with a net zero increase to the contract amount.

Utilizing Statewide Service Contracts	Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1. Current Statewide Services Contracts	x	x	x	X
2. Advertising for Statewide Services Contracts	x	x	x	X
3. Key Features of Statewide Services Contracts	x	x	x	X
x = Information from the topic may be applicable for the project classification.				

1. Current Statewide Service Contracts

One type of contract KYTC uses to acquire professional engineering and engineering-related services is the statewide services contract. Statewide contracts follow the same advertisement process; however, after selection and procurement is complete, they act as on-call contracts, allowing Project Managers (PMs) the flexibility to quickly use professional services on an as-needed basis. These contracts provide services that help deliver many programs. Statewide contracts provide additional — typically specialized — resources for user divisions and can be used on an as-needed basis. They are beneficial because assignments can be issued quickly to meet project schedules rather than being delayed for a full procurement process. Although in-house staff can perform many of the tasks covered by these contracts, when in-house resources and expertise are unavailable, statewide services can fill the gaps. Check the Division of Professional Services website for a full list of services available through statewide contracts and the user divisions that manage them.

2. Advertising for Statewide Service Contracts

The Division of Professional Services advertises statewide services during the same procurement process as other projects. One or more consultants can be selected depending on the user division needs and capacity to deliver. A PM from the user division is assigned to help distribute work and manage these contracts. Most statewide consulting contracts identify an overall upset limit for each contract. The upset limit is the maximum amount that can be spent under the Master Agreement (MA), or the contract. The upset limit may only be exceeded by a formal contract modification after approval by the State Highway Engineer's (SHE) Office and the Secretary, then must receive LRC approval. Individual projects for each

MA are made per assignment by Letter Agreement (LA). Usually, multiple LAs are assigned under each contract. Each LA also has an upset limit. On rare occasions and for urgent needs, LA upset limits may be increased with the written approval of the SHE.

Standard language in the procurement document (a) specifies the number of consultants that will be selected to provide services for a period of two years and (b) stipulates that no new work will be assigned under the contract after two years from the notice to proceed. However, the original contract term may be extended to complete work already assigned.

3. Key Features of Statewide Service Contracts

Once the upset limit is reached or the two-year term has expired, services may be re-advertised, and no additional LAs are assigned under the contract. Unless approved by contract modification, contracts will not be modified to increase the upset limit or extended in duration to assign new work. No LA can exceed the upset limit without the SHE's written approval.

Under statewide contracts, project work is assigned to consultants on a rotating basis and a LA is developed for each assignment. If there is a cost or schedule benefit to the agency, KYTC can select a consultant that is not next in the rotation. The Cabinet can also bundle assignments. A consultant selected out of order is generally skipped in the rotation when their next turn comes. After this, the regular rotation resumes. A consultant is usually not offered an additional project until the remaining firms on the list have received a project offer. If a firm declines a project, it is ineligible to accept another project until all other firms on the list have been offered a project.

Statewide contracts are valuable tools for facilitating project delivery. During project development, situations emerge which influence resource availability (e.g., schedules change, other projects within a user division are assigned a higher priority). Statewide contracts let PMs work with user divisions to obtain resources and/or expertise to deliver their project. If needed, multiple statewide contracts for a variety of services can be used to complete a project.

After KYTC selects consultants for a statewide contract, the statewide PM holds a scoping meeting with the selected consultants to communicate the intent of the contract, how assignments will be made, and invoicing instructions. Individual assignments are executed via a LA that clarifies the scope of work and anticipated level of effort to deliver. The statewide PM sends an email to the consultant notifying them of an assignment. This email serves as a notice to proceed since the MA has already been issued. A major advantage of statewide contracts is that work can begin much quicker than under the standard procurement process. Consultants operating under statewide contracts can begin work while the LA is estimated, negotiated, and finalized.

Typically, LAs on statewide contracts are negotiated as lump sum. However, KYTC may use statewide contracts for tasks where unit prices are requested (e.g., traffic counting, geotechnical drilling, right of way). KYTC may also use specific rate of compensation contracts for certain contracts (e.g., construction inspection services) or a cost-plus-a-fixed-fee contract for many bridge maintenance contracts. Other statewide contracts may identify an approximate fee in the advertisement for a full contract and the negotiation process is similar to a project-specific contract. Special instructions in the advertisement describe the contracting method.

Once an assignment is made, with a few exceptions, the PM manages the statewide consultant as they would on other projects. For some statewide contracts (e.g., Highway Design), a PM may be assigned to the individual LA or project. When this occurs the manager of the statewide contract in the user division retains administrative responsibilities. Invoices are executed by the user division PM and generally processed by the Division of Professional Services. For statewide contracts, production-hours can be negotiated directly and do not require independent estimates from the KYTC PM and the consultant if the production-hours do not exceed 500. Spreadsheet templates are available from the Division of Professional Services for submitting production-hours. The consultant portal is not currently used for statewide contract negotiations. Once the final invoice from the last active LA on the MA is processed the statewide contract will be closed.

4. Associated Articles

Project Management Guidebook Intro and Overview (coming soon)

Knowledge Book – Administration of Consultant Contracts

5. Reference Documentation

KYTC's *Highway Design Manual,* HD-205

KYTC's *Professional Services Guidance Manual*, 15-04 and 15-05

KYTC's *Planning Guidance Manual*, PL-206

Reviewing a Pay Invoice

1.0 Overview

After a consultant receives the notice to proceed they begin to provide engineering services on a highway project. As work is performed, the consultant is permitted to submit invoices as often as once per month. Upon receipt, the KYTC PM is responsible for reviewing invoices and approving all eligible expenses in a timely manner.

Most consultant contracts are lump sum and paid based on the percentage of work completed (i.e., *percent complete*). Other contract types, such as cost-plus-fixed-fee and specific rate of compensation, require additional cost documentation. See the HKP article *Understanding a Consultant Contract* for more information on contracting methods.

Each month, the consultant will email the KYTC PM a payment request. The subject line of this email should be in the following format:

PON2625xxxxxxxxxx; Item No. xx-xxxx.xx; Invoice No. xxP or xxF

If the work is being done under a statewide contract, the subject line may also include Letter Agreement numbers and other descriptions.

The payment request should include:

- A *Consultant Monthly Report* (CMR) (for applicable services with milestones)
- PDF of the signed Form TC 40-408 (*Engineering and Engineering-Related Services Pay Estimate*)
- Email Chain with approvals of invoices. If the Cabinet PM does not sign the TC 40-408 form, they must include the statement "I have reviewed the attachments and certify that, based on the information provided, requested costs are allowable."
- PDF of the signed Personal Service Contract (PSC) Invoice Form
- For statewide agreements, a scanned copy of the Letter Agreement
- For cost-plus-fixed-fee contracts, a breakdown of estimated costs, timesheets, and expense reports
- For specific rate of compensation contracts, a timesheet summary often in spreadsheet form
- For final pay requests, a copy of the last project chronology memo

The submittal may include other documentation if it has been requested by the User Division. The Division of Professional Services will also apply an eMARS Cover Page later in the approval process.

2.0 Consultant Monthly Report (CMR)

For Roadway Design services, the Highway Design Forms website has the most current CMR form. It includes the current cost estimate, milestone dates (contract, revised, and actual), monthly activities, and documentation of activities from previous CMRs. The consultant should submit an accurate and current CMR with each invoice.

The KYTC PM should:

- Review the estimate for any changes. If changes are approved, update the cost estimate on the *Estimate* tab in PDP as needed. For more information on updating cost estimates, see the user guide in the PDP application.

	Fund Source	Stage	Estimate	Fiscal Year Estimated	Escalated	eMARS Budget Amount	Prop Year	Duration (Months)
P	NH			2023				
D	STP	AUTHORIZEI	0	2023	0	11,040,000		
R	SP	ESTIMATED	18,240,000	2023	18,240,000		2012	
U	SP	ESTIMATED	8,320,000	2023	8,320,000		2012	
C	SP	ESTIMATED	99,990,000	2023	99,990,000		2014	

- Review the milestone schedule for any changes. If changes are approved, update milestones on the Schedule tab in PDP as needed. For more information on updating milestone dates, see the user guide located in the PDP application.

Unk	Req	Not Req	Phase	Milestone	Scheduled Finish	Actual Finish	Updated By
◉	○	○	Planning				System User
◉	○	○	Preliminary Engineering				System User
◉	○	○		Alternative Selection			System User
◉	○	○		Environmental Approval			System User
◉	○	○	Final Design				System User
◉	○	○		Roadway Plans			System User
◉	○	○	Right of Way Acquisition				System User
○	◉	○		ROW Clearance	06/30/2019	06/30/2019	System User
○	◉	○	Utility Clearance		07/31/2019	07/31/2019	System User
◉	○	○		Utility Agreement			System User
◉	○	○	Railroad Clearance				System User
◉	○	○	Letting		11/16/2023		System User
○	◉	○		Final Plans Submittal	09/28/2023	05/15/2018	System User

- Review and respond to *Actions Needed by the Department*.
- Note *Actions Needed by the Consultant*.
- Coordinate required *CMR* edits with the consultant. Approve the *CMR* and send copies to the consultant, location engineer, and involved KYTC Divisions or branches as needed.
- Store updated CMR in ProjectWise directory**: Item Number →Milestones & Submittals →Project Documents**

3.0 Pay Estimate

See the Professional Service website for consultant payment information and the most current TC 40-408 Invoice Form. The invoice is a request for reimbursement of monthly project expenses.

The KYTC PM should check the following:

- KYTC Contract Number
- Funding
- Federal No.
- State No.
- Item No.
- Effective Date of Notice to Begin Work
- County/Route/Mile Point
- Method of Fee
- Total Contract Amount

Each item should match information in the Agreement, including information highlighted in the figure below. Contract Agreements are housed in the ProjectWise directory: **District →Item No. →Milestones & Submittals →Professional Services**.

KYTC Contract Number	Funding	Federal No.	State No.	Item No.	Estimate No.
PON2 1400001234	12F0 C35 D625 FD52 1550 C027 E143	00STP1271102	6903803D	8-115.10	23P

Consultant Name and Address	Invoice Date	Effective Date of Notice to Begin Work Work May Not Begin Before This Date
ACME Engineering 123 Smithtonvilleford Road Jonesmontshireton, KY	1-Jul-14	1-Feb-12

County/Route/Mile Point	For Work Done		
Carroll/US 227/13-21	1-May-14	Through	30-May-14

Description of Work	Method of Fee	Total Contract Amount	Total % Prev. Est.	% This Est.	Total % to Date	Previous Earnings	Earnings This Estimate	Total Earnings to Date
Preliminary Engineering Services	Lump Sum	300,000.00	100.00%	0.00%	**100.00%**	300,000.00		300,000.00
Environmental Serivces	Lump Sum	50,000.00	100.00%	0.00%	**100.00%**	50,000.00		50,000.00
CM #1 Additional Preliminary Engineering Services	Lump Sum	25,000.00	100.00%	0.00%	**100.00%**	$ 25,000.00		25,000.00
CM#2 Final Roadway Design	Lump Sum	300,000.00	41.79%	8.38%	**50.17%**	$ 125,365.00	**$ 25,132.00**	150,497.00
CM #3 Structure Deisgn Services	Lump Sum	100,000.00	50.25%	25.25%	**75.50%**	$ 50,252.00	**$ 25,252.00**	75,504.00
								-
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	Page 1	775,000.00	71.05%	6.50%	**77.55%**	550,617.00	**50,384.00**	601,001.00
	Page 2					-	-	-
	Totals	775,000.00	71.05%	6.50%	**77.55%**	550,617.00	**50,384.00**	601,001.00

Miscellaneous Information

Total Earnings to Date	601,001.00
Less Previous Earnings	550,617.00
Total This Estimate	**50,384.00**

DBE Portion of Estimate

Joe Small - $12,123.00

I certify the amounts in this estimate are accurate.

Consultant Signature

KYTC Project Manager

- Check that the *Estimate No.* is sequential with the preceding estimate. All partial invoices should end with **P**. A project's final invoice ends with an **F**.
- Check that the *Work Done* dates fall within the Agreement dates.

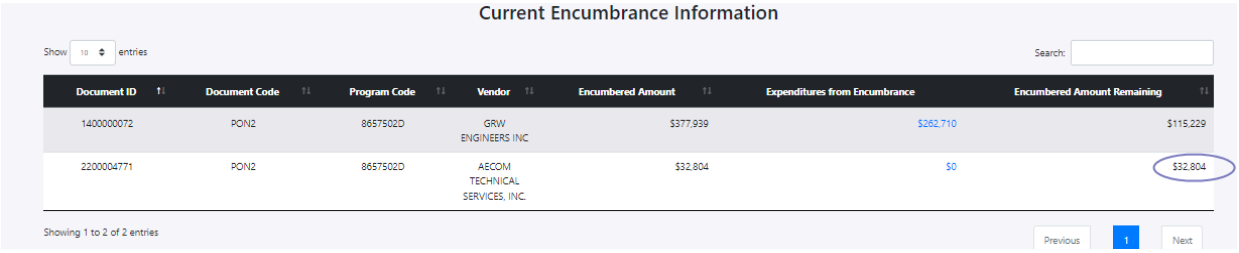
- Check *Previous Earnings* for the current estimate. Compare this amount to the *Total Earnings to Date* entry on the previous estimate to verify they match.
- Note whether percentages complete reported on the estimate sheet are consistent with progress/status reports. Verify that percentages and earnings on the estimate sheet do not exceed maximum milestone completion percentages listed in the Agreement.
- Check that the payment is within the contract encumbrance total. The encumbrance is a portion of the budget set aside for the contract. Current encumbrance information can be reviewed in PM Toolbox.

Current Encumbrance Information

Export to Excel | Select Expended amount for details $0.00 | Submit

Document ID	Document Code	Document Status	Program Code	Vendor	Encumbered Amount	Expenditures from Encumbrance	Remaining Balance
2200004771	PON2	OPEN	8657502D	AECOM TECHNICAL SERVICES, INC.	$32,804.00	$0.00	$32,804.00
1400000072	PON2	OPEN	8657502D	GRW ENGINEERS INC	$377,939.45	$262,710.30	$115,229.15

Current encumbrance information can also be viewed in PDP.



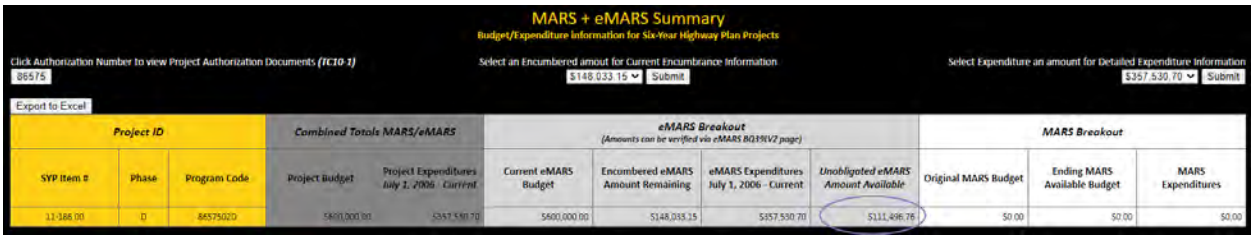
i. Identify the *Pay Estimate Total Contract Amount*. Subtract from this amount the *Estimate Paid to Date Amount* (*Total Earnings to Date*). This calculation should match the encumbered remaining balance indicated in eMARS for the PON2 contract.

ii. Next take the encumbrance remaining, less the pay estimate paid this estimate to get the new encumbrance amount to verify that encumbered amount is available to pay the invoice.

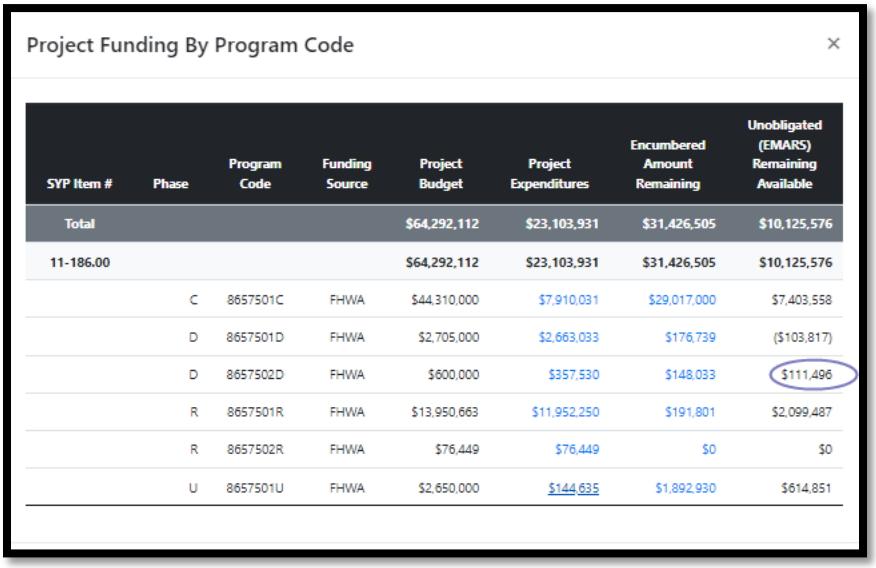
Invoices may be approved for work performed within the eMARS service period even if the invoice is submitted after the eMARS End Date. If the *Work Done Dates* on Form TC 40-408 are not within the *Service Dates* in eMARS, the KYTC PM and consultant must agree on an approximate length of time needed to finalize the work. The PM notifies the Division of Professional Services of the time extension through the Consultant Services Portal. Once the time extension is processed, payments must be resubmitted and approved to be processed.

Note: eMARS service dates can be verified in eMARS or the Professional Services application. Payments cannot be processed if the service dates do not fall between the eMARS service dates.

Check the project's unobligated amount to ensure adequate funding is available for other activities that may be charged to the project. The available unobligated amount can be reviewed in PM Toolbox.



The available unobligated amount can also be viewed in PDP.



SYP Item #	Phase	Program Code	Funding Source	Project Budget	Project Expenditures	Encumbered Amount Remaining	Unobligated (EMARS) Remaining Available
Total				$64,292,112	$23,103,931	$31,426,505	$10,125,576
11-186.00				$64,292,112	$23,103,931	$31,426,505	$10,125,576
	C	8657501C	FHWA	$44,310,000	$7,910,031	$29,017,000	$7,403,558
	D	8657501D	FHWA	$2,705,000	$2,663,033	$176,739	($103,817)
	D	8657502D	FHWA	$600,000	$357,530	$148,033	$111,496
	R	8657501R	FHWA	$13,950,663	$11,952,250	$191,801	$2,099,487
	R	8657502R	FHWA	$76,449	$76,449	$0	$0
	U	8657501U	FHWA	$2,650,000	$144,635	$1,892,930	$614,851

If additional funds are needed, the PM may submit a funding request to Program Management.

Red Flag: A partial payment request cannot leave a remaining balance of less than $1,000 at the end of each fiscal year as this will liquidate the contract encumbrance and close the contract if no payments are made before June 30.

4.0 Personal Service Contract (PSC) Invoice Form

By law, the consultant must submit the PSC form with each invoice. The Professional Services website has the most current form.

Use the checklist below to review the PSC form:

Item	Complete?
• KYTC Contract Number on the Form TC 40-408 estimate sheet matches the contract number on the PSC form.	☐
• Date of Invoice matches the invoice date on Form TC 40-408.	☐
• Contracting Body is the Kentucky Transportation Cabinet.	☐
• The Division, Branch, or other entity is the District Office or Division that requested or assigned work to the consultant.	☐
Form Item #1	☐

• Verify the contractor's name and address on the PSC form matches the consultant name and address on Form TC-40-408.	
Form Item #2 • Verify the contractor's Tax I.D. Number with information found in the contract or from the Division of Professional Services.	☐
Form Item #3 • Verify the *Effective Period of Contract Starting* date on the PSC form matches the *Effective Date of Notice to Begin Work* on Form TC 40-408.	☐
Form Item #4 • Verify the *Combined Total Amount Charged* on the PSC form matches the *Total This Estimate* on Form TC 40-408.	☐
Form Item #5 • Verify the *Dates of Service* on the PSC form match the *For Work Done* dates on Form TC 40-408. Verify these dates using eMARS or the Division of Professional Services application.	☐
Form Item #6 • Is this a Final invoice? Check yes or no after confirming.	☐
Form Item #7 • Verify the date of most recent invoice is the same on Form TC 40-408.	☐
Form Item #8 • The contractor usually submits invoices monthly. Invoices cannot be submitted more frequently.	☐
Form Items #9 – 13 • Project-specific questions that can be answered by referencing the *CMR* and the Pay Estimate.	☐
Form Item #14 • For lump sum contracts, note that it is a lump sum contract. For cost-plus contracts include the additional breakdown of costs.	☐
• Consultant has signed and dated the PSC form. o The KYTC PM does not need to sign since the email that includes the attachments will note approval.	☐

5.0 Invoice Processing

For Partial Payments

After reviewing the request, the KYTC PM should forward the email with PDF attachments to KYTC District or Central Office administrative staff responsible for initiating payment in eMARS. The KYTC PM must:

- Sign Form TC-40 estimate sheet at the bottom, **or**
- Insert the following language into the body of the email **verbatim**: *I have reviewed the attachments and certify that, based on the information provided, requested costs are allowable.*

Once KYTC administrative staff receive the forwarded email, they create a payment against the KYTC Contract Number listed on the estimate for the amount requested in the *Earnings This Estimate* column on the estimate sheet. For information on Administrative Staff instructions, see Form TC 40-408 Pay Estimate Instructions.

If the KYTC PM is the first line approver in eMARS, they should review and approve the payment in eMARS. First-level approval is required before submitting to Accounts.

The KYTC PM or designated approver in eMARS then prepares the submittal for Accounts using the SharePoint AgilePoint application: Submit to Accounts Payable Application. An Accounts Payable Process Video is located on KYTC's Intranet site. For more information on the submittal process contact the Division of Professional Services.

For Final Payments

After reviewing the estimate, the KYTC PM should complete the final consultant evaluation (see *Managing Consultant Contracts*). Roadway design evaluations are completed using the following consultant evaluation application: Consultant Evaluations. Other Divisions may use different forms or applications for consultant evaluations. Many statewide contracts also complete performance evaluations for each Letter Agreement assignment, although they are not required to process final payments. Rather, most statewide contracts are closed once the final payment is made against the last Letter Agreement.

The KYTC PM should forward the following materials in PDF format to the Roadway Design Branch Manager and District Location Engineer:

- All final payment attachments
- Consultant evaluation
- Roadway Branch Checklist for Closing Consultant Contract (located on Highway Design intranet site and ProjectWise)

Side Note: Consultant evaluations may not be required under some conditions (e.g., the PM recently acquired the project and has not worked with the consultant enough to adequately perform the evaluation).

The following language must be in the body of the email **verbatim**: *I have reviewed the attachments and certify that, based on the information provided, requested costs are allowable.*

All invoices should be paid within 30 working days of their receipt (as per KRS 45.453). The only exception is written notification, within the 30 working days, to the consultant of a problem with the invoice.

6.0 Associated Articles

Project Management Guidebook Intro and Overview

Knowledge Book – Administration of Consultant Contracts

Build Your Team

7.0 Reference Documentation

KYTC's *Highway Design Manual,* HD-205

KYTC's *Professional Services Guidance Manual, 15-07*

PMGB: Organizing and Running Effective Project Development Meetings

Organizing and Running Effective Project Development Meetings	Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1.0 Why Are Project Meetings Necessary?	x	x	x	x
2.0 Meeting Formats – In-Person, Virtual, Hybrid	x	x	x	x
2.1 In-Person Meetings	x	x	x	x
2.2 Virtual Meetings	x	x	x	x
2.3 Hybrid Meetings	x	x	x	x
3.0 Planning Successful Meetings	x	x	x	x
4.0 Executing Successful Meetings	x	x	x	x
5.0 Post-Meeting Wrap Up	x	x	x	
6.0 Common Meeting Types in Project Development	x	x	x	
7.0 Associated Articles	x	x	x	x
x = Information from the topic may be applicable for the project classification.				

1. Why Are Project Meetings Necessary?

Meetings afford project team members who occupy different roles and who have different subject-matter expertise the opportunity to collaborate, brainstorm, share information, and formulate a plan of action to ensure that project development is efficient, effective, and — ultimately — successful. Beyond facilitating project work, meetings help participants get to know their colleagues, build community, and establish a shared sense of purpose.

For Project Managers (PMs), organizing a meeting is a challenging but critical task. Participants get the most out of meetings that are well-organized and have defined goals. When attendees walk out of a thoughtfully run meeting, they are clear on next steps, understand how responsibilities are distributed among team members, and grasp how the team will collaborate to deliver a successful project.

Although meetings play a valuable role in project development, people can become frustrated when they take part in meetings they perceive as unnecessary or that are improperly run. As such, before calling a meeting PMs should carefully assess if one is necessary or if another means of communication may be more efficient to address the issue at hand. No hard and fast rules can dictate if a particular situation warrants a meeting. PMs build up their intuition over time about when meetings are the best option to facilitate communication and information exchange.

If a PM is uncertain whether a meeting is needed, a good starting point is to review Section 6, which introduces meeting types often encountered during project development. The HKP article *Common Project Team Meetings* provides more information on topics addressed at these meetings. After looking at this material, if a PM is still uncertain whether a meeting is required, they will benefit from seeking the advice from their Project Development Branch Manager or senior PMs.

This article walks PMs through key considerations related to meeting scheduling, format, organization, and execution and provides tips for deciding if a meeting is needed.

2. Meeting Formats – In-Person, Virtual, Hybrid

KYTC relies on three meeting formats — in-person, virtual, or hybrid (where some people attend in person while others participate on a platform such as Microsoft Teams or Zoom). Each meeting format has limitations and benefits. PMs should be mindful of when deciding on the best option.

2.1 In-Person Meetings

Some issues are best addressed through in-person collaborations. To determine if an in-person meeting is the most appropriate format, PMs should consider the following factors:

- Number of participants
- Planned activities (e.g., brainstorming)
- Complexity of topics that will be addressed
- Required outcomes/deliverables

In-person collaborations are a good solution for meetings that will address a range of complex topics and require sustained interactions between all participants. During in-person meetings participants communicate through body language, gestures, and facial expressions, which are typically lost in virtual meetings but which may be critical for understanding someone's perspective.

2.2 Virtual Meetings

In-person meetings are not always possible, especially if participants are spread across multiple locations or have professional and/or personal obligations that prevent their attending. Virtual meetings provide a good alternative in these cases and have the virtue of broadening representation as well as the range of voices that can be heard. Some participants may feel more comfortable engaging in a virtual meeting than during in-person meetings. Agendas for virtual meetings should include instructions for logging on and describe meeting etiquette. PMs should:

- Request that participants keep their cameras turned on.
- Use the gallery view option to establish a sense of community and promote dialogue.
- Have participants display their full names on the screen.
- Request that participants mute their microphones when they are not speaking.
- Provide instructions for how to ask questions.
- Utilize the chat functionality by asking a team member to oversee and help manage the communication.
- Assign someone as the note taker to document the meeting minutes.

2.3 Hybrid Meetings

When some meeting participants are in a shared physical space while others attend virtually, the main difficulty PMs negotiate is the engagement challenge — focusing their attention on both virtual and in-person attendees at once and ensuring everyone has the opportunity to participate in the conversations. 360-degree cameras (e.g., Meeting Owl) are valuable tools for improving hybrid meetings. These cameras zoom into the face of whomever is speaking at the in-person session, which helps virtual participants see people they are engaging with. Holding the in-person component of a meeting in a room that has a large screen on which to project virtual attendees is important for sustaining engagement between all participants.

For hybrid meetings with many attendees, the PM should consider having a facilitator monitor virtual participants, make sure their voices are heard, and document their contributions. If a PM cannot secure a facilitator, they need to take extra care to regularly check in with and engage virtual attendees.

3. Planning Successful Meetings

Meetings often fail when participants feel they are unproductive or unneeded. Before scheduling a meeting, PMs should determine if a meeting is the best way to communicate information to participants, support collaborations between team members, and accomplish stated objectives. If achieving these goals without a meeting is possible, the PM may want to explore other methods to address issues with the project team. Once a PM decides a meeting is the way to go, the checklist in Table 1 can guide preparations and lay the groundwork for success.

Table 1 Meeting Planning Checklist

• Determine the meeting format (i.e., in-person, virtual, hybrid) o Consider the purpose of the meeting, as well as activities, when deciding which format is the best. For example, sustained brainstorming may lend itself to in-person or hybrid formats.	☐
• Determine who needs to attend the meeting o Only extend invites to people whose attendance is necessary (e.g., due to their subject-matter expertise or project role).	☐
• Once an invite list is finalized, gauge the availability of all participants. o A Doodle poll is a good way to see when everyone is available. o Once the poll closes, select a meeting time during which as many invitees as possible can attend.	☐
• For meetings with an in-person component, reserve a space (e.g., conference room) able to accommodate the anticipated number of participants and activities.	☐
• After selecting the date and meeting time, send an Outlook invite to participants. If possible, circulate the invite at least **two weeks** before the meeting date. o Include a Microsoft Teams or Zoom link for virtual and hybrid meetings. o For hybrid and in-person meetings, specify where the physical meeting space is at (address and which conference room).	☐
• Establish a game plan to give all attendees — from the quietest to the most outspoken — an opportunity to make their voices heard. o Best practices are described at the end of this section.	☐
• At least 2 weeks before the meeting, distribute plans, project-related information, and other materials participants will consult during the meeting. o For KYTC attendees, send a ProjectWise link o For non-KYTC attendees, distribute plans and documents via email or OneDrive.	☐
• At least 1 – 2 days before the meeting, circulate an agenda that: o Clearly describes topics participants will discuss o Lists planned activities, expectations, and intended outcomes o Specifies required preparation for all participants • If possible, group agenda topics by subject-matter expertise and provide a time when they are estimated to be needed. For long meetings, this gives participants the option to attend only those segments relevant to them and assists in effectively managing time.	☐
• At least 1 – 2 days before the meeting, establish who is responsible for taking meeting minutes. Minutes are critical because they serve as the meeting's official record, document what was discussed at the meeting, note decisions made, and list action items. o If a consultant is working on the project, they are typically responsible for meeting minutes. If not, the PM or their designee records the minutes.	☐

Coordinating interactions between participants is one of the most challenging aspects of conducting a meeting. Some people are outspoken, while others are more reserved and reluctant to engage. PMs can adopt several strategies to

ensure quieter attendees have a chance to participate. Implementation of these strategies should begin during the planning stage. Waiting until a meeting begins to figure out how to get everyone involved is not effective.

Good strategies for bringing quieter participants into the fold include:

- Assigning them a lead role in the discussion of a particular topic. Let them know ahead of time (preferably two weeks) that they will help lead the discussion. This gives them ample time to prepare.
- Having a one-on-one conversation before the meeting. Explain they were invited to the meeting to share their expertise with the group and that the project team values their knowledge and experiences. Let them know they will be called on when issues related to their expertise arise because the team needs their input.
- Planning small group discussions in which all group members participate and write down ideas to submit to the PM for consideration by the entire group. Working in a small group provokes less anxiety than having to speak in front of the entire meeting.
- Encouraging the use of chat boxes to submit ideas and questions in meetings with a virtual component.

Side Note

A PM may retain a trained facilitator to lead a meeting or subset of activities during a meeting. During project scoping these services could be added to the advertisement. If this need becomes apparent after the design has started the PM should discuss with the Location Engineer the procurement options available. Facilitators are a good option when:

- Participants are working through contentious issues and need a disinterested voice to guide discussions.
- The PM wants the meeting to take the form of a structured workshop or brainstorming session.
- The PM needs to focus on their role as a participant in a meeting and wants an impartial person to lead.

4. Executing Successful Meetings

Thoughtful and deliberate planning sets up a meeting for success, but PMs must execute on their plan for a meeting to achieve its stated objectives. The checklist in Table 2 can assist with conducting meetings.

Table 2 Meeting Execution Checklist

• At least 15 minutes before the meeting starts, verify the computer that will be used to retrieve project documents and/or run Microsoft Teams or Zoom has a stable internet connection and that all programs are operational. o For meetings with an in-person component, verify that the screen used to display documents and/or virtual participants is functional and ensure a connection device (e.g., HDMI cable) is available.	☐
• When the meeting begins, circulate a sign-in sheet. o Consultants are typically responsible for this task. For meetings with a virtual component, an attendee list can be retrieved from Microsoft Teams or Zoom. o A sign-in sheet with pre-printed names for anticipated attendees with a check box for in-person or virtual will speed the sign in process. Blank rows can be provided for substitute / additional attendees.	☐
• The PM should keep in mind meeting ground rules: o All participants should treat one another with respect. o Talking over one another is unacceptable and counterproductive. o Contributions must be *on point* and *to the point*. o Participants must minimize technological distractions (e.g., smartphone use) unless they have an urgent matter to attend to.	☐
• Clearly articulate the meeting's objectives. o Define success as achieving all of the meeting's goals in an efficient manner.	☐

• Before discussions about agenda items commence, verify the person responsible for the meeting minutes is prepared to take notes.	☐
• During a meeting, participants may identify novel topics or challenges that need to be resolved. Establish an approach for handling these issues. This entails: o Assigning responsibility for resolving the problem o Specifying expected actions. o Requesting that findings or outcomes be communicated to relevant project team members as soon as possible.	☐
• Be respectful of everyone's time. Keep the meeting moving forward and on topic. Do not overshoot the scheduled end time.	☐
• Before adjourning, verify that: o All meeting objectives were addressed. o Everyone is clear on their responsibilities and next steps by identifying/reviewing action items.	☐

5. Post-Meeting Wrap Up

Once a meeting concludes, the PM or consultant should finalize the draft meeting minutes and circulate them to all participants as soon as possible. Because minutes function as a meeting's official record, they must be succinct, clear, and comprehensive. Readers should be able to completely understand what occurred at the meeting, what decisions were made, who is responsible for resolving action items, and how the project team intends to move forward.

When distributing meeting minutes to attendees, specify that they have seven business days to submit comments. The PM or consultant responsible for compiling the minutes should review comments and revise accordingly. Once the meeting minutes are finalized, they should be distributed to all attendees and documented in ProjectWise.

6. Common Meeting Types in Project Development

Throughout project development, PMs will organize and coordinate several types of meetings. Table 3 lists the most common meetings. PMs should keep in mind that meeting requirements vary by project type. For example, a capital improvement project requires most of the meetings listed in Table 3 but they are rarely needed for maintenance projects. On asset management and safety projects, the level of project complexity influences decisions about which meetings should be held.

Table 3 Common Project Meetings

Meeting Type
Pre-Design Conference
Public Meeting
Preliminary Line and Grade (PL&G) Meeting
Final Joint Inspection Meeting
Joint Utility Information Meeting
Pre-Bid Meeting
Miscellaneous Project Team Meetings

The HKP article *Common Project Team Meetings* provides in-depth information on each meeting type, including what topics are discussed, who should be invited, which materials should be prepared in advance (e.g., plans, typical sections), and expected outcomes.

7. Associated Articles

PMGB: Common Project Meetings (coming soon)
PMGB: Effective Communication in Project Management (coming soon)
PMGB: Project Scoping (coming soon)

PMGB: Public Involvement with Customers and Stakeholders
PMGB: PM and Preliminary Design
PMGB: PM and Final Design
PMGB: Project Schedule and Development of Milestones
PMGB: Project Management and Utility Coordination
PMGB: Preparing for Letting
HKP: Understanding a Consultant Contract

Definitions

Brainstorming – A group discussion to produce ideas or solve problems

Virtual Meeting – A meeting type that allows people in different geographic locations to use their computers or mobile devices to participate. Common virtual meeting tools include Teams, Zoom, Webex, GotoMeeting, Google Meet, Adobe Connect

Hybrid Meeting – A meeting type that has an in-person component and a virtual component. The meeting facilitator will often share the screen of their presentation with those in the meeting room and on-line using the virtual meeting tool.

PMGB: Common Project Team Meetings

Common Project Team Meetings	Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1.0 Pre-Design Conference	x	x	x	
2.0 Public Meeting	x	x		
3.0 Preliminary Line and Grade Meeting	x	x		
4.0 Miscellaneous Project Team Meetings	x	x	x	x
5.0 Final Joint Inspection Meeting	x	x	x	
6.0 Joint Utility Information Meeting	x	x		
7.0 Pre-Bid Meeting	x		x	
8.0 Associated Articles	x	x	x	x
9.0 Reference Documentation	x	x	x	x
x = Information from the topic may be applicable for the project classification.				

Project team meetings occur throughout project development. However, what types of meetings are held depends on project type. This article reviews the main features of meetings commonly encountered on capital improvement projects. Some of these meetings are also held when KYTC completes other kinds of projects.

1. Pre-Design Conference

At a **pre-design conference** (see HD-205.4), KYTC and the consultant clarify, refine, and document the scope of work. They also agree to a project schedule and the Cabinet communicates expectations based on the project budget. If Cabinet in-house staff design a project, a similar meeting can be held.

To prepare for a pre-design conference, the project manager (PM) should coordinate with subject-matter experts (SMEs), potential project development team (PDT) members, and the Location Engineer (see HDM 202.6). This coordination should focus on the project scope and reviewing any issues confronting the project. Coordination can be accomplished by meetings, phone calls, or emails depending on project complexity. On more complex projects, meetings are the best option to resolve challenging issues.

Red Flag: If the anticipated level of environmental document is a Categorical Exclusion (CE) III or above, a Scope Verification Meeting between KYTC and the Federal Highway Administration (FHWA) should occur before the pre-design conference. Additional information on scope verification meetings can be found in the HKP article *Project Scoping* (Section 4.1).

Ideally, the pre-design conference should take place within 10 days of consultant selection. The following items need to be on hand at the conference because they facilitate efforts to clarify, refine, and document the scope of work:

- A copy of the professional services advertisement bulletin
- A draft of the pre-design conference meeting minutes

- A copy of any Data Needs Assessments (DNA) and planning studies in the project area
- Aerial photos or maps of the project area. Using Google Earth to display the project area on a projector screen or large display is useful.
- Any existing data available (e.g., existing crashes, traffic counts, archived plans)

The consultant is responsible for taking meeting minutes and preparing the draft units and production hour descriptions. Minutes serve as a meeting's official record and document every decision made. Once drafted, the consultant circulates the minutes to the PDT for comment, after which they revise the minutes based on comments received. The final version of the minutes is then distributed to the PDT. See the HKP article *Understanding a Consultant Contract* article for more information.

2. Public Meeting

At **public meetings** KYTC engages public stakeholders in decision making by providing attendees with project information and giving them the opportunity to provide input to the PDT. Compared to other meeting types, planning for public meetings should start earlier given the amount of time required to select an appropriate location and the lead time needed to advertise the meeting.

The PM should work with the District Public Information Officer (PIO) to select a meeting location that is large enough to hold the anticipated number of attendees and that is accessible and can accommodate individuals with disabilities. Meeting locations should have the amenities needed to conduct an effective meeting (e.g., room to place posters or displays, projection screens or large televisions that can be used to display project-related information). The most popular days to hold a public meeting are Tuesday and Thursday. Most public meetings are scheduled for approximately two hours and are held after 5:00 pm.

KYTC and consultant staff should arrive at the meeting location at least one hour before it begins so they have ample time to set up and are ready for members of the public who arrive early. Once a meeting ends, the PDT and consultants must return the meeting room to its pre-meeting condition.

Consultants need to circulate all posters, displays, presentations, questionnaires, and handouts to PDT members for review 3-4 weeks in advance of the meeting. PDT members should submit their comments at least two weeks before the meeting so the consultant has enough time to make revisions based on feedback and print meeting materials.

Displays typically show proposed alternatives, preliminary right of way (ROW), and impacts to adjacent property. Typical sections are also a common display. Depending on the project purpose, presenting existing and expected traffic and safety performance may also be beneficial. Handouts typically include information on the project's purpose, a description of alternatives, costs, schedules, and the performance of each alternative.

Other types of meetings open to outside stakeholders, such as Public Hearings, Elected Officials meeting, Right-of-Way property owners meeting, or Citizens Advisory Group meeting would benefit from these same procedures. Additional information on public meetings can be found in the HKP article *Public Involvement with Customers and Stakeholders* and the *Highway Design Guidance Manual* (HD-600). Title VI (Civil Rights Act) requirements and information for public meetings can also be found in this article.

SIDE NOTE: It can be beneficial to hold an Elected Officials meeting at the same location, but prior to, the public meeting. This allows the project information to be presented to the elected officials prior to the public being involved, which helps to educate the elected officials, who may receive questions from their constituents, and provides an opportunity for the elected officials to hear directly what comments the public may have concerning the project.

3. Preliminary Line and Grade Meeting

At the **Preliminary Line and Grade (PL&G) Meeting** the PDT selects a preferred alternative and documents the rationale for the decision. The meeting occurs toward the end of the preliminary engineering phase (Phase I Design),

but before the NEPA document is approved. Preliminary alternative plans shown at the meeting should be developed to 30% completion and include the following:

- Plans of the project area that show plan and profiles for each alternative — typically plans are manuscript format (roll plot) instead of individual plan sheets
- Typical sections and preliminary cross sections
- Existing ROW and utilities along with any preliminary ROW (including easements) needs

Other items to have prepared and ready for discussion at the PL&G include:

- The draft environmental investigation and any potential mitigation measures
- Roundabout Design form, if applicable
- PL&G-level estimate for each alternative that includes ROW, utility relocations, and construction (including any anticipated environmental fees)
- Preliminary project schedule
- A comparison of each alternative's performance relative to the purpose and need (e.g., alternative impacts, expected safety performance, traffic performance, travel time, cost)
- Summary of public involvement

The PL&G meeting minutes are incorporated into the Design Executive Summary (DES). HD-203.5 provides additional information on PL&G meeting minutes requirements. Further discussion on the PL&G meeting can be found in the HKP article *PM and Preliminary Design*.

4. Miscellaneous Project Team Meetings

During the project development process, situations often arise that require a PDT to meet to resolve specific issues. Miscellaneous project team meetings have a similar format to the meetings described above, but they often have a smaller more specific audience. For example, during preliminary engineering, a PDT may hold a meeting to narrow down the alignments that will be considered at the PL&G meeting. Or during final design, a meeting may be held to address a narrow subject (e.g., pavement design, ROW minimization, interchange lighting).

Another type of meeting that may be encountered if certain project cost thresholds are met is the participation in a Value Engineering (VE) Study. Currently, VE Studies are required on federally funded projects on the National Highway System with an overall estimated cost over $50million or an estimated bridge cost over $40million. The PM will typically attend a meeting early in the study process to provide a basic project overview to the VE team and again at the end of the study to view the ideas that were created by the VE Team. Other involvement includes gathering and distributing project documents and information to the VE team and being available to answer questions as they arise during the VE study.

5. Final Joint Inspection Meeting

At the **final Joint Inspection (JI) meeting** PDT members review the project design and proposed contract plans and documents. Typically, it occurs toward the end of final design (Phase II Design), but before the submission of final ROW plans. Issues that arose during design, but which have not been resolved, must be presented at this meeting. Often, at this meeting the PDT conducts a sheet-by-sheet review of the plan set. Because detailed reviews of each sheet in the plan set take a lot of time, the PM needs to schedule ample time for the meeting.

Plans should be designed to approximately 80% completeness and include the following components for review at the meeting:

- Roadway plan and profile set with drainage features (typically on 11" x 17" sheets)
- Typical sections with pavement design
- General and special notes
- Anticipated bid items and quantities

- Maintenance of traffic layout, notes and an overview of any anticipated lane or road closures
- Erosion control sheets
- Coordinate control sheets
- Pipe sheets
- Striping and signing plans (if applicable)

Before the final JI meeting is held, the following design components should be complete:

- Drainage design / preliminary drainage submittal
- Pavement design
- Geotechnical investigations for the roadway and structures
- Structure design
- Review of commitments made during the NEPA process for incorporation into the plans
- JI-level cost estimate for ROW, utility relocation, and construction

SIDE NOTE: The PM can request a constructability review from the Quality Assurance Branch as part of the final JI meeting. The Quality Assurance Branch assigns a constructability reviewer to provide comments to the PDT.

Comments received at this meeting should be documented in the meeting minutes and be incorporated into the final plans prior to submitting the check print plan set to the Plan Processing Branch. The HKP article *Preparing for Letting* provides details on check prints, the HKP article *PM and Final Design* provides more details on the final JI meeting, while the HKP article *Project Schedule and Development of Milestones* provides further details on the components of JI plans.

6. Joint Utility Information Meeting

Although discussions and preliminary coordination with utility companies should take place throughout project development, the joint utility information meeting is the first official meeting between KYTC and potentially affected utility companies. It provides an opportunity to determine the accuracy of existing facilities shown on plans, identify conflicts, define possible relocations, plan utility design and relocation schedules, identify reimbursable or non-reimbursable work, look for ways to minimize utility impacts, and discuss data needs. Additional information can be found in the HKP article *Project Management and Utility Coordination* and the *Utilities and Rails Guidance Manual* (UR-800).

The District Utility Supervisor schedules the joint utility information meeting. The following people should attend:

- Representatives from potentially affected utility companies
- District utility staff
- PM
- Roadway designer
- Design consultant (if applicable)

The meeting is held after Utility funds have been authorized and ROW plans developed. Electronic and paper copies of the plans should be made available to the utility companies. The PM should be prepared to describe the overall project and answer questions about the design.

7. Pre-Bid Meeting

Some projects include a pre-bid meeting with potential contractors. At this meeting, the PM and consultant (if applicable) explains complex issues and expectations and answers questions about the design. The meeting also helps KYTC gauge levels of interest among contractors. It is held after a project is advertised for bid, but before the letting openings (which occur three weeks after the advertisement is released). If the meeting is mandatory, contractors intending to submit a bid on the project must have representation present at the pre-bid meeting.

If a pre-bid meeting is needed, the PM notifies the Division of Construction Procurement during the final plan submittal process. The Division of Construction Procurement sends out a notification of the pre-bid meeting date and time and post meeting minutes as well as the attendance list to their website. The PM is responsible for providing the Division of Construction Procurement with the attendance list and the meeting minutes.

Additional information can be found in the HKP article *Preparing for Letting*.

8. Associated Articles

HKP Project Scoping

HKP Understanding a Consultant Contract

HKP Public Involvement with Customers and Stakeholders

HKP PM and Preliminary Design

HKP Preparing for Letting

HKP PM and Final Design

HKP Project Schedule and Development of Milestones

HKP Project Management and Utility coordination

9. Reference Documentation

KYTC Highway Design Manual

KYTC Utilities and Rail Guidance Manual

Definitions

Pre-Design Conference – KYTC and the consultant clarify, refine, and document the scope of work. They also agree to a project schedule and the Cabinet communicates expectations based on the project budget. If Cabinet in-house staff design a project, a similar meeting can be held.

Public Meeting – KYTC engages public stakeholders in decision making by providing attendees with project information and giving them the opportunity to provide input to the PDT.

Preliminary Line and Grade Meeting – The PDT selects a preferred alternative and documents the rationale for the decision. The meeting occurs toward the end of the preliminary engineering phase (Phase I Design), but before the NEPA document is approved.

Final Joint Inspection Meeting – A review of the project design and proposed contract plans and documents by the project development team that occurs toward the end of final design (Phase II Design), but before the submission of final ROW plans.

Joint Utility Information Meeting – The first official meeting between KYTC and potentially affected utility companies. It provides an opportunity to determine the accuracy of existing facilities shown on plans, identify conflicts, define possible relocations, plan utility design and relocation schedules, identify reimbursable or non-reimbursable work, look for ways to minimize utility impacts, and discuss data needs.

Pre-bid Meeting – The PM and consultant (if applicable) explains complex issues and expectations and answers questions about the design. The meeting also helps KYTC gauge levels of interest among contractors.

Effective Communication in Project Management	Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1. Overview	x	x	x	x
2. Communication Factors	x	x	x	X
3. Communication Tools and Methods	x	x	x	x
3.1 Project Development Milestone Meetings	x			
4. Communication with the Public	x	x	x	x
5. Communication Styles and Obstacles	x	x	x	x
6. Common Communications in the Project Development Process	x			
x = Information from the topic may be applicable for the project classification.				

1.0 Overview

Effective communication is always essential, but is also critical for delivering successful projects. Although all members of a Project Development Team (PDT) need to communicate clearly with one another, the Project Manager (PM) is responsible for much of the communication required to keep a project moving forward.

Image Source: Adobe Stock

Project communication spans the entire project life cycle, from initiation through closeout, and beyond. To communicate efficiently and effectively, PMs should:

- Develop a communication plan whose level of detail is commensurate with the project's complexity
- Distribute information using methods that are most effective for the recipients
- Maintain project-related information and data in a document management system (see the HKP article *Document Management and Storage*)

Project Managers have access to resources that can support project communication. For instance, when an engineering consultant is hired for project development, the PM may utilize the consultant's staff to create a communication plan, disseminate information, and manage project documentation effectively.

2.0 Communication Factors

By addressing the 5Ws and 1H of communication (Rajkumar 2010), PMs can effectively communicate information on a project's expectations, schedule, and status to the PDT:

- **Who** is involved in the communication process — Identify the internal stakeholders (e.g., PDT members, subject-matter experts (SMEs)), interagency staff, and external stakeholders (i.e., the public).
- **What** is being communicated — The message or information distributed. This may take the form of a project deliverable.
- **When** the information is communicated — Weekly, monthly, quarterly, at project milestones, during a project development phase, or as identified.
- **Why** the communication is necessary.
- **Where** the communication takes place.
- **How** information is distributed (i.e., the communication channel)— In a meeting, a memorandum, an email, a newsletter, a presentation, or another medium.

PMs must ensure the PDT delivers timely and accurate information to all stakeholders and receives feedback from these stakeholders.

3.0 Communication Tools and Methods

Table 1 describes several communications tools PMs use to organize and present project information.

Table 1 Communication Tools for Project Managers

Tool	Description
Work Breakdown Structure (WBS)	Breaks down a project into smaller components, each of which may be a product or service. It is a hierarchical breakdown of the scope of work the PDT will carry out. Note: include production hours for the engineering consultant to create and update the WBS.
Gantt Chart	A chart of the project schedule. It shows the durations of and relationships between work activities or tasks. Critical path project templates (Microsoft Project files) are available in the *Project Time Management* article. Note: include production hours for the engineering consultant to create and update the Gantt Chart.
ProjectWise	KYTC's main document storage and filing platform. For more information see the ProjectWise Standard Project Folder Structure Policy.
Program Delivery Platform (PDP)	Tracks project information, including budget, schedule, project component status, and Communicating All Promises (CAPs).

Image Source: Adobe Stock

When deciding on the best form of communication, PMs should consider the urgency and type of information being sent and the method of communication the recipient(s) finds most effective. Table 2 reviews different communication channels and their use cases. The columns *Urgency* and *# of Recipients* indicate using color-coded dots situations in which each communication channel is appropriate. For example, emails are suitable for communications that have a low- or medium-level priority and those which will be sent to a low, medium, or high number of recipients.

PMs should keep in mind the benefits, disadvantages, and limitations of different communication channels. For example, virtual meetings can produce different outcomes and forms of interaction than in-person meetings because verbal or visual cues evident during face-to-face meetings (e.g., body language, voice inflections) may not be detectable in a virtual meeting, especially if participants leave their cameras off. As such, PMs need to weigh these considerations when selecting a communication channel to use.

Table 2 Communication Channel Use Cases

Communication Channel	Documentation Available?	Urgency			# of Recipients			Considerations
Email	Yes		🟡	🟢	🔴	🟡	🟢	• Frequently used to provide or request information
In-Person/Virtual Meeting	Yes	🔴	🟡		🔴	🟡	🟢	• Good for collaboration • Includes multiple forms of communication (i.e., verbal, body language, personal space) • Provides opportunities to submit and receive input on multiple items • Often held at project milestones • Documentation available through minutes or recordings
Instant Messaging	Yes	🔴				🟡	🟢	• Available through platforms like Microsoft Teams • Best for quick, informal communications
Phone Call	No	🔴					🟢	• Best for one-on-one, high-priority communications
Letter of Memorandum	Yes		🟡	🟢	🔴			• Often used to document policy or process changes
Press Release	Yes	🔴	🟡		🔴			• Delivers information to the public. • Requires District PIO involvement
Report	Yes			🟢	🔴			• Detailed documentation on a topic

🔴 = High 🟡 = Medium 🟢 = Low

3.1 Project Development Milestone Meetings

Communication often occurs during project milestone meetings or regularly scheduled status meetings. These meetings include:

- Project Scoping Meeting
- Scope Verification Meeting (as needed)
- Pre-Design Conference
- Conceptual Design Meeting
- Public Involvement Meeting (or Hearing)
- Preliminary Line and Grade (PL&G) Meeting
- Joint or Final Inspection
- Drainage Inspection
- Right of Way Inspection
- Letting Review Meetings (monthly)
- District Project Status Review Meetings

For more information on conducting effective meetings and the information or deliverables exchanged at meetings, see the HKP articles *Organizing and Running Effective Project Development Meetings* and *Common Project Team Meetings*.

4.0 Communicating with the Public

PMs should work with District Public Information Officers (PIOs) to keep the public informed of project activities and incorporate their concerns and suggestions into the decision-making process. The level and frequency of communication with public stakeholders depend on how the project will impact the public and environment. Communicating with the public may entail providing information at public or stakeholder meetings or meeting with individual property owners. A PIO may share project information through newsletters, social media, websites, or other media. For more information, see the *Highway Design Guidance Manual* (**HD-600**) and the HKP article *Public Involvement with Customers and Stakeholders*.

The public is usually not familiar with jargon used by PMs and SMEs. Implementing the practices below will improve communication with public stakeholders (after Bruzzese 2015):

- Do not assume the audience has basic technical knowledge of your project.
- Provide visualizations (e.g., maps, charts, photographs) that illustrate why the project is needed.
- Develop a deep understanding of how the project will help the public and present that information to public stakeholders using non-technical language.
- Never talk down to public stakeholders or conduct yourself in a way that could leave them with the impression you are talking down to them.

- Do not overwhelm the public with data. Only include numbers or statistics if you can associate them with something the public needs to know. Visualize information with charts, maps, and timelines.
- Ask a coworker without a technical background or specific project familiarity to watch a practice presentation or review meeting materials. Use their input to improve the presentation.
- Give public stakeholders multiple ways to submit feedback.

5.0 Communication Styles and Obstacles

Communication styles differ between people. As such, PMs need to be self-aware of their communication style and understand the style of each PDT member. To avoid miscommunication and improve collaboration, PMs may need to *flex* their interaction.

AASHTO's Technical Committee on Project Management describes four communication styles in its webinar, *What is My Communication Style*? Table 3 summarizes each style and gives recommendations on flexing methods for each.

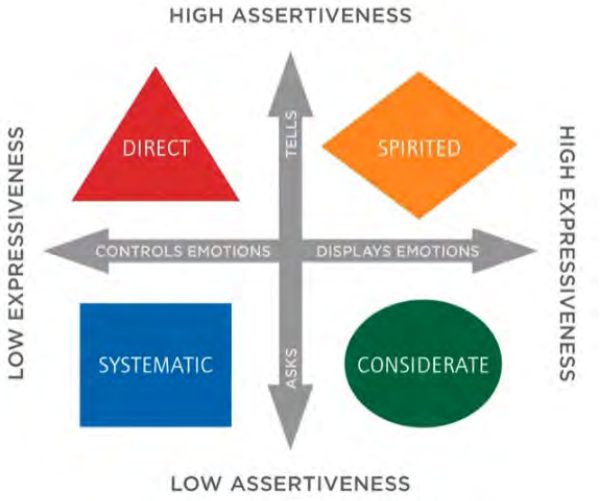


Image Source: webinar, Dillon. 2023. https://www.youtube.com/watch?v=-ZJSELSSW5s

Table 3 Communication Styles

Communication Style	Characteristics	Flexing Style
Direct	• Decisive, direct, loud, formal, direct eye contact, bold	• Focus on goals, maintain a businesslike tone, argue facts, ask direct questions, speak quickly
Spirited	• Generalizes, expresses emotions, persuades, loud, animated	• Focus on inspiring ideas, be supportive, don't rush, brainstorm, be upbeat and open to ideas
Considerate	• Listens, supportive, speaks slow and soft	• Focus on relationships, understand needs and be supportive of feelings, keep a relaxed pace
Systematic	• Precise, detail-oriented, brief and even speaking	• Focus on facts, be thorough and organized, provide data, be precise, allow time for analysis

The webinar is available on AASHTO's Technical Committee on Project Management website.

PMs can further strengthen communication with PDT members by:

- Considering the needs and the feedback of team members and stakeholders
- Sharing accurate information in a timely manner
- Encouraging open, respectful, face-to-face conversation
- Creating an environment where others feel comfortable contributing to project communication and constructively challenging ideas
- Offering multiple ways to send and receive information
- Remembering that communication is bi-directional and requires active listening
- Involving leadership when necessary
- Coordinating communication needs for each project milestone
- Ensuring that messages are clearly understood by all parties
- Focusing on information needed for project development

6.0 Common Communications in the Project Development Process

Too many instances of communication occur throughout project development to generate an exhaustive list. The content and frequency of communications also differ between projects. Table 4 reviews communications that often occur during different project phases or at milestones.

Table 4 Key Project Communications

When	Sender/Recipient *			Information Communicated or Submitted	Potential Communication Tools or Channel	Additional Resources
Project Initiation	District Project Development Branch Manager	→	PM	Project Assignment	• Meeting • Email • Documentation in PDP	HD-202.2
	PM	→	Program Management	Request for Funding Authorization	• Request for Funding Authorization form (TC 90-122) • Project Spend-Down • Design Funds Documentation Summary	HD-202.5, KYTC Forms Library, KYTC Highway Design Forms website
	Program Management	→	PM	Funding Authorization	• Project Authorization form (TC 10-1)	HD-202.5
	Planning PM, District Planner	→	PM	Project background and existing resources	• Planning or DNA studies • Meetings • Emails • CHAF	HD-202.3.1, KYTC Division of Planning website
	PDT Members	↔	PM	Early review of project issues with focus on performance measures, purpose and need, scope, schedule and milestones, need for additional resources or mapping, environmental overview, traffic forecasting, and public involvement.	• Meeting • Email	HD-202.6, *Assembling a Project Development Team*
	PM	↔	Various KYTC SMEs	Request information on resource availability needed for the project to determine required consultant services.	• Email • Meeting	HD-202.4
Establishing and Modifying	PM	→	Professional Services	Request for Proposal	• Consultant Portal • Emails	HD-205.2

When	Sender/Recipient *			Information Communicated or Submitted	Potential Communication Tools or Channel	Additional Resources
Consultant Contracts	Professional Services	↔	PM, Selection Committee	Consultant proposals and project information	• First and Second Selection Meeting	PS-15-04
	PM	→	Selected Consultant	Results of Selection Committee Meeting	• Phone call	HD-205.3
	PM	→	Consultant	Consultant's scope of work, proposed work units, project approach, milestones, deliverables, schedule	• Pre-Design Conference • Pre-Design Conference Meeting minutes (template)	HD-205.4
	PM	→	Professional Services	Pre-design conference minutes, complete listing of target dates, recommended percentages for payment in accordance with the established target dates, verification that funding is available, type of contract (e.g., lump sum, cost plus)	• Consultant Portal	HD-205.5
	Professional Services	↔ ↔	PM, Consultant	Negotiation of Scope and Production Hours	• Consultant Portal • Meeting • Email	HD-205.5
	Professional Services	→	PM, Consultant	Notice to the Consultant to Proceed with the negotiated scope of work.	• Signed Contract • Consultant Portal	HD-205.6
Preliminary Engineering	PM	↔	District Planner	Request for special traffic counts and traffic forecasts (if applicable)	• Traffic Count Request form	HD-202.6.8

When	Sender/Recipient *			Information Communicated or Submitted	Potential Communication Tools or Channel	Additional Resources
	PM	↔	Various KYTC SMEs and PDT members	Request for input on project issues such as geotechnical (Geotechnical Branch), railroad (KYTC Rail Coordinator), structures (Division of Structural Design), Complete Streets applications (KYTC Bicycle and Pedestrian Coordinator), early utility coordination (District Utility Coordinator), construction and maintenance issues (District Project Delivery and Preservation (PDP) staff). For SME contact information, contact the District's Location Engineer.	• Meetings • Emails	HD-203.7.2, HD-203.7.3
	District Environmental Coordinator (DEC)	↔	PM	Regular communication on status of environmental investigations, the environmental document, and permitting requirements. The PM should communicate changes in project termini or scope to the DEC immediately.	• Meetings • Emails	HD-202.6.7
	PM	↔	District Public Information Officer (PIO)	Coordination of External Stakeholder and other Public Meetings	• Meetings • Emails	HD-600, *Public Involvement with Customers and Stakeholders*
	PM	↔	FHWA KY Division	On projects with FHWA oversight or new or revised interstate access, coordinate needed reviews with the FHWA Area Engineer.	• Meetings • Emails	FHWA's RBP Plans, HD-203.3.10
	PM	→	Division of Highway Design	Intersection Control Evaluation (ICE)	• Email ICE forms • Roundabout Design Form (if applicable)	ICE Guidance

When	Sender/Recipient *			Information Communicated or Submitted	Potential Communication Tools or Channel	Additional Resources
	PM	→	Consultant or Statewide Contract Coordinator	Request for subsurface utility engineering (SUE), if applicable	• Email	HD-304
	PM and the PDT	→	Division of Environmental Analysis, Public	Selection of a preferred alternative	• Preliminary Line and Grade Meeting • Design Executive Summary • Meetings or other notifications to the public	HD-203.5, HD-203.6, HD-203.7.1
	PM	↔	Value Engineering (VE) Coordinator	Coordinate on projects exceeding or close to meeting the expenditure threshold for a VE study.	• Email • Meeting	HD-203.7.4
	District ROW Section	→	PM	Preliminary ROW impacts and cost estimate	• Email • Meeting	ROW-302
	District Utility Coordinator	→	PM	Preliminary utility impacts and cost estimate	• Email • Meeting	UR-600
Final Design	PM	→	Program Management	Request for Final Design Funding Authorization (if applicable)	• Request for Funding Authorization form (TC 90-122) • Project Spend-Down • Design Funds Documentation Summary	HD-202.5, KYTC Forms Library, KYTC Highway Design Forms website
	Program Management	→	PM	Funding Authorization	• Project Authorization form (TC 10-1)	HD-202.5

When	Sender/Recipient *			Information Communicated or Submitted	Potential Communication Tools or Channel	Additional Resources
	PM	→	Geotech Branch	Request for geotechnical investigation	• Email	HD-203.7.2, HD-203.7.3, *Geotechnical Investigations – Where to Begin and How to Proceed*
	Geotech Branch	→	PM	Geotechnical report with recommendations for roadway and structures, geotechnical notes, and soil profile sheets.	• Email	HD-204.4
	PM	→	Pavement Design Branch	Request for review of pavement design	• Web-based pavement design application	HD-1000
	PM	→	Drainage Branch	Request for review of drainage design	• Email • Meeting	HD-204.13
	PM	→	District Engineering Support Staff or Division of Traffic Operations	Request review of signing and striping plans	• Email • Meeting	HD-204.3
	PM	↔	District Utility Coordinator	Continued coordination of utility impacts	• Email • Meeting	HD-204.5
	PM	→	District Engineering Support & Traffic Operations	Request for review or design of electronic traffic control devices and lighting	• Email • Meeting	HD 204.7

When	Sender/Recipient *			Information Communicated or Submitted	Potential Communication Tools or Channel	Additional Resources
	PM	↔	Rail Coordinator	Project work at or near a railroad	• Email • Meeting	HD-204.8
	PM	→	PD, PDP, & Engineering Support Branch Managers	Request review and approval of Traffic Management Plan (TMP) on "significant projects"	• Email	HD-206
	PM	→	Drainage Branch	Request review of drainage design	• Drainage inspection meeting (often combined with the Final Inspection) • Submittal of reviewed Drainage Folders	HD-204.2
	Drainage Branch	↔	PM	Coordination and approval of drainage design.	• Meetings • Emails • Approved Drainage Folder	HD-204.2
	PM	→	Division of Structural Design	Request for structure design or review of consultant design.	• Email	HD-207.11
	Division of Structural Design	→	PM	Coordination and approval of structure plans.	• Emails • Approved structure plans	
	Party responsible for the survey	→	PM	Final Survey Report documenting project survey details	• Email	HD-301.6, HD-309.9.5
	PM and the PDT	↔	PM, PDT, Div. of Highway Design	Review of contract plans (≈ 80% complete). PM distributes to PDT.	• Final Inspection • Final Inspection Report	HD-204.16
	PM	→	Division of Right of Way and Utilities	Right of Way plans and revisions	• Email	HD-1305, HD-1306

When	Sender/Recipient *			Information Communicated or Submitted	Potential Communication Tools or Channel	Additional Resources
	Division of Right of Way and Utilities	→	PM	Right of Way Certification and Utilities Notes	• Email	ROW-1302
	PM and EC	↔	DEA	Coordination of needed permits	• Send plans, permit drawings and Water-Related Impacts Summary	HD-504
	DEC	→	PM	Notice of permit approvals	• Email	
	PM	→	Quality Assurance Branch	Request for a constructability review	• Email	HD-204.23
Preparing for the Letting	PM	→	Plan Processing Branch	Submittal of check prints, cost estimate, estimated completion date	• Email	HD-204.22
	PM	→	Plan Processing Branch	Submittal of Plans, Specifications, and Estimates (PS&E) package	• Email including Final Plan Submittal form and items listed on the form	HD-209, KYTC Highway Design Forms website
	PM	→	PS&E Branch	For proposal-only projects, the PS&E package is sent to the PS&E Branch in Construction Procurement	• Email including PS&E package or a link to its location	CP-301
	Construction Procurement	→	PM	Project-related questions from the Questions and Answers website during the advertisement.	• Email	
	PM	→	PDT, Construction Procurement	Answers to project-related questions during the advertisement, often with input from the PDT.	• Email	
	PM	→	Construction Procurement	Notification of need for Pre-Bid Meeting	• Email	

When	Sender/Recipient *			Information Communicated or Submitted	Potential Communication Tools or Channel	Additional Resources
Ongoing Project Communication and Submittal Activities	Consultant	→	PM	Request for payment (Pay Invoice)	• Email Consultant Monthly Report (CMR) • PDF of the signed Form TC 40-408 (Engineering and Engineering-Related Services Pay Estimate) • PDF of the signed Personal Service Contract (PSC) Invoice Form • For statewide agreements, a scanned copy of the Letter Agreement	KYTC Forms Library, KYTC Highway Design Forms website
	PM	→	KYTC Staff responsible for eMars processing	Approved Pay Invoice	• Email Consultant Monthly Report (CMR) • PDF of the signed Form TC 40-408 (Engineering and Engineering-Related Services Pay Estimate) • PDF of the signed Personal Service Contract (PSC) Invoice Form • For statewide agreements, a scanned copy of the Letter Agreement	HD 205.7, *Reviewing a Pay Invoice*
	Consultant	↔	PM	Consultant Monitoring	• Emails • Meetings • Gantt Charts • Consultant Monthly Reports	HD-205.7
	PM	→	Project Delivery	Commitments made to project stakeholders and the general public.	• Communicating All Promises (CAP) reporting in PDP	HD-203.4
After Letting	PM	→	Consultant	Evaluation of the consultant's performance.	• Evaluation forms available through https://intranet.kytc.ky.gov/org/DHD/Pages/default.aspx. • Evaluation results are sent to the consultant by the Roadway Design Branch Manager.	HD-205.9

When	Sender/Recipient *	Information Communicated or Submitted	Potential Communication Tools or Channel	Additional Resources
	PM ↔ Construction Staff	Provide input as needed during the construction of the project.	• Meetings • Emails	
* Contact information (e.g., name, email address) for SMEs within the general areas listed may be included in the C.O. Contact list in the Projectwise folder pw:\\KTC1VP-APPW001.kytc.ds.ky.gov:KYTC-Main\Documents\Central Office\Highway Design\CO Contacts\				

7.0 Associated Articles

Project Management Guidebook (PMGB) *Intro and Overview*

Project Management Guidebook (PMGB) *Holding Effective Meetings*

Project Management Guidebook (PMGB) *Document Management and Storage*

Project Time Management

8.0 Reference Documentation & Website Links

Rajkumar, S. (2010). Art of communication in project management. Paper presented at PMI® Research Conference: Defining the Future of Project Management, Washington, DC. Newtown Square, PA: Project Management Institute.

Project Communication Handbook. (2007). Caltrans Office of Project Management Process Improvement. Sacramento, CA.

Dillon, B. (2023, October 26). *What is My Communication Style?* [Webinar]. AASHTO Technical Committee on Project Management. https://transportation.org/design/technical-committees/project-management/

Bruzzese, A. (2015, December 15). "How to Explain Technical Information to Non-Techies". *Quickbase*, quickbase.com/blog/how-to-explain-technical-information-to-non-techies. Accessed 3 January 2023.

KYTC Highway Design Manual

KYTC Professional Services Guidance Manual

KYTC Projectwise Standard Project Folder Structure Policy

Project Management and Planning	Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1. Overview	x	x	x	x
2. Planning Consultant Contract Management	x			
3.Planning Studies and Early Project Management	x			
4.0 Project Management Resources	x	x	x	x
4.1 Data	x	x	x	x
4.2 Traffic Forecasts and Special Counts	x			
4.3 Coordination with Local Governments	x	x	x	x
4.4 Roadway Transfers, Closures and Abandonment	x	x	x	x
4.5 Complete Streets Coordination	x	x	x	x
x = Information from the topic may be applicable for the project classification.				

Image Source: Adobe Stock

Project Management and Planning

1.0 Overview

During the Planning phase, project management often involves managing planning studies that feed into other phases of project development. These studies include small urban area (SUA) studies, corridor studies, and Data Needs Analysis (DNA) studies. Technical transportation studies used to determine conceptual scoping parameters are described in the *Planning Guidance Manual* (PL-704).

As project development efforts become more deeply tied to the project purpose and scope identified in District-led DNA studies, District Planning Supervisors and staff may be designated as Project Managers (PMs) to guide preliminary engineering activities along a path consistent with the conceptual scope. Alternatively, the District may assign a Design PM to be part of the planning study team. Whenever practical, early involvement of the PM responsible for developing the planning study helps ensure that the initial project vision is effectively communicated and pursued.

PMs — regardless of their location — benefit from resources provided by the Division of Planning and District planners. Planners collect, analyze, and manage roadway data, provide subject-matter expertise in traffic forecasting and Complete Streets, participate in Metropolitan Planning Organization (MPO) and Area Development District (ADD) processes, and are often the first point of contact for local officials and stakeholders when a project originates.

Small Urban Area (SUA) studies evaluate and provide recommendations for transportation networks in small urban areas.

Corridor studies evaluate proposed roadway segments, existing roadway improvements, and identify and prioritize projects for future funding.

Data Needs Analysis (DNA) studies are concise studies with a consistent format that help define the project scope. They are typically completed prior to advertising a project for consultant services.

2.0 Planning Consultant Contract Management

KYTC's Division of Planning oversees statewide consultant contracts for Planning Services, Planning Traffic Modeling, and Traffic Forecasting. On projects that benefit from larger or more complex studies, consultants are selected through the Professional Services process. For more information on the consultant management of the Division of Planning's projects, see PL-206 in the *Planning Guidance Manual*.

3.0 Planning Studies and Early Project Scoping

Planning studies provide background information and conceptualize an appropriate improvement concept at a prescribed level of detail. Planning studies are not usually completed for maintenance, Highway Safety Improvement Program (HSIP), or most asset management projects. Corridor studies are

most commonly prepared in the early stages of a capital improvement project to better identify the scope, schedule and estimated cost of the project. Planning studies may be funded through the Planning Work Program with State Planning and Research (SPR) funds. They may also be included in the Enacted Highway Plan with designated funds in a planning (P) phase or as part of the preliminary design (D) phase to better define the project scope. For more information on how a project begins, see the PM Guidebook articles *Understanding the KYTC Budget and the Highway Plan* and *Project Initiation*. DNA studies are completed on projects that were not part of a previous planning study and usually have narrower scopes. They are typically completed by the District PM in coordination with the Division of Planning prior to advertising a project for consultant services.

Planning study activities may include:

- Drafting a purpose and need statement (see *Project Scoping*)
- Identifying major environmental issues, including environmental justice concerns (see *Project Management and NEPA*)
- Initiating consultation with local officials
- Initiating interagency (i.e., federal, state, tribal, regional, and local government) coordination
- Conducting appropriate levels of public involvement (see *Public Involvement with Customers and Stakeholders*)

Planning studies involve identifying and evaluating an improvement concept, generating preliminary cost estimates (design, right of way (ROW), utilities, construction), and recommending phasing priorities, as appropriate. Generally, studies are co-managed by KYTC's Division of Planning and the District Planning staff. The Cabinet works with ADDs and affected MPOs to deliver these studies. ADDs and MPOs, with coordination from KYTC planners, may also initiate planning studies with federal allocations and local matches. Completed KYTC studies are available on the Division of Planning's website.

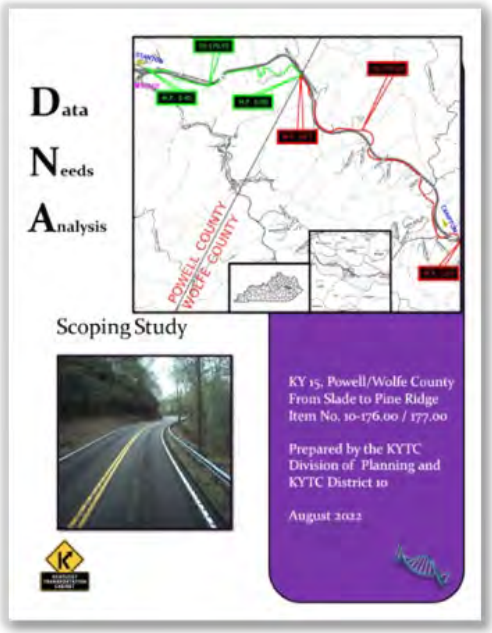


Image Source: https://transportation.ky.gov/Planning/Planning%20Studies%20and%20Reports/10-176-177%20DNA.pdf

Red Flag: DNA studies and corridor studies usually include scope statements, short- and long-term improvement concepts, and cost estimates for design, ROW, utilities, and construction. The PM should review the study and use it to establish the project baseline. If the scope, schedule, and budget do not align, the PM should revisit the project definition with KYTC leadership to properly define a new scope and obtain input and buy-in from all affected stakeholders.

4.0 Project Management Resources

PMs should take advantage of resources offered to them by the Division of Planning. In addition to early project scoping efforts, the division:

- Manages project data
- Provides traffic forecasts
- Has subject-matter experts (SMEs) who specialize in forecasting and Complete Streets

The following subsections summarize PM resources available from the Division of Planning. For more resources, visit the Division of Planning Technical Support Resources webpage.

4.1 Data

The Division of Planning collects, analyzes, and/or manages data that can assist PMs. The PMGB article *Project Initiation* describes most of these data. Key data sources are summarized below.

- KYTC's Highway Information View and Extract Interface (HIVEi) is a key source for data on existing facilities. The database stores information on roadway systems throughout the state and includes data on location, roadway feature type (e.g., mainline, ramp), pavement, traffic, and bridges.
- The CHAF database and SHIFT data include initial documentation for projects listed in the *Enacted Highway Plan* and data used to help prioritize capital projects. The CHAF Database may be accessed through the Project Delivery Platform for those with access permissions.
- Historical and current traffic counts are available for state-maintained roadways. Counts are available on country roadways with an inventoried bridge.
- Traffic speed, origin-destination, and travel demand data may also be available from the Division of Planning.

4.2 Traffic Forecasts and Special Counts

Image Source: Adobe Stock

PMs may request traffic forecasts using forms available on the Traffic Forecasting website. They should submit their requests to either the Forecasting and Modeling Team Leader or the Modal Programs Branch Manager in the Division of Planning. The Traffic Forecasting Website also contains forms that are used to request special counts (e.g., turning movement counts). PMs should request traffic forecasts and special counts early in the project development process.

4.3 Coordination with Local Governments

The Division of Planning houses the liaisons between the ADDs and MPOs. District Office planning staff also routinely interact with these organizations. ADDs and MPOs are involved in the creation and prioritization of projects. KYTC District Office planning staff are also good sources of information for the needs and goals of projects and often work with local governments to develop projects.

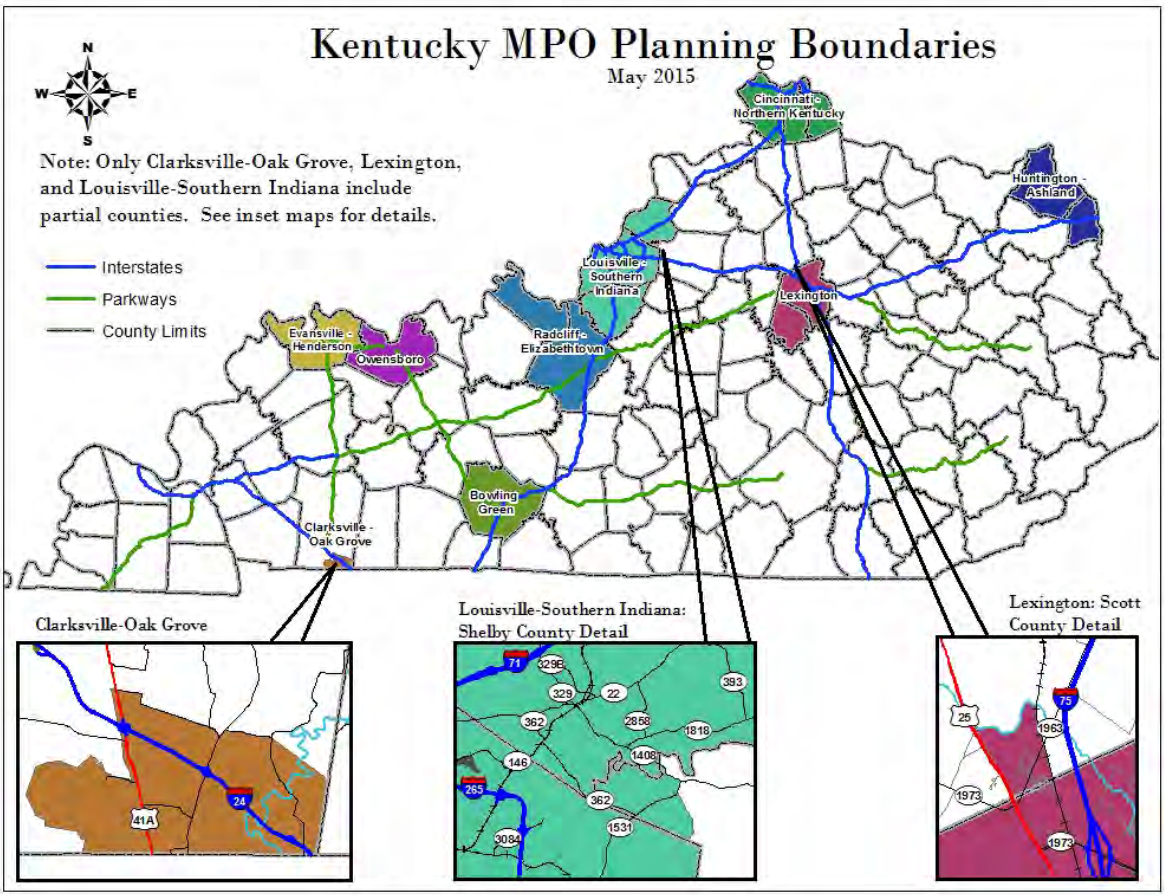


Image Source: https://transportation.ky.gov/Planning/Pages/Metropolitan-Planning.aspx.

Red Flag: If the project is in a MPO area, it must be included in the MPO's Transportation Improvement Program (TIP) to be eligible for federal funds. Contact the Division of Planning's MPO Team or the Division of Program Management with questions about eligibility. Failure to ensure that the correct project information is in the TIP may delay funding authorization, which could impact the project schedule.

4.4 Roadway Transfers, Closures and Abandonment

Occasionally, as part of the project development process it may be appropriate to transfer a road or roads from the State Primary Road System (SPRS). Examples of roadway segment changes include but are not limited to:

- New roadways assigned a state or federal route number
- Sections of old roadways bypassed or remaining as approach roads or frontage roads
- Entrances to private properties or cemeteries
- Other roadway segments no longer germane to the state-maintained system

To transfer roadway segments, an official order request must be submitted to the Division of Planning Transportation Systems Branch. The *Planning Guidance Manual* (PL-603) contains detailed information on this process.

Note: For projects that result in the relinquishment of ROW that was originally bought with federal funds, or if the project was constructed with federal funds, the provisions of 23 CFR 620.203 apply. KYTC must develop the appropriate documentation and obtain approvals required by the Federal Highway Administration (FHWA), as stipulated in 23 CFR 620.203.

4.5 Complete Streets Coordination

Kentucky's *Complete Streets, Roads, and Highways Policy* requires that KYTC include appropriate facilities to meet the needs of all users of the transportation system when the agency plans, builds, and reconstructs its streets, roads, and highways. Complete Streets users include, but are not limited to motorists, bicyclists, pedestrians, transit riders, and freight drivers.

Contact the State Bicycle and Pedestrian Coordinator in the Division of Planning with questions on Complete Streets implementation. Additional information is available through the Complete Streets Program Website.

Image Source: https://transportation.ky.gov/BikeWalk/Pages/Complete-Streets.aspx

5.0 Associated Articles

Project Management Guidebook (PMGB) *Intro and Overview*

Project Initiation

Project Scoping

Public Involvement with Customers and Stakeholders

Division of Planning Technical Support Resources

Understanding the KYTC Budget and the Highway Plan

6.0 Reference Documentation & Website Links

KYTC's Division of Planning Manual

Planning Studies

DNA Studies

KYTC's Highway Information View and Extract Interface (HIVEi)

Traffic Counts

Traffic Forecasting

MPO and Regional Planning

KYTC Complete Streets Policy

KYTC Complete Streets, Roads, and Highways Manual

Project Management and NEPA	Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1.0 Introduction	x	x	x	x
2.0 The Role of Integrated Decision Making in Project Development and Delivery	x	x	x	x
3.0 Environmental Clearance and NEPA Document Types	x	x	x	x
4.0 Purpose and Need	x	x	x	x
5.0 Selecting the Appropriate Environmental Document	x	x	x	x
5.1 No Significant Impacts – Categorical Exclusion	x	x	x	x
5.2 Uncertain Impacts — Environmental Assessment	x			
5.3 Significant Impacts — Environmental Impact Statement	x			
6.0 Uses, Responsibilities, and Time to Complete	x	x	x	x
7.0 The Public and NEPA	x	x	x	x
8.0 Tools for the Project Manager	x	x	x	x
9.0 Risk Mitigation	x	x	x	x
9.1 Importance of Documentation	x	x	x	x
9.2 Time for Permits	x	x	x	x
9.3 Changes in Scope	x	x	x	x
9.4 Other Considerations for Project Risk	x	x	x	x
x = Information from the topic may be applicable for the project classification.				

1. Introduction

The National Environmental Policy Act (NEPA) requires federal agencies to perform environmental reviews and assess the potential environmental impacts of proposed actions (e.g., road projects, issuing permits). To maintain compliance with NEPA, when the Federal Highway Administration (FHWA) approves transportation projects the agency must identify, evaluate, and — if possible — avoid impacts to the social and natural environment. Analysis of potential impacts requires interagency and interdisciplinary coordination. Once analyses are complete, findings must be documented and made available to the public so individuals can submit comments. FHWA and KYTC work to balance environmental considerations and the public interest to arrive at the best possible transportation decision.

KYTC's Division of Environmental Analysis (DEA) assists project managers (PMs) on all issues related to NEPA and the environmental process. DEA helps PMs ensure applicable state and federal laws are followed during planning, design, construction, operation, and maintenance projects that require environmental review. Throughout every project, PMs must work closely with DEA and District Environmental Coordinator (DECs) in each highway district to keep the environmental process moving forward and make sure that KYTC fulfills all environmental commitments made throughout project development. Drawing on partnerships with and the expertise of DEA, DECs, and subject-

matter experts (SMEs) helps PMs understand the environmental implications of alternatives; avoid, minimize, or mitigate project impacts; and implement sound, cost-effective, and defensible decision making.

When a project begins KYTC evaluates whether it will have significant environmental impacts, looking at a number of factors to make this determination:

- Public health and safety
- Unique geographical characteristics
- Human environment
- Historic and cultural resources
- Endangered or threatened species
- Cumulative impacts or setting a precedent for additional future actions

The NEPA process can sometimes be long and winding — especially for complex projects — but it provides critical protections for fragile ecosystems and gives community stakeholders a voice in transportation decision making. No one wants to return to the pre-1970 status quo, prior to the passage of key environmental and social legislation, when rivers teeming with pollution caught fire and interstate construction uprooted communities of color. Through the environmental process, KYTC can develop projects equitably and practice good environmental stewardship.

2. The Role of Integrated Decision Making in Project Development and Delivery

NEPA impacts the design and implementation of projects in many ways. As such, PMs must put integrated decision making into practice from a project's outset. This means design and environmental work should occur alongside and inform one another. Integrated decision making has six key components:

- Develop a reasonable number of alternatives, including a no-build alternative. The Project Development Team (PDT) evaluates alternatives based on the purpose and need (see Section 4). Alternatives failing to address the purpose and need are eliminated from consideration.
- Use FHWA-approved procedures to share project information with the public and solicit feedback (see Section 5)
- Evaluate impacts to local ecology, wetlands, streams, communities, and historic and cultural resources.
- Coordinate with agencies and partners that participate in the environmental and public involvement processes (e.g., tribal governments, transportation and environmental interest groups, MPOs, resource and regulatory agencies, underserved communities).
- Implement FHWA's five-step mitigation sequence: avoid impacts, minimize impacts, repair or restore impacted areas, reduce or eliminate impacts across the project life cycle, compensate for impacts [e.g., purchase wetland and stream mitigation credits).
- Thoroughly and clearly document the transportation decision making process. Document every step KYTC takes to avoid, minimize, or mitigate negative environmental impacts.

Through integrated decision making, the PDT can develop alternative implementation strategies during a project's early stages. And with multiple alternatives in hand, the Cabinet can avoid costly, time-consuming efforts to re-engineer a project. From a project's outset, the PM should engage in and document the decision-making process and strive to a balance public impacts, environmental directives and regulations issued by external agencies, cost, safety, and mitigation techniques.

3. Environmental Clearance and NEPA Document Types

A critical step in the NEPA process is obtaining environmental clearance. This entails completing an environmental document and receiving state/federal approval for a proposed project. Environmental documents record the project decision-making process and evaluate project alternatives. When evaluating alternatives, the PDT must consider engineering, environmental, and socioeconomic factors. Analysis contained in environmental documents must state who evaluated alternatives, criteria used to eliminate alternatives, when alternatives were eliminated, and measures

that were employed to assess the effectiveness of alternatives. The goal is to make informed decisions that balance project objectives with environmental considerations.

The type of environmental document generated for a project is determined by considering the project's scope, scale of impacts, complexity, and potential for controversy. Table 1 describes the three types of environmental documents. The amount of time and resources that are needed to prepare environmental documents varies greatly (see Table 4). Environmental assessments (EA) and environmental impact statements (EIS) are usually reserved for complex capital projects with significant impacts. Very few projects require an EA or an EIS. If a PM is managing a project with an EA environmental document, they must understand all relevant requirements and timeframes.

Table 1 Environmental Documents

Document Type	Description
Categorical Exclusion (CE)	A category of actions which do not individually or cumulatively have a significant effect on the human environment…and…for which, therefore, neither an environmental assessment nor an environmental impact statement is required (40 CFR 1508.4).
Environmental Assessment (EA)	A concise public document for which a Federal agency is responsible that serves to (40 CFR 1508.9): a) Briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement (EIS) or a finding of no significant impact (FONSI). b) Aid an agency's compliance with the Act when no environmental impact statement is necessary. c) Facilitate preparation of a statement when one is necessary. An EA briefly discusses the need for the project, the alternatives, environmental impacts of the proposed action and alternatives, and a listing of agencies and persons consulted.
Environmental Impact Statement (EIS)	Federal agencies must prepare environmental impact statements (EISs) for major federal actions that significantly affect the quality of the human environment. An EIS is a full disclosure document that: • Details the process through which a transportation project was developed, • Considers a range of reasonable alternatives • Analyzes the potential impacts of alternatives • Demonstrates compliance with other applicable environmental laws and executive orders The EIS process is completed in the following ordered steps: Notice of Intent (NOI), draft EIS, final EIS, and record of decision (ROD).

Approved environmental documents are valid for a specified time period. If an approval expires, the project must be reevaluated to verify the decision reflects the current project and that effects and impacts previously identified have not significantly changed.

Red Flag: Irrespective of an environmental document's expiration date, it may need to be reevaluated if there are changes in the project scope, regulations, or conditions within the project area. Before a Federal-aid project advances to a major phase (right of way, utilities, construction), FHWA requires a reevaluation of the approved NEPA document.

Note: FHWA approval of a NEPA document is not required for **state-funded projects**. Environmental resources on these projects are typically documented in an Environmental Overview (EO).

4. Purpose and Need

Purpose and need statements explain and justify why KYTC is proposing a project and consist of purpose and need elements (Table 2). Not all Cabinet projects require individual purpose and need statements. Programmatic purpose and need statements cover projects and activities conducted under the following programs:

- FE01 — Routine Maintenance Program
- FE05 — State Resurfacing Program
- FE02 — Bridge Maintenance Program
- FE06 — New Guardrail Program
- FE07 — Welcome Center/Rest Area Maintenance and Operation Program
- FE04 — Traffic Operations Program

A good purpose and need statement is straightforward and can be understood by different stakeholders, including the general public. Purpose and need statements justify (a) why public funds should be used to finance a project and (b) any environmental impacts that a project may generate. It should not suggest specific roadway solutions but rather focus on outlining the issues.

Table 2 Purpose and Need Components

Element	Description
Need	• Answers the question: What problem(s) needs to be fixed? • Uses data and factual statements to demonstrate the problem(s) or deficiencies that exist or which are projected to materialize • Common examples of needs include excess congestion, safety issues, deterioration of physical infrastructure
Purpose	• Answers the question: How will a project fix the problem(s)? • Provides a clear, concise definition of project objectives • Project definition should be broad enough to support the development and analysis of a range of reasonable and competitive alternatives

During project development, the PDT uses the purpose and need statement as the basis to establish a project scope, including the project footprint and project deliverables. Developing a comprehensive, highly specific purpose and need statement is critical for identifying which alternative is best positioned to address operational, safety, and performance goals in a reasonable, prudent, and practicable manner. The purpose and need statement is not static. It is updated throughout project development as the PDT gains knowledge of the project context and receives feedback from the public. All updates to the purpose and need statement should be complete by the end of Preliminary Design.

FHWA has catalogued items that purpose and need statements often tackle (Table 3). This list is non-exhaustive, and it is important to keep in mind that purpose and need statements must be tailored to individual projects.

Table 3 Purpose and Need Content

Item	Description
Project Status	• Discuss project history, measures taken to date, other participating government agencies, action spending, schedules.
Capacity	• Review the facility's capacity and ability to meet current and projected traffic demands. Discuss capacity and performance goals and factors that limit the facility's capacity or negatively impact travel time reliability.
System Linkage	• Describe physical or operational linkages between the facility and broader transportation network.
Transportation Demand	• Highlight where the project fits in with statewide or regional transportation demand management plans or programs. Consider fluctuations in transportation demand and describe traffic forecasts that differ significantly from the estimates developed for Section 134 planning processes.
Legislation	• Address if the project is mandated by the federal, state, or local government.
Social Demands / Economic Development	• Explain how the project will benefit employment, schools, land use plans, and recreational facilities. Review projected changes in development or land use that require expanding the roadway capacity.
Modal Interrelationships	• Describe the project's multimodal implications (e.g., connections to airports, railroads, ports, mass transit services).
Safety	• If the project's goal is to improve safety, use crash data to illustrate a safety hazard exists. Describe how the project will eliminate or mitigate safety issues.
Roadway Deficiencies	• If the project's goal is to correct roadway deficiencies, identify and explain what problems exist (e.g., poor condition, substandard geometrics, inadequate cross sections, load limits on structures, high maintenance costs). Describe how the project will correct deficiencies.

The PMGB article *Project Scoping* provides an in-depth treatment of purpose and need statements.

5. Selecting the Appropriate Environmental Document

The environmental document records the project decision-making process and presents an evaluation of alternatives — including the chosen alternative — based on engineering, environmental, and economic factors.

Once a project is authorized, the environmental process kicks off with the PM and Project Development Branch Manager (PDM) working with the District Environmental Coordinator (DEC) to gauge potential project impacts and determine the most appropriate environmental document type.

If the expected environmental document is a Categorical Exclusion (CE) Level 3 or above, the PM must work with DEA Environmental Project Mangers (EPMs) and Division of Highway Design's Location Engineers to schedule a scope verification meeting. Required attendees include the PM, PDT members, and the FHWA representative. The meeting should be held before the pre-design conference and focuses on potential environmental impacts, including those related to:

- Air quality
- Aesthetics
- Cemeteries
- Cultural resources
- Endangered species

- Federal lands
- Floodplains
- Groundwater resources
- Hazardous materials and underground storage tanks
- Section 4(f) resources
- Section 6(f) resources
- Socioeconomic concerns and environmental justice
- Streams
- Wetlands

If KYTC knows a project will have significant environmental impacts, it can issue a notice of intent (NOI) and begin the scoping process, after which an environmental impact statement (EIS) is drafted (see Section 3.3). But if there is uncertainty over whether a project will generate significant impacts, KYTC conducts an Environmental Assessment (EA) (see Section 3.2).

5.1 No Significant Impacts — Categorical Exclusions
The most common type of environmental document is a CE — over 90 percent of KYTC projects qualify for a CE.

Under an agreement with FHWA, the Cabinet is authorized on the agency's behalf to determine whether a project counts as a CE action. Appendix A and Appendix B of this agreement list many project types eligible for a CE. DECs help PMs determine if their project qualifies for a CE. But some common actions covered by the agreement include:

- Projects that will take place entirely within the existing operational right of way, including:
    - Highway modernization through resurfacing, restoration, rehabilitation, reconstruction, and the addition of shoulders or auxiliary lanes
    - Highway safety improvement projects (i.e., those included in Kentucky's highway safety plan) or traffic operations improvement projects
    - Bridge rehabilitation, reconstruction, or the replacement or construction of grade separation to replace existing at-grade railroad crossings
    - Bridge scour and debris removal
- Installation of fencing, signs, pavement markings, traffic signals, railroad warning devices and small passenger shelters if no significant land acquisition or traffic disruptions will occur
- Emergency repairs following a disaster declaration by Kentucky's governor or the president. This encompasses the repair, reconstruction, restoration, retrofitting, or replacement of any road, highway, tunnel, or transit facility that was under construction or operational when a disaster struck.
- Facility alterations designed to improve accessibility for the elderly and people with disabilities
- Federal-aid projects that **(a)** receive less than $5 million in federal funds or **(b)** have a total cost of < $30 million and < 15 percent of costs are paid for with federal funds.

The agreement also establishes four CE levels (Table 4) as well as criteria for determining the appropriate CE level. Cells in the *Class of Action* column link to checklists that are used to evaluate whether a project meets the criteria for different types of CE. When deciding on the appropriate CE level, the first step is to look at the CEMP checklist to determine if a project fulfills relevant criteria. If it does not, evaluate the project against CE Level 1 criteria. This process continues until the correct CE level is identified.

Table 4 Types of Categorical Exclusion Defined in the FHWA – KYTC Agreement

Class of Action	Approval Signatures Required	Level of Complexity and Scale of Impacts
CE for Minor Projects (CEMP)	• DEC or EPM or Director of DEA • PM	●

CE Level 1	• DEC or EPM or Director of DEA • PM	🟢
CE Level 2	• DEC, EPM, and Director of DEA • PM	🟡
CE Level 3	• DEC, EPM, and Director of DEA • PM • FHWA	🟡

🟢 = Minor; 🟡 = Moderate; EPM = Environmental Project Manager

Form TC 58-48 (CE Determination) must be completed for all CEs. This form, usually completed by the DEC, includes a project summary, description of alternatives evaluated, environmental determinations for each functional area, environmental commitments and/ or mitigation, review of public involvement, a discussion of social, economic, and cultural historic resource impacts, and other information. PMs must review commitments and input relevant information into the Communicating All Promises (CAP) document in KYTC's Project Delivery Platform (PDP).

For CE Level 1 – 3 projects, a CE Environmental Review must also be completed and attached to Form TC 58-48 (CE Determination)

A CE document remains valid for two years after its approval. If more than two years pass, FHWA will not authorize funding until the CE document is reevaluated. Reevaluations are also needed prior to a federal funding authorization of a project phase (i.e. right-of-way, utilities, construction) if more than 3 months have elapsed since the original approval. Reevaluations may be needed if there are changes in the project scope, conditions in the project area, or regulations.

5.2 Uncertain Impacts — Environmental Assessment

Environmental assessments (EAs) are reserved for projects that may have larger impacts but when it is unclear if they are significant enough to warrant an environmental impact statement (EIS). Regulations issued by the Council on Environmental Quality (CEQ) mandate that EAs contain the following information:

- Description of the proposed action and the purpose and need
- Description of alternatives
- Evaluations of impacts associated with each alternative
- Review of proposed mitigation
- A list of agencies and people consulted during early coordination
- Discussion of the preferred alternative (if selected)

EAs must also describe the findings of environmental base studies, which are detailed investigations of how different environmental features (e.g., air quality, ecology, noise) will be impacted by project activities.

EAs are performed almost exclusively by consultants. But the PM, PDT, DEC, other DEA subject-matter experts, and FHWA collaborate to establish a schedule for completing documentation and the levels of effort needed to identify the range of alternatives and conduct relevant investigations (e.g., base studies). Table 5 lists the possible outcomes of EAs. Once DEA approves an EA, it submits the EA to FHWA.

Table 5 Potential Environmental Assessment Outcomes

EA Finding	Outcome
Project will generate significant environmental impacts.	KYTC prepares an environmental impact statement (EIS).

Project will generate minor environmental impacts that do not exceed CE thresholds.	KYTC prepares the appropriate level CE.
Project will generate environmental impacts that exceed CE thresholds but are not deemed significant.	KYTC finalizes the EA, solicits public input, and prepares a finding of no significant impact (FONSI).

A FONSI documents the final transportation decision and summarizes information on the project's environmental, economic, and engineering impacts as well as mitigation that will be carried out as part of the selected alternative and responses to issues raised during the public hearing and comment period. Specifically, a FONSI must:

- Address the impacts of the selected alternative
- Include an explicit finding that the project will not significantly impact the environment
- Describe steps to comply with relevant environmental laws and regulations
- Include a final Section 4(f) determination
- Identify mitigation measures that will be implemented to minimize the project's environmental impacts

FHWA must approve a FONSI if Federal-aid dollars will be used to fund the project.

5.3 Significant Impacts — Environmental Impact Statement

If an EA concludes a project will produce significant environmental impacts or KYTC knows the project will result in significant impacts, the Cabinet moves forward with the EIS process — typically lead by a consultant. This process begins with KYTC preparing and publishing a notice of intent (NOI) in the *Federal Register*. Next, a Draft EIS (DEIS) is developed. This document:

- Summarizes the findings of environmental base studies
- Reviews environmental, engineering, and economic data or reports undertaken in accordance with the approved scope of work
- Discusses a reasonable range of alternatives for the proposed action (including eliminated alternatives)
- Summarizes studies, reviews, consultations, and coordination mandated by environmental laws and executive orders

DEA submits the completed DEIS to FHWA. Following FHWA approval, the Cabinet has 30 days to publish a notice for a public hearing in a local newspaper; the PM can also decide to publish the notice in publications that have regional or statewide circulation.

Following public hearings, the PDT evaluates the comments received, prepares responses, and identifies a preferred alternative. In some cases, comments submitted by the public or information comes to light that motivates the study of new alternatives. Once these are taken under consideration, the environmental process culminates in preparation of the Final EIS (FEIS). This document:

- Identifies the preferred alternatives
- Summarizes investigations and activities that occurred following publication of the DEIS
- Discusses comments received on the DEIS
- Documents the final Section 4(f) determination (if applicable)
- Catalogues environmental mitigation measures
- Documents compliance with all relevant environmental laws and executive orders

Once the FEIS is drafted, undergoes internal review, and is finalized, the document is submitted to FHWA along with Form TC 58-52 (Final Environmental Impact Statement — Guidance and Accountability Form). The process ends with KYTC preparing a record of decision (ROD). This document undergoes internal reviews before DEA submits it to FHWA for approval. An approved ROD cannot be published until at least 45 days pass following approval of the FEIS.

For additional information on step-by-step procedures for the environmental process, see the *Environmental Analysis Guidance Manual*.

6. Uses, Responsibilities, and Time to Complete

Table 6 summarizes the features of different NEPA documents. It specifies when each type of document should be used, the party responsible for its preparation, approval authority, time required for completion, and the amount of time a document is valid for before it needs to be reevaluated. The Document Type column links to sections in the Environmental Analysis Guidance Manual that talk about each kind of environmental document.

Table 6 Summary of Environmental Document Features

Document Type	When to Use	Who Prepares	Who Approves	Time to complete	Valid for
Environmental Overview (EA-403)	Planning phase of state-funded project	KYTC Planning or Environmental Staff or Consultant	N/A	2-12 months	N/A
Categorical Exclusion (EA-404)	No significant impacts (See CE Manual)	KYTC District or CO Environmental Staff or Consultant	See Table 4	CEMPs usually require a few days to 2 months. CE I typically requires 2-6 months. CE IIs typical require 2-6 months. CE IIIs typically require 6-24 months.	2 years
Environmental Assessment (EA-405)	Uncertainty if impacts will be significant	Typically Consultant	FHWA	6-18 months	Until environmental document is complete.
Finding of No Significant Impact (EA-406)	An EA finds the project will not result in significant impacts	Typically Consultant	FHWA	6-12 months after EA	2 years
Environmental Impact Statement (EA-407, EA-408)	Impacts are expected to be significant	Typically Consultant	FHWA	24-36 months	Until ROD is signed
Record of Decision (EA-409)	Impacts are expected to be significant	Typically Consultant	FHWA	6-12 months after Final EIS (FEIS)	3 years

Reevaluation (EA-410)	Expired document, plan changes, phase changes, or changes in regulation	Manager or Original Document (EPM or DEC)	Same as original document	1 week - several months	Same as original document

PMs are responsible for initiating reevaluation of approved NEPA documents. Typically, reevaluations are done when a document is no longer valid due to the passage of time, if it will expire before a major project phase is authorized, if the project has undergone significant changes following the approval (e.g., in scope, regulation, or project area). PMs must work with the DEC to initiate reevaluations promptly, well in advance of scheduled major phase authorizations to ensure there is enough time to complete additional studies, coordinate with resource agencies, and finish other activities.

In most cases, the office that developed the original document performs the reevaluation. For CEMP and CE Level I documents prepared in a District Office, the DEC coordinates and/or completes the reevaluation. For other types of documents developed by DEA or consultants, the Division coordinates and/or completes the reevaluation. In some cases, environmental consultants may help prepare documents as part of reevaluations.

The following HKP articles provide insights into subject-area assessments and mitigation strategies:

- Section 7 of the Endangered Species Act for Project Managers
- Section 404 Permitting for Project Managers
- Section 106 Process for Project Managers
- Stream and Wetland Mitigation for Impacts to Waters of the U.S. (WOTUS)

Further description of the level of effort and information to be included in each document type is included in the DEA's *Environmental Analysis Guidance Manual*, and the *Categorical Exclusion Guidance Manual*.

7. The Public and NEPA

FHWA requires that states develop a public involvement program pursuant to 23 U.S.C. 128 and 40 CFR 1500 – 1508. A project's size, potential impacts, and NEPA document type (CE, EA or EIS) influence decisions about the type and scale of public involvement opportunities. KYTC must:

- Offer planning and coordination of public involvement opportunities from the outset of the NEPA process.
- Give opportunities for the public to help identify potential impacts (e.g., social, economic, and environmental impacts as well as relocations).
- Hold at least one or more public hearings for any Federal-aid project determined to have significant impacts in the public interest (typically only EIS projects).
- Advertise or provide other reasonable notice of public input opportunities.

The HKP article *Public Involvement with Customers and Stakeholders* and the *Highway Design Guidance Manual* (HD-600 — Public Involvement) provide additional information on KYTC's public involvement procedures

8. Tools for the Project Manager

Several tools help PMs track findings, decisions, and commitments made during the environmental process. Because the NEPA process can be complex, stretch across multiple years, and involve numerous agencies and people (some of whom move to other positions), PMs must track project decisions so project commitments and project statuses are readily available. Key tools are described below.

- ProjectWise®: KYTC uses Bentley ProjectWise® to store and manage project reports, files, and data. It is available only to Cabinet staff and provides immediate access to users across KYTC. The system uses a standard file

structure that includes locations of environmental documents and data. PMs need to ensure the completed environmental documents are in the appropriate project folder locations.

- CE Matrix and Checklists:
  - The CE Exclusion Matrix lists the characteristics of different types of CEs
  - The Categorical Exclusion Determination sheet (TC 58-48) is submitted for review and approval of CEs.
  - The Categorical Exclusion Environmental Review is required for CE Levels 1 – 3 is and is an attachment to the CE Determination Sheet (Form TC 58-48) .

- Communicating All Promises (CAP): KYTC must fulfill promises made to project participants and stakeholders. CAP tracks the following information:

  - Description of the promise made
  - The person/entity to whom the promise was made
  - Source of the promise
  - Date the promise was made
  - Location of the work or activities to fulfill the promise

  All promises and related data are stored and tracked in the project database system. Users cannot delete entries from the system once they have been entered. The CAP report follows the project through the construction bid package and project completion. See HD-203.4 for more information.

- Environmental Assessment Tracking System database (EATS): EPMs and other KYTC staff can use the web-based EATS to enter, maintain, and access detailed information for environmental reviews. EATS' interface provides access to information such as status and comment data related to environmental milestones, meetings, review dates, and documents received. It should be regularly updated.

  EATS can capture commitments that will be addressed prior to the construction phase, and therefore may not need to be entered into CAP. For example, if KYTC identifies archaeological sites that need further investigation, that can be noted in the project commitments function of EATS. Any commitment that needs to be carried through to project construction should be coordinated with the PM so they can include it in CAP. EATS can generate customized reports and is available through KYTC's intranet site.

- Project Impact Profile (PIP): The PIP form (TC 58-28) summarizes findings from the development of an EA/FONSI or EIS/ROD, including potential environmental impacts. It provides a consistent format to capture potential issues for each resource subject area and is submitted along with the environmental document.

More information on tools KYTC uses to monitor environmental assessments and commitments is included in the *Environmental Analysis Guidance Manual*. For additional information on PM tools see the HKP article *PM Tools and Technology* (coming soon).

9. Risk Mitigation

Throughout a project, PMs need to identify and manage environmental risks that may affect the project's timeline, cost, and legal status. Risk assessment begins with project scoping. A good starting point is reviewing all previous studies and documents related to the proposed action to identify information relevant to the NEPA process as well as to locate potential risks, special considerations, and possible solutions previously identified.

9.1 Importance of Documentation

PMs and DEA personnel must carefully document the NEPA process. While the Cabinet may have taken appropriate actions and adhered to the NEPA process, the effectiveness of these efforts relies heavily on thorough documentation. Without proper documentation, it is as if these actions didn't occur or are not evident, highlighting the importance of well-documented processes. All environmental documentation should use clear, concise

language. Because NEPA litigation can focus on project termini, the PM and PDT must pay close attention to segmentation on highway projects. NEPA documents should include evidence- and data-rich narratives of the project decision-making process that can be placed in a project's administrative record. PDTs must document how and when alternatives are eliminated. Reevaluating alternatives whose elimination was justified but not properly documented increases time and costs.

9.2 Time for Permits

If KYTC needs to obtain permits or approvals from other agencies (e.g., United States Coast Guard), or a project is especially complex, PM and PDTs should allocate more time during project development for the environmental process. Routinely coordinating with regulatory agencies from the earliest stages of a project can help PDTs locate sources of risk and mitigate delays. Findings from base studies help PMs identify potential risks from the project's outset. PM and PDTs must identify potential water-related impacts early in project development and refine the design, if feasible, to avoid these impacts. This helps keep permitting off the critical path.

9.3 Changes in Scope

As preliminary design advances on complex projects, scopes typically evolve. Modifying the project scope could change the type of environmental document needed. To address these challenges, the PM communicates issues to the PDT, including the SMEs and DEC, so team members can discuss the probable environmental impacts associated with scope modifications and determine if a different environmental document type is warranted. Scope changes can negatively impact the project schedule.

If a project is modified after an environmental document is approved the PM must communicate the nature of the changes to all PDT members and oversee efforts to update environmental documents. Examples of changes that require reworking environmental documents include minor revisions to the project footprint resulting from detailed design at intersections, definition of approaches, changes in slopes, or other refinements that minimally expand the area impacted by a project.

If the PDT identifies significant additional impacts or the project area is greatly expanded after completion of the environmental document (e.g., incorporation of excess excavation sites), the PM and PDT may need to reevaluate the environmental document and prepare a supplement or addendum, regardless of scheduled project development phases.

9.4 Other Considerations for Project Risk

The amount of research conducted and the scope of field studies vary based on the level of NEPA documentation. For all environmental document types, project decision making must consider direct and indirect impacts as well as short-term and long-term effects. Strategies to reduce risk associated with the environmental process are outlined below.

- Environmental Justice Analysis (EJA) might correspond with the Socioeconomic Impact Assessment, but EJA requirements are separate and stipulated in an Executive Order.

- Some ecological fieldwork can only occur during particular seasons. This is an important consideration for investigating certain resources, especially streams, wetlands, and threatened or endangered species. PMs need to consider seasonal fieldwork requirements when developing project schedules.

- When geotechnical field investigations are needed, analyze the environmental setting to verify geotechnical work (e.g., drilling) will not adversely impact sensitive features (e.g., archaeology, forested habitat, special use stream, wetland). The PM must determine if an environmental overview should be conducted prior to geotechnical field investigations.

- The schedule for completing historic resource assessments may vary based upon anticipated project impacts. These impacts are contingent upon context, magnitude, and intensity. Consultation with the State Historic Preservation Office, and possibly other consulting parties, is mandatory at key points throughout the process.

- Evaluations of archaeology and historic architecture are separate disciplines of cultural resource analysis. Although subject to many of the same laws and regulations, they are investigated by discipline-specific SMEs and have unique fieldwork, reporting, and review requirements.

- If the Biological Assessment finding is *may affect, likely to adversely affect* for any federally endangered species, DEA must coordinate with the lead federal agency to begin a formal Section 7 consultation with the United States Fish and Wildlife Service (USFWS), unless there is an applicable programmatic agreement (e.g., Indiana Bats) in place.

- A federally funded highway project that uses Section 4(f) property can be approved only after it has been determined no prudent and feasible alternative to use the property exists and that project planning minimizes harm to Section 4(f) sites (49 USC 303). Consult with the DEC to determine any applicable programmatic agreements or flexibilities afforded by de minimis impacts.

- Section 6(f) of the Land and Water Conservation Act requires that the conversion of lands or facilities acquired with Land and Water Conservation Act funds under the State Assistance program be coordinated with the National Park Service (NPS). Coordination requirements of Section 6(f) compliance are complex and can be time consuming. Section 6(f) applies to state and federally funded projects if a resource is impacted.

- Conforming with the purpose of the State Implementation Plan (SIP) requires that transportation activities must not cause new air quality violations, worsen existing violations, or delay timely attainment of National Ambient Air Quality Standards (NAAQS). Because the Clean Air Act requires transportation conformity, air quality analysis has a high level of importance and urgency. Transportation plans and projects demonstrate conformity through planning level documents. These conformity documents are typically the Statewide Transportation Improvement Plan (STIP) for areas outside of a Metropolitan Planning Organization (MPO) area. Projects within the boundaries of an MPO demonstrate conformity in the MPO's Transportation Implementation Plan (TIP). Ensure needed project-related modifications to these documents are addressed early to avoid funding authorization delays.

- KYTC may require property owners to perform required cleanup procedures before purchasing a property. Potential sources of pollutants include underground storage tanks (USTs), aboveground storage tanks, waste storage areas, and commercial and industrial process locations. The *Environmental Analysis Guidance Manual* contains a list of applicable codes, regulations, statutes, and guidance documents.

- Consider potential environmental mitigation fees during alternatives analysis and include forecast expenses in the project cost estimate.

Additional information on red flag scenarios is available in the HKP article *Environmental Approval*.

Associated Articles

Project Cost Estimation and Management
2022 PMBC Overview Book
Environmental Approval
Develop Preliminary Alternatives
Section 7 of the Endangered Species Act
Section 404 Permitting for Project Managers

Section 106 Process for Project Managers
Stream and Wetland Mitigation for Impacts to Waters of the U.S. (WOTUS)

References

Code of Federal Regulations Definition of Terms in CEQ Regulations
Environmental Analysis Guidance Manual
Highway Design Guidance Manual
Guidance for Managing Legal Risks in the NEPA Process
CE Exclusion Matrix
Categorical Exclusion Determination sheet
Categorical Exclusion Environmental Review
Categorical Exclusion Guidance Manual
The Elements of Purpose and Need in FHWA's Environmental Review Toolkit.

Glossary

Significant Impacts — According to the Code of Federal Regulations (CFR), making determination about whether *significant impacts* requires that context and intensity be considered in relation to short- and long-term potential impacts of project actions. Project context includes impacts to the local area, the affected region, the stakeholders, and potentially, society. Project intensity refers to the severity of the project action, including both beneficial and adverse impacts.

Notice of Intent — A formal announcement of intent to prepare an EIS as defined in Council on Environmental Quality (CEQ) NEPA regulations (40 CFR 1508.22).

Base Studies — Determine the initial environmental status and the potential effects of alternatives on specific areas of environmental concern (e.g., historic properties, air quality, socioeconomic, noise,). Performed by environmental subject-matter experts.

Communicating All Promises (CAP) — Project commitments to project participants and stakeholders stored and tracked in a project database.

Record of Decision (ROD) - A concise public document summarizing the findings in the EIS and the basis for the decision. The ROD must identify mitigations which were important in supporting decisions, such as those mitigations which reduce otherwise significant impacts, and ensure that appropriate monitoring procedures are implemented (32 CFR 651.26).

Environmental Overview (EO) – Preliminary assessment of possible environmental impacts that may result from the project and may require field evaluation, ranging from windshield survey to full environmental investigation, depending upon project complexity.

Categorical Exclusion (CE) - A category of actions which do not individually or cumulatively have a significant effect on the human environment…and…for which, therefore, neither an environmental assessment nor an environmental impact statement is required (**40 CFR 1508.4**).

Environmental Assessment (EA) - A concise public document for which a Federal agency is responsible that serves to (**40 CFR 1508.9**):

a) Briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement (EIS) or a finding of no significant impact (FONSI).
b) Aid an agency's compliance with the Act when no environmental impact statement is necessary.
c) Facilitate preparation of a statement when one is necessary.

An EA briefly discusses the need for the project, the alternatives, environmental impacts of the proposed action and alternatives, and a listing of agencies and persons consulted.

Environmental Impact Statement (EIS) - Federal agencies must prepare environmental impact statements (EISs) for major federal actions that significantly affect the quality of the human environment. An EIS is a full disclosure document that:

- Details the process through which a transportation project was developed,
- Considers a range of reasonable alternatives
- Analyzes the potential impacts of alternatives
- Demonstrates compliance with other applicable environmental laws and executive orders

The EIS process is completed in the following ordered steps: Notice of Intent (NOI), draft EIS, final EIS, and record

List of Projects Approved for CE Under Appendix A of the KYTC – FHWA Agreement

Activities which do not involve or lead directly to construction, such as planning and research activities; grants for training; engineering to define the elements of a proposed action or alternatives so that social, economic, and environmental effects can be assessed; and Federal-aid system revisions that establish classes of highways on the Federal-aid highway system.	☐
Approval of utility installations along or across a transportation facility.	☐
Construction of bicycle and pedestrian lanes, paths, and facilities.	☐
Activities included in the State's highway safety plan under 23 U.S.C. 402.	☐
Transfer of Federal lands pursuant to 23 U.S.C. 107(d) and/or 23 U.S.C. 317 when the land transfer is in support of an action that is not otherwise subject to FHWA review under NEPA.	☐
The installation of noise barriers or alterations to existing publicly owned buildings to provide for noise reduction.	☐
Landscaping.	☐
Installation of fencing, signs, pavement markings, small passenger shelters, traffic signals, and railroad warning devices where no substantial land acquisition or traffic disruption will occur.	☐
The following actions for transportation facilities damaged by an incident resulting in an emergency declared by the Governor of the State and concurred in by the Secretary, or a disaster or emergency declared by the President pursuant to the Robert T. Stafford Act (42 U.S.C. 5121): (i) Emergency repairs under 23 U.S.C. 125; and (ii) The repair, reconstruction, restoration, retrofitting, or replacement of any road, highway, bridge, tunnel, or transit facility (such as a ferry dock or bus transfer station), including ancillary transportation facilities (such as pedestrian/bicycle paths and bike lanes), that is in operation or under construction when damaged and the action: (A) Occurs within the existing right-of-way and in a manner that substantially conforms to the preexisting design, function, and location as the original (which may include upgrades to meet existing codes and standards as well as upgrades warranted to address conditions that have changed since the original construction); and (B) Is commenced within a 2-year period beginning on the date of the declaration	☐
Acquisition of scenic easements.	☐
Determination of payback under 23 U.S.C. 156 for property previously acquired with Federal-aid participation.	☐
Improvements to existing rest areas and truck weigh stations.	☐
Ridesharing activities.	☐

Bus and rail car rehabilitation.	☐
Alterations to facilities or vehicles in order to make them accessible for elderly and handicapped persons.	☐
Program administration, technical assistance activities, and operating assistance to transit authorities to continue existing service or increase service to meet routine changes in demand.	☐
The purchase of vehicles by the applicant where the use of these vehicles can be accommodated by existing facilities or by new facilities which themselves are within a CE.	☐
Track and railbed maintenance and improvements when carried out within the existing right-of-way.	☐
Purchase and installation of operating or maintenance equipment to be located within the transit facility and with no significant impacts off the site.	☐
Promulgation of rules, regulations, and directives.	☐
Deployment of electronics, photonics, communications, or information processing used singly or in combination, or as components of a fully integrated system, to improve the efficiency or safety of a surface transportation system or to enhance security or passenger convenience. Examples include, but are not limited to, traffic control and detector devices, lane management systems, electronic payment equipment, automatic vehicle locaters, automated passenger counters, computer-aided dispatching systems, radio communications systems, dynamic message signs, and security equipment including surveillance and detection cameras on roadways and in transit facilities and on buses.	☐
Projects, as defined in 23 U .S.C. 101, that would take place entirely within the existing operational right-of-way. Existing operational right-of-way means all real property interests acquired for the construction, operation, or mitigation of a project. This area includes the features associated with the physical footprint of the transportation facility including but not limited to the roadway, bridges, interchanges, culverts, drainage, clear zone, traffic control signage, landscaping, and any rest areas with direct access to a controlled access highway., This also includes fixed guideways, mitigation areas, areas maintained for safety and security of a transportation facility, parking facilities with direct access to an existing transportation facility, transit power substations, transportation venting structures, and transportation maintenance facilities.	☐
Federally-funded projects: A. That receive less than $5,000,000 (as adjusted annually by the Secretary to reflect any increases in the Consumer Price Index prepared by the Department of Labor, see www.fhwa.dot.gov or ww.fta.dot.gov) of Federal funds; or B. With a total estimated cost of not more than $30,000,000 (as adjusted annually by the Secretary to reflect any increases in the Consumer Price Index prepared by the Department of Labor, see www.fhwa.dot.gov or ww.fta.dot.gov) and Federal funds comprising less than 15 percent of the total estimated project cost.	☐
Localized geotechnical and other investigation to provide information for preliminary design and for environmental analyses and permitting purposes, such as drilling test bores for soil sampling; archeological investigations for archeology resources assessment or similar survey; and wetland surveys.	☐
Environmental restoration and pollution abatement actions to minimize or mitigate the impacts of any existing transportation facility (including retrofitting and construction of stormwater treatment systems to meet Federal and State requirements under sections 401 and 402 of the Federal Water Pollution Control Act (33 U.S.C. 1341; 1342)) carried out to address water pollution or environmental degradation.	☐

Modernization of a highway by resurfacing, restoration, rehabilitation, reconstruction, adding shoulders, or adding auxiliary lanes (including parking, weaving, turning, and climbing lanes), if the action meets the constraints in Note 1*.	☐
Highway safety or traffic operations improvement projects, including the installation of ramp metering control devices and lighting, if the project meets the constraints in Note 1*.	☐
Bridge rehabilitation, reconstruction, or replacement or the construction of grade separation to replace existing at-grade railroad crossings, if the actions meet the constraints in Note 1*.	☐
Purchase, construction, replacement, or rehabilitation of ferry vessels (including improvements to ferry vessel safety, navigation, and security systems) that would not require a change in the function of the ferry terminals and can be accommodated by existing facilities or by new facilities which themselves are within a CE.	☐
Rehabilitation or reconstruction of existing ferry facilities that occupy substantially the same geographic footprint, do not result in a change in their functional use, and do not result in a substantial increase in the existing facility's capacity. Example actions include work on pedestrian and vehicle transfer structures and associated utilities, buildings, and terminals.	☐

*Note 1: Actions required to meet Note 1 constraints **may not** be processed as CEs if they involve:

- An acquisition of more than a minor amount of right-of-way or that would result in any residential or non-residential displacements.
- An action that needs a bridge permit form the S.S. Coast Guard, or an action that does not meet the terms and conditions of the U.S. Army Corps of Engineers nationwide or general permit under section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act of 1899.
- A finding of “adverse effect” to historic properties under the National Historic Preservation Act, the use of resource protected und 23 U.S.C. 138 or 49 U.S.C. 303 (section 4(f) except for actions resulting in de minimis impacts, or a finding of “may affect, likely to adversely affect” threatened or endangered species or critical habitat under the Endangered Species Act.
- Construction of temporary access or the closure of existing road, bridge, or ramps that would result in major traffic disruptions.
- Changes in access control.
- A floodplain encroachment other than functionally dependent uses (e.g., bridges, wetlands) or actions that facilitate open space use (e.g., recreational trails, bicycle and pedestrian paths); or construction activities in, across or adjacent to a river component designated or proposed for inclusion in the National System of Wild and Scenic Rivers.

List of Projects Approved for CE Under Appendix B of the KYTC – FHWA Agreement

Transportation corridor fringe parking facilities.	☐
Construction of new truck weigh stations or rest areas.	☐
Approvals for disposal of excess right-of-way or for joint or limited use of right-of-way, where the proposed use does not have significant adverse impacts.	☐
Approvals for changes in access control.	☐
Construction of new bus storage and maintenance facilities in areas used predominantly for industrial or transportation purposes where such construction is not inconsistent with existing zoning and located on or near a street with adequate capacity to handle anticipated bus and support vehicle traffic.	☐
Rehabilitation or reconstruction of existing rail and bus buildings and ancillary facilities where only minor amounts of additional land are required and there is not a substantial increase in the number of users.	☐
Construction of bus transfer facilities (an open area consisting of passenger shelters, boarding areas, kiosks and related street improvements) when located in a	☐

commercial area or other high activity center in which there is adequate street capacity for projected bus traffic.	
Construction of rail storage and maintenance facilities in areas used predominantly for industrial or transportation purposes where such construction is not inconsistent with existing zoning and where there is no significant noise impact on the surrounding community.	☐
Acquisition of land for hardship or protective purposes. Hardship and protective buying will be permitted only for a particular parcel or a limited number of parcels. These types of land acquisition qualify for a CE only where the acquisition will not limit the evaluation of alternatives, including shifts in alignment for planned construction projects, which may be required in the NEPA process. No project development on such land may proceed until the NEPA process has been completed. A. Hardship acquisition is early acquisition of property by the applicant at the property owner's request to alleviate particular hardship to the owner, in contrast to others, because of an inability to sell his property. This is justified when the property owner can document on the basis of health, safety or financial reasons that remaining in the property poses an undue hardship compared to others. B. Protective acquisition is done to prevent imminent development of a parcel which may be needed for a proposed transportation corridor or site. Documentation must clearly demonstrate that development of the land would preclude future transportation use and that such development is imminent. Advance acquisition is not permitted for the sole purpose of reducing the cost of property for a proposed project.	☐

CEMP Criteria

An acquisition of no more than a minor amount of right-of-way	☐
No residential or non-residential displacements	☐
No bridge permit required from the U.S. Coast Guard, under Section 9 of the Rivers and Harbors Act of 1899	☐
Wetland and stream impacts that meet the terms and conditions of a U.S. Army Corps of Engineers nationwide or general permit under Section 404 of the Clean Water Act	☐
A finding of either no historic properties affected or no adverse effect to historic properties under the National Historic Preservation Act	☐
An impact no greater than a de minimis use of a resource protected under 23 U.S.C. 138 or 49 U.S.C. 303 (Section 4(f));	☐
No impacts to federally-listed threatened or endangered species determined May Affect, Likely to Adversely Affect unless addressed through the Kentucky Programmatic Conservation Memorandum of Agreement for Forest Dwelling Bats (CMOA).	☐
Construction of temporary access, or the closure of existing road, bridge, or ramps, that would result in major traffic disruptions	☐
No change in access control	☐
A floodplain encroachment other than functionally dependent uses (e.g., bridges, wetlands) or actions that facilitate open space use (e.g., recreational trails, bicycle and pedestrian paths);	☐
No construction activities in, across or adjacent to a river component designated or proposed for inclusion in the National System of Wild and Scenic Rivers	☐
No impacts to Section 6(f) properties	☐

CE Level 1 — Actions listed in Appendix B or actions listed in Appendix A of the FHWA – KYTC agreement that do not meet the criteria for a CEMP, but which satisfy the criteria below.

A finding under "Section 106" of the National Historic Preservation Act of either: a) "No historic properties affected" or "no adverse effect" to historic properties; or, b) For bridge replacement or rehabilitation projects meeting criterion 2 of this section, a finding of adverse effect to historic properties	☐
No Section 4(f) use, unless such use can be addressed with a de minimis determination or, with FHWA approval, through a programmatic evaluation	☐
No impacts to Section 6(f) properties that require a conversion	☐
No more than 5 relocations	☐
No more than 10 acres of fee simple ROW	☐
No disproportionate and highly adverse impacts to an environmental justice community;	☐
No more than 0.5 acres of wetland impacts	☐
No impacts to federally-listed threatened or endangered species determined May Affect, Likely to Adversely Affect unless addressed through the CMOA	☐

CE Level 2 — Actions listed in Appendix B or Appendix A of the FHWA – KYTC agreement that do not meet the criteria for a CE Level 1, but which satisfy the criteria below.

A finding under "Section 106" of the National Historic Preservation Act of either: a) "No historic properties affected" or "no adverse effect" to historic properties; or, b) For bridge replacement or rehabilitation projects meeting criterion 2 of this section, a finding of adverse effect to historic properties	☐
No Section 4(f) use, unless such use can be addressed with a de minimis determination or, with FHWA approval, through a programmatic evaluation	☐
No impacts to Section 6(f) properties that require a conversion	☐

No more than 10 relocations	☐
No more than 25 acres of fee simple ROW	☐
No disproportionate and highly adverse impacts to an environmental justice community;	☐
No more than 5 acres of wetland impacts	☐
No impacts to federally-listed threatened or endangered species determined May Affect, Likely to Adversely Affect unless addressed through the CMOA	☐

CE Level 3— Actions that do not satisfy the criteria for CEMP or CE Levels 1 – 2. Projects that meet any of the criteria below can only be processed as a CE Level 3 with written approval of FHWA.

Any disproportionately high and adverse impacts relative to environmental justice	☐
Unresolved or substantial public and/or resource agency opposition. CE documentation must demonstrate that the public or agency concerns have been addressed and is attached.	☐
Impacts to areas of cultural or religious significance to Native American tribes	☐
Project resulting in nonconformity with air quality standards.	☐
Federal or proposed federal wild and scenic river corridor impacts that result in an Individual 4(f) Impact/Use.	☐
With the exception of species addressed under the CMOA, impacts that result in a "May Affect, Likely to Adversely Affect" federally listed threatened or endangered species.	☐
Individual Section 4(f) Impacts/Use.	☐
Section 6(f) Impacts that require a conversion.	☐

Highway Project Management and Preliminary Design (Phase I)

Highway Project Management and Preliminary Design	Highway Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1.0 Introduction	x	x	x	X
2.0 Alternative Study, Screening and Selection	x	x		X
2.01 Interchange Justification Study (IJS)/Interchange Modification Report (IMR)	x	x	x	
2.02 KYTC Complete Streets, Roads, and Highways	x	x	x	X
2.03 Environmental and Permitting Considerations	x	x	x	
2.04 Identify Right-of-Way Issues	x	x	x	
2.05 Identify Utility Impacts and Preliminary Joint Utilities Meeting	x	x	x	X
2.06 Identify Rail Involvement	x	x		
2.07 Preliminary Geotechnical Recommendations	x		x	
3.0 Evaluation and Comparison of Proposed Roadway Alternatives (Impacts on the Environment, Right-of-Way, Utilities, and Budget)	x		x	

4.0 Public Involvement in Preliminary Design	x			
5.0 Preliminary Line and Grade Meeting/Identify Selected Alternative (Milestone)	x			
6.0 Breaking a Project into Smaller Constructable Sections (If required)	x			
7.0 Design Executive Summary (DES) Submittal and Approval (Milestone)	x	x	x	x
x = Information from the topic may be applicable for the project classification.				

1.0 Introduction

Sound project management underpins highway project delivery. The Project Manager (PM) assumes responsibility for moving the project through the design process after the following occurs:

- The project appears in the *Enacted Highway Plan*
- Existing data is gathered
- A purpose and need is drafted
- A scope is defined
- An estimated schedule (with milestones) is established
- Funds are authorized

The first phase of this process is Preliminary Design (Phase I Design). Sometimes this is referred to as *preliminary engineering and environmental*. The second phase of this process is Final Design (Phase II Design).

A PM must collaborate with divisions across KYTC as early as possible in project development (see the HKP article, *Organizing a Team*, coming soon). The Project Development Team (PDT) consists of subject-matter experts (SME) from different functional areas throughout the Department of Highways. The PM should solicit their input throughout project development. Early SME involvement facilitates:

- Identification of potential environmentally sensitive areas
- Utility coordination, including railroad involvement
- Right-of-way (ROW) acquisition
- Structures
- Geotechnical

- Construction

On projects with federal oversight, early coordination with FHWA is critical to anticipate potential project risks and develop possible solutions. This helps ensure that the project stays on schedule and within budget.

The goal of preliminary engineering and environmental is to produce a list of feasible alternatives that fulfill the project purpose and need. Alternatives go through a screening process to identify which ones balance impacts on the environment, ROW, utilities, and budget. Those which balance these elements move forward.

The primary focus of Phase I Design is to develop, study, and document the performance and impacts of different alternatives within the project corridor. A Preliminary Line and Grade (PL&G) Meeting is held at the end of this phase. At this meeting alternatives are presented and discussed by the PDT to determine a recommended alignment. This alignment is carried forward into Phase II Design. Documentation of the engineering and environmental work is key to this phase.

This article reviews the process of guiding a project through Phase I Design.

2.0 Development of Preliminary Alternatives

Before the PDT studies alternatives, it must map key existing features within a corridor that represent potential project risks, including those related to:

- Environmental considerations
- Topographic constraints
- ROW needs
- Utilities in the area

A project risk is “an uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objective.” Project risks can affect quality (solutions or deliverables), schedules, and budgets. Because they may result in positive or negative outcomes, it is important to specify the direction of influence when defining risks. Negative risks threaten a project's successful completion if not managed properly.

By identifying potential risks, assessing their impact, developing mitigation plans, and continuously monitoring the emergence of new risks, PMs can minimize the likelihood of project failure and ensure the project is delivered on time, within budget, and to the satisfaction of all stakeholders.

During Phase I design, the PDT develops a reasonable range of competitive alternatives that satisfies the project’s purpose and need. To arrive at the best project solution, SMEs should identify potential risks, constraints, issues, and possible solutions. For each viable alternative, the PDT must pay close attention to fiscal and engineering constraints. A viable alternative should fulfill the operational, safety, and other performance goals outlined in the purpose and need statement. When evaluating alternatives, it is also important to:

- Assess constructability and how traffic can be maintained during construction.
- Include at least one alternative that has to be within 15% of the total project budget.
- Consider a no-build alternative. This is required by the NEPA process and should be a part of the evaluation of alternatives.

The chosen template/typical section (traveled way and roadside), horizontal, and vertical alignment are key factors that influence the impacts of each alternative and dictate a roadway's operation, safety, and performance.
To determine an alternative's typical cross section, designers should use the seven basic design controls listed in Section HD-702.10 of the *Highway Design Guidance Manual*:

- Functional classification
- Context classification
  - Rural, rural town, suburban, urban, urban core
- Project Type
  - New construction, reconstruction, construction of existing roads (spot improvements)
- Multimodal considerations
- Volume of traffic (and traffic makeup)
- Design speed
- Overall project context

Developing, studying, and screening alternatives helps the PM and PDT select a preferred alternative based on environmental impacts, engineering, economics, anticipated performance, and public input.

A key product of Phase I Design is the transportation decision and rationale. This is described in the environmental document and reflected in the preliminary line and grade plans. Another important product is the Design Executive Summary (DES), which reviews/documents the project's highway design criteria (used to layout and evaluate the roadway) and is typically submitted after the PL&G Meeting.

Some transportation agencies are moving towards Transportation Systems Management and Operations (TSMO) Plans. TSMO is a set of strategies that aim to optimize the safe, efficient, and reliable use of existing and planned transportation infrastructure for all modes. The goal is to get the most performance out of existing transportation facilities and implement comprehensive solutions that can be implemented quickly at relatively low cost. KYTC is in the process of developing a TSMO Plan, including a training program for staff and partners. The plan is anticipated to implement TSMO strategies for all areas of the cabinet including performance-based flexible design, ITS (Intelligent Transportation System) projects, and work-safety improvements in a construction work zone.
For more information about TSMO, refer to the FHWA article Organizing and Planning for Operations.

- For more information on preliminary design, see Section HD-203 of the *Highway Design Guidance Manual*.
- For information on project templates and alignments, see Section HD-700 of the *Highway Design Guidance Manual*.
- For information on project risk, refer to the HKP Article *Managing Project Risks* (coming soon).

2.01 Interchange Justification Study (IJS)/Interchange Modification Report (IMR)

An Interchange Justification Study (IJS) is required when a project establishes a new access (interchanges and ramps) on an interstate highway. Modifying access at an existing interchange constitutes a change in the interchange configuration and requires an Interchange Modification Report (IMR). All IJS/IMR's should be developed in a manner consistent with FHWA's Interstate Access Policy and KYTC guidance. It is crucial to involve the FHWA early in this process to keep a project on schedule.

FHWA approval is a federal action and, as such, requires that transportation planning, conformity, the congestion management process, and National Environmental Policy Act (NEPA) procedures be followed and their requirements satisfied. Final FHWA approval of requests for new or modified access cannot precede the completion of these processes or necessary actions. However, to offer maximum flexibility, KYTC can submit proposed changes in access to the FHWA Division Office for a determination of safety, operational, and engineering acceptability prior to final approval. This gives agencies the option of obtaining this acceptability determination earlier in the process, prior to completing the environmental approval process.

- For more information on this process, see Section HD-203.3.10 of the *Highway Design Guidance Manual*.

2.02 KYTC Complete Streets, Roads, and Highways

Consistent with KYTC's Complete Streets policy, the PDT needs to consider including transportation facilities on a project that meet the needs of all users. Multimodal facilities should be discussed during project planning and early design phases. Discussions should address:

- Highway access control
- Local transportation plans
- Comprehensive plans
- Other plans (e.g., Safe Routes to School plans developed by schools and school districts)
- Roadside environment
- Existing and projected pedestrian volumes
- User age group(s)
- Continuity of local walkways along or across the roadway
- Potential need for multimodal facilities near areas with low income housing

The design process must consider all existing and planned modes. To accommodate non-vehicle users (e.g., pedestrians, bicyclists), the design process often requires flexibility in applying conventional roadway design criteria for the vehicle travel way. Chapter 5 of the *KYTC's Complete Streets, Roads, and Highways Manual* addresses some elements of travel way design that may require flexibility and creativity. The manual also provides detailed information on pedestrian facilities.

2.03 Environmental and Permitting Considerations

Environmental investigations should be completed early in project development, preferably before alignment studies begin. The PM needs to coordinate investigations with the District Environmental Coordinator (DEC) as soon as practical. To initiate environmental investigations, the PM submits to the DEC preliminary boundaries of areas potentially impacted by each alternative so environmental constraints along the corridor can be identified.

The DEC communicates the results of environmental investigations to the PDT. Results help the PM and PDT understand possible environmental and permitting issues along the corridor that could affect the project budget and timeline. Knowing where these issues are early on lets the PDT develop alternatives that avoid or minimize impacts. Phase I Design Funds are utilized for these investigations.

A Scope Verification Meeting (SVM) must be held for all Federal-aid projects requiring a Categorical Exclusion Level 3 (CE3), EA/FONSI, or EIS. This meeting brings together key members of the PDT — including FHWA — to ensure that all team members agree with the environmental classification and work to be undertaken.

If a consultant is used on the project, the SVM is normally held during the period between the Advertisement for Consultant Services and the Pre-Design Meeting. The meeting should be timed to ensure all parties agree on the scope of work to be assigned to the consultant before the Pre-Design Meeting. The PM schedules the SVM, provides information to meeting attendees, and documents meeting outcomes.

The following resources provide detailed information on environmental and permitting considerations:

- HKP Article — *Develop Preliminary Alternatives*
- HKP Article — *Project Management & NEPA* (coming soon)
- HKP Article — *Environmental Approval*

2.04 Identify Right-Of-Way Issues

Procuring sufficient ROW to accommodate construction, drainage, and maintenance is integral to project development. Several factors influence the amount of ROW that needs to be acquired:

- Traffic requirements
- Topography
- Environmental issues
- Utilities

- Land use
- Land costs
- Intersection design
- Extent of ultimate roadway expansion

Potential ROW issues and challenges should be identified and analyzed when preliminary alternatives are developed. Determining the amount of ROW needed for a project is a roadway design function but requires close coordination with other SMEs. Project development must be advanced far enough in Phase I Design to generally describe a project's ROW needs (typically around 30% plans).

Once ROW needs have been identified and areas of fee simple and easements estimated, the District ROW section provides the PM with cost estimates. This amount should be used to evaluate/update the ROW estimate initially established for the project. Design staff and ROW personnel must coordinate throughout project development to ensure all property concerns are addressed. For more information on the ROW process, see Section HD-1300 of the *Highway Design Guidance Manual*. The following are also valuable resources:

- *Right of Way Guidance Manual*
- HKP Article — *Right of Way Acquisition*
- HKP Article — *Identify Selected Alternative* (Section 3)
- HKP Article — *Project Management & Right of Way* (coming soon)

RED FLAG ROW acquisition and supporting activities normally occur during Phase II design. But in some cases, when a project has a lot of right-of-way impacts, and the project schedule is tight, the PM and ROW Supervisor may decide it is advantageous to start title report work at the end of Phase I Design. Securing title reports as a preliminary ROW activity may save time during Phase II Design and is an acceptable Phase I Design activity if it does not influence the objective consideration of alternatives. Section ROW-403-2 of the *Right of Way Guidance Manual* provides directions for requesting title reports.

RED FLAG Relocation of existing utilities normally occurs during Phase II Design. However, the PM and PDT should analyze existing utility data and begin identifying potential project risks early in the design process. If an initial assessment reveals potential conflicts between existing utilities, easements, or other physical features, the PM and PDT should consider sites where utilities may be relocated. By identifying existing areas of significant concern for utilities, ROW property needs can be assessed for potentially complex utility facilities.

2.05 Identify Utility Impacts and Preliminary Joint Utilities Meeting

Existing utility facilities must be identified early in the design process. After knowing their locations, avoidance, minimization, and mitigation opportunities should be considered when addressing utility conflicts.

When a project begins, the District Utility Supervisor notifies public and private utility companies of proposed activities and their potential impacts to utility facilities. Early coordination may be appropriate so ROW can be acquired to relocate facilities. Utility companies and the PDT can identify conflicts with existing facilities, avoid facilities, or plan for the relocation or adjustment of facilities to a new location on the highway ROW or private easements. During collaboration, companies should be encouraged to identify methods that will speed up relocations or allow relocation plans to be included with roadway plans.

When developing preliminary alternatives on more complex road projects or projects with a complex network of multiple facilities, the PDT needs to pay careful attention to details for utility planning. Conversely, on a small bridge rehabilitation or replacement, the District Utility Supervisor and PM should not invest much time planning around utilities. On smaller projects, recommended steps for utility planning include identifying existing facilities and conflicts with those facilities. Conversely, on a major road widening in an urban area with many utility facilities, a detailed utility plan should be established.
Detailed utility plans show the following information:

- Facility locations
- Subsurface utility engineering (SUE) notations
- Identified conflicts
- Proposed relocation placements

On more complex projects, Preliminary Joint Utilities Meetings may be held early in Phase I Design to foster early and frequent communication between utility owners and the PDT. The following are good resources:

- HKP Article — *Data Gathering* (Sections 4 and 5)
- HKP Article — *Project Management Railroad Coordination* (coming soon)

For more information on utility plan development, see Section UR-1002 of the *Utilities and Rails Guidance Manual*. Refer to Section HD-304 of the *Highway Design Guidance Manual* for information on subsurface utility locations.

2.06 Identify Rail Involvement

Unlike most fixed objects in the highway environment, railroad facilities are not owned or directly operated by state or local highway agencies. As such, rail coordination is a critical aspect of project development when a railroad is present.

Coordinating with railroads early in project development fosters effective communication and collaboration between KYTC and railroad companies, minimizes effort needed later in the project or during construction, and helps avoid costly and time-consuming unexpected issues. This includes projects that are at-grade, over, or under railroad tracks as well as projects impacting railroad-owned property.

When rail involvement is possible, the PM should contact the Railroad Coordinator in the Division of Right of Way, Utilities, and Rails as soon as possible, but no later than selection of the preferred alternative at the end of Phase I Design. While preliminary alternatives are under development and discussion, the Railroad Coordinator can give valuable information to assist in decision making. The Railroad Coordinator can attend the PL&G Meeting when needed and share the following details with designers:

- Railroad requirements
- Type and number of trains per day
- Train speeds
- Railroad company contact information
- Estimated rail-related costs for each alternative

The selection of an alternative may be influenced by how each alternative will impact a railroad during and after construction. Some of the factors examined during early rail coordination include:

- Track signalization
- Communications services
- Track geometry
- Plans for additional tracks in an area
- Sight distance issues
- Horizontal and vertical clearances
- Drainage considerations (railroad property)

The PM and PDT can use knowledge of these factors to understand the potential impacts of alternatives on existing railroads. Proactive coordination also helps the Railroad Coordinator obtain future approvals from railroad companies. For more information on railroads, see:

- HKP Article — *Project Management and Railroad Coordination* (coming soon)

SIDE NOTE

KYTC prefers to consolidate railroad crossings, close crossings, or provide grade-separated crossings. When these options are not feasible, the Cabinet's Rail Safety Program (Section 130 Program) may be utilized to install warning devices for vehicle traffic (e.g., warning bells, lights, gates). PMs should contact the Utilities and Rail Branch's Railroad Coordinator to see if Rail Safety Program funds could be used on their project.

2.07 Preliminary Geotechnical Recommendations

Identifying the types and locations of geotechnical features is essential to roadway design and construction. Typically, the PM submits a request for detailed geotechnical analysis after Phase I Design is complete.

At the beginning of a project, the PM should collect existing geotechnical data. A good source is the KYTC Geotechnical Database, which contains the results of completed investigations.

Depending on project topography and available geotechnical mapping, the PM may need more detailed information. In these cases, the PM requests a preliminary geotechnical overview from the Geotechnical Branch for proposed project areas or corridors. The PM or design consultant must submit project corridor information with this request.
During Phase I Design, sites are evaluated through field reconnaissance of surface conditions and reviewing available surface and geologic maps. Other information (e.g., previous geotechnical studies or investigations) may supplement these data.

Geotechnical overviews must address issues that may affect transportation decisions within the project area. Overviews should describe:

- The project area's topography, including regional and structural geology.
- Impacts of different features and potential mitigation actions — including cost — if a feature is encountered during project work.

This information is used when studying alternatives to determine if a feature should be impacted, particularly in a situation when competing issues are present (e.g., historic, environmental, cultural). Issues that may require discussion include:

- Geologic formations that could complicate or hinder project work.
- Presence of springs, landslides, mines, karst, faulted strata, acidic shale, mineral deposits, or other topographic or subsurface features that could affect construction and maintenance.
- Foundation types for structures.
- Possible issues with cut-and-fill slopes resulting from known soil and rock conditions (i.e., how they broadly affect a project area [e.g., flatter or steeper slopes than normal so that the cost of needing more earthwork or ROW can be considered]).
- Possible issues with pavement subgrade and the need for modifying the subgrade.
- Seismic zones for earthquake design and possible mitigation actions.
- Availability of suitable excavated materials (i.e., rock from excavation) for use in the subgrade and embankments

Project area maps should include as many of the features listed above as possible. Areas of concern should be clearly noted. When possible, information should be provided in GIS layers so it can be visualized in combination with other features as well as to identify recommended corridors. If alternatives are available, the geotechnical overview should discuss each alternative with respect to geologic conditions — both beneficial and adverse.

3.0 Evaluation and Comparison of Proposed Roadway Alternatives

Understanding the environmental, ROW, utility, constructability, performance-based design, and budgetary impacts associated with each alternative is critical to the progression of alternatives analysis. Each alternative should be buildable, fit the project scope, be within the established budget, and have satisfactory predicted performance.

Performance measures for each alternative (including a no-build option), should be evaluated and compared relative to the project purpose and need. These performance measures include, but are not limited to:

- Existing and expected crash frequency and severity
- Capacity and traffic operation efficiency
- Mobility, connectivity, and accessibility
- Existing and potential development
- Asset management (pavement and structures)
- Cost
- Environmental impacts
- Community impacts
- Freight

Not all projects require the use of every measure. Which performance measures should be addressed is governed by the project budget and the overall effect the improvement would have on a project.

During alternatives analysis:

- Environmental SMEs should offer suggestions on the risks associated with each alternative and expected timeframes for resolving impact-related issues.
- ROW and Utility SMEs should present their findings so the PDT can consider the possible impacts of property acquisition and utility location on the transportation decision.
- Construction SMEs should evaluate each alternative for constructability issues and maintenance of traffic concerns. If roadway construction would excessively disturb a key existing feature(s), alternatives may be dropped from consideration with adequate supporting documentation.

When conducting their analysis, SMEs must adopt a corridor approach rather than focusing on a particular alignment. This lets adjustments be made to avoid or minimize impacts. SMEs should remain involved in the decision-making process to ensure impacts are considered and offer suggestions for minimizing or mitigating impacts when necessary. If a detailed SME study of a corridor is cost prohibitive (e.g., archaeology) during the early stages of roadway evaluation, an overview is normally completed to guide the corridor and alignment study. As development of the alignment progresses, detailed study may become necessary.

While a preferred alternative may stand out, the PDT should not make a recommendation until team members understand and evaluate all relevant impacts and issues in the study area.

For more information on Performance-Based Design refer to:

- AASHTO 2018 *Green Book* (Section 1.9 Performance-Based Design)
- *Highway Design Guidance Manual* Section HD-202.6.1 (Performance Measures).

4.0 Public Involvement in Phase I Design

The amount of public involvement required varies significantly between projects. More public meetings are needed on projects where several alternatives are under consideration or projects with heightened controversy. In some cases, stakeholder meetings may be necessary. On small projects (e.g., small bridge replacement) no formal public involvement may be needed.

Public involvement should begin early — perhaps before alignments are considered — and continue throughout Phase I Design. Early public involvement lets community members offer insights about the project's goals, needs, and effects on the community. Information obtained from these meetings should be summarized, discussed with the PDT, and when appropriate, taken into consideration when developing alternatives.

For more information about public involvement, see

- HKP Article — Public Involvement with Customers and Stakeholders (coming soon).

5.0 Preliminary Line and Grade Meeting (Milestone)

After SMEs have studied the project's range of alternatives and comments are collected at public meetings, the PDT holds a PL&G Meeting. The primary goal of the PL&G Meeting is to select a preferred alternative and document the rationale for the decision. When selecting a preferred alternative, the PDT factors into its decision making each alternative's social, economic, and environmental impacts.

At the PL&G Meeting, the PDT needs at least the following information to compare alternatives and select the preferred alternative:

- Draft environmental assessment or categorical exclusion
- Preliminary alternative plans
- Comparison of each alternative's performance relative to the purpose and need (e.g., alternative impacts, expected safety performance, compare travel times).
- ROW and utility impacts with associated costs
- Potential mitigation measures
- Corresponding project costs and schedule impacts

Plans for individual alternatives should be developed to a stage where a decision can be made about each one presented (usually referred to as the 30% stage).

For more information on the stages of plan development, see the HKP Article *Project Schedule and Development of Milestones* (coming soon).

Red Flag

PL&G Meeting invitations, and preliminary plans and information for each of the alternatives developed, should be distributed to the PDT far enough in advance of the meeting so each team member can thoroughly review them before the meeting. Preferably, this information should be provided at least two (2) weeks prior to the scheduled meeting.

At the PL&G Meeting PDT members discuss each alternative and briefly summarize alternatives eliminated earlier in the process. Conversations focus on impacts, performance, impact mitigation, and a timeframe for resolving identified issues.

- Environmental SMEs describe how each alternative will impact the study area's environment.
- Construction SMEs evaluate temporary traffic control and construction phasing for each alternative. They also judge whether the proposed ROW is sufficient based on issues such as equipment access, construction phasing, and possible staging areas.
- ROW and Utility SMEs present their findings along with estimated ROW and Utilities cost estimates for each alternative. This allows the PDT to consider the possible impacts of property acquisition and utility location on the transportation decision.
- The PDT also discusses diversions, including their construction and ROW impacts.

Although no formal drainage submittal is required at this stage, for each alternative the PDT needs to identify and discuss key drainage issues and concerns. Consultation with the Division of Structural Design may be necessary if bridges and/or culverts are involved.

To determine a preferred alternative, the PDT must work through the decision-making process for highway projects. This includes avoidance, minimization, mitigation, performance measures, and possibly enhancement of each alternative's impacts. Decisions are recorded in NEPA documentation and the Design Executive Summary (DES). The *Environmental Analysis Guidance Manual* (EA-400) and *Highway Design Guidance Manual* (HD-400) provides guidance on these documents.

RED FLAG

When the PM, in consultation with the PDT, determines that public and resource agency involvement has been sufficient, the PDT may identify a preferred alternative in the environmental document before conducting a public hearing. A selected alternative may not be chosen prior to the hearing, when applicable.

The PDT selects a preferred alternative based on:

- Environmental, economic, and engineering issues
- Performance measures
- How well it meets the purpose and need of the project
- Public input
- Professional judgement

Once the preferred alternative is chosen, the final environmental document is prepared, reviewed, and approved.

The output of the PL&G meeting is the final approved environmental document and the alternative selected to proceed into Phase II Design.

RED FLAG

During the PL&G meeting, the PDT considers and discusses for each alternative potential strategies to maintain traffic operations during construction. This discussion is summarized in the PL&G meeting minutes. For some alternatives, problems related to maintenance of traffic and constructability may be insurmountable. These issues must be examined when developing alternatives.

PL&G meeting minutes are a critical part and serve as the main body of the DES. These minutes should document most, if not all, of the design decisions prior to moving into final design. For more information, see Section HD-203.05 of the Highway Design Guidance Manual.

6.0 Breaking a Project into Smaller Constructable Sections (If required)

Sometimes the *Enacted Highway Plan* does not allocate enough funding to construct the entire length of a proposed project, or it only sets aside enough funds for Phase I Design. This happens most often on longer project corridors. When this is the case, the PM and PDT must decide if breaking the project into shorter constructable sections is necessary.

Sections must have independent utility, and to satisfy NEPA requirements each section must have a *Logical Termini*. Logical Termini for project development describes the beginning and ending points of a project and whether or not the selection of these points has a rational basis, considering the project's purpose and need.

FHWA notes three criteria for logical termini:

- The project should have rational endpoints that are long enough to address broad environmental concerns.
- The project should have independent utility (i.e., be usable and constitute a reasonable expenditure even if no additional transportation improvements in the area are made) and should not force additional improvements elsewhere.
- The project should not restrict the consideration of alternatives for other reasonably foreseeable transportation improvements, either connecting or nearby.

Logical termini can be locations with major traffic generators or changes in traffic volumes, major crossroads, or system intersections, and/or locations where there are changes in development patterns (e.g., transition from an urban area to a suburban or rural area).

For more information on Logical Termini, refer to FHWA Document *The Development of Logical Project Termini*.

RED FLAG

The decision about breaking a project into smaller sections usually takes place at the end of Phase I.

Alternative alignments are evaluated in their entirety during Phase I Design so that the overall impacts to the project corridor are discussed and documented. Once the PL&G Meeting has been held and an alternative chosen, the PDT must divide the project into shorter constructable sections prior to starting Phase II Design. Each breakout section should include descriptions and cost information for D, R, U and C, and this information should be submitted to the Central Office for programming the sections into the next *Enacted Highway Plan*.

7.0 Design Executive Summary (DES) Submittal and Approval (Milestone)

The DES is the record of engineering decisions related to the project. At the end of Phase I Design—typically after the PL&G Meeting and selection of an alternative — the PM drafts a DES and submits it to the Division of Highway Design for review and approval.

PL&G meeting minutes serve as the main body of the DES. The DES justifies the preferred alternative as well as design exceptions or variances. Projects administered by the Division of Highway Design require a DES unless the division's director grants an exemption.

Since the DES documents the decision-making process, including preferred alternative selection and design exceptions or variances, it is important for the DES to contain all pertinent information used in the decision process. The Department of Environmental Analysis (DEA) typically adopts language from the discussion of alternatives in the DES when preparing the environmental document.

- Section HD-203.6 of the *Highway Design Guidance Manual* provides information on DES contents, approval processes, and examples.
- DES forms are available on the Division of Highway Design Forms Page.
- Also see the HKP Article — *Identify Selected Alternative* (Section 4).

RED FLAG

The DES approval process is tiered — more complex projects require additional review and approval. For example, final DES approval on the most complex projects requires signatures from the Location Engineer, Roadway Design Branch Manager, and Director of the Division of Highway Design. As project complexity increases, the time required for DES review and approval increases as well.

On FHWA oversight projects (Risk-Based Projects [RBPs]), the DES must be provided to FHWA by the PM, and its approval for design exceptions must be solicited separately from Division of Highway Design approvals. FHWA approval of design exceptions are included in the project record.

After the DES has been submitted and approved, in some instances design decisions are reevaluated and changes made. When this occurs, the DES must be amended. ***HD Section 203.6.2*** *describes procedures for amending the approved DES.*

8.0 Associated Articles

KYTC Manuals and Information:

Design Manual (HD-203, HD-203.3.10, HD-203.5, HD-203.6, HD-304, HD-600, HD-603, HD-700, HD-1300, HD-1401)

Complete Streets, Roads, and Highways

Right of Way Guidance Manual (ROW 403-2)

Utilities and Rails Guidance Manual (UR-1002)

Geotechnical Database

DEA Guidance Manual

Environmental Handbook

FHWA

"The Development of Logical Project Termini"

"Policy on Access to the Interstate System"

Highway Knowledge Portal Articles:

Develop Preliminary Alternatives

Alternative Study, Screening, & Selection

Identify Selected Alternative

Environmental Approval

Right-of-Way Acquisition

Railroad Coordination

Build Your Team

Public Involvement with Customers and Stakeholders (coming soon)

9.0 Reference Documentation

KYTC Design Manual:

https://transportation.ky.gov/Organizational-Resources/Policy%20Manuals%20Library/Highway%20Design.pdf

KYTC *DEA Guidance Manual*:
https://transportation.ky.gov/EnvironmentalAnalysis/Environmental%20Resources/DEA%20Guidance%20Manual.pdf

KYTC Environmental Handbook:

https://transportation.ky.gov/EnvironmentalAnalysis/Pages/KYTC-Environmental-Handbook.aspx

KYTC Utilities and Rails Guidance Manual:

https://transportation.ky.gov/Organizational-Resources/Policy%20Manuals%20Library/Utilities%20and%20Rails.pdf

KYTC Complete Streets, Roads, and Highways: KYTC's Complete Streets, Roads, and Highways

KYTC Right of Way Guidance Manual: https://transportation.ky.gov/Organizational-Resources/Policy%20Manuals%20Library/RightOfWay.pdf

KYTC Geotechnical Database: https://kgs.uky.edu/kgsmap/kytclinks.asp

FHWA Document "Policy on Access to the Interstate System:
https://www.fhwa.dot.gov/design/interstate/170522.cfm

FHWA Document "*The Development of Logical Project Termini":*
https://www.environment.fhwa.dot.gov/legislation/nepa/guidance_project_termini.aspx

Highway Knowledge Portal Articles:

Develop Preliminary Alternatives:
https://kp.uky.edu/knowledge-portal/articles/time-management-5-develop-preliminary-alternatives/

Alternative Study, Screening, & Selection:
https://kp.uky.edu/knowledge-portal/articles/time-management-6-alternative-study-screening-selection/
Identify Selected Alternative, Section 3:
https://kp.uky.edu/knowledge-portal/articles/time-management-7-identify-selected-alternative/

Environmental Approval :

https://kp.uky.edu/knowledge-portal/articles/time-management-8-environmental-approval/

Right-of-Way Acquisition :

https://kp.uky.edu/knowledge-portal/articles/time-management-10-right-of-way-acquisition/

Data Gathering, Sections 4 and 5, Locate Utilities:
https://kp.uky.edu/knowledge-portal/articles/time-management-4-data-gathering/

Public Involvement with Customers and Stakeholders: (Link coming soon)
Project Management & NEPA: (Link coming soon)
Project Management and Right-of-Way: (Link coming soon)
Project Management and Utilities & Railroads: (Link coming soon)

10.0 Glossary

Interchange Justification Study (IJS): Required for a project that proposes to provide a new interchange to an existing interstate facility.

Interchange Modification Report: Required when a project proposes to revise/reconfigure an existing interchange on an interstate facility.

Multimodal Facilities: All modes of transportation are considered (automobiles, commuter trains, public transit, bicycles, and pedestrians.

Public Utilities: Utilities that are publicly owned and non-profit (i.e. Local Municipalities water and sewer)

Private Utilities: Utilities that provides essential services for a profit, which would include common carriers as well as corporations that provide Electric, Gas, Communications, Sewer, and Water.

Stakeholder Meetings: On projects that are anticipated to be controversial, it is a good idea to assemble a group of people from the area and form a group of "Stakeholders" for the project. This could include property owners along the corridor, local officials (county judges, magistrates), and Local Planning and Zoning personnel, along with KYTC representatives. These are sometimes referred to as Citizens Advisory Groups or Committees. These groups can help with the effort by KYTC to be transparent in the project development process

KYTC PROJECT MANAGEMENT AND FINAL DESIGN

Project Management and Final Design	Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1.0 Introduction	x	x	x	x
2.0 Design Funding Request	x	x		x
3.0 Contract Modification To Final Design	x	x	x	
4.0 Final Design	x		x	
5.0 Locate Utilities: Subsurface Utility Engineering (SUE) QL A or B (If Required)	x			
6.0 Drainage Design	x		x	
7.0 Pavement Design	x	x	x	
8.0 Roadway Design	x			
9.0 Structural Design	x			
10.0 Engineering Agreements (Utilities)	x	x	x	x
11.0 Final Survey Report	x		x	
12.0 Geotechnical Investigation	x		x	x
13.0 Traffic Control Devices	x	x	x	x
14.0 Constructability Reviews	x	x	x	
15. Final Joint Inspection	x	x	x	
16.0 Right of Way Plans & Revisions	x	x	x	
17.0 Final Plan Development (Construction Plans or Proposals	x	x	x	x

x = Information from the topic may be applicable for the project classification.

1.0 INTRODUCTION

Once an alternative is selected and the transportation decision is documented (e.g., National Environmental Policy Act [NEPA] Document and Design Executive Summary [DES]), the project moves into final design. Details prepared for the selected alternative in final design are used to develop plans for ROW acquisition, utility relocation, and construction. The plans should contain details and quantities needed to bid and construct the proposed project, including a final cost estimate. The most important role of the PM during this phase is to constantly track and coordinate the activities and compare with the project schedule. The PM and PDT should work across disciplines to help each other coordinate efforts and resolve any project issues.

2.0 DESIGN FUNDING REQUEST

For most KYTC Capital Improvement projects, project development is commonly broken into two phases (e.g., preliminary design and final design). This allows for the preliminary design process to generate a reasonable range of alternatives and select a more detailed project definition. These details are necessary to understand the type and amount of work needed in final design.

The PM initially requests enough funding to complete preliminary engineering and environmental work. After a transportation decision is made and adequately documented, the PM then requests additional funding for the completion of final design. Final Design Funding Authorizations mirror the process used in the initial funding request.

An exception to the two-phase process might include small bridge replacement projects, where alternatives are limited, and the scope is well defined. In this case, the PM might decide to combine the preliminary and final design into one phase, resulting in just one design funding request.

Red Flag: Design Funding Authorization may take several months once the request is submitted, especially at the start of a new biennium and new *Enacted Highway Plan*. The KYTC's *Strategic Highway Investment Formula for Tomorrow* (SHIFT) process helps to prioritizes projects based on risk, funding, and KYTC's strategic plan. When multiple Design Funding Requests are submitted, the PM should communicate the projects' needs and risks to the Central Office to assist with project prioritization. For time-sensitive projects (e.g., those whose on-time delivery are placed at risk if an activity on the critical path does not begin on time), the PM should communicate thru the respective CO Liaison, to Program Management, that an expedited Design Funding Authorization process is needed. FHWA must approve funding requests on Federal-aid projects, which adds review time.

Red Flag: FHWA requires a final, approved NEPA document before it will authorize a PR-1 form to allocate additional federal funds for final design. Refer to FHWA Order 6640.1A for detailed information on what activities are permissible during the NEPA process.

SIDE NOTE

FHWA provides several examples of activities that are part of preliminary design that are necessary to adequately analyze alternatives. These examples include horizontal and vertical alignments,

environmental assessments, topographic and boundary surveys, geotechnical investigations, hydrologic/hydraulic analyses, traffic studies, and other information needed to evaluate project alternatives.

Examples of activities FHWA may consider as final design include final design details for a specific alternative (final plans, final quantities, final engineers estimate), contract modification for a consultant to provide final plans for a project (if applicable), right-of-way (ROW) plan development, and utility relocations.

3.0 CONTRACT MODIFICATION TO FINAL DESIGN

If consultant services are used on a project where additional phases of work are added to the scope, the contract must be modified, and the schedule adjusted. The Division of Professional Services helps the PM with contract modifications. A contract modification is negotiated using the same procedure as the original contract.

The Division of Professional Services webpage contains helpful tools and guidance, including the *Professional Services Guidance Manual* (Section PS-15-06). Also refer to the *Highway Design Guidance Manual* (Section HD-205).

Review the HKP Article *Understanding a Consultant Contract* (coming soon) for more information on consultant contracts.

Red Flag: The review process for contract modifications is similar to the review process for the original contract. The Division of Professional Services finalizes the contract and sends it through KYTC's approval process. When the Division of Professional Services receives eMARS approval (indicating the contract has been automatically filed with the LRC Government Contract Review Committee) the Division sends a notice to proceed and approval for payment to the firm, which indicates it may begin work and bill for services.

4.0 FINAL DESIGN

Final design generates the detailed plans and documents needed for ROW acquisition, utility relocation, permitting, and construction of the selected alternative. The final design must incorporate (1) resolutions to project-specific issues or special circumstances identified in the preliminary design phase and (2) information in the approved DES.

During final design, if changes are made to the controlling design criteria, project scope, or budget that result in the project budget being more than 15% over the budget listed in the *Enacted Highway Plan*, the changes must be approved through the Location Engineer and then documented in an amendment to the DES. See Section HD-203.6.2 of the *Highway Design Guidance Manual* for more information.

When activities in one subject-matter area influence work in another during final design, an iterative approach should be adopted during the revision process. Work between subject-matter areas can and should overlap. During this phase, the PM relies on the critical path schedule to target work progress and to identify strategies to keep the project moving forward. Refer to the HKP Articles *Project Schedule and Development of Milestones* (coming soon) and *Monitoring Scope, Schedule, and Budget* (coming soon) for details.

Red Flag: A PM should organize project files using consistent naming conventions and a systematic organizational framework, with one location for all project documents. Throughout project development — but especially during the final design, ROW, and utility phases — updates occur frequently, and a clear organizational system is critical for keeping track of files. For further information concerning ProjectWise and folder structure, refer to KYTC CADD Standards and ProjectWise Standard Project Folder Structure.

Red Flag: The members of a PDT may change between preliminary design to final design. When a new member joins the team or an existing member takes on a new role, the PM and/or other members who have experience working on the project should help to coordinate the work of people occupying new roles. To prevent progress from stalling out if someone leaves the PDT, make sure to maintain clear and thorough project documentation — this is non-optional, it must be done!

5.0 LOCATE UTILITIES: SUBSURFACE UTILITY ENGINEERING (SUE) QL A OR B (IF REQUIRED)

Sometimes the PDT may need SUE Quality Level (QL) A or B surveys to complete final design. These surveys are especially useful in areas with multiple underground utilities that potentially conflict with proposed construction. Conflicts can significantly delay projects. SUE QL A or B survey data are used to determine if it is feasible to design around utilities instead of relocating them.

Think of SUE QL A or B surveys as activities performed during the utility phase **unless** potential impacts are severe enough for the PDT to further evaluate alternatives prior to selecting the preferred alternative. In this case, design funds could be utilized for the SUE work earlier in the design phase.

Redesigns may be needed if any of these facilities are within the project footprint — large gas transmission lines, water mains, buried fiber optic cable, and other facilities whose relocation will result in costs or delays disproportionately large compared to the overall project budget and schedule.

Even if a utility relocation is not reimbursable (i.e., direct costs will not impact the project budget), the PDT may elect to avoid the facility if relocation work would significantly impact the project schedule.

Advertisements for consultant services should mention that the consultant will be required to survey utilities to different QLs as needed during project development.

For additional information refer to *FHWA* SUE and *KYTC Design Manual* HD-304 Surveying-Utility Location

SIDE NOTE: The PM has several options for acquiring SUE QL A surveying. Using a letter agreement for statewide surveying services may be faster than modifying the original consultant contract.

6.0 DRAINAGE DESIGN

A proposed drainage plan for the selected alternative includes culverts and headwalls, inlets and storm sewers, bridges, temporary drainage, and project-specific drainage needs. Proposed drainage plans must contain economical and hydraulically feasible solutions that comply with KYTC's policies, specifications, and standards. Early and continued coordination by the PM with the Central Office Drainage Engineer assigned to the district office is essential to the drainage decisions made on the project.

Once the drainage design meets the PDT's expectations, all relevant information is placed into ProjectWise at the appropriate location. The submittal format facilitates the organization of documents as well as the review process. The PM provides the drainage submittal to the Central Office Drainage Section. Drainage submittals are required on most projects that:

- Contain major drainage structures, including structures used to transport water directly through, or which delay the flow of water into or away from, the roadway system; or
- Include extensions of existing structures or improvements to those structures or drainage systems.

The exception is bridge replacement projects included in the *Statewide Bridge Project Delivery Services*. The goal of these projects is to replace a bridge in-kind and in the same location so that the size of the existing bridge's hydraulic opening is matched or exceeded. A risk assessment is required for all crossings classified as bridges on these type projects, as defined in the *Drainage Manual* (Section DR-807), to determine the risks and required level of hydraulic analysis. A full drainage submittal may not be required.

The Division of Highway Design uses two drainage submittals: *preliminary* and *final*. Typically, *preliminary* drainage submittals are not required unless bridges, bridge-sized culverts, storm sewers, or major channel changes are among the drainage features. A third submittal — the *advance situation* folder — is primarily used by the Division of Structural Design. The *Highway Design Guidance Manual* (Sections HD-204.13 and HD-204.20), *Drainage Manual* (DR-300), and *Structural Design Guidance Manual* (SD-200) contain detailed instructions on procedure and format.

A drainage inspection meeting — which the PM is responsible for scheduling — is held for each project. It is often combined with the Final Joint Inspection meeting (refer below to Section 15 Final Joint Inspection), with comments on drainage design being incorporated into the meeting minutes. If a project or the drainage design are complex, a separate drainage inspection meeting may be held. Whether the drainage inspection meeting is combined with the Final Joint Inspection meeting or held independently, its purpose is to review material submitted in the *preliminary* folder and let subject-matter experts (SMEs) ask questions about elements of the submittal they are unclear on.

A separate drainage inspection report is prepared when a drainage inspection meeting is held, or if the PM deems it appropriate. Regardless of how minutes are documented, discussions on drainage design are placed in the drainage inspection report. This report:

- Summarizes written comments from SMEs on the drainage design as well as responses from the PM and/or drainage designer, and
- Documents that all personnel concur with the final drainage design (including modifications made based on SME reviews of the initial design).

When project plans call for larger drainage designs and features (e.g., bridges), the drainage inspection report also:

- Recommends location, span arrangement, and abutment type as well as the sounding layout for drainage structures, piers, and abutments, and
- Documents if scour analysis is needed, which is determined during the geotechnical investigation.

The PM must ensure the report includes the Central Office Drainage Engineer's endorsement of the drainage inspection meeting minutes and comments.

The *final* drainage submittal:

- Includes recommendations from the review process
- Serves as the permanent record of the project drainage plan
- Contains all required information to support the selection of drainage items proposed in plans
- Documents final resolution(s) of drainage inspection comments

In the event of flooding and subsequent lawsuits by plaintiffs whose properties are damaged by high water, the *final* drainage submittal contains materials KYTC will cite as evidence to justify and defend its decision making.

Variations on current practices and standards incorporated into the drainage plan are fully documented in the *final* drainage submittal. Once the final drainage submittal is approved, the PM needs to make sure that the approved submittal is included in the project folder for future reference and documentation.

Side Note: The *advance situation* folder is treated as an order form that instructs the Division of Structural Design to either begin structure design or to direct a consultant to begin this work on KYTC's behalf. The *advance situation* folder should contain explicit requirements identified by the PDM and PDT project team. Once the *advance situation* folder is submitted to the Division of Structures, a sounding layout is prepared to guide drilling for structures, piers, and abutments. The PM should ensure that this folder is submitted in a timely manner to allow for field work needed for the Geotechnical work.

Red Flag: The installation of drainage structures can present significant challenges related to constructability and maintenance of traffic (MOT). Of particular concern are pipe culverts with either little cover or extraordinarily deep cover heights. The PM may consult construction SMEs to identify strategies that minimize cost and project delays during later work phases.

Red Flag: Many local governments have ordinances, codes, guidelines, or other requirements that influence roadway drainage design for projects in their jurisdictions. KYTC completes additional coordination with local governments that have specific drainage criteria, including the Louisville and Jefferson County Metropolitan Sewer District (MSD) and Lexington-Fayette Urban County Government (LFUCG.) Consult the *Drainage Guidance Manual* and drainage SMEs for assistance.

7.0 PAVEMENT DESIGN

The PM and PDT need to draw on resources from several Divisions to design a pavement structure that will support the traffic load and distribute it to the roadbed. These include:

- Division of Planning
- Division of Structural Design's Geotechnical Branch
- Division of Highway Design Pavement Branch

With the help of staff in these Divisions, the PM records the project-specific conditions and decisions made during the pavement design process.

Typically, the PM determines who develops the pavement design, although the Pavement Design Responsibility Chart (Figure 1) is used to determine the submission and approval. The pavement design is typically developed and submitted for approval after an alignment is chosen, traffic data is obtained, and existing soil properties are assessed by the Geotechnical Branch.

Criteria*	Submitted By	Approved By	Type Selection Justification and LCCA** Required	Type Selection Determined By
On the NHS	Central Office TEBM for Pavement Branch	State Highway Engineer and if required, FHWA	Yes	State Highway Engineer
Structural Overlay Or AADTT > 4,000	C.O. Pavement Branch Staff or Project Manager	C.O. TEBM for Pavement Branch	Yes***	State Highway Engineer
AADTT ≥ 1,000 and ≤ 4,000; or ≥ 5 Lane Miles	Project Manager	C.O. TEBM for Pavement Branch	Yes	State Highway Engineer
< 1,000 AADTT and < 5 Lane Miles	Project Manager	District TEBM for Project Development	No	Project Manager

*Average Annual Daily Truck Traffic (AADTT) is current year data. NHS is the National Highway System.
** LCCA – Life Cycle Cost Analysis
*** Structural Overlay requires Type Selection Justification and LCCA if overlay is adding more than 4 inches of new pavement.

Figure 1- PAVEMENT DESIGN RESPONSIBILITY (Recreated from KYTC Design Manual, Pavement Design Section HD-1001.2)

The *Highway Design Guidance Manual* (Sections HD-1001.2 – HD-1001.3) lists responsibilities related to pavement design preparation, submittal, and approval.

Pavement Branch staff provide technical assistance, review and advice, training, and support. Consult the *Pavement Design Guide* when preparing pavement designs for new construction or full-depth reconstruction projects. The PM may also request pavement designs from the Central Office Pavement Branch by submitting a request to the Transportation Engineering Branch Manager (TEBM) of the Pavement Branch.

Kentucky uses AASHTO's mechanistic empirical (ME) pavement design process and AASHTOWare's Pavement ME software. For most new and reconstructed pavements in Kentucky, designers use Pavement ME. A 20-year design life is recommended if Pavement ME is used to develop the structural design. Pavement Branch staff help the PDT tailor solutions to project-specific conditions.

Pavement designs should be adapted to the conditions and characteristics of each project location and depend on engineering factors, including:

- **Traffic**
  - Consider both total volume and the percentage of truck traffic when selecting pavement type.
  - Upon request, the Division of Planning will provide traffic forecast values for Average Annual Daily Truck Traffic (AADTT), Average Daily Traffic (ADT), and Percent Trucks (%T)
- **Subgrade Characteristics**
  - The load-carrying capacity of a native soil is of utmost importance in pavement performance. The Geotechnical Branch offers guidance and makes recommendations on subgrade stabilization. Upon request the Geotech Branch will provide subgrade strength values such as Resilient Modulus (MR) and California Bearing Ratio (CBR).
- **Construction**
  - Speed of construction, MOT stages, anticipated future widening, and ease of replacement may influence the selection of pavement type.
- **Cost**
  - Initial construction costs, the cost of subsequent stages or corrective work, anticipated life, maintenance costs, and costs to road users during periods of reconstruction or maintenance are all important considerations.

The PDT initially selects hot mix asphalt (HMA) bound material or Portland Cement Concrete (PCC) pavement (flexible or rigid). Alternate Pavement Type Bidding (AD/AB) procedures may generate project savings if one pavement type does not hold a clear advantage over another.

Side Note: A Special Note is used in plan documents to record the use of nonstandard and new materials, equipment, or prescribed testing. Visit the Pavement Branch website for Special Notes.

Side Note: All pavement designs shall be submitted electronically via the web-based pavement design application. For detail refer to KYTC Pavement Design Web Application

Red Flag: To avoid delays in finalizing a pavement design, the PM should request traffic data from the Division of Traffic and soil characteristics and the California Bearing Ratio (CBR) from Geotechnical staff as early as possible in project development.

Red Flag: An excessive number of pavement mix designs can increase construction bid pricing and unnecessarily complicate general bookkeeping. The PDT should review mix requirements and consolidate them as much as possible, using input from Pavement Branch and Materials staff.

For more information on pavement design visit the Pavement Branch website and consult the *Pavement Design Guide*.

8.0 FINAL ROADWAY DESIGN

Final design addresses several project-specific topics. The outcome of final design is a set of plans, profile sheets, cross sections, and the necessary detail sheets. For further information concerning KYTC CADD Standards and the delivery of contract plans and proposals, including Electronic Engineering Data (EED), refer to CADD STANDARDS POLICY MANUAL.

During final design — if not earlier — roadway design staff with the oversight of the PM, engage in and complete work on numerous topics, including:

- Intersections
- Roadside safety and guardrail design
- Pavement design
- Drainage submittal development
- Item quantity takeoff measurements for the general summary, pavement summary, and drainage summary (bid item quantities and types)
- Final earthwork volume measurements according to each material classification
- Construction estimate
- Erosion control plan details
- Construction notes and temporary traffic control measures
- Traffic Management Plan (TMP), including the Traffic Control Plan (TCP) and a Public Involvement Plan (PIP) when applicable
- Signing and pavement markings/striping plan
- Pedestrian and/or bicycle facilities design
- Proposed ROW and easements
- Deed descriptions for proposed ROW
- Finalization of plan deliverables (including electronic files)

Red Flag: A Value Engineering (VE) study may be required. The PM should consult current FHWA requirements to determine which projects require a VE Study. These are scheduled through the Quality Assurance Branch. Except for projects with a well-defined scope, VE studies should be conducted around the time an alternative is selected during preliminary design. For large bridge replacement projects, a good time to schedule a VE Study is during final design. For additional information refer to KYTC *Highway Design Manual Section*s HD-104.2.8 , HD-203.7.4 and FHWA *VE Document.*

Red Flag: Building the roadway and supporting structures is the primary goal of most highway projects. As such, the designer's plans are often the focal point of the project's construction documents, thus, construction SME's should be consulted thru-out the project development process. The PM and designer must communicate with the other PDT members to convey the design intent (especially as new details are derived). Conversely, as SMEs make decisions and uncover new project details, they should relay this information back to the PM and designer, especially if they affect the road design and/or needs that should be included in the plans.

9.0 STRUCTURE DESIGN

For projects designed by KYTC staff, the PM submits to the Division of Structural Design all necessary data for analysis and design (including the Advance Situation Survey and Advance Situation Folder).

When a consultant prepares designs for bridges, box culverts, tunnel liners, retaining walls, and noise barriers, the consultant coordinates and submits the information to the Division of Structural Design for review and approval. This coordination should be captured in their monthly reports submitted to the PM. The review process has five phases:

1) Advance Situation Folder (serves as the "order form" for structure plans)
2) Preliminary Plans, Stage 1 (Preliminary structure plans submitted for review. Upon completion of the Stage 1 Preliminary Plans, the Division of Structural Design will determine whether Stage 2 Preliminary Plans are required)

3) Preliminary Plans, Stage 2 (if required- Includes preliminary plans with revisions from the Preliminary Stage 1 review)
4) Final Plans, Stage 1 (Detailed structure plans, including design, details, special notes, and quantities submitted to Division of Structural Design for review)
5) Final Plans, Stage 2 (Final structure plans with any changes from Stage 1 Final plans review, to be included in the final plans submitted for a letting)

Detailed format and content requirements for the submittal are described in the *Structure Design Guidance Manual*, *Drainage Guidance Manual*, and *Highway Design Guidance Manual* (Sections HD-204.20 and HD-207.11).

The purpose of a PM's review of early-stage and final structure plans is to ensure a structure's design aligns with the project's intent and does not conflict with other project details (e.g., utilities, MOT, environmental concerns, barrier considerations).

The Geotechnical Report should be completed prior to the Advance Situation Folder submittal, otherwise the final structure design will be delayed due to the time needed to finish geotechnical work.

For bridges with wall-type abutments, a spill-through–type structure is generally more economical than a short-span structure with tall abutments. Selection of bridge type should be coordinated by the PM in concert with Division of Structural Design.

Often, the Standard Specifications adequately address the demolition and disposal of existing structures. In some cases, special demolition instructions may be needed, such as when the partial demolition of an existing structure carrying traffic is necessary.

Project details that complicate structure design (and the other phases of project development) include:

- Curved bridges
- Phased construction
- Steel bridges
- Railroad overpass or underpasses
- Hydraulic requirements

Red Flag: Bridges located on horizontally and vertically curved alignments cost more to design and construct than bridges on straight alignments. If a structure cannot be located outside a curved roadway segment, the next best option is to keep the bridge outside of pavement transitions. When it is apparent that a bridge alignment may need to be on a curved alignment, the PM and road designer should coordinate early with the bridge designer to identify structure options and determine the preferred bridge structure.

Red Flag: If permits or approvals from other agencies are required (e.g., US Coast Guard [USCG], FHWA), or the structure is complex, significantly more time should be allocated for project development. Refer to *KYTC Design Manual* HD-501 Permits & Certifications.

For additional information about the Division of Structural Design and submittal procedures, see the HKP Article *Division of Structural Design*.

10.0 ENGINEERING AGREEMENTS (UTILITIES) (IF REQUIRED)

Engineering service agreements are keep-cost agreements that KYTC uses to reimburse utility company staff or an approved consultant for relocation engineering and administrative work. They may be established for engineering, accounting, legal, appraising, or consulting services and can be used for any of the following reasons:

- The utility company requires the immediate ability to invoice only engineering-related work.
- Utility relocation will be included in the highway contract, and the utility company will not be directly reimbursed for construction costs.
- The Cabinet has determined that utility relocation engineering should begin before U-phase funding is available (e.g., to help with the project schedule).

As noted in the HKP Knowledge Book- Sections 3,4, and 5: ***Identify and Contact Involved Utility Companies and Locate Utilities*:**

The PM, in consultation with the District Utility Section, may determine that the preliminary utility engineering relocation design should be initiated before the U-phase funding authorization. Initiation may occur as early as the start of roadway design. If the work is eligible for reimbursement, D-phase funds are used. Look at the HKP Article Project Time Management *Data Gathering* for more details.

Early initiation is encouraged for the following project types:

- Extensive utility work is needed and cannot be completed without early utility engineering.
- Adhering to the project schedule is not possible without early utility engineering, and the letting date must be maintained.
- The project includes complex utility relocations that require more extensive, time-consuming coordination efforts (e.g., impacts to gas transmission lines).
- Utility easements must be procured, and preliminary engineering is required to identify the easement.

When engineering agreements are used, preliminary engineering (relocation design for the utility) is reimbursed by a separate agreement using a funding source that differs from what is used for utility relocation construction. Relocation construction may be reimbursed under a typical keep-cost or lump-sum relocation agreement.

Side Note: D-phase funding may be used for utility engineering-related work like Subsurface Utility Engineering, engineering service agreements, and utility coordination. If this work is anticipated early enough in the project development process, the estimated design cost should include funds to account for utility design. D-phase funding cannot purchase utility easements or construct the physical utility relocation.

Red Flag: KYTC approval and authorization of engineering services (whether utility company personnel or their consultant) applies only to utility companies authorized to receive compensation for relocation work.

For additional information, refer to the KYTC *Utilities and Rails Guidance Manual*.

11.0 FINAL SURVEY REPORT

The Final Survey Report documents project survey details. The party responsible for the survey prepares and submits the report to the PM.

The District Surveyor or consultant PM (if applicable) must submit a PDF of the survey report to the KYTC Survey Coordinator for review. This report generally includes the following information:

- Project name and identification, including:
  - County, Route, Mile Post, E.A., or Project Identification
- Survey date, limits, and purpose
- A scaled map (e.g., KML file) of the project area that shows all primary and supplemental (horizontal and vertical) control monumentation established along with appropriate designation.
- Datum realization, epoch, geoid model, and units
- Project datum factor (if used) that relates to the Kentucky State Plane Coordinates
- Dated signature and seal of the Kentucky Professional Land Surveyor in charge, if a consultant survey crew is used
- Description of all primary and project control found, held, or established
- Closures of all traverses

For a complete list of items contained in the report, refer to *Highway Design Guidance Manual* (Section HD-301.6). Refer to the *Highway Design Guidance Manual* (Section HD-309.9.5) for more information on the Survey Report.

Survey pickup may be necessary at multiple times throughout final design as the designers encounter details that are new, or which require confirmation. The PM is encouraged to collect survey needs and strategically order the survey to maximize efficiency. Examples of this type of small-scale survey work include identifying a new building or feature, a disputed property boundary between two parcels, a developing slide, or septic lines. Having accurate knowledge of where existing structures are located and their boundaries is particularly Important to the design process.

Red Flag: A survey report will not be accepted from a non-KYTC source unless it is signed, dated, and stamped by a Kentucky Professional Land Surveyor who has certified the accuracy of the submitted report and verified the accuracy of all control monuments established for KYTC.

Red Flag: If a project is temporarily shelved or otherwise delayed, surveys of existing topography and property lines may become outdated and inaccurate. If so, additional time and resources will be needed to update the existing digital terrain data.

Side Note: Additional survey pickup or staking of the proposed ROW may be needed when ROW is acquired. Property owners often provide new or more accurate information than was previously available, and the staking of proposed ROW often helps the property owner visualize impacts to their parcel.

12.0 GEOTECHNICAL INVESTIGATION

The PM consults with the Geotechnical Branch to determine the level of geotechnical investigation. The level of effort ranges from advisory to a full-scale geotechnical analysis, with fieldwork, lab work, and reports for roadway, structures, or both.

Traditionally, the geotechnical investigation begins after the Preliminary Line and Grade meeting has been held and the alignment selection has been made. However, seeking and obtaining geotechnical information earlier in the project development process is invaluable for the PDT's decision making. For example, if geotechnical recommendations for cut-and-fill slopes are proposed early, more accurate estimates of the disturbed area and the amount of ROW needed can be produced.

The *Highway Design Guidance Manual*, *Drainage Guidance Manual*, *Geotechnical Guidance Manual*, and *Structures Design Guidance Manual* all contain information on the level of geotechnical investigation appropriate for a given project feature. More in-depth geotechnical investigations are needed where springs, landslides, mines, karst, faulted strata, acidic shale, mineral deposits, or other topographic or subsurface features are present.

Large drainage structures require more extensive geotechnical field data collection and analysis than smaller structures. A large drainage structure meets one or more of the following criteria:

- All bridges
- Culvert pipes with a diameter (or equivalent) greater than or equal to 54"
- Culvert pipes with improved inlets
- All cast in place box culverts
- All precast or metal box culverts 4' span x 4' rise or larger
- All bottomless (3-sided) structures

Final plan development relies heavily on geotechnical report recommendations. The Geotechnical Branch provides the following sheets for inclusion in the roadway plan set:

- Geotechnical notes sheets
- Geotechnical symbols sheets
- Soil profile sheets

The scale of soil profile sheets are commensurate with the project's scale.

Soil profiles can be used to establish cut-and-fill slopes. CBR values can be used to develop the pavement design, cut and embankment stability sections, and rock refill. The designer determines the quantities of rock available from roadway excavation and the quantity needed for rock roadbed, embankment, and rip rap using information from the geotechnical report. Embankment foundations and/or transverse (profile) benches, granular embankment, or a proving period may be needed.

Side Note: The scope of geotechnical investigations is often minimized on projects selected for expedited delivery to reduce costs and maintain the desired schedule. When evaluating how much risk will be assumed by omitting or limiting the scope of geotechnical investigations, the PM should work with a geotechnical SME to prepare a geotechnical action plan that defines acceptable risk levels.

Red Flag: When performing early geotechnical field investigations, analyze the environmental setting to verify that no sensitive features (e.g., archaeology, forested habitat, special use stream, wetland) will be adversely impacted by geotechnical work (e.g., drilling). The PM, working with the district environmental

coordinator and/or environmental SME's, must decide if an environmental overview should be conducted prior to geotechnical field investigations.

Red Flag: The Geotechnical Branch's online database houses the results of KYTC geotechnical investigations. Additional geotechnical mapping and information may also be obtained from the Geotechnical Branch's online database.

Red Flag: To retain flexibility in project work tasks and keep a project moving forward, a PM may want to consider initiating geotechnical fieldwork for the roadway investigation separately from the geotechnical fieldwork for the structures investigation.

Red Flag: Karst terrain (including sinkholes, closed drainage basins, sinking streams, caves, underground mine openings, fault lines and similar geohydrological features) requires additional investigation and analysis during design. Stringent guidelines for drainage design and construction are in place and must be adhered to if sinkholes will be used for drainage.

Red Flag: Potentially adverse pH conditions in the surrounding soils and geology should be evaluated. Elevated acidity can result from strip mining or other actions that expose acid-producing soils, acid shale seams, or other acid-producing formations. Additional requirements during design and construction should be expected where these conditions are present.

Red Flag: A common source of plan error is omitting recommended quantities from the geotechnical report. To avoid this pitfall, it may be helpful for the report to list where rock and fabric are recommended to deal with the presence of saturated soil. Omitting these quantities from the plan quantities can result in overruns or change orders.

For more detailed information concerning the Geotechnical Process, visit the HKP Article *Geotechnical Investigations – Where to Begin and How to Proceed*.

13.0 TRAFFIC CONTROL DEVICES

Traffic control devices regulate, inform, warn, and guide roadway users. Examples of traffic control devices are:

- Signing
- Pavement markings
- Electrical traffic control devices (including traffic signals)
- Lighting

Note: Some transportation agencies are moving towards Transportation Systems Management and Operations (TSMO) Plans. TSMO is a set of strategies that aim to optimize the safe, efficient, and reliable use of existing and planned transportation infrastructure for all modes. The goal is to get the most performance out of existing transportation facilities and implement comprehensive solutions that can be implemented quickly at relatively low cost. KYTC is in the process of developing a TSMO Plan, including a training program for staff and partners. The plan is anticipated to implement TSMO strategies for all areas of the cabinet including performance-based flexible design, ITS (Intelligent Transportation System) projects, and work-safety improvements in a construction work zone.
For more information about TSMO, refer to the FHWA article Organizing and Planning for Operations.

The PM, with input from the District Traffic Engineer, is responsible for identifying and including appropriate traffic device plans in the total plan set.

Once locations are identified that may require signal, signing, and/or lighting plans, the PM notifies the District Traffic Engineer and Central Office Traffic Operations. The PM should notify the District Traffic Engineer of project meetings and inspections as early in the process as feasible. The District Traffic Engineer will send a written request and provide appropriate supporting information to Central Office Traffic Operations.

The Division of Traffic Operations provides oversight when a consultant designs signing, signals, or lighting devices. Oversight takes place during plan development and through a review of final plan details. The Division of Traffic Operations may also design devices in-house and coordinate project details with the PM.

Road projects generally include the design and installation of one or more of the following devices:

- **SIGNS**: New sign installation plans are prepared for interstates, parkways, and other high-volume, limited-access roads that include interchanges. See the *Traffic Operations Guidance Manual* (Section TO-400) and *Highway Design Guidance Manual* (Section HD-1201.2).

- **PAVEMENT MARKINGS & DELINEATION**: Like signs, pavement marking plans are prepared for interstates, parkways, and other high-volume, limited-access roads that include interchanges. See the *Traffic Operations Guidance Manual* (Section TO-500) and the MUTCD.

- **ELECTRICAL TRAFFIC CONTROL DEVICES**: The PDT may choose to modify existing electrical devices or install new electrical devices on a project (e.g., traffic signals, advance warning flashers, railroad-warning system, flashing beacons, school flashers). When this occurs, the District Traffic Engineer forwards the recommendation to Central Office Division of Traffic Operations, Traffic Engineering Branch (on the PM's behalf). It contains roadway plan details, traffic counts, traffic projections, and crash history. See the *Highway Design Guidance Manual* (Section HD-902) and *Traffic Operations Guidance Manual* (Section TO-600) for more information.

- **LIGHTING (e.g., conventional light poles, high-mast lighting)**: The process for requesting lighting designs and plans is described in the *Highway Design Guidance Manual* (Section HD-902.7) and *Traffic Operations Guidance Manual* (Sections TO-701 – TO-716).

- **MISCELLANEOUS:** The PM should talk with the District Traffic Engineer and the Division of Traffic Operations when making decisions about rumble strips, runaway truck ramps, and work zone traffic control (Sections TO–801 – TO-803).

- **INTELLIGENT TRANSPORTATION SYSTEMS (ITS):** ITS improves transportation safety and mobility through the use of advanced communications technologies within the transportation infrastructure and in vehicles. For more information about ITS refer to KYTC ITS and USDOT-ITS

In 2012, the Division of Highway Design (No. 03-12) and Division of Traffic Operations (No. 01-12) issued a (Joint Memo) that explains procedures for developing plans for electrical devices as part of a roadway design project. Plans must be developed in accordance with all of the following:

- Kentucky Transportation Cabinet (KYTC) CAD Standards
- *Kentucky Standard Specifications for Road and Bridge Construction*
- *Traffic Operations Guidance Manual*
- *Highway Design Guidance Manual*
- Division of Traffic Operations' Roadway Lighting Standard Detail Sheets
- *National Electrical Code*
- *National Electrical Safety Code*
- MUTCD
- AASHTO's *Roadway Lighting Design Guide*

Red Flag: When planning the installation of traffic control devices for a road project, it's essential to carefully determine their placement. If the placement requires additional land, the designer should incorporate the required extra land into the right-of-way takings and make provisions for its acquisition through the right-of-way process.

Red Flag: To avoid conflicts (e.g., expensive utility impacts, time-consuming ROW purchases), the PM must coordinate the design of signs, signals, and lighting devices with all other design processes. Under no circumstances should this be postponed until the project letting nears.

Red Flag: All sign supports located in the clear zone must have a breakaway design or be protected by crashworthy barriers. When struck by a vehicle, a breakaway sign support either separates from the base or yields, allowing the vehicle to run over it. When possible, coordinate sign placement with the barrier systems that will be used on the project. Once the traffic control devices and proper signage is approved by Central Office Traffic Operations, the PM coordinates with the Division of Structural Design on the structural design of sign supports.

For additional information refer to the *Traffic Operations Guidance Manual*.

14.0 CONSTRUCTABILITY REVIEWS

The Constructability Review (CR) Program is managed by the Quality Assurance Branch in the Division of Highway Design. CR's are performed by construction personnel who have extensive knowledge of and experience with constructing KYTC projects. These reviews help ensure that projects are constructable, biddable, and can be maintained. The goal of a CR is to improve project quality and minimize potential change orders during construction.

All KYTC projects are eligible for CR's. The PM can submit a request for a CR directly to the Quality Assurance Branch. The PM should submit a request with plans to the Quality Assurance Branch before the Final Joint Inspection, so that comments from this review can be discussed at the inspection.

For more information on CR's, refer to the *Highway Design Guidance Manual* (Section HD-204.23).

15.0 FINAL JOINT INSPECTION

All projects should have a Final Joint Inspection meeting. This meeting is held when the contract plans are approximately 80 percent complete. Construction, maintenance, traffic, structures, design, row, utilities, geotech, and drainage staff may be invited to attend and offer input. At this point, the plans reflect approved decisions from the DES, as well as all ROW and utility information, including identified relocations, detailed MOT information and plans.

Other design review meetings can be combined with the final inspection (e.g., a structure review for bridge replacement projects or the drainage inspection). During the Final Joint Inspection meeting the PDT and project-specific SMEs (e.g., environmental, ROW, utilities, construction, maintenance, traffic) review the project design and the proposed contract plans and documents.

The PM distributes electronic or paper (hard copy) versions of proposed plans before the meeting so they can perform a detailed technical review of the project's design and prepare feedback. When scheduling the Final Joint Inspection Meeting, the PM should make sure the PDT has at least two weeks to review the plans. When appropriate, contract plans are made available to FHWA as well as the city or county. This technical review provides reasonable assurances that the project design is complete, accurate, and high quality. Contract plans are also made available to the PDM and the Location Engineer. A construction cost estimate detailing biddable quantities is included.

Another goal of the review is to confirm that the roadway design information found in contract documents will effectively communicate the engineering details, facilitate construction contracting, and help to achieve project construction that is consistent with KYTC requirements and specifications.

Side Note: Because representatives from multiple specialty groups attend the Final Joint Inspection, the meeting can have a large number of attendees. As such, its success hinges on good planning and focused discussions. The PM can take the following steps to ensure a successful Final Joint Inspection meeting:

- Create and distribute a systematic agenda.
- Focus attendees by using a single display for the entire room.
- Designate one meeting facilitator who is responsible for keeping discussions moving.
- Group agenda topics according to the specialties represented (i.e., team members may wish to attend only discussions relevant to their expertise.)
- Documentation of the Final Joint Inspection is very important and includes meeting minutes, topics discussed/potential solutions, sending these minutes out for comments, and finalizing this information in the project file. Documentation provides information that may be needed for future reference when a question or issue comes up about the project.

Side Note: The District Environmental Coordinator (and environmental SMEs) may review plans at the Final Joint Inspection to verify environmental commitments are accurately documented. During the meeting, the PM should remind the PDT of commitments made in the NEPA document. For example, impacts to historic properties should be reviewed and taken into account when ROW plans are generated (a task regularly completed after the Final Joint Inspection). Follow through after the Final Joint Inspection can prevent the erroneous purchase/demolition of an eligible structure. Refer to Design Memo 01-18 for additional guidance.

Red Flag: Typically, the Final Joint Inspection meeting should not be scheduled before the following are complete:

- Geotechnical investigation
- Pavement design
- Drainage design
- Roadway design

Red Flag: Final Joint Inspection meeting attendees should be given at least two weeks to go through review materials. Schedule the distribution of review materials accordingly.

Red Flag: Once the Final Joint Inspection has been held and comments have been addressed, the PM must submit check prints, a cost estimate, and an estimated completion date to the Plan Processing Branch for review prior to the submittal of the Contract Plans. These check prints should be submitted approximately 3.5 months before the scheduled letting.

For additional information refer to HKP Article *Preparing for Letting* (coming soon).

16.0 RIGHT OF WAY PLANS & REVISIONS

The PDT considers many factors when establishing limits for the proposed ROW. The extent of ROW must be sufficient to accommodate the construction and maintenance of the new roadway and structures. Access control type(s) affects new ROW limits as well as the location of entrances or approach tie-ins. Deed research undertaken as part of survey work clarifies the existing ROW and property boundaries and is used to identify prior easements or rights (e.g., mineral rights or access) that must be addressed during ROW acquisition. It may be appropriate to acquire permanent fee-simple ROW, permanent easements, temporary easements, or some combination of these.

The PM should submit the ROW Plans after the Final Joint Inspection has been held once comments or edits to the plans have been addressed. The plans should include enough detail to ensure that adequate ROW or easements are shown to address side slopes, drainage ditches/structures, signs, utilities, waste sites, construction staging areas, MOT, and other requirements.

Whenever the PM and ROW personnel determine that ROW plans should be modified, a *Right-of-Way Revision Sheet* is added to the ROW plans. It is inserted directly after the layout sheet and numbered *R1a*; see the *Highway Design Guidance Manual* (Section HD-208.6). Each time a revision is processed, the *Right-of-Way Revision Sheet* should be updated electronically, reprinted, and inserted into the plans. For some projects, the Director of Division of Right of Way and Utilities may adopt an informal version of this revision process. Regardless of the method used, it is important to meticulously track all changes. The District Right of Way Supervisor keeps the Director of the Division of Right of Way and Utilities apprised of the status of project plans and deeds.

Red Flag: For parcels that proceed to condemnation, the PM must identify and then preserve the plan version used at the time the suit was filed even if ROW revisions occur adjacent to the parcel being litigated. Office of Legal Services staff also require exhibits or prints, and those files must be similarly preserved.

Red Flag: Adequate temporary easements must be provided around existing improvements if they will be demolished after ROW acquisition. Examples include pond dams and buildings.

Red Flag: Adequate ROW must be provided to maintain traffic and perform construction activities even if doing so produces a larger footprint than what is needed for the final roadway.

17.0 FINAL PLAN DEVELOPMENT (Contract Plans or Proposals)

Contract plan sets are the highway plans awarded through the letting process. They are a product of the project development process and for a typical capital improvement project will consist of the roadway, structures, traffic, and/or utility relocation plans, along with any project specific detail sheets. When the PM submits contract roadway plans, estimates, and proposals to the Division of Highway Design's Plan Processing Branch, all electronic file submittals must adhere to the standards outlined in the *CADD Standards for Highway Plans*. These standards have been established to ensure files are put to the best possible use during the review, publication, construction, and archival processes. The standards represent the minimum requirements for the development of highway plans. Visit the CADD Standards webpage for more information.

For more information on the submittal of final contract plans, refer to *Highway Design Guidance Manual* (Section HD-209).

Typically, Highway Safety Improvement Program (HSIP), Asset Management, and Maintenance projects are developed and let to construction as *Proposal Only* projects. These are usually submitted on 8.5" x 11" sheets. It may be appropriate on certain projects to include 11" x 17" size sheets if more details are needed.

Typically, a proposal project will include project-specific specifications and detail sheets, along with bid item information. If typical section sheets, plan and profile sheets, drainage detail sheets, or cross-sections are needed, these are submitted on the same size sheets as mentioned above for proposal-only projects and are included in the details for the proposal.

Please refer to the appropriate KYTC Divisions for proposal development and submittal process.

Red Flag: Completing a final comparison of structure and roadway plans during final plan development is worthwhile, especially for reconstruction projects. For example, if a new structure's beam arrangement conflicts with MOT plans for using the existing structure, the project will take longer, the contractor may file a claim, and a change order may become necessary. Finding and resolving these issues during design saves time and expense later.

18.0 Associated Articles

KYTC Manuals and Information:

Design Manual (HD-203, HD-203.3.10, HD-203.5, HD-203.6, HD-204.23, HD-304, HD-600, HD-603, HD-700, HD-1300, HD-1401)

Complete Streets, Roads, and Highways

Right of Way Guidance Manual (ROW 403-2)

Utilities and Rails Guidance Manual (UR-1002)

Geotechnical Database

DEA Guidance Manual

Environmental Handbook

Highway Knowledge Portal Articles:

Environmental Approval

Right-of-Way Acquisition

Railroad Coordination

"*Geotechnical Investigations – Where to Begin and How to Proceed*"

19.0 Reference Documentation

KYTC Design Manual:

https://transportation.ky.gov/Organizational-Resources/Policy%20Manuals%20Library/Highway%20Design.pdf

KYTC *DEA Guidance Manual*:
https://transportation.ky.gov/EnvironmentalAnalysis/Environmental%20Resources/DEA%20Guidance%20Manual.pdf

KYTC CADD Standards: https://transportation.ky.gov/CADD-Standards/Pages/default.aspx

KYTC CADD STANDARDS POLICY : CADD Standards Policy Manual

KYTC Environmental Handbook:

https://transportation.ky.gov/EnvironmentalAnalysis/Pages/KYTC-Environmental-Handbook.aspx

KYTC Utilities and Rails Guidance Manual:

https://transportation.ky.gov/Organizational-Resources/Policy%20Manuals%20Library/Utilities%20and%20Rails.pdf

KYTC Complete Streets, Roads, and Highways: KYTC's Complete Streets, Roads, and Highways

KYTC Right of Way Guidance Manual: https://transportation.ky.gov/Organizational-Resources/Policy%20Manuals%20Library/RightOfWay.pdf

KYTC Geotechnical Database: https://kgs.uky.edu/kgsmap/kytclinks.asp

Highway Knowledge Portal Articles:

Environmental Approval:

https://kp.uky.edu/knowledge-portal/articles/time-management-8-environmental-approval/

Right-of-Way Acquisition:

https://kp.uky.edu/knowledge-portal/articles/time-management-10-right-of-way-acquisition/

Data Gathering, Sections 4 and 5, Locate Utilities:

https://kp.uky.edu/knowledge-portal/articles/time-management-4-data-gathering/

Geotechnical Investigations – Where to Begin and How to Proceed:
https://kp.uky.edu/knowledge-portal/articles/initiating-and-understanding-geotechnical-investigations/
Project Management and Right-of-Way: (Link coming soon)

Project Management and Utilities & Railroads: (Link coming soon)

GLOSSARY

Strategic Highway Investment Formula for Tomorrow (SHIFT): KYTC's data-driven, objective approach to compare capital improvement projects and prioritize limited transportation funds. SHIFT helps reduce overprogramming and provides a clear road map for construction in the coming years. The formula applies to all transportation funding that isn't prioritized by other means, such as maintenance work, local government projects and dedicated federal funds.

ProjectWise: KYTC's current document management system. It is utilized to electronically manage, find, and share CADD files, geospatial content, project data, and office documents.

Subsurface Utility Engineering (SUE): The SUE process combines civil engineering, surveying, and geophysics. It utilizes several technologies, including vacuum excavation and surface geophysics to determine more precise locations of existing underground utilities.

National Highway System (NHS): A network of nationally significant highways within the United States approved by Congress. NHS includes the Interstate Highway System and over 100,000 miles of arterial and other roads.

Traffic Control Plan (TCP): The TCP should outline specific requirements for proper maintenance and control of traffic during construction. This includes Maintenance of Traffic Detail Sheets and Notes included in the final plans.

Public Involvement Plan (PIP): For certain KYTC projects a PIP should be developed thru coordination with the district public information office (PIO) and district project delivery and preservation (PD&P) staff to provide accurate and timely information to the public concerning project start dates, road closures, etc.

Value Engineering (VE) Study: A systematic process of review and analysis of a project, during the concept and design phases, by a multidiscipline team of persons not involved in the project, that is conducted to provide recommendations for:

1. Providing the needed project scope safely, reliably, efficiently, and at the lowest overall cost;

2. Improving the value and quality of the project; and
3. Reducing the time to complete the project.

Environmental Overview: These studies are a preliminary assessment of possible environmental impacts that may result from the project and may require field evaluation, ranging from windshield survey to full environmental investigation, depending upon project complexity.

Change Order: An amendment to a construction contract that changes the contractor's scope of work. Most change orders modify the work required by contract documents (which, in turn, usually increases the contract price) or adjust the amount of time the contractor has to complete the work, or both. For there to be a valid change order, KYTC and contractor must both agree on all terms.

KYTC PROJECT MANAGEMENT AND RIGHT OF WAY PROCESS

Image Source: KTC Stock photo library

Project Management and Right of Way Process	Project Classification			
	Improvement Capital Projects	Safety Projects	Management Asset Projects	Maintenance Projects
1.0 Introduction	x	x	x	x
2.0 Right of Way Plans	x	x	x	x
3.0 Right of Way Funding Authorization, Official Order, Notice to Proceed, Notice of Acquisition	x	x	x	x
4.0 Survey Requests for Staking Proposed Right of Way and Easements	x	x	x	
5.0 Right of Way Revisions	x	x	x	x
6. Communicating All Promises (CAP) Report	x		x	
7. Project Managers Role During Condemnation Process	x	x	x	x

1. Introduction

During project development of capital improvement projects, the right-of-way (ROW) process is a critical milestone. Most Highway Safety Improvement Program (HSIP), asset management, and maintenance projects as well as improvements or repairs are done within existing ROW. On these projects, if any work is needed outside of the existing ROW, a Consent and Release Form is typically used to get permission from the property owner to work on private property.

The Division of Right of Way and Utilities acquires property for transportation projects. District ROW offices are responsible for carrying out the processes necessary to clear the ROW on a project. PMs are responsible for the following:

- Support the ROW Section by answering questions or concerns staff have
- Provide guidance when property owners ask for changes to ROW plans
- Meet with property owners when requested by the ROW Section
- Make agreed-upon revisions to plans and document these changes or revisions

Not all projects require ROW plans. When ROW plans are prepared, they must define the extent of areas necessary to construct and maintain the roadway. Without the appropriate ROW and easements, a project cannot be completed.

Sometimes the ROW process takes significant time to complete. Therefore, working toward ROW plan submittal should be a priority to initiate the process.

2. Right-of-Way Plans

Highway Design, under the direction of the PM, prepares ROW plans in accordance with current design criteria. ROW plans should be approximately 80 percent complete before the final joint inspection and include all ROW and utility information (including relocations). Proposed ROW and temporary or permanent easements must be adequate to support features like side slopes, drainage structures, signs, utilities, waste sites, and staging areas as well as maintenance of traffic.

Final ROW plans are typically compiled after the final joint inspection meeting(s). The PM submits ROW plans to the Director of the Division of Right of Way and Utilities via the District Right of Way Supervisor. The KYTC *Highway Design Guidance Manual* (HD-1300) provides detailed instructions on developing ROW plans and related processes.

When ROW plans are developed, some items require special consideration and are analyzed using specific procedures, including:

- Existing ROW
- Cemeteries
- Residential septic systems
- Encroachments on existing ROW
- Oil, water, and gas wells
- Mineral plans
- Federal lands
- Utility relocations
- Demolition of existing structures
- Existence of hazardous substances
- Waste area sites
- Railroad involvement
- Parks and recreational lands
- Historic sites
- Wildlife Management Areas

For more information on these items and procedures for addressing them, refer to KYTC *Highway Design Manual* (HD-1303) and *Right of Way Guidance Manual*. The layout sheet,

which is the title or coversheet for the ROW plan set, must include the project location, description, and identification features. Location maps must clearly indicate the project location. The layout sheet is signed by the PM and State Highway Engineer. For projects on the National Highway System (NHS), the layout sheet must note proposed access control. See the *Highway Design Guidance Manual* (HD-1100) for information on different types of access control.

The following items are included with the ROW plan submittal:

- Proposed deed descriptions
- Recorded source deed(s) and plats — if available — for each parcel being acquired
- ROW plans
  - Must include plan and profile sheets, pipe sheets, and maintenance of traffic (MOT) diversions (if applicable)
- Project item number
- Description
- Program number
- County
- Route
- If possible, submit cross sections with the ROW plans. This information can be used by ROW personnel to better assess impacts to parcels.

See KYTC *Highway Design Manual* (HD-1305) for detailed instructions on submitting ROW plans.

When KYTC retains a ROW consultant to acquire ROW for a project, the District ROW office includes a full set of ROW plans in advertisements for consultant services. Once a ROW consultant is selected, the district ROW office supplies them with a set of plans for parcels included in the contract.

Sometimes after consulting with the District ROW Supervisor, the PM may decide to hold a ROW inspection prior to the final inspection. This can expedite the ROW process and allow for advanced acquisition of certain properties if deemed necessary. Plans should be developed enough to provide information on drainage features, such as ditches, and the proposed ROW and easements necessary. A final inspection is still required on these projects. While this process should not be used on most projects, it is a tool PMs can take advantage of when appropriate. See KYTC *Right of Way Guidance Manual* (**ROW-308**) for more information on advanced authorization of ROW.

RED FLAG

Sometimes KYTC may acquire excess property (i.e., property not needed for the project). This can occur when a project requires a portion of a property and leaves a small area that the owner can no longer access or use. Excess property **is not** identified when ROW plans are submitted. ROW plans are revised to reflect excess parcels only after the District ROW Supervisor in coordination with the project appraiser, determines that an excess parcel has been identified and will be acquired. Deed descriptions of excess property are

provided by the PM or design consultant upon request. Procedures for handling excess property are detailed in the *Right of Way Guidance Manual* (ROW 805-4).

3. ROW Funding Authorization, Official Order, Notice to Proceed and Notice of Acquisition

The Director of the Division of Right of Way and Utilities submits ROW funding authorization requests to the Division of Program Management. KYTC's Secretary approves ROW funding by signing Form TC 10-1 form (*Project Authorization*). On projects utilizing federal funds to purchase ROW, the Division of ROW and Utilities must obtain FHWA approval (PR-1).

Once the Director of the Division of Right of Way and Utilities receives (1) the project authorization, (2) FHWA approval (if necessary), and (3) approved ROW Plans from the PM, they request that an Official Order be prepared thru the Office of the Secretary. An Official Order authorizes ROW acquisition using eminent domain procedures permissible under Kentucky law. Once the official order is signed by the Office of Legal Services, the State Highway Engineer, and the Secretary of the KYTC, the Division of Accounts numbers and returns it to the Division of ROW and Utilities.

Once the Division of ROW and Utilities receives project funding, the Acquisition Branch creates a project file that contains individual files for each parcel. Parcel files include hard copies or electronic copies of all relevant documents, including official orders.

If KYTC will retain a consultant for ROW acquisition, District ROW staff prepare a request for consultant services and forward it to the Central Office Acquisition Branch.

Once a prequalified consultant is approved, the consultant coordinates with the Division of ROW and Utilities to develop a project report and set up a scoping meeting. The PM should attend this scoping meeting to answer questions and to familiarize themselves with the ROW consultants that will acquire the ROW. For a more detailed list of scoping meeting requirements, consult the Scoping Meeting Guidelines.

For more information on the Division of Right of Way and Utilities, see the HKP Articles *Division of Right of Way & Utilities* and *Right of Way Acquisition*.

RED FLAG

ROW funding will not be approved until the final environmental document has been approved. However, to expedite the process, some ROW activities may be performed during the design phase using design funds, such as:

- Title searches
- Comp sales book (by district row staff)

The PM and the District ROW Supervisor shall discuss whether this would be a viable option for the project before proceeding with the use of design funds.

4. Surveying Requests For Staking Proposed Right of Way and

Easements

Often, ROW agents or property owners (through ROW agents) ask for the Cabinet to temporarily stake out proposed ROW onsite to so they can better visualize areas that will be acquired. This usually involves the use of wooden stakes with flagging located along the proposed ROW breaks. The PM should coordinate this effort with the District survey crew or consultant (if applicable) and schedule a time for staking out the ROW.

5. Right of Way Revisions

During the ROW process, ROW plans will be modified or revised. ROW plan modifications could result from refinement of the design as the final plans are further developed or from agreed-upon changes requested by a property owner during negotiations. . The ROW Agent submits requested plan changes to the PM, who then reviews and approves/disapproves them.

Once approved, the PM must ensure that:

- All ROW plan revisions are distributed to the District ROW Office,
- Updated ROW plans and deed descriptions are in the appropriate folder,
- Central Office Division of ROW and Utilities is notified of the revisions via revision memo prepared by the PM, to the Director of ROW and Utilities.

The PM must coordinate ROW plan revisions with all subject-matter experts working on the project. For information on the ROW revision process, refer to the *Highway Design Guidance Manual* (**HD-1306**).

RED FLAG

Design changes made after the ROW process begins, depending upon the scope of the change, may require KYTC to restart the acquisition process for a parcel, including updated appraisals and review of appraisals. If changes are made outside the approved environmental footprint, a reevaluation of the environmental document may be necessary. Changes must be closely coordinated with district ROW Staff and, if necessary, the District Environmental Coordinator.

6. Communicating All Promises (CAP) Report

During ROW negotiations with property owners, KYTC may need to document commitments it makes during the process to ensure they are kept. Commitments can be recorded in a CAP Report. Once commitments have been discussed and approved by the PM, the PM enters them into the CAPS Report located in the project folder. Refer to the KYTC *Highway Design Manual* (**HD-203.4**) for detailed instructions on CAPs.

7. Project Managers Role During Condemnation Process

After reasonable attempts have been made to negotiate for a property without reaching

an agreement, the District ROW Supervisor submits the parcel for condemnation.

During the condemnation process, the PM may be asked to discuss the project and its impacts on the parcel in question with the KYTC-assigned attorney. If appropriate, this attorney may ask the PM to attend a meeting with the property owner to further explain the project impacts and better understand their concerns.

As during normal ROW negotiations, the PM may also be asked to review requested changes to ROW plans proposed by the property owner and their representative during the condemnation process. For further information, refer to the *Right of Way Manual* (**ROW-1001** and **ROW-1004**).

RED FLAG

Projects cannot be advertised for construction until right of entry has been secured for all ROW parcels on the project. Right of Way Clearance should be obtained 60 days before the proposed letting date. Once the row is clear, a Right of Way Certification can be submitted for signature. This certification is due at the time of final plan submittal, which is 45 days before the scheduled letting. PMs and ROW Supervisors should set a milestone date for ROW clearance 60-75 days prior to the proposed letting date.

8. Associated Articles

Highway Knowledge Portal Articles:

Right-of-Way Acquisition:
https://kp.uky.edu/knowledge-portal/articles/time-management-10-right-of-way-acquisition/

9. Reference Documentation

KYTC Design Manual:

KYTC Design Manual

KYTC Right of Way Guidance Manual:

KYTC ROW Manual

KYTC Manuals and Information:

Design Manual (HD-203, HD-203.3.10, HD-203.5, HD-203.6, HD-304, HD-600, HD-603, HD-700, HD-1300, HD-1401)

Right of Way Guidance Manual: ROW 403-3, ROW 403-4, ROW 805-6, ROW 807, ROW 1004, ROW 1201 – 1203

Definitions

Right of Way (ROW) –Property owned by KYTC in fee simple or as an easement interest, within

which a highway exists or is planned to be constructed. Examples of what this property can contain include, but are not limited to, the roadway, shoulders and curbing, sidewalks and shared use paths, drainage facilities, traffic control devices, rest areas and weight stations, fencing, and utilities. Right of Way can also include abandoned roadway and/or their supporting structures.

Consent and Release – An agreement between KYTC and property owner(s) that allows KYTC or contractors to enter onto property that is not owned or controlled by the KYTC in order to perform necessary work. All property owners (including tenants, if applicable) must sign the release form with others serving as witnesses to their signature to verify the signor understood what they were signing and voluntarily signed it. The Chief District Engineer approves these forms. A detailed description of the work is included along with the location.

Easement – An easement is an interest in land which permits the owner of the easement to use the land owned by another for a specific purpose or prohibits the owner of the land from doing something that would otherwise be lawful to do, (e.g. plant trees, build structures, etc.). Easements can be public or private. For these purposes an easement refers to a public easement. An easement can be either temporary or permanent. A temporary easement grants the right to use the property for a particular purpose, typically construction, and is extinguished once use of the property for construction (or other purpose) is completed. A permanent easement grants a perpetual legal right to use land owned by others for a specific use (e.g., drainage, utilities).

National Highway System (NHS) – A system of roads designated by the US Department of Transportation in cooperation with the states, local officials, and metropolitan planning organizations that includes the Interstate Highway System as well as other roads important to the nation's economy, defense, and mobility. Maps of the National Highway System in Kentucky can be found on the Division of Planning's website.

Communicating All Promises (CAP) – Promises and commitments made by KYTC during the project development process, e.g. right of way negotiation process outside of compensation for the value of the property being obtained. The Project Manager documents CAPs and includes a report of these in the project letting proposal. In the hierarchy of construction contract documents, the CAP report is the second highest in this order, ranking behind questions and answers from the Division of Construction Website and before Special Notes.

KYTC PROJECT MANAGEMENT AND INVOLVEMENT IN THE CONDEMNATION PROCESS

Image Source: KTC stock photo library

Project Management and Involvement in the Condemnation Process	Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1.0 Introduction	x	x	x	x
2.0 Project Manager's Role During the Condemnation Process	x	x	x	x
3.0 Preparing for Possible Litigation	x	x	x	x
4.0 Depositions	x	x	x	x
5.0 Handling Summons or Subpoena	x	x	x	x

1. Introduction

Once reasonable attempts to negotiate for a property have been exhausted, the Cabinet initiates a condemnation action. After verifying that reasonable measures were taken to settle with the property owner and that it is unlikely further negotiations would be productive, the District Right of Way (ROW) Supervisor sends a recommendation for condemnation to the Director of the Division of Right of Way and Utilities, who then submits a written request to the Office of Legal Services recommending a condemnation action be initiated. Under the best of circumstances this process can take between 99 and 106 days from case assignment to right of entry (ROE) . If a property owner decides to file a right to take challenge within the specified time period, this can delay a project's schedule and add additional time (months, or even years if there an appeal) to the condemnation process.

General condemnation process timelines can be found in the Project Manager's Boot Camp *Condemnation Timeline Handout* and *Right to Take Challenge Timeline Handout.* For strategies on mitigating right to take impacts on the time it takes to obtain right of entry, refer to KTC Report 1726 *Understanding and Efficiently Managing Right-to-Take Challenges in Kentucky*

SIDE NOTE:
Condemnation is also necessary whenever KYTC cannot establish the rightful ownership of a property or a partial property interest.

The Project Manager (PM) provides the District ROW Supervisor and KYTC attorney relevant plan sheets, right of way records, and property descriptions for any parcel recommended for condemnation. The PM may also be asked to assist in preparing mediation or trial exhibits that may be needed during legal proceedings. The project manager may also be asked to assist in identifying documents needed to respond to a discovery request from the property owner.

For detailed information on the condemnation process, refer to the HKP article *Condemnation*.

2. Project Manager's Role During the Condemnation Process

During the condemnation process, the PM may be asked to discuss the project and its impacts on the parcel in question with the KYTC-assigned attorney. If appropriate, this attorney may ask the PM to attend a meeting with the property owner to further explain the project impacts, better understand their concerns, and perhaps work out a solution that will help expedite resolving the case.

As during normal ROW negotiations, the PM may be asked to review requested changes to ROW plans proposed by the property owner and their representative during the condemnation process. For further information, refer to the *Right of Way Manual* (**ROW-1001** and **ROW-1004**).

3. Preparing for Possible Litigation

PMs must maintain clear and concise documentation, so they are prepared to explain a project and actions taken during the design process. They must take detailed minutes during the Preliminary and Final Inspections. Providing clear, detailed information in the Design Executive Summary is very important since it records decisions made on a project.

SIDE NOTE:
Where possible, use *liability neutral* language in project reports and documents. This means using words such as ***can***, ***should***, ***may***, ***consider***, and ***preferable*** instead of words that mandate actions like ***will***, ***shall***, ***must***, ***ensure***, and ***essential***.

In addition to taking detailed project meeting minutes, whenever a PM meets with a property owner(s), it is very beneficial to document and take minutes of these meetings. Minutes should describe when and where the meeting occurred, who attended, and what was discussed. It should never include opinions about either the property owner or their requests.

If the District Office has a District Attorney on staff, PMs should engage them early in

project development for advice when difficult issues arise related to condemnation. PMs are responsible for submitting all necessary design related information to the District Attorney for the condemnation action. If a District does not have an in-house attorney, the PM can ask the District ROW Supervisor to recommend a point of contact to discuss project-related concerns with and seek advice from.

4. Depositions

A deposition is a witness's sworn out-of-court testimony. It can be used to gather information as part of the discovery process. When giving a deposition, PMs should follow the tips below.

- Dress professionally.
- Do not try to win the case in the deposition.
- Maintain your composure.
- Listen carefully to the question and answer **only** the question asked.
- Answer questions honestly.
- Do not volunteer information. Keep your answers short. If a yes or no answer is requested, give a yes or no answer.
- Do not speculate.
- Pause and think before answering a question
- If you do not understand a question, ask the attorney to clarify the question
- If you do not know or cannot remember, do not hesitate to say *I do not know* or *I cannot remember*
- There is no such thing as *unofficial* or *off-the-record* communications
- Unless you are asked by the attorney representing the Cabinet to be an expert witness and offer opinions, you are a fact witness. Limit your testimony to facts.

5. Handling a Summons or Subpoena

Sometimes a KYTC employee might receive a summons or a subpoena because of a connection between the employee and a Cabinet project or some other work-related incident involving KYTC. Given the timelines involved, if an employee is served with a summons or subpoena, they must take it to their District legal office at the earliest possible opportunity.

6. Associated Articles

Highway Knowledge Portal Articles:

Right-of-Way Acquisition:

https://kp.uky.edu/knowledge-portal/articles/time-management-10-right-of-way-acquisition/

Condemnation:

https://kp.uky.edu/knowledge-portal/articles/time-management-11-condemnation/

7. Reference Documentation

KYTC Right of Way Guidance Manual: https://transportation.ky.gov/Organizational-Resources/Policy%20Manuals%20Library/RightOfWay.pdf

Project Manager's Boot Camp (Articles by Pam-Clay Young): How to Survive a Deposition, *Condemnation Timeline Handout* and *Right to Take Challenge Timeline Handout*

Understanding and Efficiently Managing Right-to-Take Challenges in Kentucky: Clay-Young, P., Waddle, S., Gibson, B., KTC Report 1726: *Understanding and Efficiently Managing Right-to-Take Challenges in Kentucky*

Definitions:

Condemnation: The process of exercising the right of eminent domain. It is the legal process necessary to take private property for public use, with payment made to compensate property owners.

Eminent Domain: The power of a governmental or other entity (e.g., railroads, utilities) to acquire private property for a public purpose.

Right of Entry (ROE): The legal right to take possession of real estate in a peaceable manner.

Right to Take Challenge: Within the allocated answer period, the property owner(s) challenge KYTC's right to take of the property needed for a project. The property owner(s) must prove fraud, bad faith, or abuse of discretion in order to prevail in a right to take challenge.

Deposition: Testimony made under oath and taken down in writing by an authorized officer of the court, typically in an out-of-court setting before trial.

Summons: A written statement that is delivered by the sheriff and used to give notice to the person that an action has been filed against him or her.

Subpoena: A written directive to appear at a certain time and place to provide testimony on a specified matter.

Project Management and Utility Coordination

Image Source: KTC stock photo library

Project Management And Utility Coordination	Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1.0 Introduction	x	x	x	x
2.0 Utility Coordination in Preliminary Design	x	x	x	x
3.0 Utility Coordination in Final Design	x	x	x	x
4.0 Utility Phase Funding and Estimates	x	x	x	x
5.0 Utility Agreements and Authorizations	x	x	x	x
6.0 Joint Utility Information Meeting	x	x	x	
7.0 Utility Relocation Plans and Cost Estimate	x	x	x	x
8.0 Utility Permits within KYTC ROW	x	x	x	x
9.0. Right of Way for Utilities (When Applicable)	x	x	x	
10.0 Utility Relocation Work	x	x	x	x

1. Introduction

A utility is a privately or publicly owned facility, or system that produces, transmits, or distributes commodities that directly or indirectly serve the public. Utility facilities, unlike most other fixed objects that may be located within the highway right of way (ROW) are not owned by KYTC. Nor are their operations directly controlled by state or local transportation agencies. As a consequence, agencies have developed policies and practices that govern when and how utility companies may use public highway ROW and the conditions under which public funds may be used to relocate utility facilities, prior to, or as part of road construction. For further information see UR-203.

Highway projects often impact utility facilities. Given the amount of time needed to relocate affected

facilities or redesign plans to avoid impacting facilities, utility coordination must begin early in project development. The Utilities and Rail Branch administers KYTC's utility relocation function and supports District Utility Supervisors (DUS) and their staff statewide. Project Managers (PMs) need to coordinate with a DUS and provide them information on the project corridor. With this information in hand, the DUS can contact utility companies to determine if they have facilities on the corridor.

Utility companies that need to relocate facilities must provide KYTC with relocation plans developed either in-house or by an approved consulting firm. Companies have two options — relocate facilities themselves and/or their contractor, or include their relocation plans in KYTC's construction plans so the roadway contractor can relocate facilities. For a full explanation of this process, refer to the Utility & Rails Guidance Manual.

During project development the DUS, working with the PM and design staff, should:

- Identify, verify, and locate the known facilities within the project limits.
- Provide up-to-date roadway plans to the impacted utility companies.
- Identify and verify utility conflicts.
- Determine, if possible, whether the project design can avoid any of the conflicts.
- Estimate of the cost and time frame to relocate facilities.
- Work with impacted utility companies to facilitate timely solutions and the development of utility relocation plans. Preferably, these plans should be included in the Final Project Plans so the roadway contractor can relocate these facilities in coordination with their construction phasing.

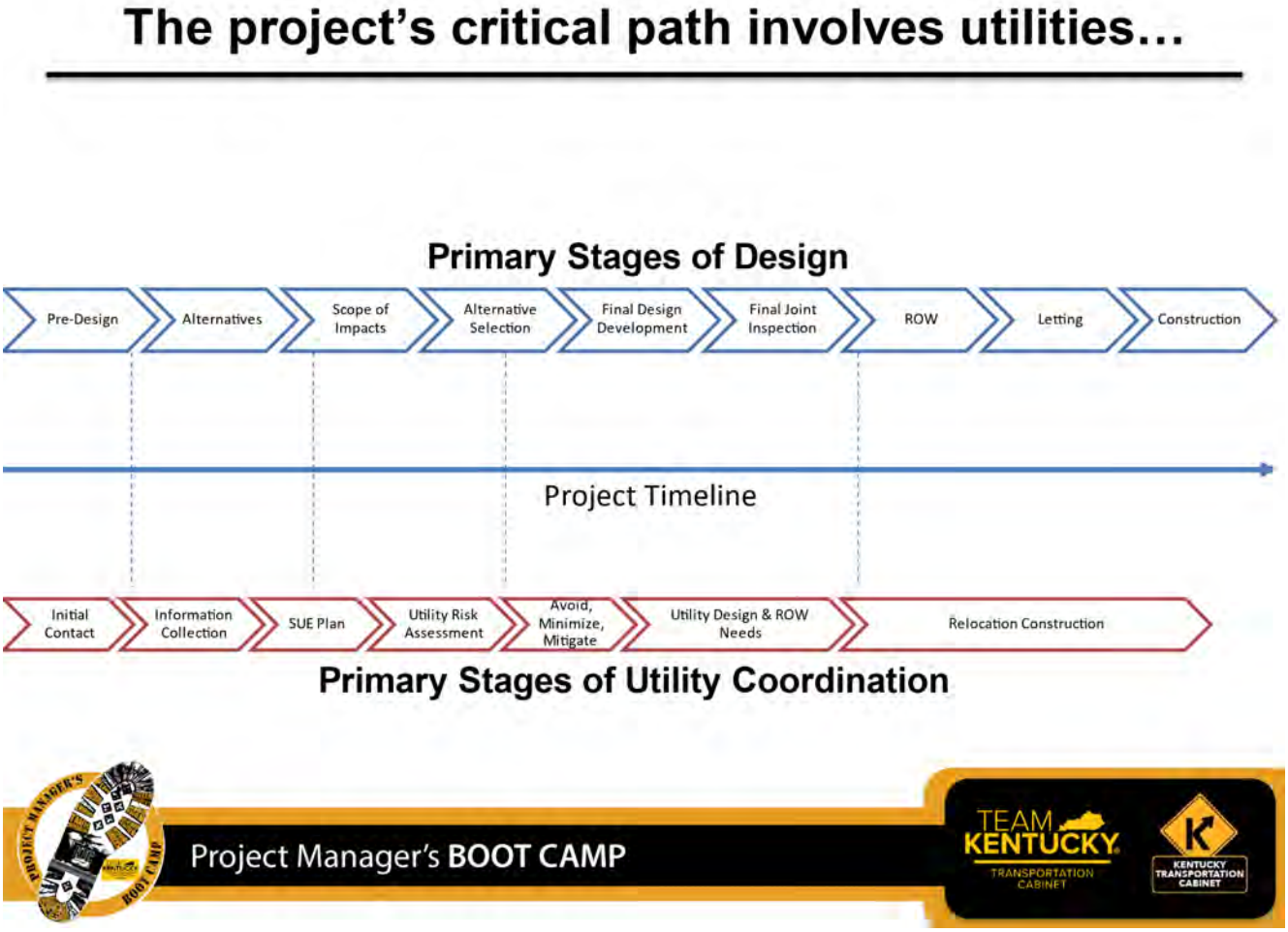


Image Source: 2023 PMBC- Utilities Presentation-McCleve

SIDE NOTE

To avoid delays in developing utility relocation plans, a PM must provide the DUS with the most up-to-date plans (DGN files) that capture any changes that could affect relocations. The DUS forwards these plans to utility companies for use by their design staff.

2. Utility Coordination in Preliminary Design

PMs must begin coordinating with the DUS early in project development. Once the project scope is developed, the PM should discuss the project corridor with the DUS and have them reach out to local utility companies to see if they have existing or proposed facilities within the corridor. If utility companies have facilities in the project area, often they can provide KYTC with facility maps that show basic utility type and location information. If available, the DUS should provide utility as-built information to the PM.

During an initial project survey, KYTC must attempt to locate every aboveground and any indicators of underground facilities along the project corridor. The quality level of utility facility location work refers to the degree of accuracy achieved when mapping the horizontal and vertical position of facilities. Table 1 summarizes the attributes of each quality level. Quality level should be chosen based on the potential for conflict and stage of project development.

Table 1 Description of Utility Surveying Quality Levels

Quality Level	Application	Description of Work
QL D	• Aboveground Location • Initial Location of Belowground Facilities	• Review records or verbal recollections.
QL C	• Aboveground Location • Initial Location of Belowground Facilities	• Survey and plot visible aboveground features. Professional judgement is used to correlate this information with QL D information.
QL B	• Belowground Location	• Surface geophysical methods used to identify the approximate horizontal location of subsurface facilities.
QL A	• Belowground Location	• Precise horizontal and vertical positions of subsurface facilities obtained through excavation.

If KYTC uses a consultant, the PM must specify in the advertisement for consultant services the required quality level of location work at different stages of project development. HD-304 contains more detailed information on utility locations practices.

Prior to the Preliminary Line and Grade Inspection (PL&G), the PM submits plans to the DUS for evaluation. The DUS prepares preliminary cost estimates for alignments that will be evaluated at the PL&G based on their potential impacts to utility facilities. The DUS should also discuss the estimated time frame for any relocations to be completed. These estimates along with other cost and schedule estimates are used to determine the preferred alignment to carry into the final design.

SIDE NOTE

When selecting an alternative, the Project Development Team (PDT) should have good knowledge of facility features and locations, relocation costs, responsibilities, schedules, and potential easement needs. Data on these elements should be collected before the PL&G so the design team can make informed project decisions and avoid relocations when possible.

The best way to ensure facility location data are accurate is to work closely with utility companies from a project's outset. The PL&G occurs when design plans are 30 – 40% complete, so communication and coordination with utility companies must begin as early as possible. Early interactions between the design team and utility companies is a best practice.

3. Utility Coordination in Final Design

As details of the chosen alignment are refined during project development, the PDT gains a better understanding of the design's potential impacts on utility facilities. At this stage, the PDT may need to further investigate facilities that could conflict with the proposed roadway, including temporary maintenance of traffic, (e.g., detours, temporary widening). A higher quality level survey may be needed to locate and document conflicts and determine if a facility can be avoided or impacts to it minimized.

If many utility facilities are on or near the proposed alignment, determining the accurate horizontal and vertical locations of one or more underground facilities may be necessary. Subsurface Utility Engineering (SUE) is used to obtain this information. A QL A survey is used to help the PDT more accurately assess impacts and determine if a facility can be avoided, whether impacts can be minimized, or if relocation is necessary. PMs, based on feedback from the PDT, specify where SUE work is to be conducted.

To schedule SUE work, a PM and/or DUS should contact the Statewide Survey Coordinator in the Division of Highway Design. For more information on SUE, refer to HD-304.

Prior to the Final Inspection, the PM sends more detailed plans to the DUS for distribution to impacted utility companies. Based on the refined information in these plans and coordination with the affected utility companies, the DUS provides an estimated cost and schedule for utility relocations to the PM for discussion at the PL&G. The updated Utility phase (U phase) cost is used to update the project budget.

SIDE NOTE:

Where feasible, the Utilities and Rails Branch encourages the selection of alignments that avoid utility facilities. Branch staff help PDTs identify these alignments by providing relevant information, reviews, and subject-matter expertise. If impacts are unavoidable, Utilities Staff will work to relocate facilities in an orderly and fiscally responsible manner. The process requires early and continuous communication between the stakeholders listed below to accurately identify and resolve issues with impacted facilities:

- DUS and their staff
- Central Office Utilities and Rail Branch
- PM
- Impacted utility owners

During all stages of project development, utility companies — working through the DUS — should be an integral part of the design process. They should be invited to key meetings so they can be advised of and consulted about impacts to their facilities.

Utility Conflict Mitigation

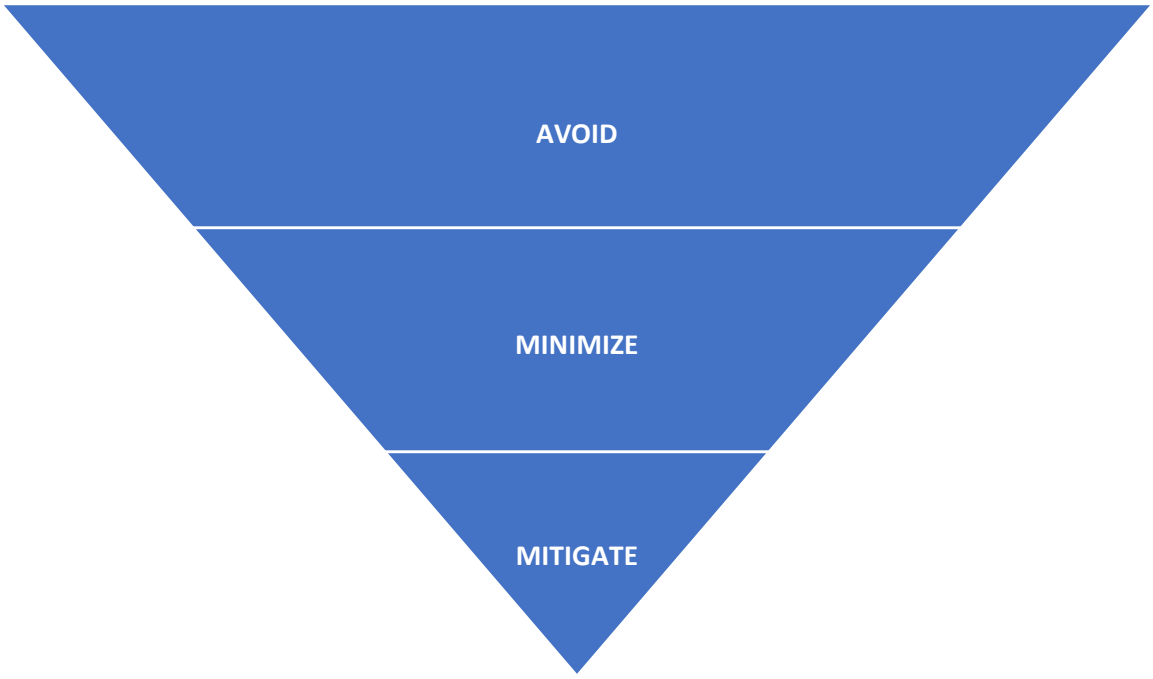


Image Source: 2023 PMBC- Utilities Presentation-McCleve

RED FLAG:

During utility coordination, the PM's goal must be to minimize the number of utility conflicts while considering the project scope, schedule, and budget. While avoiding utility conflicts is a goal throughout project development, avoidance should not compromise a project's functionality or safety.

4. Utility Phase Funding and Estimates

U phase funds are budgeted to cover expenses associated with utility relocations. These costs are updated at several project development milestones. During different project development phases, the DUS prepares utility cost estimates, ranging from Class E through Class A estimates (Table 2).

Table 2 Description of Cost Estimates

Class E Estimate	• Used to determine the economic feasibility of alternative route locations. Requires a field visit to project and makes assumptions about utilities involved. Estimate developed by counting utility poles and estimating the location of underground utilities by observing the placement of water meters, fire hydrants, gas meters, and other relevant features.
Class D Estimate	• Provides sufficient detail to help identify a preferred alternative. The PM provides the DUC with topographic maps, aerial photographs, or preliminary project plans/manuscript indicating alternative alignments.
Class C Estimate	• Estimate based on PL&G Plans.

Class B Estimate	• Estimate based on Final Line and Grade Plans.
Class A Estimate	• Estimate based on the final ROW plans submitted to utility companies.

U phase estimates and funding requests are generated, recorded, and submitted through the Kentucky Utility and Rail Tracking System (KURTS). KURTS contains actively updated U phase line items for each of the Cabinet's 12 Districts. For more information on Utility Estimates refer to UR-602 and the Highway Knowledge Portal Article Utility Engineering And Coordination.

5. Utility Agreements and Authorizations

Typically, once the DUS secures appropriate U phase funding, they issue a *project authorization letter*. This letter allows affected utility companies to begin preliminary engineering services and serves as KYTC's legal authorization for relocation planning to begin. The date of the letter is the start date for all associated utility relocation agreements. Start dates for agreements made under the auspices of the project must be the same as the *project authorization letter's* start date.

Utility engineering work may be initiated prior to the authorization of U phase funding. Situations in which KYTC encourages early initiation include:

- Extensive utility work is needed to finish the project and cannot be completed without early utility engineering.
- The project schedule cannot be maintained without early utility engineering, and the letting date must be maintained.
- The project includes complex utility relocations that require more extensive and time-consuming coordination.
- KYTC ROW staff need to acquire utility easements, and preliminary engineering is required to identify the easement.

In these scenarios, the Cabinet may apply Design phase (D phase) funding to preliminary utility engineering services. These services must be approved by the Project Development Branch Manager (PDBM). Once approved, the PM submits a funding request through their Central Office liaison to the Division of Program Management, based on the DUC's cost estimates. If this information is available before submission of the final design funding request, it can be added to that submittal. Refer to UR-604 for more information.

SIDE NOTE:

Project authorization letters authorize utility companies to initiate preliminary engineering with utility company personnel only. Utility companies may retain consultant engineers for engineering services if the utility company is not adequately staffed to perform engineering. If a utility company needs to enlist the services of a consultant engineer, it must submit a written request to the Cabinet. UR-901 outlines steps that utility companies must take to obtain KYTC's approval.

The engineering service contract (ESC) is a document binding the utility company and its consultant. The Cabinet must act as an interested party to the ESC if it will compensate the utility company for all or part of the contract engineering costs.

6. Joint Utility Information Meeting

Led by the DUS, the Joint Utility Information Meeting (JUM) is the first official meeting between potentially affected utility companies and District utility staff. Attendees also include the PM and other KYTC staff. Decisions about which Cabinet staff to invite are made based on project-specific issues that require subject-matter expertise. The JUM is typically scheduled after U phase funding is authorized (which occurs at the same time or shortly after ROW authorization), when plans are more fully developed. The DUS is responsible for inviting all potentially affected utility companies to the meeting. These companies are recorded on the project utility contact list in KURTS.

If utility companies have not received the most recent roadway plans, KYTC distributes them at the JUM (electronic and/or hard copies). Utility companies use these plans to begin facility relocation designs.

The JUM provides an opportunity to:

- Validate the location of existing facilities shown on plans
- Discuss potential proposed utility projects
- Identify where facilities conflict with the highway design
- Define possible relocations to address conflicts and easement needs for the relocations
- Examine potential resolutions with all involved utility companies to identify and reconcile conflicts between relocation plans
- Plan utility design and relocation schedules
- Identify reimbursable and non-reimbursable utility work
- Identify betterments planned for compensable utility facilities
- Review the project schedule (including anticipated letting date)
- Look for minor highway redesign measures that could minimize facility relocations while still meeting project purpose and need
- Identify utility data needs that can be easily addressed with SUE or surveying
- Identify staking needs required by utility companies
- Discuss appropriate erosion prevention and sediment control measures
- Discuss KYTC permitting and traffic control requirements
- Consider utility relocation work that should or can be included in the roadway construction bid package

For detailed information on the JUM, refer to UR-801.

SIDE NOTE:

The PM and a representative of the highway design consultant (if applicable) should attend the JUM so they can address questions and concerns utility companies raise about the alignment design and details. By attending, PMs better understand the concerns of utility companies. The PM and/or DUS should also invite SME's and CO Liaisons to also attend to gain a better understanding of the utility relocation work involved.

7. Utility Relocation Plans and Cost Estimate

Utility relocation plans document work necessary to clear impacted facilities from a project's construction areas in a manner that ensures facilities function in a like manner after relocation work is completed. The DUS and their staff must review all utility company submissions to ensure proposed relocation work is necessary, appropriate, and both physically and fiscally viable.

Utility company relocation plans must include:

- Facilities to be removed, materials to be installed, materials to be transferred, and items that will be left in place.
- Pertinent specifications and standard drawings.
- Total project cost estimate, which must be itemized and divided into engineering, administrative, and construction costs (if applicable).
- Reasonable schedule of consecutive days for completing the relocation that KYTC has agreed to.
- Explanation of any coordination required with the roadway contractor during construction. For example, utility installation to begin after tree clearing or roadway earthwork is completed in an area.
- KYTC's requested level of cost participation in the form of a percentage compensable, to be justified in writing (UR-1004).
- Engineering service contract package (if applicable and executed as described in UR-901).
- Special requests related to project development or execution; these must be submitted in writing.

For additional information on utility company relocation plan submissions and content refer to UR-1001 and UR-1002.

In addition to utility relocation plans, compensable utility companies must submit a cost estimate for compensable work necessary to clear their facilities. The estimate should include:

- Plan development costs
- Construction costs
- Construction management costs

For details on utility cost estimates, see UR-1003. For more information on compensable utility work, see UR-1102-1. Utility companies can upload relocation plans and estimates to KURTS or mail hard copies to the DUS.

8. Utility Permits within KYTC Right of Way

Any utility company that wants to perform work or conduct any activity on state ROW must obtain an encroachment permit through the District Permits Office, which is located in the Traffic Engineering and Permits Section. Utility relocation projects must comply with KYTC's utility accommodation policy (UR-

400) and (UR-401-1).

9. Right of Way for Utilities (when applicable)

Some facility relocations require property acquisition. Property may be acquired to replace existing utility easements and is authorized under an easement agreement (UR-1104-8). Utility companies typically contact and negotiate directly with property owners along the project corridor on easement locations/widths for their facilities. This typically takes place after KYTC has negotiated for and acquired necessary ROW.

To expedite relocations, KYTC may benefit from acquiring easements needed for utility relocations. This could be accomplished at the same time property negotiations and acquisitions occur. Since KYTC has the resources to acquire easements needed for utility relocation, this would eliminate some of the hurdles that create delays for projects. Communication and coordination between the PM, District ROW personnel, and Utilities staff are essential during this process.

10. Utility Relocation Work

Image Source: KTC stock photo library

Once a compensable utility enters into an agreement with KYTC, utility relocation work can be accomplished by one of the following options:

1) Facilities that conflict with highway construction are removed and relocated independently of

the KYTC project. The affected utility company is responsible for relocation work. Sometimes conditions prevent the completion of facility relocation until after roadway construction begins. In these cases, the facility is partially relocated prior to construction, with outstanding work finished after construction is underway. When this occurs, roadway contractors may have to delay work in areas where facilities are being relocated. The locations of facilities that are not completely relocated should be specified by utility and location (Station to Station) in the Utility Impact Notes. For information on utility impact notes refer to UR-1601.

SIDE NOTE:

In some situations where there are a lot of utilities to be relocated and the project schedule is accelerated, upon approval from the SHE's Office, the PM and DUS may decide that it would be beneficial to the construction schedule to allow the roadway contractor to coordinate the utility relocations with the utility company contractors. If this is the case, this should be specified in the contract plans and specifications.

Or

2) The utility facility is included in the final roadway contract.

Including utility relocation plans in the final roadway contract and having the roadway contractor perform relocation work yield significant benefits. It lets the contractor prioritize areas in which to begin relocation work in way that better aligns with roadway construction phases of work. This approach can reduce project risk because the contractor does not have to wait for a utility company to relocate facilities before work can begin on the roadway project. Also, if unexpected utility/design conflicts emerge during construction, the roadway/utility (sub) contractor is better prepared to address the conflict rather than having the utility company and/or their contractors re-mobilize to address the conflict.

If one or more of its facilities will be included in the highway contract, the utility company must submit the following information to KYTC:

- Utility Relocation Plans
- Utility Specifications
- Final Construction Cost Estimate for the relocation

For more information refer to UR-1701.

SIDE NOTE:

Most utility relocation work incorporated into the highway contract is for relocation or adjustment of underground utility facilities.

11. Associated Articles

Highway Knowledge Portal Article: Utility Engineering and Coordination

12. Reference Documentation

KYTC *Utilities and Rails Guidance Manual*: Utilities and Rails Guidance Manual

***KYTC Design Guidance Manual*: Design Guidance Manual**

KTC Research Report *Integration of Utility Engineering, Coordination, and Highway Design*:

KTC-21-17/SPR20-581-1F

KYTC Manuals and Information:

Design Manual: HD-203.7.3, HD-204.18, HD-304

Utilities and Rails Guidance Manual: UR-203, UR-400, UR-401-1, UR 602, UR-604, UR-801 thru UR-804, UR-901, UR-1001 thru UR-1004, UR-1102-1, UR-1104-8, UR-1701

Glossary

Subsurface Utility Engineering (SUE): SUE is an engineering practice that has evolved considerably over the past few decades. The SUE process combines civil engineering, surveying, and geophysics to locate underground utilities both horizontally and vertically. It utilizes several technologies, including vacuum excavation and surface geophysics (e.g., ground penetrating radar).

Compensable Utility: Per KRS 177.035, KYTC may compensate certain utility companies for relocating their facilities as needed to complete a road project. This includes relocations of utility facilities owned by publicly held companies and, in certain instances, facilities owned by privately held companies. A publicly held utility may be a municipally owned utility, water district, water association, sewer district, or local school district. In instances where a private utility is being considered for full reimbursement under KRS 177.035(3) – (5), there must be a significant and ascertainable benefit to the project.

Utility Impact Notes: Notes provided by the District Utility Supervisor (DUS) and included in every set of construction bid documents. They communicate the presence, location, and relocation status of utilities. Construction personnel use the notes to help plan the project execution and phases.

PROJECT MANAGEMENT AND RAILROAD COORDINATION

Image Source: Microsoft Word stock photo.

Project Management and Railroad Coordination	Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1.0 Internal KYTC Review and Coordination	x	x	x	x
2.0 External Review Between Railroad and KYTC	x	x	x	x
3.0 Railroad Estimate	x	x	x	x
4.0 Railroad Agreement	x	x	x	
5.0 Prepare Parcel Easement Offer	x	x	x	X
6. Review of Offer	x		x	
7. Negotiations/Acceptance	x	x	x	X
8. Railroad Safety Program		x		X

1. Internal KYTC Review and Coordination

If railroad involvement is anticipated, throughout project development the Project Manager (PM) and Central Office (CO) Rails staff should communicate about project status and rail accommodations. When a KYTC project adjoins or impacts a railroad facility, the railroad company that owns the facility becomes an active partner in project development and delivery.

A common scenario that involves railroad coordination is the replacement of a bridge over a railroad track(s). When this situation arises, KYTC must determine if the railroad company plans future expansion by adding tracks within the project limits (i.e., under a bridge) before it begins structural design work for the project. This lets KYTC account for extra width when designing the new structure span.

The railroad company involved in a project provides flagging services (see Section 3 below for additional information). Contractors must coordinate with the railroad company on times when these services are needed. Any work to be performed by the contractor which requires flagging service must be deferred until the flagging protection required by the railroad company is available at the job site.

The CO Railroad Coordination Program is housed within the Division of Right of Way and Utilities. It serves as a single point of contact for coordinating efforts between the Cabinet and the affected railroad company. Following this review, the CO Rail Coordinator prepares a submittal package, with assistance from the PM. The submittal package includes all relevant project details and is sent to the railroad company. This typically includes a submittal letter, plan and profile sheets in the areas that impact the railroad facility, details for any proposed structures over the railroad tracks (including horizontal and vertical clearances), along with existing and proposed right-of-way information. For more information about plan development with railroad involvement refer to the *KYTC Design Manual* **(** HD-1401), *Design Manual Exhibits* Exhibit 1400-01, Exhibit 1400-02 and Exhibit 1400-03 and the *Utilities and Rails Guidance Manual* **(** UR-2001)

The *Highway Design Guidance Manual* (HD-1400) lists formatting requirements for railroad plan notation details, including horizontal and vertical clearance and railroad stationing. The KYTC Division of Right of Way and Utilities Railroad Programs website contains special notes and forms that are used when a railroad is involved.

The PM may also want to review documents specific to railroad company criteria (e.g., the railroad's Public Projects Manual). The CO Rail Coordinator assists the PM as railroad plan notation details are prepared.

SIDE NOTE: Once the PM knows a railroad may be involved on a project, they should note it on the programming documentation. They should add *Railroad Involvement* in the appropriate location of the project description.

SIDE NOTE: In a project's early stages, the PM may want to refer to the Division of Planning's *Railroads* website. A lot of information on railroad companies operating in Kentucky is housed here, including links to maps showing freight and passenger railroads in Kentucky as well as the *Kentucky Statewide Rail Plan*.

SIDE NOTE: All land parcels within the railroad company's right of way (ROW) needed for highway construction must be taken as either a permanent or temporary easement. A permanent easement should be used when a proposed structure goes over or underneath a railroad. This allows KYTC to maintain the structure following project completion.

2. External Review Between Railroad and KYTC

The CO Rail Coordinator routinely informs railroad companies of planned highway construction projects that may impact their facilities. However, these companies do not formally start preliminary engineering work until they receive a project-specific submittal package.

The CO Rail Coordinator submits a formal correspondence package to a rail company following the authorization of Utility Phase funding (which is comparable to how state letters are submitted to utility companies). If the project will benefit from early railroad coordination, the Cabinet may use Design Funds for this purpose. Railroad companies use the submittal package to develop cost estimates for preliminary engineering, final engineering, administration, construction management, flagging, and other project-specific costs.

The PM should expect to go through multiple rounds of questions and revisions before a railroad company formally accepts roadway plan details. This process can affect every facet of project development, including structure design (substructure and superstructure), drainage design, and construction sequencing. CO Rails staff convey all railroad company comments to the PM. The PM responds to comments by either revising plans or supplying information that clarifies the plans or design. The PM returns revised plans or supplemental information to the CO Rail Coordinator, who then submits them to the rail company. The review cycle continues until the railroad company approves project plans.

Image Source: https://transportation.ky.gov/MultimodalFreight/Pages/Railroads.aspx (Amtrack)

3. Railroad Estimate

The CO Rail Coordinator, in communication with the PM, reviews railroad company estimates for project-related railroad expenses, including costs for flagging services. If flagging services are needed during construction, the PM assesses the estimated duration (and schedule) of work that will directly impact or occur in close proximity to rail facilities. Coordinating with railroad company requirements, the PM may need to include railroad flagging as a quantified bid item in the project's final construction estimate.

4. Railroad Agreement

Formal agreements between KYTC and impacted railroads are similar to utility agreements. But often, a railroad agreement is executed as an addendum to the standing term agreement between the Cabinet and a railroad company. This addendum is called a *Rail Coordination Project Agreement Addendum*. The addendum's purpose is to include all project-specific details because the term *agreement* includes only static details. When KYTC and a railroad company do not have a term agreement, an Individual Project Agreement (IPA) is used. Typically, per KRS 277.065, railroad companies can contribute up to 10% of the total cost of the project.

Irrespective of the option used, the agreement includes plan details and cost estimates that have undergone multiple revisions and reviews throughout project development. Projects cannot be awarded until a railroad agreement is in place.

5. Prepare Parcel Easement Offer

Once the railroad agreement is executed, KYTC District ROW staff prepare the parcel easement offer, which must adhere to the railroad company's formatting requirements. Design and ROW subject-matter experts on the project team coordinate to develop this offer. They receive advisory assistance from CO Rails staff.

6. Review of Offer

Railroad companies can spend a significant amount of time reviewing KYTC's easement offer. Prolonged reviews may impact the project schedule. CO Rails staff familiar with railroad review requirements assist the project development team during the iterative review process.

7. Negotiations/Acceptance

Easement negotiations follow a review cycle similar to the plan review process. Unfortunately, railroad companies do not always consult Rails Right of Way staff during earlier plan reviews. In response to questions or requests submitted by railroad company personnel, the PM and the CO Rail Coordinator revise plans or provide clarification until KYTC's offer is accepted.

RED FLAG

District ROW staff need to prepare the parcel easement offer as soon as practical so it can be reviewed at the same time as the plan. The ROW offer may be fully reviewed and negotiated before the railroad agreement is executed. If this occurs, the ROW offer cannot proceed further until the agreement is executed. The offer resumes where it left off and is executed immediately after the railroad agreement is implemented.

Image Source: KYTC, https://transportation.ky.gov/HighwaySafety/Pages/RailCrossingSafety.aspx

8. Railroad Safety Program

CO Rails staff maintain a statewide inventory of at-grade railroad crossings on public roads. Rail Coordinators, who facilitate the programming of funds for crossing improvements, use this information to prioritize crossings based on safety needs. They also oversee the execution of safety projects. During this process, the PM may ask District Design staff to submit plans for these improvements. The District Surveyor may also be asked to survey the improvement area. See the *Utilities and Rails Guidance Manual* (UR-2100) for more information.

SIDE NOTE: A project may include bicycle/pedestrian pathways that need to cross a railroad facility. Typically, an at-grade crossing needs to stay within the existing highway crossing easement if one exists. For new crossings, railroad companies prefer the use of grade-separated pathways. Once it is determined by the PM and Project Develop Team that a bicycle/pedestrian facility should traverse a railroad, the PM must inform the CO Rail Coordinator. The CO Rail Coordinator initiates discussions with the affected railroad company to discuss and determine available options.

At-grade crossings within an existing highway easement must have appropriate signs and warning systems as specified by KYTC requirements. These devices must be accounted for when designing the at-grade crossing.

9. Associated Articles

Highway Knowledge Portal Articles:

Railroad Coordination:
https://kp.uky.edu/knowledge-portal/articles/time-management-16-railroad-coordination/

10. Reference Documentation

KYTC Highway Design Guidance Manual

KYTC Utilities and Rail Guidance Manual

11. Glossary

Flagging Services: The railroad typically assigns one flag-person to a project. These services are typically needed whenever the KYTC contractor is working on, across, over or under the Railroad rights of way. The flag-person has a very important role of ensuring the safety of railway employees and KYTC contractors working on or near the track. They direct or restrict the movement of trains through the working limits and/or control the work of contractors during the planned work. The Railroad Company has sole authority to determine the need for flagging required to protect its operation.

Railroad Term Agreement: Instead of executing an agreement for each project, the KYTC employs one term agreement with each of the major railroads. The purpose of the term agreement is to minimize the time required to negotiate and formally agree to terms between KYTC and the railroad company for highway project execution.

Managing Project Risks	Transportation Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1. Introduction	x	x	x	x
2. Steps of Project Risk Management	x	x	x	x
2.1 Identifying Risk	x	x	x	x
2.2 Analyzing Risk	x	x	x	x
2.3 Prioritizing Risk	x	x	x	x
2.4 Assign Ownership	x	x	x	x
2.5 Risk Response	x	x	x	x
2.6 Monitoring and Control	x	x	x	x
3. Risk Management Tools	x	x	x	x
x = Information from the topic may be applicable for the project classification.				

Image Source: PM Bootcamp Day 4 presentation: Project Risk and Change Management.

Project Risk – An uncertain event or condition that could arise and change the outcome of a project, for better or for worse. It may be a positive or negative effect on the objectives of the planned work (Project Management Institute, 2004).

1. Introduction

The one constant in transportation project management is risk. Risks are uncertain positive or negative events that can affect project delivery. While risks may never materialize, project managers (PMs) and project development teams (PDTs) need a good understanding of what risks could impact different facets of project work and their effects on project delivery. Project risks can affect quality (e.g., of solutions or deliverables), schedules, and/or budgets. Risks that produce negative outcomes can lead to a project's failure if they are not managed properly. Typically, risks are greater at the beginning of a project because there are more unknowns. As the project progresses, the accuracy of the budget, scope, and schedule increases, which in turn lowers risk (Figure 1).

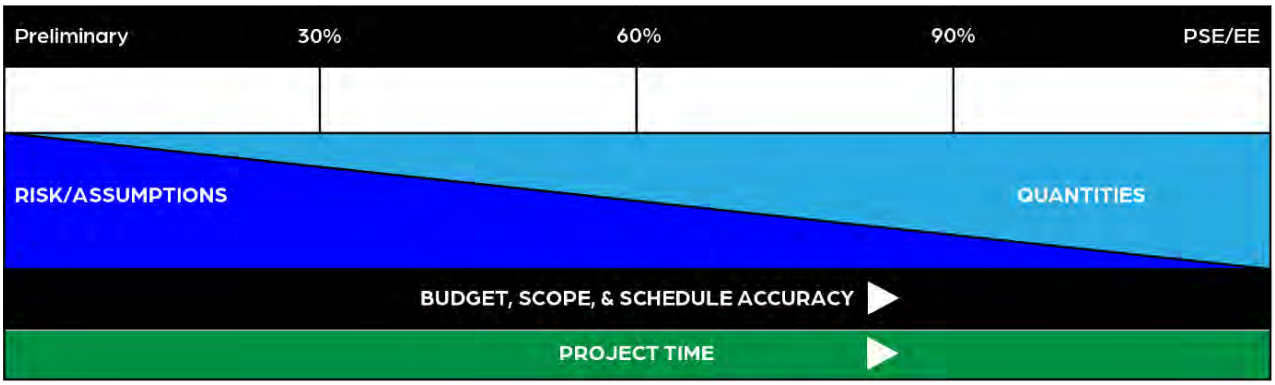


Figure 1 Relationship Between Risk; Accuracy of Budget, Scope, and Schedule; and the Project Timeline (Source: KTC)

The goal of risk management is to deliver a successful project. Even though KYTC does not have a formalized risk management process, the benefits of risk management far exceed the resources needed to identify and manage risk. All projects can benefit from sound risk management.

To get the most out of risk management processes, PMs and PDTs need to remain focused on project objectives related to scope, schedule, cost, and quality. PMs and PDTs should tailor risk management strategies to project complexity and budget. Complex projects with larger budgets may need more formalized risk planning and documentation.

This article reviews the tools and procedures PDTs can leverage to minimize project risk. For additional information on the systematic evaluation of risk and strategies for eliminating, minimizing, or mitigating the impacts of risks, consult Waddle et al.'s (2022) report *Risk-Based Project Development*. This report also contains practical knowledge and tools for implementing risk-based project development.

2. Steps of Project Risk Management

PMs can adopt an ongoing risk management process to identify, understand, and respond to negative risks (i.e., threats) and positive risks (i.e., opportunities). Before implementing this process, however, it is important to fully understand KYTC's practices and how risk management will be conducted for a project. A risk management plan typically has the following steps:

- **Identify** risks that could potentially impact the project.

- **Analyze** each risk to understand contributing factors and potential impacts. Consider the breadth and depth of each threat at this stage to evaluate the severity of each risk in the context of the overall project.
- **Prioritize** project risks according to urgency, probability, and the severity of their impact(s).
- **Assign Risk Oversight** for each identified risk to a PDT member. They will be responsible for addressing that threat or opportunity.
- **Respond** to risks to prevent them or minimize and mitigate their impacts.
- **Monitor** project risks.

Image Source: KTC

2.1 Identifying Risk

PMs and PDTs need to identify both positive and negative risks. Risks are often perceived as negative or threats (e.g., delay in permit approval), but there are also positive risks or opportunities (e.g., benefiting from a policy change or becoming more efficient with a new technology).

One way to get a handle on how risk is distributed throughout project development is to break down the project development process into small pieces (or activities) and identify the risks associated with each. PMs should ask all PDT members who have expertise in each of these activities to estimate the likelihood of individual risk materializing and the potential negative (or positive) consequences. A good starting point is identifying risks that impacted previous projects which had a similar scope.

PDTs need to document risks that could impact the project scope, budget, schedule, quality, and/or commitments. Information collected for each risk may include:

- Characteristics
- Potential impacts on scope, cost, schedule, quality, and/or commitments
- Risk triggers

KYTC often uses the term *Red Flags* to indicate a potential risk. Red Flags do not necessarily identify locations that must be avoided. Rather, they are locations that entail additional study, coordination, design, right of way, utility relocation, or construction costs. Locations that must be avoided are referred to as *fatal flaws*. The PM should consult with appropriate subject-matter experts (SMEs) to determine the level of concern for each Red Flag item. Environmental Red Flags and design challenges are often identified in planning and Data Needs Analysis (DNA) studies.

Image Source: PM Bootcamp Day 4 presentation: Project Risk and Change Management.

Appendix 2a of Waddle et al.'s (2022) *Risk-Based Project Development* lists risks that could affect road projects and what areas they can impact (e.g., scope, cost, schedule, quality).

2.2 Analyzing Risk

During risk analysis PMs and PDTs use data on risk probabilities and consequences to determine how risk could influence budgets and schedules. Qualitative risk analysis is reserved for less expensive, less complex projects or to perform an initial screening on projects that would benefit from an in-depth quantitative analysis later in the development process. Beyond analyzing risks individually, PDTs need to consider how risks relate to one another and how individual risks can offset or increase one another's impacts. Table 1 lists common risk assessment methods.

Table 1 Risk Assessment Methods for Road Projects

Qualitative and Quantitative Methods	
Qualitative	**Quantitative**
• Brainstorming and project team meetings • Use of simple scales (e.g., 1 – 5; Low, Medium, High) to rate risk probability and impacts • Development of risk matrices to characterize outcomes	• Interviews and SME input • Cost Risk Assessment and Cost Estimate Validation workshops • Monte Carlo simulations o Probabilistic calculations that use random numbers to draw samples from probability distributions • Probability trees and decision trees o Diagrams that show the effects of a sequence of multiple events • Tornado diagrams, o Graphical tools that depict the sensitivity to risk to changes in variables

Source: Molenaar et al. (2006)

Documenting risk information in a matrix can help PMs prioritize risks and create a risk management plan that allocates the correct resources and includes appropriate strategies to properly mitigate risks.

2.3 Prioritizing Risk

Based on qualitative and/or quantitative analysis, PMs should develop lists that prioritize each risk. If qualitative risk matrices are used, priorities can be assigned based on where risks are located in a matrix (Figure 2). Risks are often prioritized in order of importance by focusing on:

- Risks that would have the greatest impact on the project
- Risks that have a higher likelihood of occurring

		LIKELIHOOD				
		1 Rare	2 Unlikely	3 Possible	4 Likely	5 Almost Certain
CONSEQUENCES	5 CATASTROPHIC	5	10	15	20	25
	4 MAJOR	4	8	12	16	20
	3 MODERATE	3	6	9	12	15
	2 MINOR	2	4	6	8	10
	1 NEGLIGIBLE	1	2	3	4	5
RISK=		Low	Moderate	High	Extreme	

Figure 2 Sample Risk Matrix

PMs and PDTs should be attentive to risk sequencing (i.e., upstream and downstream effects of risk on project development), risk interdependencies (e.g., if one risk materializes does it make other risks more or less likely to occur), and overall impacts (Waddle et al. 2022).

Attempting to avoid all or most risks raises project costs and typically extends delivery timelines. A key part of project risk management is identifying which risks to focus on. Trying to perfect projects or plan sets raises costs and draws out schedules. Attaining perfection is impossible. As such, PMs and PDTs need to be aware that increasing efforts to avoid all or most risks results in diminishing returns. Further activity becomes increasingly inefficient and yields few returns.

2.4 Assign Risk Oversight

When PMs build their PDTs, they need to include SMEs who will help them identify, monitor, and address risks (see the PMGB article *Assembling a Project Development Team*). PMs need input from SMEs on topics that have a critical impact on project risk. SMEs ultimately need to reach a consensus estimating the impact of a risk and how to address it.

2.5 Risk Response

Risk analysis and risk prioritization inform risk response planning and helps PDTs determine what type of strategy is best suited for handling each risk. For threats (i.e., negative risks) teams must decide whether to (a) avoid, (b) transfer, or (c) mitigate the risk (Waddle et al. 2022):

- **Avoid** — Eliminate the risk trigger or adjust project execution to prevent confronting the risk.
- **Transfer** — Shift management of the risk to a third party (e.g., a contractor). This may involve a financial commitment, potentially increasing project costs. However, in some cases a third party is more capable of handling the risk and is the best option.
- **Mitigate** — Reduce the probability and/or impact of a risk to a specified threshold. This can require additional resource allocations (e.g., staff time, funding).

For opportunities (i.e., positive risks) teams have to decide whether to (a) exploit, (b) share, or (c) enhance the risk:

- **Exploit** — Do everything possible to realize the opportunity as it will benefit the project.
- **Share** — Transfer risk ownership to a third party best positioned to maximize the benefits of a risk if it occurs.
- **Enhance** — Pursue actions to increase the probability and/or impact of a risk event.

Another option for both threats and opportunities is **acceptance**. This is the acknowledgement of a risk without taking immediate action to deal with it — Risks will be handled when they arise.

PMs should work with the PDT to develop actions or strategies to address each risk. This can be documented in a risk management plan or a risk register. If a risk could significantly increase the project cost or extend the project timeline, the PM should inform KYTC leadership.

2.6 Monitoring and Control

Monitoring and control of risk involves:

- Tracking and documenting response actions taken and their outcomes
- Evaluating residual risks following responses
- Identifying new risks
- Assessing if risk profiles have changed
- Communicating updates to stakeholders

The PM is responsible for monitoring risks and reassessing and evaluating a project's status to know where it is in the project development processes. Ultimately, it falls to the PM to keep a project moving forward. An example of risk monitoring is displayed in Figure 3.

RISK	RESPONSE STRATEGY	RESPONSE ACTIONS	RESPONSIBILITY	INTERVAL OR MILESTONE CHECK
Unexpected geotechnical issues at bridge piers *Assessment—high*	Mitigation	The team will conduct further soils exploration and consider alternative pier designs.	Project team lead	Soil exploration complete Initial pier design complete
Landowners unwilling to sell at US 555–SH 111 junction *Assessment—high*	Avoidance	The team will attempt to design around areas where right-of-way may be an issue.	Right-of-way lead	Alignment complete
Local communities pose objections *Assessment—medium*	Mitigation	The team will conduct an aggressive public information campaign and inform the public about the safety and efficiency benefits of the project.	Public information lead	Monthly
Too many projects in the region for QDOT staff *Assessment—medium*	Acceptance	The team will attempt to design the project with agency staff and accept a longer design schedule.	Region executive management	Monthly

Figure 3 Monitoring Risk (Molenaar et al., 2006, p30)

3. Risk Management Tools

Several tools can help PMs and PDTs identify, document, and monitor risks, including the Excel-based Risk-Based Project Development Excel Tool. After users input the project type, the tool identifies potential risks and strategies for Key Decision Points and Key Execution Points in Project Development. Critical Path Method (CPM) diagrams can also help PMs monitor risks to the schedule.

A risk management register lists all the potential risks that could occur during the project execution phase as well as critical information about each. FHWA provides a risk management register template on its website.

4. Associated Articles

Project Management Guidebook *Intro and Overview*

Project Management Guidebook *Assembling a Project Team*

Knowledge Book – Time Management for Highway Project Development

Reference Documentation

KYTC's *Highway Design Manual*

KYTC's *Environmental Analysis Guidance Manual*

Molenaar, K., Diekmann, J., and Ashley, D. (2006). *Guide to Risk Assessment and Allocation for Highway Construction Management*. Report #FHWA-PL-06-032, Federal Highway Administration, Washington, DC.

Project Management Institute. (2004). *A Guide to Project Management Body of Knowledge* (PMBOK® Guide). Project Management Institute, Newton Square, PA.

Waddle, S., Li, Y., and Van Dyke, C. (2022). Risk-Based Project Development, KTC-22-13/SPR21-609-1F, Kentucky Transportation Center. https://doi.org/10.13023/ktc.rr.2022.13

Definitions

Project Risk – An uncertain event or condition that could arise and change the outcome of a project, for better or for worse. It may have a positive or negative effect on the objectives of the planned work (Project Management Institute, 2004).

Red Flags – Locations or activities of concern within the project area that entail additional study, coordination, design, right of way, utility relocation, or construction costs.

Fatal Flaw – Project location or activity that must be avoided due to the negative impacts it would have on the project.

Risk Matrix – Documents project risks and allows for risk prioritization. Risks are often prioritized in order of importance by focusing on those that would have the greatest impact on the project and a higher likelihood of occurring.

Critical Path Method Diagram – Identifies project tasks, their time for completion, and their dependence on other tasks. The critical path is the longest sequence of activities that must be completed on time for the project to be complete.

Monte Carlo Simulations – Risk management technique used to conduct a quantitative analysis of risks using various simulations.

Tornado Diagram – A type of bar chart with bars extending horizontally. The data is displayed with the bars from longest to shortest, resembling a tornado.

Risk Management Register – A list of the potential risks, critical information about each risk, and impact of the risk that could occur during the project execution phase. It typically provides a description, the risk response, and the responsible party for mitigating and monitoring the risk.

Monitoring Scope, Schedule, and Budget

Image Source: From Project Managers Bootcamp *Project Management 101* Presentation

Monitoring Scope, Schedule and Budget	Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1.0 Introduction	x	x	x	x
2.0 Monitoring the Scope	x	x	x	x
3.0 Monitoring the Schedule	x	x	x	x
4.0 Monitoring the Budget	x	x	x	x

1.0 Introduction

A successful project meets the defined scope, stays on schedule and within budget, and produces quality solutions and deliverables. The project management triangle (Figure 1) illustrates the relationship between time, cost, scope, and quality. These variables are interrelated, which means adjusting one affects the others. For instance, modifying the scope influences the project cost, amount of time needed to deliver a project, and the project's finished quality. As work progresses, the Project Manager (PM) should monitor, assess, and refine the scope, schedule, and budget as necessary. When a change to one of these items occurs, the PM needs to investigate the causes for the change, notify and discuss the changed conditions with the Project Development Team (PDT), and take corrective action to address the changed condition.

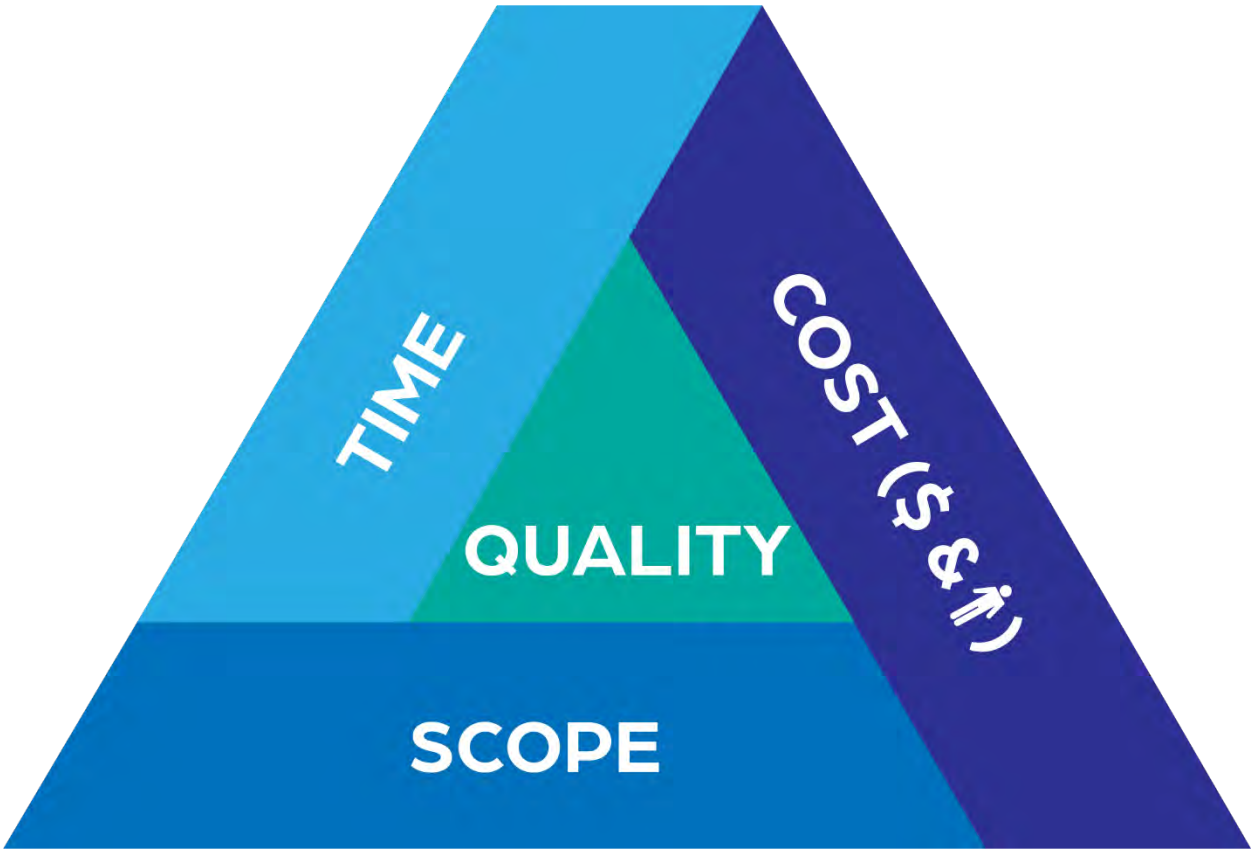


Figure 1 Project Management Triangle (Image Source: Project Managers Bootcamp- ***Project Management 101 Presentation.)***

When monitoring the scope, schedule, and budget, subject-matter experts (SMEs) on the PDT provide advice and guidance, however, the PM is responsible for making timely decisions to keep the project moving forward. Major decisions that would modify the scope, schedule, and budget need to be elevated to the State Highway Engineer's (SHE) Office for concurrence.

PMs can employ the **MITAR (Monitor, Investigate, Take Action, Report)** framework when overseeing projects**.**

MONITOR: At each milestone meeting, the PM and PDT should compare the scope defined earlier in project development to the scope detailed in project plans. Further scope refinement is expected during the project development process, but PMs should strive to ensure that project's scope does not expand (i.e., scope creep). For more information about project milestones, refer to HKP Article *Project Schedule and Development of Milestones* (coming soon).

INVESTIGATE: When issues arise related to scope changes, the PM, PDT, and SHE Office need to understand the source(s) of those changes. Potential causes include unforeseen needs, stakeholder requests, unforeseen environmental concerns, changes in existing site conditions, the type of work needed to resolve an issue, scope creep, or a poorly defined initial scope.

TAKE ACTION: Once the root cause(s) of scope changes are identified, the PM and PDT brainstorm possible solutions to resolve the underlying issues. Multiple solutions should be developed, with a list of pros and cons, as well as schedule and budget impacts, noted for each. The PM, with input from the PDT, decides whether scope modifications are needed. The PM then notifies the Central Office Liaison of the potential scope change to decide next steps, including a possible request for approval to the SHE's Office for a significant project scope modification. If budget increase is less than 15%, the modified scope meets the purpose and need of the project, and schedule isn't affected, the CO Liaison or Director can approve the scope modification.

REPORT: Communicate changes in project scope to all PDT members once the scope modification is approved.

Red Flag: Although their funding sources may differ, strategies described in this article for monitoring the scope, schedule, and budget can be used by PMs working on any of the four types of KYTC projects: Capital Improvement, Asset Management, HSIP, and Maintenance.

Side Note: To help with the various KYTC project types, the Divisions involved have liaisons in central office that work with their assigned districts to help coordinate/facilitate various tasks involved with a project and help to get that project thru the process and completed. The liaisons for the different project types are as follows:

- Capital Improvement Projects: Location Engineers located in the Division of Highway Design, Roadway Design Branch.
- Asset Management Projects: Operations and Pavement Management Section and Bridge Maintenance/Preservation Branch.
- HSIP Projects: Highway Safety Engineer located in the Division of Traffic Operations, Traffic Safety Branch.
- Maintenance Projects: Field Engineers located in the Division of Maintenance

Figure 2 Process flowchart for managing project scope, schedule, and budget. (Source: Project Managers Bootcamp (PMBC) – *Project Management 101* Presentation.)

2.0 Monitoring the Scope

A good scope defines project expectations and goals and clarifies project objectives. At each milestone meeting the PM and PDT should compare the project's initial scope to the current scope detailed in the plans.

Red Flag: A well-defined scope separates *wants* from *needs* and helps control what is and is not included within the project's objectives.

The scope is refined throughout project development, but the PM and PDT should avoid scope creep — uncontrolled changes or continuous growth in the project's scope. This can occur when the scope is not properly defined, documented, or controlled.

Scope changes should not be approached lightly as they can influence the budget and schedule. Depending on how far environmental analysis has progressed, a scope change could greatly affect the type of environmental approval needed and the timeline for obtaining it. If the scope changes during project development, the PM and PDT must investigate and understand why the scope has changed. Factors that contribute to scope changes include unforeseen conditions, stakeholder requests, and modifications in type of work to be accomplished due to issues uncovered during project development.

Once the underlying causes are understood, the PM, PDT, and the Central Office Liaison should discuss possible solutions to resolve issues related to the scope change. When developing solutions, impacts to the schedule and budget must be considered. The PM and Central Office Liaison must notify the SHE Office as soon as possible of a significant scope modification. If additional funds are needed to execute the scope change, at the request of the CO Liaison, the Division of Program Management needs to be involved in determining a funding source and when (or if) the funds could be added to the project. Additional funding may need to be programmed into the next *Highway Plan*. Questions about funding should be resolved before continuing the project.

For more information on scoping, refer to the PMGB Article *Project Scoping* (coming soon) and the *Highway Design Guidance Manual* (HD-202.6).

3.0 Monitoring the Schedule

A successful project cannot achieve its desired outcome until it is constructed and open to the traveling public. Thus, keeping a project on schedule and letting to construction when planned is critical. A reasonable project schedule minimizes conflicts and confusion and builds in mechanisms for accountability. The PM must (1) communicate and manage the expectations related to the project schedule and (2) track and manage the progress of the work and the use of resources to accomplish work within the project schedule. The PM should provide quarterly updates to the PDT on schedule status and progress. This helps the PDT focus on delivering the project according to the established schedule by reminding team members that the time-value of money increases project expenses if delays occur. Projects that are discussed at the Monthly Letting Review Meetings in Central Office will also require updates by the PM to the CO Liaisons prior to the meeting. Using Microsoft Project to create a Gantt chart is a very useful for helping PMs track the project schedule. It can be used to establish the initial schedule, milestones, and critical path. If a consultant is used on the project, the PM can request as a part of negotiations that they develop and maintain a Gantt chart and provide regular updates as directed.

PMs must closely monitor the critical path. Modifying the duration of activities on the critical path affects the project completion date. If Gantt Charts are not available, the PM should review project milestones and KYTC's Project Development Process (PDP). It is also a good idea to review activities *off* the critical path to determine if a delay would place them *on* the critical path. The PM and PDT should review and discuss the project schedule at milestone meetings. If activities on the schedule start to slip, the PM and PDT should investigate the root causes. It is important to understand the causes for delays so that corrective actions can be taken to resolve the problems. Potential sources of delay include inaccurate original estimates for the schedule, unforeseen issues, and overscheduled resources. There are also delays such as organizations outside of KYTC's control (i.e. railroads, private utilities).

PMs need to collaborate with all participating SMEs to understand issues related to their areas of expertise and identify resolutions. Possible corrective actions include acquiring additional resources, improving coordination between team members, and sometimes extending the project schedule. Before implementing a solution, the PM should discuss it with the PDT. Any major changes to the project schedule should be further discussed with Chief District Engineer, SHE Office, Central Office Liaison, and — if possible — the project sponsor.

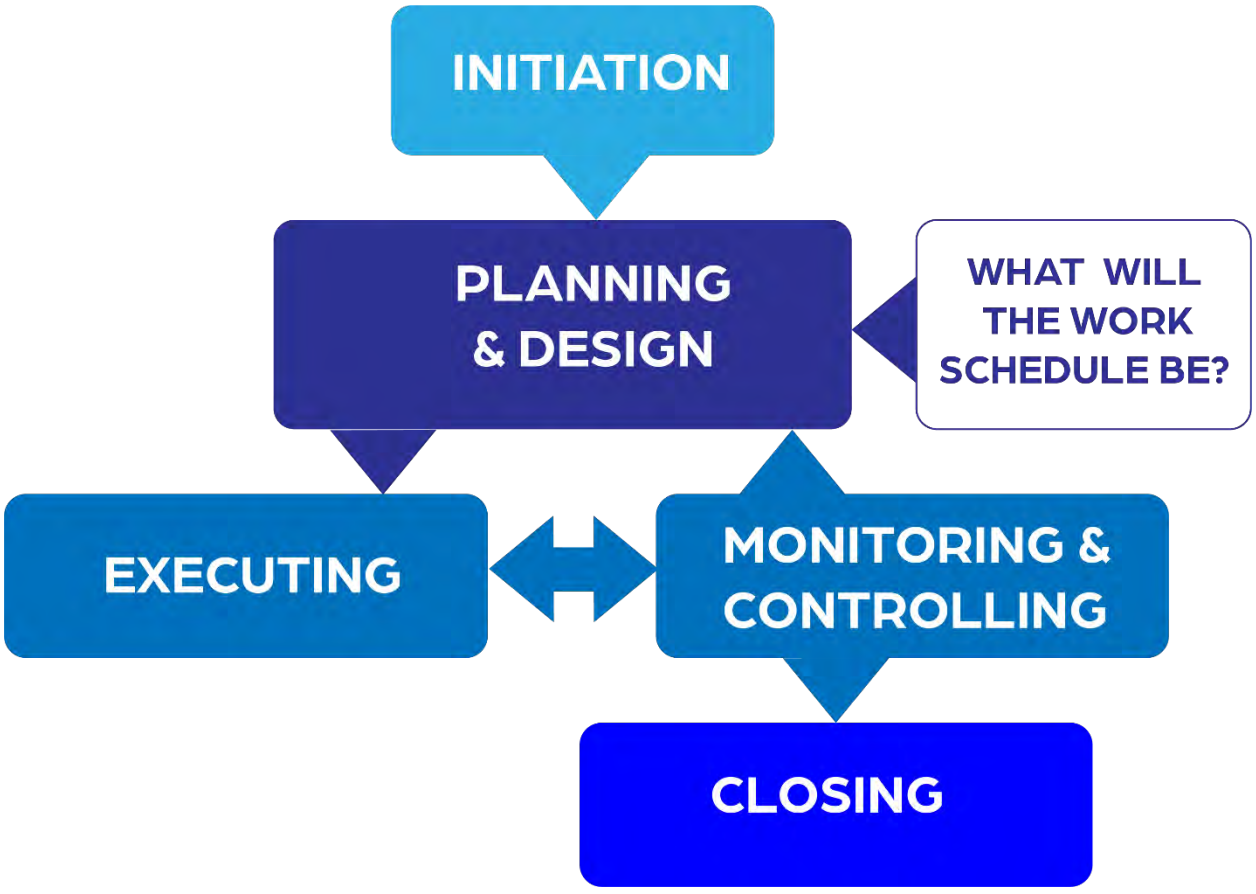


Figure 3 Process flowchart for managing project schedules. Image Source: PMBC *Project Time Management* presentation.

For more information on project schedules and Gantt charts refer to the PMGB Articles *Project Time Management* and *Project Schedule and Development of Milestones* (coming soon)

Red Flag: Sometimes it is necessary to plan a project's tasks, letting schedule, and construction to coincide with certain months of the year. For example, on bridge replacement projects, the project corridor should be investigated to determine whether it is on a school bus route. If the corridor has a school bus route, construction should occur during summer to avoid impacts from school traffic. If endangered flora or fauna are thought to occupy a project corridor, there may be a limited window to investigate whether they are present. For example, buffalo clover has a short blooming season and each spring only a small window of opportunity is available to determine if it is present. In situations like these, the project development schedule and delivery to the letting on time is highly critical. Instead of missing a letting by one month, the project letting could be moved to the next year.

4.0 Monitoring the Budget

Image Source: Microsoft Word Stock Images

From the PMBC *Project Cost Management* presentation.
The *Enacted Highway Plan* contains authorized project budgets. When developing alternatives that address the project purpose and need, the PM needs to draw on information in the plan, including the project description, funding cost estimates, and fiscal years indicated for each project phase. The PM should also consider supporting information that was used to program the project into the highway plan, including planning studies, scoping studies, and Project Identification Forms (PIF).

Throughout project development, the PM must track and update project estimates for design (D), right of way (R), utilities (U), and construction (C) phases in the *PDP Precon* system. Estimates should be updated at the following points:

- Issuance of a new *Highway Plan* (every two years).
- Potential Scope Change.
- Project Milestones.
- Final Plans Submittal (Final Plans Estimate).

Estimates should be kept current to ensure programmed funds are accurate and available when requested. If estimated costs for each phase exceed *Highway Plan* budgets by 15 percent or more, the PM and PDT should investigate the reasons for the cost overruns and provide justification. Some explanations include prices and quantities being underestimated in previous estimates, the emergence of unforeseen issues, or scope creep.

Key Section Definitions

Budget - Funds authorized to execute the project. It establishes the cost baseline used for program management.

Estimate - Approximation of monetary resources necessary to complete project. Developed at various stages of the project to measure and track the cost.

Cost Control - Controlling changes to the project budget.

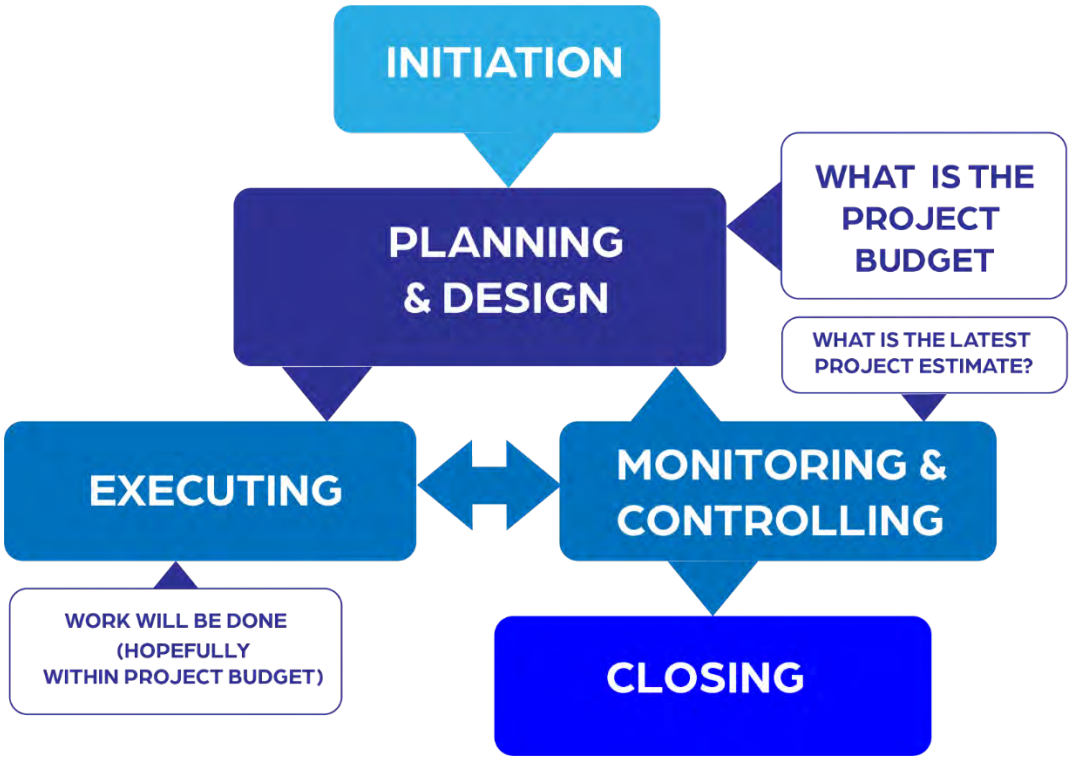


Figure 4 Process flowchart for managing project costs. Image Source: PMBC *Project Cost Management* Presentation.

Red Flag: The PM is responsible for monitoring the balance of available project funding throughout the life of the project and updating estimated costs of not-yet-authorized funding for future project phases. If the remaining balance for an authorized phase is not sufficient, the PM must submit a request for additional funding to the respective CO Liaison.

Red Flag: When project costs increase, the amount of funding available for other projects declines. This also negatively impacts the schedules of these projects. The PM and PDT must control project costs, ensure that only appropriate project changes are permitted, proactively inform, and discuss issues with the CO Liaison and the SHE Office, and request authorization for changes that will affect costs.

Red Flag: The PM and PDT have the greatest ability to influence the final project characteristics — without significantly impacting cost — at the start of the project. As the project progresses, the cost of altering the final project characteristics increases.

The PM will encounter instances of the *Highway Plan's* programmed estimates not matching the type of work spelled out in the project description. When this happens, the PDT should develop an alternative that does not exceed allocated funding to demonstrate what can be accomplished with the approved budget, along with alternatives that meet the purpose and need. Solutions should be

presented to the SHE Office for discussion and to establish a path forward for the project. Because limited funding cannot pay for all projects that are needed in the state, the PM, PDT, and SHE Office must evaluate solutions and choose one that best addresses the purpose and need.

For more information concerning the project budget refer to PMGB Articles *Understanding the KYTC Budget* and *the Highway Plan* and *Project Cost Estimating* (both coming soon). To learn more about tracking project funding balances refer to the KYTC *PDP Precon* and KYTC *Project Managers Toolbox*.

5.0 Associated Articles

PMGB Article *Project Scoping* (coming soon)
PMGB Article *Project Schedule and Development of Milestones* (coming soon).
PMGB Articles *Understanding the KYTC Budget* and *the Highway Plan (coming soon)*
PMGB *Project Cost Estimating* (coming soon)
PMGB *Project Time Management*
KYTC Design Manual HD-202.6

6.0 Reference Documentation

PDP Precon: https://apps.intranet.kytc.ky.gov/precon/Home/Dashboard

KYTC Project Managers Toolbox: http://www.pmtoolbox.kytc.ky.gov/

KYTC Maintenance Manual: https://transportation.ky.gov/Organizational-Resources/Policy%20Manuals%20Library/Maintenance.pdf

UDOT Project Managers Guide, Section 4.1 Link to guide:
https://drive.google.com/file/d/1TK5qiN_bElXrcRu6L2peN5WngiqW_3l9/view

Project Managers Bootcamp Presentations:

***Project Cost Management*:**
https://www.dropbox.com/s/nyvxy8l79om8r1k/04%202023%20PMBC_Project%20Cost%20Management_Siwula%20Eldridge%20%26%20Jasper.pptx?dl=0

***Project Management 101*:**

https://www.dropbox.com/s/la02h7r3xkiqrhr/07%202023%20PMBC_Project%20Management%20101_Jasper.pptx?dl=0

***Project Time Management*:**

https://www.dropbox.com/s/v4wf30jhijgqqlr/08%202023%20PMBC%20Project%20Time%20Management%20Gibson.pptx?dl=0

Definitions

Scope – the work to be performed to accomplish the project goals and objectives.

Scope Creep – uncontrolled changes or continuous growth in the project's scope. Occurs when the scope is not properly defined, documented, or controlled.

Schedule – a plan for carrying out the project from initiation to completion and includes activities, deliverables, and milestones.

Critical Path – the longest path from project start to completion that passes through essential activities/tasks, thus determining the minimum time needed to complete the project.

Budget – funds authorized to execute the project. It establishes the cost baseline used for Program Management.

Estimate – an approximation of monetary resources necessary to complete the project. Developed at various stages of the project to measure and track the cost.

Cost Control – Controlling changes to the project budget.

Quality – how close the project scope is to meeting the project goals and objectives.

Project Management and Public Involvement	Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1.0 Introduction to Public Involvement	x	x	x	x
1.1 Public Involvement Defined	x	x	x	x
1.2 Roles and Responsibilities	x	x	x	x
2.0 Public Involvement in the Project Development Process	x	x	x	x
2.1 Public Involvement Timeline	x	x	x	
2.2 Public Involvement Plan	x	x	x	
2.3 Early Public Involvement in Preliminary Design	x	x	x	
2.4 Later Public Involvement in Preliminary Design	x	x		
2.5 Review, Summarize, and Address Public Comments	x	x	x	
2.6 Identify and Study Additional Alternatives (if Required)	x	x	x	x
2.7 Public Hearing (if Applicable)	x			
3.0 Public Involvement for Other Project Types	x	x	x	x
3.1 Safety Projects		x		
3.2 Asset Management Projects			x	
3.3 Maintenance Projects				x
4.0 Public Involvement Strategies	x	x	x	x
5.0 Associated Articles	x	x	x	x
6.0 Reference Documentation	x	x	x	x
x = Information from the topic may be applicable for the project classification.				

1. Introduction to Public Involvement

A critical element of all projects, public involvement encompasses more than a single meeting or hearing near the end of the project development process. It should begin early in the project and remain ongoing throughout. To avoid, minimize, and mitigate impacts, as well as to narrow the range of alternatives, it is essential to understand the values of the community impacted by a project. Opinions expressed by the public are important considerations in the transportation decision-making process.

Public Meeting in Highway District 5

1.1. Public Involvement Defined

Public involvement is the process of actively engaging and involving the public in decision

making. KYTC carries out public involvement activities to solicit input, receive feedback, and formally consider public perspectives during transportation planning, design, and implementation processes *(1)*.

The **public** includes the following stakeholders:

- All users of the facility (irrespective of transportation mode)
- Individuals, businesses, and organizations affected by the project (including those that reside in the project area)
- Elected officials
- Others interested in the project's outcome

Regardless of the types and methods of public involvement used, the Project Manager (PM) and Project Development Team (PDT) should implement seven basic steps to execute the public involvement process for any decision or activity:

1. Create a plan for public involvement activities.
2. Identify the interested and affected public.
3. Provide information to the public and conduct outreach.
4. Offer assistance to the public to facilitate their involvement.
5. Conduct public involvement activities.
6. Review and consider public input. Provide feedback to the public.
7. Evaluate public involvement activities.

Red Flag: Make sure to account for the cost of public involvement and its impact on the project schedule when planning outreach. Cost depends on the level of public involvement and includes staff time and consultant fees (if needed, there are consultants who specialize in public engagement). When estimating impacts to the project schedule account for the time needed to prepare for meetings and other activities, advance notification requirements, and time for the PDT to review public feedback.

Side Note: If significant time has passed since public involvement activities and the project letting, consider updating the public through social media, newsletters, websites, traditional media sources, or other means as appropriate.

1.2. Roles and Responsibilities

The *KYTC Public Involvement Plan* is the primary resource that governs public involvement activities in Kentucky. The *Highway Design Guidance Manual* (**HD-600)** describes the roles and responsibilities of PDT members involved in public involvement activities. This information is summarized in Table 1. Each District functions slightly differently, and some of these responsibilities could be delegated to others on the PDT. PMs need to be familiar with the roles and responsibilities of each team member. For planning study projects see the *Planning Guidance Manual* (**PL-701.2)** for the approval chain.

Table 1 Roles and Responsibilities for Public Involvement Activities

Person/Team	Roles and Responsibilities
Project Development Team (PDT)	• Considers creating a public involvement plan (defined in Section 2.2). Helps execute public involvement activities. If the project is in-house or public involvement is not included in a consultant's scope of work, the PDT creates documents, displays, handouts, and other information provided to the public.
Project Development Branch Manager (PDM)	• Initiates public involvement. Defines the level of public involvement. Creates a public involvement plan. Schedules and holds public hearings and meetings. This includes selecting the venue (check for ADA compliance), meeting format, meeting preparation, meeting materials, and offering an opportunity for comment. Advertises and develops

	notifications for public hearings and meetings. Offers an opportunity for public hearing. Often the PDM delegates these activities to the Project Manager.
Project Manager (PM)	• Responsible for public involvement activities delegated to them by the PDM and documentation for public hearings and meetings.
Chief District Engineer (CDE)	• Provides concurrence on public involvement activities.
District Public Information Officer (PIO)	• Assists the PDT with public involvement activities. Can help upload information to the District webpage and social media accounts and submit project information to traditional media sources.
Central Office Public Involvement Coordinator	• Can help the PDT with public involvement activities if requested. Distributes public hearing/meeting documentation to appropriate Divisions and agencies.
Consultant (If included on the PDT)	• Helps the PDT execute all public involvement activities. Creates documents, displays, handouts, and other information provided to the public. Compiles public hearing and meeting documentation.

2. Public Involvement in the Project Development Process

The level of public involvement can vary significantly between projects and depends on the project location, type, and magnitude. For example, on projects where several alternatives are under consideration or projects that trigger greater public controversy, more public meetings may be necessary.

Understanding tradeoffs and constraints associated with each alternative is critical for informing the public and increasing the likelihood of public acceptance. Early public involvement lets community members offer critical insights about the project's goals, needs, and its effects on the community.

Section 2.1 provides typical timelines for public involvement in the project development process for two project types — (1) Categorical Exclusion (CE) projects and (2) Environmental Assessment (EA), Finding of No Significant Impact (FONSI), Environmental Impact Statement (EIS) projects. Section 2.2 addresses public involvement plans and provides additional information about key points during public involvement.

Although the subsections below focus on projects that include public hearings and meetings, the PM should keep in mind that the level and types of public involvement varies between projects. When deciding how to approach public involvement, the PM must select methods that will provide clear and accessible information to affected communities and provide stakeholders adequate opportunity to provide feedback while working within project budget and schedule constraints.

RED FLAG: Title VI of the *Civil Rights Act of 1964* requires that as part of the project development process, accommodations be made for individuals with Limited English Proficiency. Being able to reach and engage all communities and individuals is critical to gaining a full understanding of project needs and issues. Information on requesting language accommodations in public involvement notifications/advertisements can be found in Section 2.2.

The *Office of Civil Rights and Small Business Development* has developed a Title VI informational flyer (*link coming soon*) that has been translated into several languages. The English and Spanish versions are to be made available at **all** public meetings (also available in online and virtual formats). Translations in other languages are required to be provided if 5% of the eligible population or more than 50 people in the study area speaks a specific language (USDOT 70 Red. Reg. 74095, 76 Fed. Reg. 21765). A voluntary demographic information survey (*link coming soon*) has also been created that is used to help gain insight on the communities that have been engaged during the project development process. This survey can also be incorporated into virtual public involvement such as online surveys and StoryMaps.

2.1. Public Involvement Timeline

Several opportunities to engage the public are available during the project development process. Most of these opportunities occur during Preliminary Engineering prior to National Environmental Policy Act (NEPA) approval. Early public engagement can be used to identify the public's issues and concerns. Public engagement during later stages of project development can be used to communicate project details to the public and to show the public how the project addresses their concerns.

Figure 1 indicates when public involvement typically occurs during project development on a typical capital improvement project where the NEPA document is a CE.

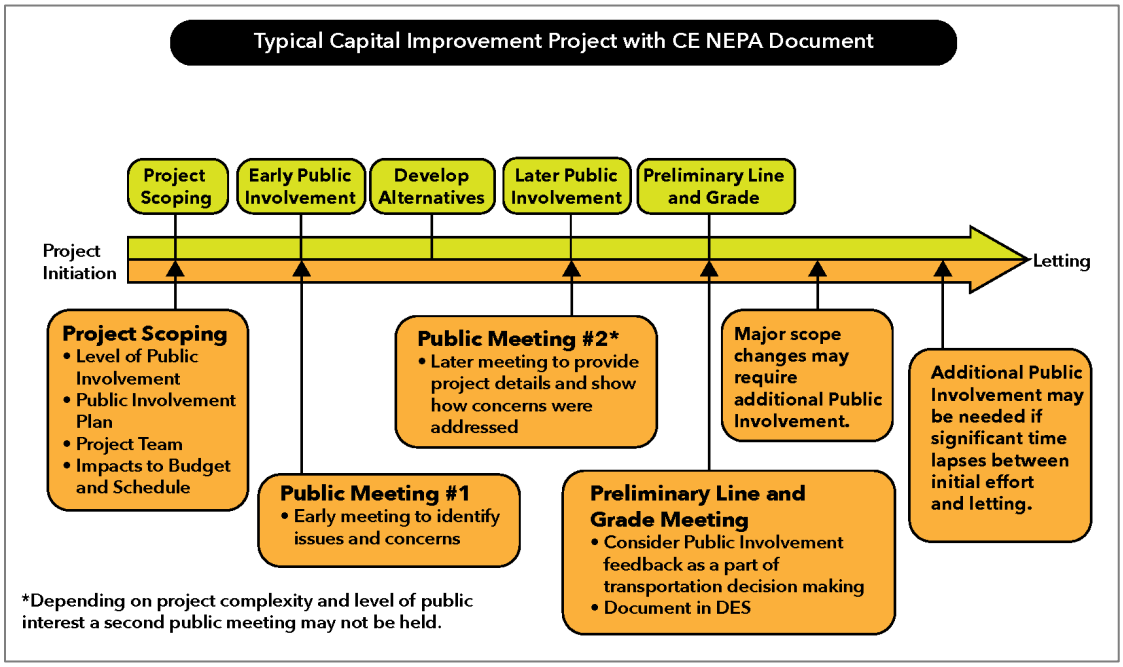


Figure 1: Public Involvement Process Timeline for a Typical Capital Improvement Project (CE NEPA Document)

A public hearing must be held for projects with a NEPA document including an Environmental Impact Statement (EIS), Environmental Assessment (EA) or a Finding of No Significant Impact (FONSI). Figure 2 shows when the public hearing takes place for these project types. Additional information on Public Hearings is available in the *Highway Design Guidance Manual* (**HD-603** and **Exhibit 200-06**)

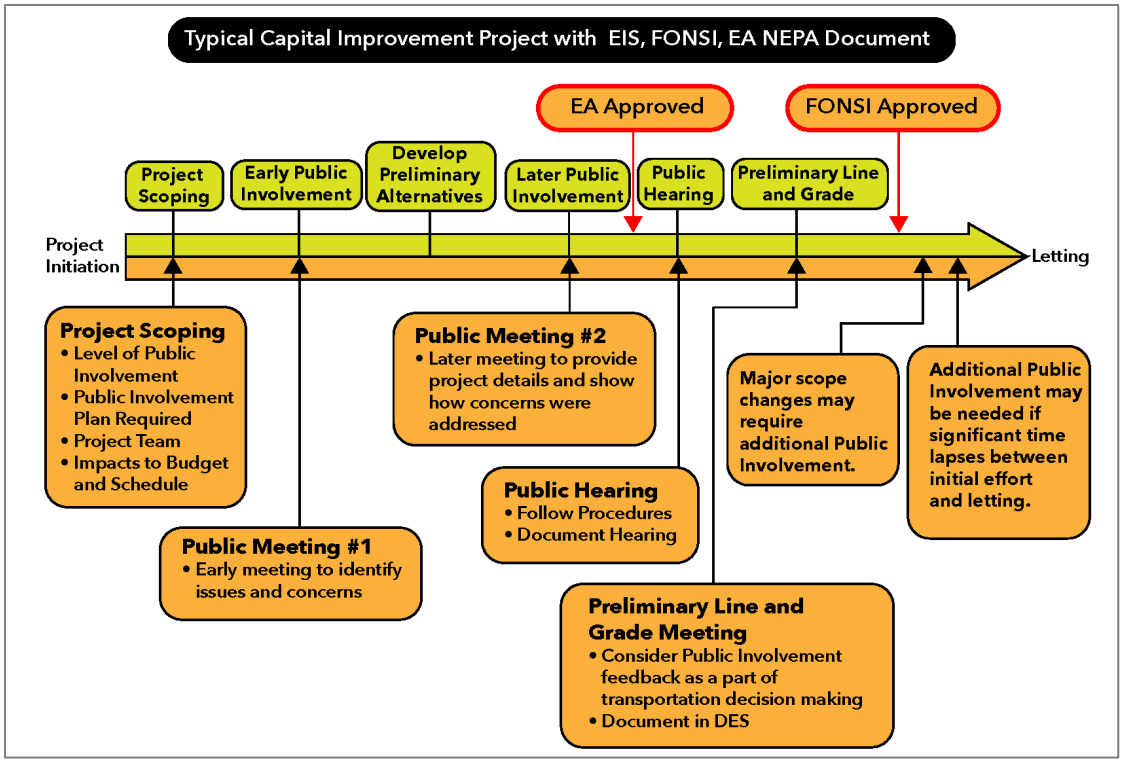


Figure 2: Public Involvement Process Timeline for a Typical Capital Improvement Project (EA, FONSI or EIS NEPA Document)

Red Flag: One of the first decisions the PM makes about public involvement is whether a public hearing is needed for the project. Making this determination requires working with the District Environmental Coordinator and holding a Scope Verification Meeting with Federal Highway Administration (if the anticipated NEPA document is a CEIII or above). PMs need to consider impacts to the project schedule and budget along with the recording and documentation requirements.

2.2. Public Involvement Plan

It should be determined whether a formal **public involvement plan** (PIP) or an informal plan will be used on the project.

As early in the project development process as possible (typically during project scoping and before advertisement if consultant services are needed), the PM, PDM, District Environmental Coordinator, and the District PIO should discuss project public involvement strategies.

Although a PIP is only mandatory for projects that require an EIS, PMs should consider developing a PIP for every project advanced through project development. Whether or not a PIP is used, public involvement activities can be scoped/documented in the Pre-Design Meeting Minutes.

A PIP's content should be tailored to individual project needs and may include items or activities ranging from contacting individual property owners on small projects to conducting a series of public involvement meetings or public hearings on more complex projects. Some PIPs may prescribe the formation of a citizens advisory committee, the purpose of which is to involve property owners or special interest groups when significant environmental issues or concerns must be addressed. A PIP must facilitate communication between KYTC and the public so the Cabinet can make the best transportation decision possible.

The PDT should develop a PIP outline during the early stages of project development. The plan must include any federally required public hearings. Supplemental public involvement meetings that will contribute to better

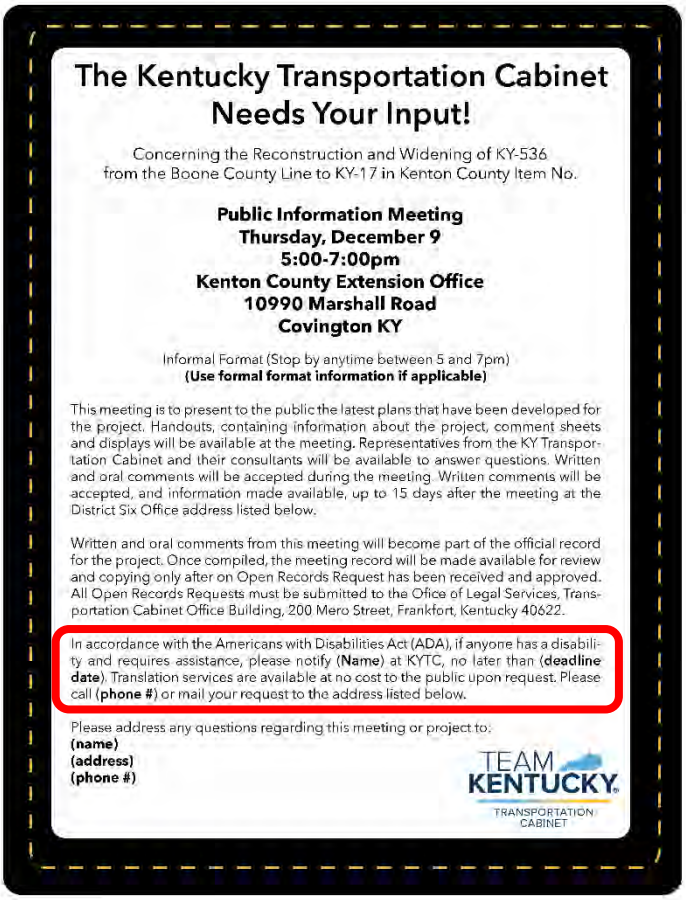
decisions on the project location or details may be included as well. The plan may be modified as the project advances, and it should be reviewed by the PDT at critical stages in project development. The PIP should describe the specific methods that will be used to conduct public outreach, such as telephone surveys, newsletters, social media, websites, and focus groups.

The KYTC Public Involvement Toolbox website contains examples of PIPs. The following template can be used when developing a PIP:

1. Identify the purpose of the plan
    a. What transportation decisions are to be made?
    b. What is the desired level of public involvement/influence?
2. Status of the project development process (brief summary of the process up to this point, including planning).
3. History of public involvement related to the project (brief summary of past public involvement activities, including Statewide Transportation Improvement Plan (STIP) comments, Metropolitan Planning Organization/Area Development District (MPO/ADD) engagement, and planning activities).
4. Understand the affected communities/public. List and briefly describe each. The PM can also create an Excel spreadsheet that compiles contact information of interested parties for future coordination and project updates. For each community, the PIP should include:
    a. A community profile (social, economic, and political structures)
    b. Key community issues and interests
    c. Assessment of community awareness of and knowledge about the project
    d. Identification of special sensitivities and/or requirements related to public involvement methods and activities
5. Summarize the overall approach to public involvement. List and briefly describe each:
    a. Outreach
    b. Education
    c. Gathering of input
    d. Opportunities for direct involvement
    e. Pathways for incorporating input into decision making
    f. Providing feedback to the public on decision making
    g. Plan for monitoring, evaluating, and readjusting the PIP
6. Define specific action steps, techniques, and timing for public involvement (i.e., who will do what, on what timeline, and with what resources).

All interested members of the public must have an opportunity to participate in the public involvement process. Public involvement notifications/advertisements are to include a notice that translation services are available at no cost to the public upon request for Limited English Proficiency populations. The *Office for Civil Rights and Small Business Development* can be contacted to obtain these services. The KYTC Public Involvement Process provides minority and non-English-speaking newspaper and radio resources that can be used to communicate project information to these communities. It also contains basic demographic information that could be used to identify these populations.

Efforts must be made to identify and accommodate any individuals with disabilities (ADA) or other special needs participants. This includes arranging for meeting venue facilities to accommodate people with physical disabilities. Meeting notifications and advertisements distributed to the public must include a request for accommodations, including translation services (Figure 3).



The Kentucky Transportation Cabinet Needs Your Input!

Concerning the Reconstruction and Widening of KY-536 from the Boone County Line to KY-17 in Kenton County Item No.

Public Information Meeting
Thursday, December 9
5:00-7:00pm
Kenton County Extension Office
10990 Marshall Road
Covington KY

Informal Format (Stop by anytime between 5 and 7pm)
(Use formal format information if applicable)

This meeting is to present to the public the latest plans that have been developed for the project. Handouts, containing information about the project, comment sheets and displays will be available at the meeting. Representatives from the KY Transportation Cabinet and their consultants will be available to answer questions. Written and oral comments will be accepted during the meeting. Written comments will be accepted, and information made available, up to 15 days after the meeting at the District Six Office address listed below.

Written and oral comments from this meeting will become part of the official record for the project. Once compiled, the meeting record will be made available for review and copying only after an Open Records Request has been received and approved. All Open Records Requests must be submitted to the Office of Legal Services, Transportation Cabinet Office Building, 200 Mero Street, Frankfort, Kentucky 40622.

In accordance with the Americans with Disabilities Act (ADA), if anyone has a disability and requires assistance, please notify (**Name**) at KYTC, no later than (**deadline date**). Translation services are available at no cost to the public upon request. Please call (**phone #**) or mail your request to the address listed below.

Please address any questions regarding this meeting or project to:
(name)
(address)
(phone #)

TEAM KENTUCKY
TRANSPORTATION CABINET

Figure 3: Sample Meeting Notification with Request for Accommodations

2.3. Early Public Involvement in Preliminary Design

For larger or controversial projects — those whose NEPA document is an EA, FONSI or EIS — a public meeting must be held as soon as possible in the project development process to address the Purpose and Need statement. Projects where the NEPA document is a CE may also benefit from a public meeting.

The first public meeting is typically an informal public kickoff for the project. The purpose of this meeting is to gather information, describe the project development process and project timeline, determine community support for the project, and understand community issues as well as the public's expectations for the project. A request for accommodations should be made part of any public meeting advertisement.

For large-scale projects and/or projects that involve a sensitive corridor, assembling a group of stakeholders may prove beneficial. Stakeholder engagement helps the PM and PDT develop a better understanding of conditions in the project area and can also provide the stakeholders with a better appreciation of what goes into the project development process. Stakeholder groups may include members with different backgrounds (e.g., local officials, emergency services, school transportation and/or administration, impacted utility owners). The composition of stakeholder groups should be tailored to the project's needs and context. Often stakeholder groups continue to meet periodically to receive updates and discuss alternatives and other project-related information provided by the PDT. If more direct involvement with the PDT is needed, the PDT may engage a subset of the stakeholder group through a focus group.

Red Flag: Before any public meeting, stakeholder meeting, posting information to a project website, or disseminating information to the public in any manner, the PM must review all materials, displays, and handouts to verify their accuracy, clarity, and ease of understanding. Additional guidance can be found in the HKP articles *Organizing and Efficiently Running Project Development Team Meetings* and *Effective Communication in Project Management*.

2.4. Later Public Involvement in Preliminary Design

Once the PDT has developed a reasonable number of feasible and competitive alternatives and understands the potential impacts of each, it may be appropriate to hold another stakeholder meeting to present alternatives, solicit opinions, and obtain stakeholder buy-in. This meeting may be held before or after identifying a preferred alternative. Once stakeholders have been brought up to date on the alternatives, another public meeting should be held to present the preferred alternative and obtain further public input.

Continued public involvement is very important for the progress of a project. The main objective of public meetings during the latter stages of alternative development is to let community members examine, review, and comment on the details of each alternative. Opinions voiced at late-stage meetings are important considerations when selecting an alternative. Public meetings at this juncture are also used to discuss how issues or concerns brought up at a previous meeting can be resolved, particularly challenges related to environmental commitments.

Side Note: Members of stakeholder groups should be encouraged to attend public meetings. This allows them to interact with the public and hear concerns from their community. It also lets the public know that KYTC is committed to the transparent development of a project solution. One way of doing this is to hold the stakeholder meeting at the same location as the public meeting, but just prior to the public meeting.

2.5. Review, Summarize, and Address Public Comments

Public involvement efforts help the PM and PDT identify and document the community's concerns about the project. After meeting with the public, the PM and PDT should prepare a summary that describes key issues voiced by members of the public. Close attention should be paid to special sensitivities, requests, and/or requirements advanced by community members. After examining public meeting records, the PM (assisted by the PDT) should address public comments and provide feedback to the community where they judge it appropriate to do so. The PM and PDT should also develop plans — if necessary — for resolving issues so the project can move forward. If a significant amount of time elapses between the public involvement meetings and project letting, consider updating the public through media, newsletters, websites, social media, or other means as appropriate.

Documentation is required for any public involvement activity or contact that is part of the project decision making process. For Public Hearings this documentation must include the items listed in the *Highway Design Guidance Manual* (HD-603.1). Often referred to as the Public Hearing notebook, these items are summarized below. Public meeting records may also follow the documentation needs listed in HD-603.1, with a few of the components not being required (see below). Documentation of public involvement activities outside of public hearings and meetings can be accomplished by including a memorandum in the project files that summarizes methods used to conduct the activities and public feedback.

Documentation for a Public Hearing (*best practice is to use for public meetings too*)

- Cover Sheet
  - Titled as Corridor or Design Public Hearing, county, item number, road name; and date, time, and place of hearing
- Table of contents
- Notification to manager of advertising section of newspaper

- Legal notice
  - *Not needed for public meetings*
- Tear sheet from newspaper
- Sketch map showing the project on which the hearing was held
- Copy of handouts
  - If a presentation is given, copies of slides can go here.
- Sign-in sheets, including KYTC staff, consultants, FHWA, and all persons attending
- For formal hearings, a transcript of the entire proceedings. For informal hearings, all oral statements received.
  - The record will include all statements made and identify the people who made them. The record should show throughout that all pertinent subjects were open to discussion and that everyone had an opportunity to speak.
    - *Not needed for public meetings*
  - The record should include a certification that states the transcript is a true, complete, and accurate record of the hearing and/or oral statements received.
    - *Not needed for public meeting*
- Written statements, endorsements, etc. Copies should be obtained and made part of the hearing record.
  - *For public meetings, questionnaire responses can be shown in this section, including any from online sources. Charts and graphs can help summarize the responses received.*
- Copies of replies to statements made.
  - *Not needed for public meetings*
- Copies of statements and exhibits used during the public hearing.
  - *For public meetings pictures of exhibits in the meeting room should be included. Comments the public attaches or draws on exhibits can also be compiled here.*

Red Flag: Documentation of public meetings and hearings must be submitted to the Division of Highway Design Public Involvement Coordinator within 30-45 days after the date of a public meeting and within 45 days of a public hearing.

2.6. Identify and Study Additional Alternatives (if Required)

Based on comments or additional information received at the public meetings and/or stakeholder meetings, the PDT may need to study further alternative combinations, crossovers, or new alignments. New solutions must be evaluated at the same level of detail as previous alternatives before a final alternative selection is made.

If a new alternative(s) appears promising (e.g., achieves the Purpose and Need at a lower cost or with fewer impacts), the PM and PDT should discuss and then decide whether more time should be allocated to investigate it and collect relevant information. When deciding if a new alternative should be examined late in Preliminary Design the PDT must consider the project budget, schedule, and milestones. A new alternative that reduces impacts may simplify and compress the Final Design schedule and/or decrease the overall project cost, affording time and money for study while still meeting the targeted letting date. If studying a new alternative requires more design funding or time, the decision should be coordinated with the CDE and Central Office to obtain their approval.

2.7. Public Hearing (if Applicable)

On Federal-aid projects whose NEPA document includes an EA, FONSI or EIS, once the draft EA is completed and approved by FHWA, KYTC must: (1) give the public an opportunity to request a public hearing or (2) hold a corridor and/or design public hearing.

The primary objectives of a public hearing are to (1) circulate detailed project information for public review and comment and (2) discuss how issues and concerns voiced during earlier meetings have been resolved, especially those related to environmental commitments. For more information on public hearings see the *Highway Design Guidance Manual* (HD-603).

3. Public Involvement for other Project Types

Public involvement should be a part of any KYTC project regardless of project type or magnitude. As noted, methods used for public involvement and the level of effort should be scaled to fit individual projects.

3.1. Safety Projects

Public involvement activities for safety projects typically focus on talking to affected property owners over the telephone or meeting them onsite to discuss project improvements and how they will affect their property. Communication can also take place over email. If the impacts are larger, a stakeholder or public meeting may be held. For projects such as community safety plans, holding recurring stakeholder or steering committee–type meetings are a good option. If road diets (roadway reconfiguration) are considered, the District cannot proceed without a public information/outreach effort.

Coordination with the Central Office Traffic Safety Branch, which oversees the Highway Safety Improvement Program (HSIP), is essential for developing an appropriate public involvement strategy for safety projects.

3.2. Asset Management Projects

Asset management projects (bridge replacement/rehabilitation and pavement rehabilitation) typically involve less public involvement than capital improvement projects. Depending on the project context, more in-depth public involvement may be needed, such as when right of way is required or if maintenance of traffic will produce significant disruptions (e.g., road closures, lane closures). In these cases, PMs need to coordinate with the District PIO.

3.3. Maintenance Projects

For planned maintenance activities the District PIO will communicate information provided by Division of Maintenance staff to the public before the anticipated start date. District PIOs convey this information through notifications on social media, updates to the District webpage, and press releases to the media.

For maintenance projects that include roadway or bridge closures, the CDE or their designated representative must notify the following entities that KYTC intends to close a facility:

- County school superintendent
- Post office
- Law enforcement agencies
- Ambulance services
- Fire department
- Public transportation agencies

When KYTC expects maintenance work to impact traffic for a significant period of time, variable message signs can be used to provide additional notice.

Meetings with individual property owners typically occur if a question or concern is received from a property owner.

4. Public Involvement Strategies

Numerous methods and tools can be used to engage the public. These methods and tools fall along a spectrum, ranging from the lowest level of involvement/intensity to higher levels of involvement/intensity. Figure 4 visualizes this spectrum and lists common public involvement techniques used.

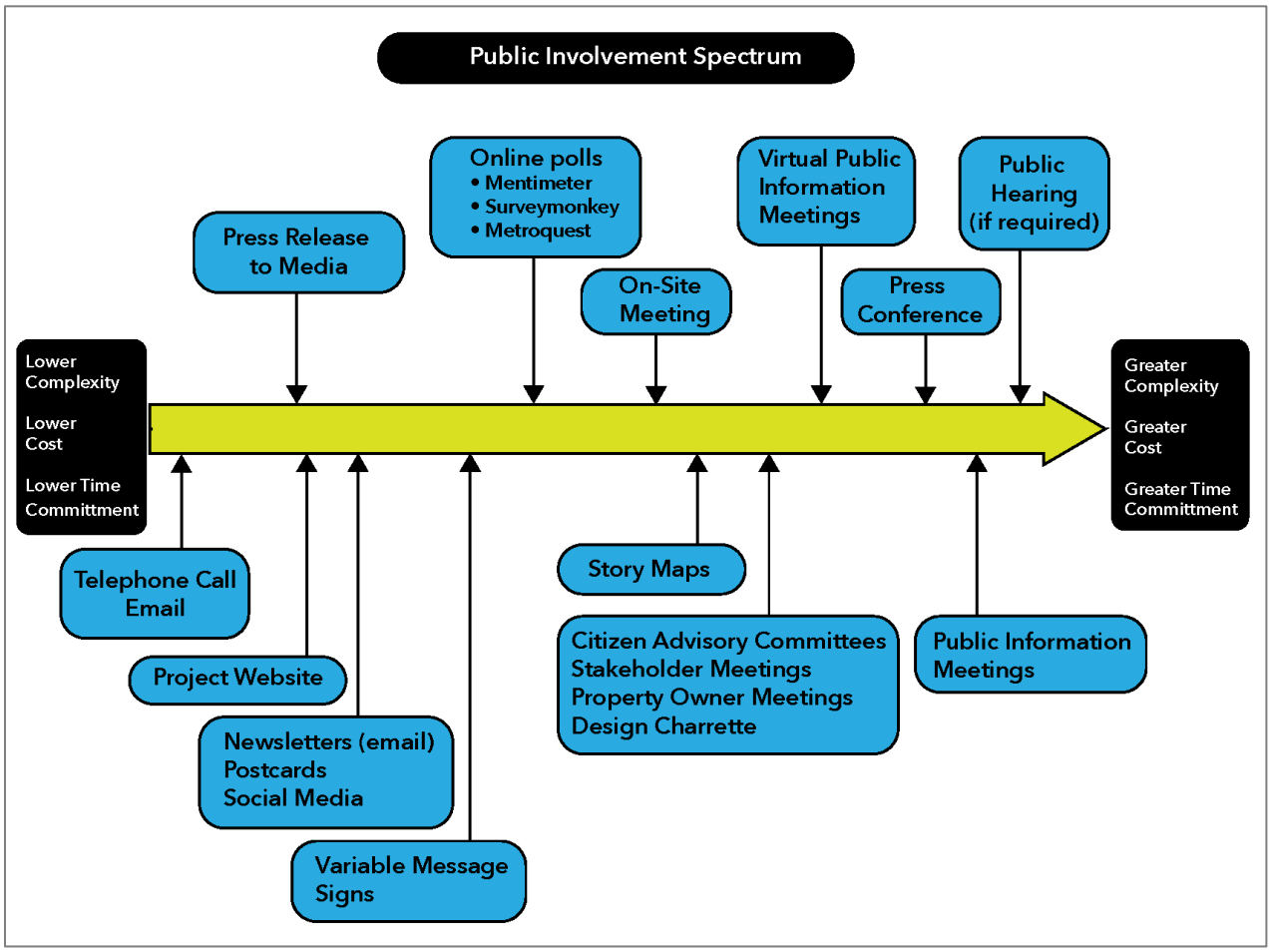


Figure 4: Spectrum of Public Involvement Activities

- Public Hearings
  - Used when required. Refer to the *Highway Design Guidance Manual* (**HD-603**) for an in-depth discussion on public hearing details including preparation, announcement, legal notice, how to conduct a hearing, and documentation requirements.
- Public Meetings – Both in-person and virtual formats
  - Citizens' Advisory Committees
  - Stakeholder Groups
  - Public Information Meetings – Typically adopt an informal format
  - Property Owner Meetings – Typically include property owners where right of way is needed
- Design Charrettes
  - Meetings called to resolve problems or issues and can include members of the PDT, stakeholders, and the public. A time limit is imposed for participants to reach a resolution.
- Newsletters
  - Can be emailed or issued via postcards

    - Local elected officials, homeowners associations, and other associations (such as business associations) can include project information in their newsletters
- Press Release to Media
    - Distributed to print, television, radio, and online outlets
- Social Media
    - If using Facebook, a Facebook Boost can be used to target specific audiences, such as those within a defined geographic location. It amplifies a post's reach at a low cost.
- Project Website
    - On District webpage
    - Project-specific webpage
- ArcGIS StoryMaps
    - A web-based application for sharing maps, narratives, and multimedia content with the public.
- Online Surveys
    - Metroquest, Mentimeter, and Surveymonkey are a few examples.
- Variable Message Signs
    - Used onsite to notify public of upcoming meetings
- Press Conference or press releases
    - coordinate with KYTC's Office of Public Affairs
- Telephone calls or email communications with public

Red Flag: If conducting a public meeting virtually (through an online meeting) consult the KYTC Virtual Meetings Guidance. Although virtual engagement can reach a wider audience, care should be taken to prepare for the meeting. This includes planning for technical difficulties, practicing the presentation ahead of time, assigning a person to serve as an online moderator, and deciding how to document and respond to public comments.

SIDE NOTE: If it can be demonstrated that expenditures made to public meeting participants are "necessary and reasonable" this can be an acceptable use of federal funds as project expenses (2). Examples include, providing food and childcare at meetings, hiring of community-based organizations, and providing financial incentive/reimbursement for participation (2).

5. Associated Articles

Highway Knowledge Portal: Build Your Team

PMGB – PM & Preliminary Design (Coming Soon)

PMGB – Organizing and Efficiently Running Project Development Team Meetings (Coming Soon)

PMGB – Effective Communication in Project Management (Coming Soon)

6. Reference Documentation

1. **Florida DOT Public involvement Handbook (August 2023)**
2. **Promising Practices for Meaningful Public Involvement in Transportation Decision-Making, USDOT**
   KYTC Highway Design Guidance Manual
   KYTC Traffic Operations Guidance Manual
   KYTC Division of Maintenance Guidance Manual
   KYTC Public Involvement Process (2020)
   KYTC Planning Manual
   KYTC Public Involvement Toolbox
   KYTC Virtual Meetings Guidance (September 2020)

KYTC Partnering Conference, 2021 | Public Involvement Post Pandemic; Connecting Virtually and In-Person:
KYTC Division of Environmental Analysis Guidance Manual
KYTC Scheduled Public Meetings
FHWA Public Involvement Techniques for Transportation Decision Making (2015 Update)
KYTC Highway District Media Pages

7. Definitions

Public involvement is the process of actively engaging and involving the public in decision making. KYTC carries out public involvement activities to solicit input, receive feedback, and formally consider public perspectives during transportation planning, design, and implementation processes.

Public includes all users of the facility (irrespective of transportation mode); individuals, businesses, and organizations affected by the project; elected officials, and others interested in the project's outcome.

Public involvement plan (PIP) is a plan created to guide public involvement activities conducted by the project development team on a project. It should identify affected communities/stakeholders, lay out an overall approach for engaging the public, and list specific actions steps (i.e., who will do what, on what timeline, and with what resources).

Preparing for Letting	Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1.0 Roadway (& Structures) Plans, Specs, & Estimates to Project Manager/Plan Processing & Review	x	x	x	
2.0 Advertisement and Questions and Answers from the Division of Construction Procurement Website	x	x	x	x
3.0 Utility Relocation Plans, Specs, and Estimates to Project Manager	x	x	x	
4.0 Utility and Rail Certification Note	x	x	x	x
5.0 Right of Way Certification	x	x	x	x
6.0 Environmental Clearance	x	x	x	x
7.0 Final Contract Plans & Begin Letting Process	x	x	x	x
8.0 Proposal Only Projects		x	x	x
9.0 Pre-Bid Meetings and Coordination during Construction	x	x	x	x
x = Information from the topic may be applicable for the project classification.				

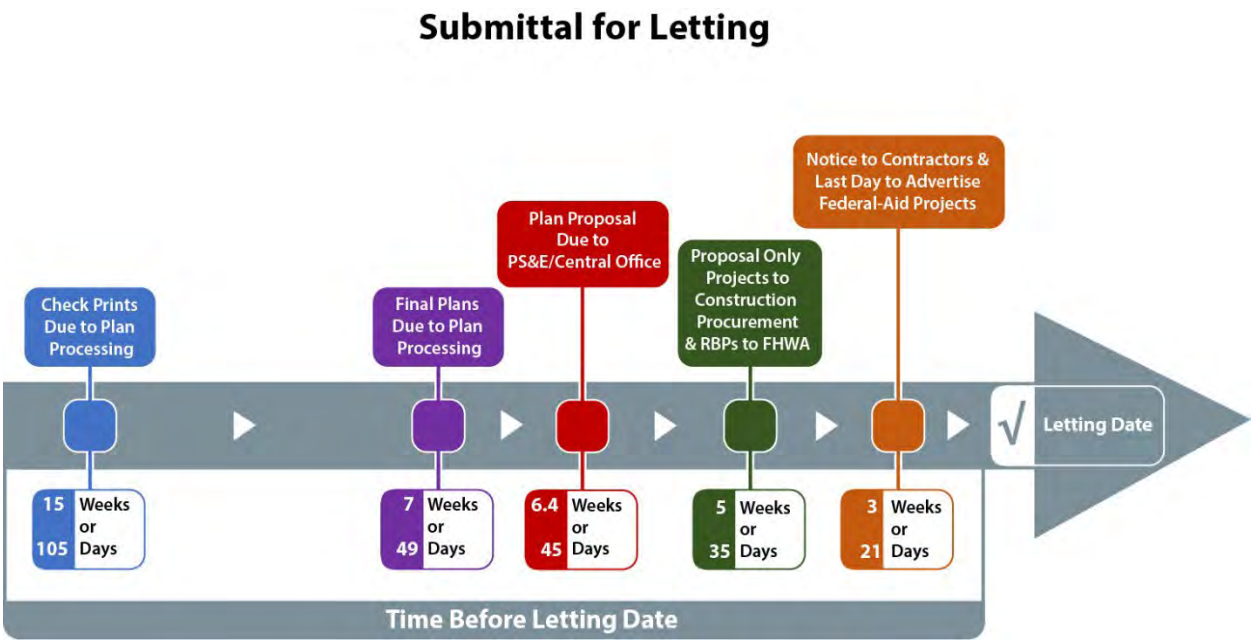
1. Roadway (& Structures) Plans, Specifications, & Estimates to Project Manager/Plan Processing & Review

On projects that include plans, the PM submits the following materials to the Plan Processing Branch approximately fifteen weeks before the scheduled letting date:

- Check prints (first submittal of final plans)
- Cost estimate
- Estimated completion date

The Plan Processing Branch returns plans to the PM with comments. The PM then makes necessary revisions to the plan set so that all appropriate items are included. See **HD-200** in the *Highway Design Guidance Manual* for detailed formatting requirements for the components of a complete plan set. Final plans for projects with PS&E (plans, specifications, and estimates) must be submitted at least 49 days in advance of the letting to the Plan Processing Branch. Proposal-only projects processed by the Division of Construction Procurement must be submitted at least 35 days before the letting. The PM ensures that all materials needed for the letting process are submitted.

The Plan Processing Branch's website publishes a Letting Schedule every year. The PM compiles final project components, performs bid-ability reviews, and assembles all the project plan sets (e.g., roadway, cross sections, utility relocation, traffic, and/or structures) and the branch ensures all the components are there.



Deadlines vary by project type. A Final Plan Submittal Form is required for all projects that have plans. The Project Development Checklist (PDC) is a federal requirement. Guidance and submittal requirements are available on the form. Risk-based Projects (RBPs) are projects identified by the FHWA KY Division that require federal oversight of certain activities. If FHWA has identified a project as an RBP with involvement in the PS&E activities, the PS&E package will need to be sent to FHWA for their concurrence at least 5 weeks prior to the letting. Local Public Agency (LPA) projects have an LPA PDC which can be accessed through KYTC's LPA Guide.

Section 8 provides information on proposal-only projects.

Red Flag: If the final construction bid documents contain utility relocation plans, they are incorporated into the final plan set once they are received from the utility designer. More information is available in **UR-1200** *of the Utilities & Rails Guidance Manual.*

Red Flag: When a railroad is involved, special notes or provisions that were made part of the binding agreement between KYTC and the railroad company are included in the project proposal. Typically, the Division of Construction Procurement's Plans, Specifications, and Estimates Branch requests from the Rail Coordinator Special Notes for Protection of Railroad Interest and Form TC 69-11 (Summary for KYTC Projects That Involve a Railroad). The Railroad Coordinator reviews final plans to confirm that the railroad company's comments and requirements have been integrated into the plans.

2. Utility Relocation Plans, Specifications, and Estimates to Project Manager

Utility relocation plans document the work required to remove utility facilities from a proposed roadway work area and reestablish their preexisting functionality in a new location. Services and functions provided by relocated facilities must be identical to those provided before relocation. The PM provides information about the location and scope of the project to the district utility supervisor or their staff for coordination with the utility companies in the project area. The utility relocation plans are typically prepared by the utility company or their consultant, but they may also be prepared by the roadway designer.

- When utilities are relocated as part of the highway contract, the PM incorporates final utility relocation plans into the final roadway plans.
- When utility relocation is not part of the roadway contract, the PM may deem it necessary to include utility relocation plans in roadway construction documents for informational purposes only. The District Office Utilities Section may be able to provide utility relocation plans.

Utility relocation plans are required for compensable and non-compensable facility relocations. For more information on reimbursement for the relocation of utility facilities, see UR 203 and 204 in KYTC's *Utilities and Rails Guidance Manual.* If utility companies expect compensation, they must submit cost estimates.

Prompt submission of utility relocation plans helps the Cabinet ensure that:

- All relocated facilities avoid physical conflicts with the road project.
- All relocated facilities avoid physical conflicts with other relocated facilities.
- All facility relocations comply with the Cabinet's utility accommodation policy.

KYTC roadway plan submittals incorporated into the bid package follow a prescribed schedule and process. Similarly, Utilities staff are responsible for submitting utility relocation plans that will be included in the bid package. The PM must coordinate with the Utilities staff to ensure a timely submittal.

3. Utility and Rail Certification Note

Milestone

The PM must make sure every set of construction bid documents includes utility and rail certification notes that communicate (1) the presence, location, and relocation of utility facilities; (2) the presence and impact of railroad facilities; and (3) related structures. These notes inform contractors of facility locations and describe planned and completed facility relocations or adjustments. For planned facility relocations, the notes inventory incomplete utility construction work and its approximate completion date(s). They describe the presence of railroad facilities within the project area, or facilities that are close enough to potentially impact the project. When railroad facilities are expected to impact a project, railroad notes and documentation define expectations for bidding contractors with respect to flagging service needs, insurance, and other considerations.

Contractors review utility and rail certification notes when preparing bids. Additionally, construction personnel use the notes to:

- Plan project execution.
- Identify possible hazards during excavation and grading activities.
- Identify abandoned facilities.
- Plan operations involving the use of cranes, booms, or other equipment that is of sufficient height to impact aerial facilities, encroach upon critical areas, or which may otherwise require consideration during ongoing utility work.

The amount of detail in utility and rail certification notes varies according to project needs, the complexity of facilities described, project complexity, and the potential impact of utility facilities and related structures on a project. A certification note template and details are available in the Kentucky Utility and Rail Tracking System (KURTS).

Red Flag: As per 23 CFR 635.309, on Federal-aid projects the utility and rail certification note must be delivered before bidding can be authorized. KYTC requires delivery of the utility and rail certification note prior to releasing construction funds on any project, including those without utility or rail impacts.

4. Right of Way Certification

Milestone

The District Right of Way Supervisor prepares a Right of Way Certification (Form TC 62-226) and submits it to the PM and Director of the Division of Right of Way and Utilities. The PM ensures that a signed certification is included in the final plan submittal documents. Form TC 62-226 is applicable to both state and federal projects. However, a Right of Way Certification must be submitted to FHWA for approval on all interstate projects and selected non-interstate projects with FHWA oversight before construction is

authorized. For all other NHS projects, copies of the Right of Way Certification are submitted to FHWA for informational purposes only.

RW-1302 in the *Right of Way Guidance Manual* lists all information included with the Right of Way Certification form.

If a project letting is postponed, Right of Way Certifications with exceptions must be revised and resubmitted.

5. Environmental Clearance

Milestone

Obtaining environmental clearance requires approval of a project's completed environmental document. Except for some levels of categorical exclusions (CEs), the document must be approved by FHWA. **EA-404** in the *Environmental Analysis Guidance Manual* discusses approval requirements for CEs. State-funded projects do not require FHWA approval, but they may require an approval or permit from another federal agency that needs NEPA documentation (e.g., USACE permits, USCG permits, easements on federally owned property or federally designated lands [such as Daniel Boone National Forest]).

Sometimes an environmental document is approved, and project commitments place requirements on construction activities (e.g., clearing restrictions). The Division of Environmental Analysis (DEA), the PM, and the District Environmental Coordinator (DEC) must ensure requirements are formally communicated to KYTC construction staff and contractors via the bid package and final contract documents. This may be done using a Communicating All Promises (CAP) or Special Notes in the project bid package.

> Communicating All Promises **(CAPS)** are commitments made to project stakeholders and the public. CAPs are included in the project database system. See **HD-203.4** for more information.

A Kentucky Pollutant Discharge Elimination System (KPDES) permit certifies construction activities do not violate Kentucky water quality standards (see **EA-1108** in the *Environmental Analysis Guidance Manual*). The PM must verify a project's bid package contains KPDES permit information. This information is to remain in the final contract documents. An individual KPDES permit must be obtained when planned construction activities will not meet Division of Water KYR10 general permit criteria (e.g., discharge into a Special Use Water). Irrespective of permit type, the PM prepares plan details required for the KPDES permit process. This typically includes topographic mapping of Disturbed Drainage Areas (DDAs). These areas are to be outlined, measured, and located by coordinates. The PM should coordinate mapping with the DEC.

Red Flag: When a project delay postpones letting, the environmental clearance may expire before construction activities begin. The PM must communicate changes in the letting (i.e., current project status) to the DEC as they may need time to obtain reevaluations from the agencies which have jurisdiction. Environmental approvals do expire. **EA-410** *in the Environmental Analysis Guidance Manual notes how long documents associated with the NEPA process remain valid.*

Red Flag: Prior to requesting approval of Construction funds, all CE projects must be reevaluated to establish whether or not conditions have changed, rendering the CE classification invalid, unless there have been no changes and the CE has been approved within the last 90 days (see IV. CE Re-evaluations in the Categorical Exclusion Guidance Manual).

6. Final Contract Plans & Begin Letting Process

Milestone

Final Contract Plans are the highway plans that will be awarded through the letting process. Contract Plan Sets are the product of the project development process and consist of the Roadway, Structures, Traffic, and/or Utility Relocation Plans.

The PM or a designee bundles the following items with the final contract plans submitted to the Central Office Division of Highway Design:

- Final contract plans in a full-size PDF pursuant to the latest CAD Standards policy (these become the Record plans.)
- A Final Plans Submittal Form
- Information needed to create the proposal, including the following, when applicable:
    - CAP Report (even if the CAP has no entries) (**HD-203.4**)
    - Final estimate (including all items in the complete contract plans)
    - Project construction schedule (fixed completion date or maximum working days)
    - Permit and/or water quality certification (**EA-1101**)
    - Utility impact notes (even if there are no utility impacts)
    - ROW certification (even if there are no right-of-way impacts)
    - Special provisions for protection of railroad interest
    - Project-specific special notes or specifications
    - Approved Traffic Management Plan (TMP) (**HD-206.3**)
    - Best management practices (BMP) documents
    - Notice of Intent (NOI) documents
- Supplemental electronic files (delivered via ProjectWise) required by the CAD Standards for Highway Plans. Note: Supplemental files are provided to bidders for informational purposes only. The PM should review the 3D model prior to submittal.
- On Federal-aid projects, the Project Development Checklist (PDC)

See **CP-301** in the *Construction Procurement Guidance Manual* for more information on items the proposal may include.

Maintenance Project PMs enter project information and estimates into AASHTOWare Project. Information for other project types is entered by the Division of Construction Procurement. During letting, the Division of Construction Procurement (1) advertises highway projects, (2) receives bids to complete project work, and (3) awards projects to the low bidder, if approved by the Awards Committee. Each project receives a target letting date; it is KYTC's intention to deliver all projects to letting on time.

Red Flag: Submitting Final Contract Plans on time prevents scheduling problems and delayed lettings. When submitting Final Contract Plans, the PM must inform the Plan Processing Branch if additional information will need to be inserted into the plans.

The documents prepared for letting should be complementary. In case of discrepancy, Section 105.05 of Kentucky Standard Specifications notes the governing ranking:

Dimensions

1. Plan
2. Calculated
3. Scaled

Documents

1. Questions and Answers from the Division of Construction Procurement Website
2. CAP report
3. Special Notes
4. Special Provisions
5. Plans
6. Standard Drawings
7. Supplemental Specifications
8. Standard Specifications

7. Proposal Only Projects

Less complex projects (e.g., maintenance, pavement rehabilitations, HSIP) often lack separate contract plan sets and are typically referred to as proposal-only projects. Section 6 lists information typically included in the proposal. Proposals are submitted to the Division of Construction Procurement at least five weeks prior to letting. Since there are no separate contract plans, a check-print submittal to the Plan Processing Branch is not required. Proposal-only projects must meet the same requirements for environmental clearance, Utility and Rail Certification Notes, and right-of-way clearance discussed above. They must also include a cost estimate and estimated completion date.

8. Pre-Bid Meetings and Coordination during Construction

Pre-bid meetings are sometimes held with potential contractors to explain complex issues and expectations, answer questions, and gauge levels of interest in the project. Typically, if a project has a pre-bid meeting, attendance is mandatory for a contractor to bid on the project. However, informational meetings may also be held. The PM notifies the Division of Construction Procurement that a pre-bid meeting will be held prior to advertisement. The PM develops an agenda and submits it to the Division of Construction Procurement for posting on its website. After the meeting, the PM submits the sign-in sheet and meeting minutes to the Division of Construction Procurement.

During construction the PM for project development should be involved in any significant changes to the design.

9. Advertisement and Questions and Answers from the Division of Construction Procurement Website

The Division of Construction Procurement advertises construction projects. The purpose of advertisements is to solicit bids from qualified contractors. Advertisements are distributed (1) not less than 21 days before the opening of bids on Federal-aid projects, or (2) not less than 7 days before the opening of bids on projects that are 100 percent state-funded. The bulletins advertising the project lettings and project-related information are posted on Construction Procurement's website. Project-related information includes information that is helpful to the contractor, but not part of the contract plans.

When KYTC receives questions during advertisements, the agency posts those questions and answers on the Division of Construction Procurement Questions and Answers webpage. Published answers are integrated into the contract between KYTC and the successful bidder.

The Division of Construction Procurement forwards questions to the PM, who then provides an answer to be posted to the website. Sometimes PMs forward questions to subject-matter experts (e.g., structural, geotechnical, traffic operations, consultants, district staff) for their input. Because lettings are time-constrained, the PM is responsible for quickly returning clear and informative answers. The PM should coordinate answers with the Construction and Construction Procurement staff. The question-and-answer process may prompt revisions or the addition of an item(s) into the bid documents package (e.g., changes to bid quantities and plan sheets). Changes must be made quickly to process an addendum to ensure the proposal remains in the letting and the contractors have sufficient time to put their best bid together.

10. Associated Articles

Project Management Guidebook *Intro and Overview*

Project Management & NEPA

Project Management & Right-of-Way

Project Management & Utilities

11. Reference Documentation

KYTC's *Highway Design Manual*

KYTC's *Environmental Analysis Guidance Manual*

KYTC's Construction Procurement Guidance Manual

KYTC's Local Public Agency (LPA) Guide

KYTC's Right of Way Guidance Manual

KYTC's Utilities and Rails Guidance Manual

Kentucky Standard Specifications

Kentucky Utility and Rail Tracking System (KURTS)

Document Management and Storage	Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1.0 Document Management, Storage, and Archival Overview	x	x	x	x
2.0 ProjectWise Storage				
2.1 Capital Improvement Projects	x			
2.2 Other Project Types		x	x	x
3.0 Other Storage Tools				
3.1 OneDrive	x	x	x	x
3.2 Program Delivery Platform	x	x	x	
3.3 Professional Services Portal	x	x	x	
3.4 Email Filing	x	x	x	x
3.5 Consultant Evaluations	x	x	x	
3.6 Pavement Design Web Application	x	x	x	
x = Information from the topic may be applicable for the project classification.				

1. Document Management, Storage, and Archival Overview

KYTC Project Managers (PMs) need to abide by sound **document management** practices. Document management refers to how an organization stores, manages, and tracks electronic documents (1). Features of a document management system include standard storage templates, version history control, the ability to check documents in and out, file archiving, the ability to control user permissions and assign rights (e.g., read-only), search functions, and the ability to share files. At the project level, PMs need to preserve files that document the historical record of a project's development.

KYTC's document retention schedule specifies how long project documents must be retained. It is available on the Kentucky Department for Libraries and Archives webpage.

The Kentucky Open Records Act — KRS 61.870 through KRS 61.884 — authorizes individuals to inspect nonexempt public records. If a PM receives a request for copies of project information from a member of the public, they should direct the requester to the Office of Legal Services webpage, which contains instructions for how to file an Open Records request.

If the Open Records request is granted, the PM will receive the request with specific information from the District Attorney. Note that records must be provided to the requester within a certain timeframe. PMs should direct any questions about what documents will be supplied to the District Attorney.

Several tools can help PMs manage and store project documents. The rest of this article describes each.

Side Note: PMs should contact the Office of Local Programs for document management and storage procedures for any Local Public Agency (LPA) projects they are managing.

2. ProjectWise Storage

ProjectWise is the main document management and storage platform for KYTC projects. It offers document control capabilities by allowing documents to be checked in and out. Users can also make files read only and manage who has permission to open/view particular folders.

Each District and the Central Office has a main ProjectWise folder that contains several subfolders. Those most applicable to the PM and Document Management are:

- Active projects are housed in individual project folders within the District directory they are geographically located in.
- Once a project is let to construction and awarded to a contractor the project folder moves to the *Awarded (In Construction)* folder.
- After construction is completed the project folder will move to the *Completed (Constructed)* folder for archival storage. Files are made read only.

Red Flag: If a file is accidentally deleted or an older version is needed, it may be possible to retrieve these files. Contact the Division of Highway Design Technical Support Branch for further information on document retrieval.

2.1. Capital Improvement Projects

When a PM is assigned a project, they can request that a folder be created in ProjectWise by completing an online technical support form available on the Division of Highway Design's CADD Standard website. The project folder template is the same for all projects. Each project folder is broken into subfolders as established in the current KYTC CADD Standards Policy. The CADD standards specify how deliverable files for contract plans and the proposal are to be titled and named. Figure 1 is an example of the standard folder structure.

A project folder contains two main subfolders: *Working Folders* and *Milestones & Submittals*. *Working Folders* contains subfolders to store materials related to different project components (e.g., Construction, Planning) and is used to store all working/draft documents and files. Divisions and Branches should keep copies of working/draft documents in these folders. The PM and project development team (PDT) members must place all documents in the proper ProjectWise folder so they can be retrieved easily in the future.

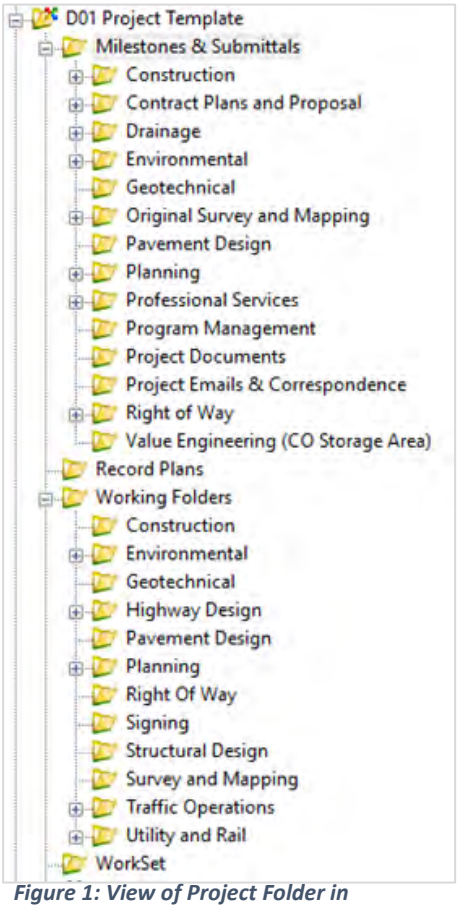


Figure 1: View of Project Folder in ProjectWise

Milestones and Submittals stores all final contract plans and proposal documents, including electronic engineering data. Also placed in this folder are final documents and deliverables (e.g., final drainage folder, traffic forecast, design executive summary, right of way plans and revisions).

A more detailed description of files that should be placed in the appropriate ProjectWise folder can be found on the Division of Highway Design website and the PMGB article *Preparing for Letting (coming soon)*.

Red Flag: While the *CADD Standards for Highway Plans* are to be applied to the deliverable files for Contract Plans and Proposals, **they should not be used** to restrict the format of plans submitted for inspections, public meetings, or interim reviews. If the PDT agrees to hold a digital project review, the PM should make every effort to accommodate the needs of team members without generating paper copies of the plans and supporting engineering documents.

2.2. Other Project Types

ProjectWise can be used to store final project documents for planning study projects with an Item Number. PMs should request and review checklists for electronic document retention of final documents created by the Division of Planning. Final planning studies and reports are posted on the Division of Planning website.

Once a project is let to construction, Section Engineers and Division of Construction staff also use ProjectWise to store project information. Project types whose materials can be stored on ProjectWise include asset management projects, safety projects, and maintenance projects with an Item Number or Contract Identification Number (CID).

Guidance on using ProjectWise for construction administration is available on the Division of Construction's webpage. Once construction is complete, a project's ProjectWise folder is moved to the *Completed (Constructed) Projects* directory. Files placed in this directory are made read only.

Documentation for maintenance projects that **do not** require contractor services through the construction procurement process (including work done by the maintenance crew and/or master agreement) are retained at the county maintenance facility.

3. Other Storage Tools

Some project-related documents are stored outside of ProjectWise. PMs should be familiar with the locations describe below.

3.1. OneDrive

Although OneDrive is not used to permanently store documents, it can be used to share documents with people outside of KYTC (e.g., consultants). OneDrive should be thought of as a temporary storage location for files, with copies always being kept in ProjectWise.

3.2. Program Delivery Platform

KYTC's Program Delivery Platform (PDP) gives PMs a way to track project information, such as budget, schedule, and project component status. Project phase cost estimates can be updated in PDP and past estimates can also be viewed. PDP also stores Communicating All Promises (CAPs) entered by the PM.

3.3. Professional Services Portal

KYTC's Professional Services Portal stores (a) consultant contract information for both individual projects and statewide contracts and (b) documents related to consultant prequalification. Contract documents include independent hour estimates, consultant fee proposals, contract modifications, letter agreements (for statewide contracts), and the notice to proceed. Additional information on KYTC's Professional Services Portal is available in the HKP article *Division of Professional Services*.

3.4. Email Filing

While KYTC does not have a standard for storing project-related email documents, PMs should establish a dedicated folder for each project they are managing in Outlook. This helps them in quickly accessing project-related emails.

When sending project-related emails, PMs should include in the subject line essential project identification details, including the project item number, county, and route. Critical emails, including those that document decisions that were made, can also be stored in ProjectWise.

3.5. Consultant Evaluations

Consultant performance evaluations conducted by PMs and the Location Engineer at project milestones (i.e., conceptual design approval, joint inspection approval, and contract plan submittal) are stored in SharePoint on the Division of Highway Design's intranet website. Additional information on consultant evaluations can be found in the PMGB article *Managing Consultant Contracts*.

3.6. Pavement Design Web Application

KYTC's Pavement Design Web Application is a portal where PMs can submit project pavement designs for approval. The portal stores approved Pavement Design Folders, including attachments to folders that contain typical sections, traffic forecast report, Design Executive Summary, and the geotechnical report. PMs should also keep the final pavement design folder and attachments in the ProjectWise *Pavement Design* folder in the *Milestones and Submittals* folder.

4. Other Articles

1. PMGB – Preparing for Letting (coming soon)
2. HKP Division of Professional Services
3. HKP Managing Consultant Contracts

5. Sources

1. Association for Information and Image Management: https://www.aiim.org/what-is-document-imaging

6. Definitions

Document Management - how an organization stores, manages, and tracks its electronic documents.

KYTC PM Guidebook: Tools for the Project Manager

Tools for the Project Manager	Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1.0 Tools and Resources for the Project Manager	x	x	x	x
2.0 List of Tools and Resources	x	x	x	x
3.0 Associated Articles	x	x	x	x
4.0 Reference Documentation	x	x	x	x
x = Information from the topic may be applicable for the project classification.				

1. Tools and Resources for the Project Manager

Many tools and resources are available to help KYTC Project Managers (PMs) manage projects. Some (e.g., communication tools) are used throughout a project's life cycle while the use of others (e.g., Pavement Design Web Application) is confined to one project phase. Tools and resources are available to facilitate the following project functions:

- Track project schedule (project progress) and budgets
- Communicate with project team members and the public
- Document project decisions and commitments
- Identify project needs
- Assist in project design and decision making
- Manage consultant contracts and payments
- Reduce project risk

The PMGB article *Project Manager Training* provides information on training available for some of these tools.

2. List of Tools and Resources

Table 1 lists project management tools and resources KYTC PMs use most often. If a tool or resource is accessible on the web, a link is provided. Links to associated PMGB or Highway Knowledge Portal articles are also included. These pieces offer more context on the application of tools and resources.

Table 1 *Project Manager Tools and Resources*

Tool Name	Program	Tool Location	Phase of Project	Use	Manual Location	Highway Knowledge Portal Article
Project Management						
Project Managers Toolbox	Web-based	Project Managers Toolbox	Throughout Project Life	• Allows PMs to review the project budget and expenditures by phase. • TC-10 funding authorizations are searchable.	PM Toolbox Manual	
Program Delivery Platform (PDP)	Web-based	Program Delivery Platform Intranet (*KYTC Access Only*)	Throughout Project Life	• Track project information such as budget, schedule, and project component status. • Update project phase cost estimates. • Enter Communicating All Promises. • Document the assigned PM. • Provides project information in a PM Dashboard format.	N/A	PMGB: Document Management and Storage
ProjectWise	ProjectWise	ProjectWise Request Form	Throughout Project Life	• KYTC's main document management and storage platform. Folder structure follows KYTC CADD Standard Policy. • Manage and store draft and final files by project task and phase. • Archive documents when project complete. • Archived design plans by county are available.	KYTC CADD Standard Policy	PMGB: Document Management and Storage
Microsoft Outlook	MS Outlook	Assigned Computer	Throughout Project Life	• Email communication tool used by KYTC. • Used to schedule meetings. • Folders can be created for each project to store emails.	Guides and Cheat Sheets	PMGB: Document Management and Storage
Microsoft Teams	MS Teams	Assigned Computer	Throughout Project Life	• Used to instant message KYTC staff and host virtual team meetings.	Guides and Cheat Sheets	
Microsoft OneDrive	MS OneDrive	Cloud Based	Throughout Project Life	• Share files with KYTC and non-KYTC project development team members.	Guides and Cheat Sheets	PMGB: Document Management and Storage
Highway Design Forms	MS Word and Excel	Highway Design Forms Library	Throughout Project Life	• Links to forms typically used by the PM of a highway design project, including production-hour descriptions and production-hour worksheets.		
KYTC Policy Manual Library	PDF	Policy Manual Library	Throughout Project Life	• Links to KYTC policy manuals.	N/A	
Risk-Based Project Development Tool	MS Excel	Need Link (currently being uploaded to web).	Throughout Project Life	• Based on user input, identifies potential risks and strategies for Key Decision Points and Key Execution Points in project development.	N/A	PMGB: Managing Project Risk
FHWA Risk Management Register	MS Excel	Risk Management Register	Throughout Project Life	• Template spreadsheet for tracking identified risks through assessment, strategy, monitoring, and controlling.	N/A	PMGB: Managing Project Risk
Highway Knowledge Portal	Web-based	Highway Knowledge Portal	Throughout Project Life	• Articles covering engineering topics and knowledge books to aid PMs throughout the project life cycle.	N/A	
Consultant Contract Administration						
Professional Services Portal	Web-based	Professional Services Portal	Throughout Project Life	• Administer consultant contracts, including submitting independent hours, approving units and hours, uploading requests for proposals, and approving contract modifications.	Professional Services Portal User Guide	HKP: Managing Consultant Contracts

Tool Name	Program	Tool Location	Phase of Project	Use	Manual Location	Highway Knowledge Portal Article
Professional Service Forms	MS Word and Excel	Professional Services Forms Library	Throughout Project Life	• Links to forms for administering a consultant contract, including production hour descriptions, consultant monthly reports, and pay estimate forms.	N/A	HKP: Managing Consultant Contracts
Pre-Design Conference Minutes (File download)	MS Word	Pre-Design Conference Minutes	Project Scoping	• Project data are reviewed to refine the purpose and need, the consultant's scope of work is reviewed, and work units for the consultant contract are discussed.	HD-205.4	HKP: Managing Consultant Contracts
Consultant Evaluations	SharePoint	Consultant Evaluations Intranet (*KYTC Access Only*)	Preliminary Engineering, Final Design, Letting	• Consultant performance evaluations at the project preliminary engineering, final design, and final plan submittal stages. • Can be used to review past performance of consultants during consultant selection.	HD-205.9	HKP: Managing Consultant Contracts
Project Initiation						
Work Breakdown Structures	MS Project or PDF	Critical Path Project Templates	Throughout Project Life	• Breaks down the project scope and deliverables into smaller pieces, illustrates how they fit into the project development process, and shows relationships between them. • Helps with resource determination and scheduling.	N/A	HKP: Project Time Management
Planning Studies and Reports	PDF	Planning Studies and Reports	Initiation and Preliminary Engineering	• Source of data, traffic information, safety information, evaluated concepts, initial public input, and preliminary costs for projects that may overlap planning study areas.	HD-202.3.1	PMGB: PM and Planning
Data Needs Analysis Studies	PDF	Data Needs Analysis Studies	Initiation and Preliminary Engineering	• Brief, limited, small-scale studies that contain basic existing data, identify project development concerns, and provide an initial definition of the purpose and need.	N/A	PMGB: PM and Planning
Gantt Chart	MS Project or similar program	Assigned Computer	Throughout Project Life	• A chart illustrating the project schedule. Shows the duration and relationships between work activities and tasks. The critical path can be identified. • Typically encountered on alternative delivery method projects.	N/A	HKP: Project Time Management
Continuous Highway Analysis Framework (CHAF)	Web-based	CHAF Intranet (*KYTC Access Only*)	Project initiation	• Database that collects and tracks identified transportation needs.	HD-202.1	PMGB: Project Identification
Highway Plan	Web-based	Program Management	Project Initiation	• The Enacted Highway Plan provides the project schedule and budget by phase as enacted by the Kentucky Legislature that the PM is to use. • Past versions of the Highway Plan and the Governor's Recommended Highway Plan can also be found on the Program Management website.	HD-202.1	PMGB: Project Identification
Highway Information View and Extract Interface (HIVEi)	Web-based	HIVEi	Project Initiation	• Provides data on existing roadway facilities, including Highway Systems, Roadway Information, Roadway Features, Pavement Data, Traffic Data, and Bridge Data.	HD-202.3.4	PMGB: PM and Planning PMGB: Project Initiation
KYTC Traffic Count Reporting System	Web-based	Traffic Counting Reporting System	Project Initiation	• Historic traffic count data by count station ID.	HD-202.3.3	PMGB: PM and Planning PMGB: Project Initiation
Highway Information System (HIS)	Web-based, ESRI ArcGIS	Highway Information System	Project Initiation and Preliminary Engineering	• GIS data for roadway attributes, route logs, and roadway feature type.	HD-202.3	PMGB: Project Initiation

Tool Name	Program	Tool Location	Phase of Project	Use	Manual Location	Highway Knowledge Portal Article
KYTC Mapping	Web-based and PDF	Maps/Resources	Throughout Project Life	• Links to online and print maps, including the active highway plan, photolog viewer, bridge data miner, functional classification, traffic counts, and archive plans, among others.	HD-211.3	PMGB: Project Initiation
Crash Data Analysis Tool (CDAT)	Web-based	CDAT	Project Initiation and Preliminary Engineering	• Interactive web-based tool to analyze Kentucky crash data. • User must sign MOA and be granted permission before accessing.	HD-202.3.4	PMGB: Project Initiation
Kentucky State Police Collision Data	Web-based	KSP Collision Data	Project Initiation and Preliminary Engineering	• Publicly available crash data.	HD-202.3.4	PMGB: Project Initiation
Google Earth	Web-based	Google Earth	Throughout Project Life	• Aerial view interactive mapping and Streetview mapping. Geometric CADD files can also be displayed in Google Earth using the .kmz format. • Historic mapping, including for Streetview, is available at some locations.	N/A	
KYTC Public Involvement Toolbox	Web-based	Public Involvement Toolbox	Preliminary Engineering	• Provides public involvement tools and techniques. Also includes examples.	N/A	PMGB: Public Involvement
Preliminary Engineering						
Design Executive Summary Form (File download)	MS Excel	Design Executive Summary	Preliminary Engineering	• Record of engineering decisions related to the project. • Justifies the preferred alternative and requested design exceptions or variances.	HD-203.6	PMGB: PM and Preliminary Design
Estimator	Estimator Program	KYTC Estimator Page	Preliminary Engineering, Final Design, Letting	• Program used to develop project construction estimates based on unit bid items and estimated quantities. Estimate factors in seasonal adjustments. • Subject matter experts can be a resource when developing bid items and quantities. • *Note: Estimator may be replaced by AASHTOWARE in the future.*	N/A	
KYTC Geotechnical Investigations	Web-based	KYTC Geotechnical Data	Project Initiation	• Provides historical roadway and structure geotechnical reports.	HD-202.3.8	PMGB: PM and Preliminary Design
Archive Plans	Web-based mapping	Project Plan Archives	Preliminary Engineering	• Downloadable PDFs of archived record plans.	HD-202.3.2	PMGB: Project Initiation
KYFromAbove	GIS Image mapping	KYFromAbove	Preliminary Engineering	• Downloadable point cloud data, digital elevation models, color imagery, and elevation data.	HD-202.3.5	PMGB: Project Initiation
FEMA Flood Map Service Center	Web-based, PDF	FEMA	Preliminary Engineering	• Downloadable FEMA flood maps.	HD-202.3.5	PMGB: Project Initiation
Kentucky Water Resource Info System	Web-based mapping	Kentucky Infrastructure Authority	Preliminary Engineering	• Web-based mapping for drinking water and wastewater/sewer.	N/A	PMGB: Project Initiation
Communicating All Promises (CAP)	Web-based in PDP	Program Delivery Platform Intranet (*KYTC Access Only*)	Preliminary Engineering and Final Design	• Record of promises KYTC made during project development. • Can include environmental commitments, commitments to property owners, and commitments to stakeholders.	HD-203.4	PMGB: Project Management and NEPA
Environmental Assessment Tracking System (EATS)	Web-based	Intranet (*KYTC Access Only*)	Preliminary Engineering and Final Design	• A web-based tool that tracks the environmental process. • PM can review in PDP.	N/A	PMGB: Project Management and NEPA

Tool Name	Program	Tool Location	Phase of Project	Use	Manual Location	Highway Knowledge Portal Article
CE Checklist and Matrix	PDF	CE Matrix	Preliminary Engineering	• Summary of the four levels of Categorical Exclusions.	N/A	PMGB: Project Management and NEPA
Kentucky Utility and Rail Tracking System (KURTS)	Web-based	KURTS (*KYTC Access Only*)	Preliminary and Final Design	• A web-based tool that tracks the utility coordination process. • PM can review in PDP.	UR-301	PMGB: PM and Utility Coordination
KROWDS/RWUMS	Web-based	Intranet	Preliminary and Final Design	• A web-based tool that tracks the right-of-way acquisition process. • PM can review right-of-way summary information in PDP.	N/A	
SAFERoad Solutions	Web-based	SAFERoad Solutions	Preliminary Design	• Provides an overview of innovative intersections, interchanges, and designs. • Includes informational videos, traffic, and safety characteristics of each. • Can be a resource for public involvement.	N/A	HKP: Intersection Control Evaluation
Complete Streets Program	Web-based PDF	Complete Streets	Preliminary Design	• A guide to implementing safe and equitable transportation strategies for facilities in rural and urban Kentucky.	Complete Streets Manual	
Final Design						
Pavement Design Web Application	Web-based	KYTC Pavement Design	Final Design	• Aids in the selection of pavement type. Includes the approval process and archives the pavement design selected.	HD-1001.1	PMGB: PM and Final Design
Standard Drawings	Web-based PDF	KYTC Standard Drawings	Final Design	• Webpage that links current Standard Drawings and Sepia Drawings used in design. • Historic Standard Drawings are also linked.	N/A	
Standard Specifications for Road and Bridge Construction	Web-based PDF	KYTC Standard Specifications for Road and Bridge Construction	Final Design	• Provides the current KYTC standard specifications for roadway and bridge construction. • Includes bid items, units of measurement, specifications, and tolerances.	N/A	
Drainage Resource Materials	Web-based	KYTC Drainage Resources	Final Design	• Webpage that links to drainage-related items such as the three-sided culvert policy, drainage calculation spreadsheets, reference documents, and BMP plans.	Drainage Manual	PMGB: PM and Final Design
Traffic Management Plan (File download)	MS Word	Traffic Management Plan	Final Design	• The Traffic Management Plan (TMP) incorporates elements of the traffic control plan. Different requirements for significant or other project types.	HD-206.3	
Final Plan Submittal Form (File download)	MS Excel	KYTC Final Plan Submittal Form	Final Design	• Lists the final deliverable documents and files (including CADD files) needed for a project to be let. • Final Plans and Final Plan documentation are uploaded to the Contract Plans and Proposal folder in ProjectWise.	HD-209.1	PMGB: Preparing for Letting
Project Development Checklist (File download)	PDF	Project Development Checklist	Final Design	• A form required on federally funded projects to summarize conformance to FHWA Federal-aid regulations, policies, and guidance.	HD-209.3	PMGB: Preparing for Letting

2. Associated Articles

HKP: Managing Consultant Contracts

HKP: Project Time Management

HKP: Intersection Control Evaluation

PMGB: Document Management and Storage

PMGB: Managing Project Risk

PMGB: PM and Planning

PMGB: Project Identification

PMGB: Project Initiation

PMGB: Public Involvement

PMGB: PM and Preliminary Design

PMGB: Project Management and NEPA

PMGB: PM and Utility Coordination

PMGB: PM and Final Design

PMGB: Preparing for Letting

3. Reference Documentation

KYTC PM Toolbox Manual

KYTC CADD Standards Policy

KYTC Highway Design Manual

KYTC Utilities and Rail Manual

KYTC Drainage Manual

KYTC Professional Services Portal User Guide

Project Management Training	Project Classification			
	Capital Improvement Projects	Safety Projects	Asset Management Projects	Maintenance Projects
1.0 Project Management Training Overview	x	x	x	x
1.1 Project Management	x	x	x	x
1.2 Transportation Decision Making	x	x	x	x
1.3 Leadership Training	x	x	x	x
1.4 Consultant and Contract Administration	x	x	x	
1.5 Communication / Soft Skills	x	x	x	x
x = Information from the topic may be applicable for the project classification.				

1. Project Management Training Overview

Maintaining a well-trained and knowledgeable workforce is integral to the Kentucky Transportation Cabinet (KYTC) fulfilling its mission. Competent Project Managers (PMs) can improve project delivery success rates. A successful project meets the defined scope with quality solutions and deliverables on schedule and within the specified budget (1). Knowledge of project management skills are relevant to the delivery of all project types — capital improvement, safety, asset management, and maintenance.

Cabinet PMs can access several training courses on project management. Trainings are offered by external (e.g., professional organizations, government institutions) and internal sources (e.g., Office of Human Resource Management, in-house webinars). When requesting training from an external source KYTC staff must submit a completed version of Form TC 12-242 (External Training Authorization and Registration).

The HKP article *Department of Highways Training Resources* provides a more extensive list of trainings offered to KYTC staff.

Trainings focused on project management skills are categorized into five areas:

1. Project Management
2. Transportation Decision Making
3. Leadership
4. Consultant and Contract Administration

5. Communication / Soft Skills

PMs need knowledge in each of these areas to deliver successful projects.

1.1. Project Management

Project management training focuses on the tasks, responsibilities, and knowledge needed to manage a project.

1.1.1. AASHTO Technical Committee on Project Management Webinars

The AASHTO Technical Committee on Project Management offers webinars throughout the year on transportation project management. They are presented by practitioners and project management experts from across the country. Past webinars have covered topics such as cost estimating, change management, working with consultants, budgeting, and communication. They can be viewed by visiting the Project Management Webinar Series webpage.

1.1.2. Project Manager's Boot Camp

Sponsored by the Division of Highway Design, the purpose of Project Manager's Boot Camp (PMBC) is to help KYTC continue improving its success rate in delivering the *Enacted Highway Plan*. Successful project delivery helps the Cabinet fulfill its mission and enriches the lives of all Kentuckians. Attendees improve their project management skills and learn about the roles and responsibilities of PMs and other subject-matter experts (SMEs) involved in projects. Information on the PMBC can be found on the Kentucky Transportation Center's website. This eight-day training covers the following topics:

- Project Management: Your Project and the KYTC Mission
  - Understand the KYTC Mission
  - Roles and Responsibilities of a Project Manager
  - Change is inevitable
- Project Management: The Task at Hand
  - Overview of Kentucky's *Enacted Highway Plan*
  - Project Costs and Schedules
  - Project Management described
  - Importance of Communication
  - Work Breakdown Structures
- Project Management: Where's the Data and Money for My Project?
  - Project Cost Management
  - Division of Planning Resources
  - Transportation Funding
  - Program Management
- Project Management: Where's my Help?
  - Managing Consultants
  - Professional Services
  - Professional Ethics
- Project Management: DEA Day at the Boot Camp!
  - Overview of the NEPA Process
  - Critical Path of the NEPA Process
  - Clean Water Act, Endangered Species Act

- Project Management: You Mean There's More Engineering to this than the Roadway?
  - Division of Structural Design
  - Traffic Operations in Project Development
  - Utility and Rail Coordination
  - Highway Design in Project Development
- Project Management: Not in My Backyard! I Don't Have the Time!
  - Right of Way in Project Development
  - Office of Legal Services and Condemnation Process
  - Project Risk and Time Management
- Project Management: Get Me to the Finish Line!
  - Bidding and Construction Procurement Process

Project Manager's Boot Camp Xpress is a two-day version of PMBC required for all consultant PMs. Xpress covers many of the topics addressed by PMBC in an abbreviated form and communicates the importance of consultant PMs to the Cabinet's success.

1.2. Transportation Decision Making

Transportation decision making requires PMs to balance engineering needs with social, economic, and environmental factors (2). Making sound project-related decisions requires PMs to fully understand KYTC's project delivery core processes. The Highway Design Manual Section 200 and Exhibit 200-01 present an overview of these processes (Figure 1).

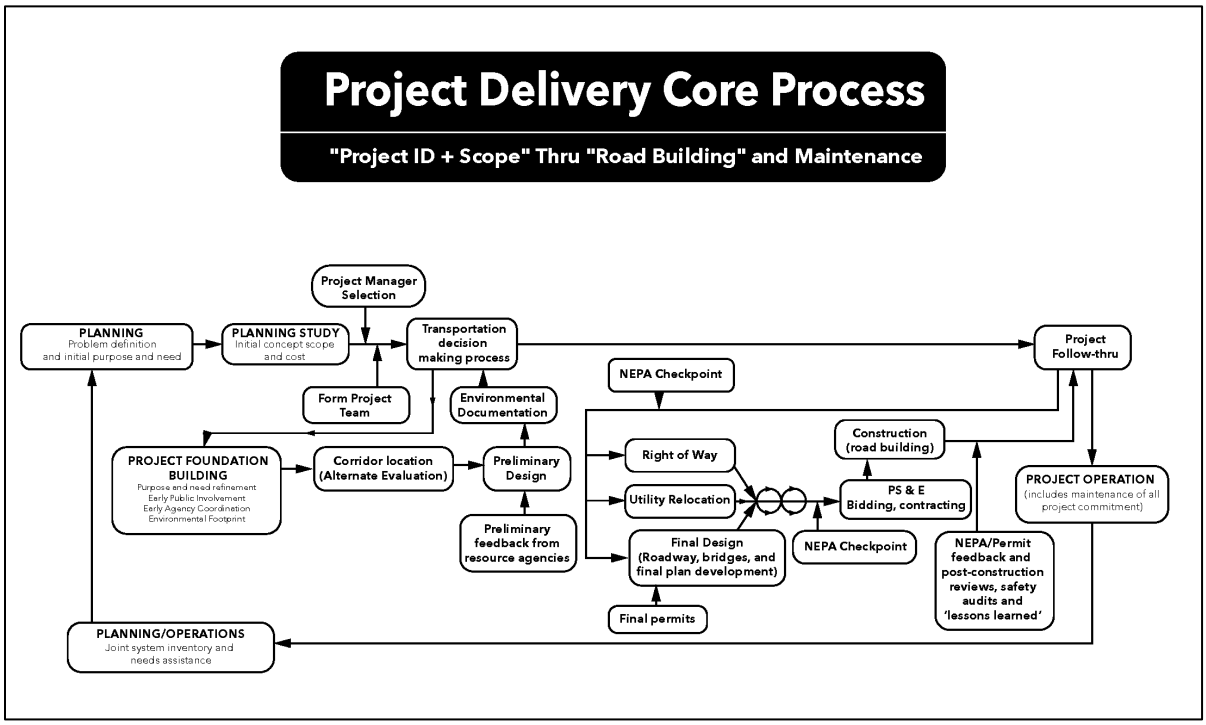


Figure 1: KYTC Project Delivery Core Processes

To successfully lead projects, PMs should be familiar with many subjects, like the National Environmental Policy Act (NEPA) process, public involvement activities, right of way acquisition, and utility coordination, to name a few. A PM's knowledge of these areas does not need to be at the same level as a SME. However, they need to understand how each component affects the project scope, schedule, budget, and quality (e.g., if condemnation is used to acquire right of way, the PM needs to know the length of time it generally takes to complete the condemnation process to acquire a parcel).

1.2.1. ACEC/KYTC/FHWA Partnering Conference

The annual ACEC/KYTC/FHWA Partnering Conference takes place every autumn and often includes presentations focused on project management. Conference participants include KYTC staff from multiple branches and divisions, FHWA representatives, members of the engineering consulting industry, and local government staff. Past presentations are available on the KYTC Highway Design website.

1.2.2. National Highway Institute Trainings

Established by Congress in 1970 as the FHWA's training and education arm, the National Highway Institute (NHI) has a long and rich history of innovation and expertise in delivering transportation training (3). A full listing of the courses offered can be found at the NHI Course Search Page. Below are classes relevant to transportation decision making and project management. Typically, the Division of Highway Design is responsible for organizing NHI trainings pertinent to PMs.

- NEPA and the Transportation Decision Making Process
- Public Involvement in the Transportation Decision Making Process
- Real Estate Acquisition under the Uniform Act: An Overview
- Introduction to Utility Coordination for Highway Projects
- Utility Coordination for Highway Projects
- Risk Management

1.3. Leadership Training

The Project Management Institute defines **Leadership** as the ability to guide, motivate, and direct a team (4). Leadership skills include negotiation, resilience, communication, problem solving, critical thinking, and interpersonal skills (4). Leadership, while not on the technical side of project management knowledge, is essential to the success of a project and for meeting KYTC's goals. Assuming leadership on a project gives PMs the confidence to navigate difficult situations and instills in them a sense of ownership and responsibility that improves the chances of project success. KYTC's Office of Human Resource Management offers the following leadership training opportunities:

1.3.1. Leadership Character Program

A series of courses designed to help KYTC employees develop their leadership knowledge, skills, and abilities. This program focuses on developing the employee's leadership character. The Program consists of five classes and is open to all Cabinet Employees. More information is available in GAP-512.

1.3.2. Leadership Influence Program

A series of training courses designed to help KYTC employees develop their leadership knowledge, skills, and abilities in leading others through influence. The program consists of five classes and is open to all Cabinet Employees. More information is available in GAP-513.

1.3.3. Advanced Leadership Academy

The KYTC Advanced Leadership Academy (ALA) identifies and develops the employee leadership skills essential to the success of KYTC's future operations. ALA is a one-year program comprised of training focused on expanding and enhancing the leadership skills of Cabinet employees. These trainings take place both in the classroom and in the field and include mentor interactions, job-shadowing, and group and individual studies. More information is available in GAP-503.

1.4. Consultant and Contract Administration

Understanding how to effectively manage consultants and administer contracts helps KYTC PMs deliver successful projects. Contract administration entails:

- Advertising for and selecting consultants for engineering services
- Developing independent production hours and negotiating contracts
- Managing the consultant as the project progresses, including paying invoices
- Proceeding with contract modifications, when applicable
- Closing out the project, including any consultant evaluations

To learn more about the PM's role in managing consultant contracts, visit the HKP *Managing Consultant Contracts* knowledge book.

1.4.1. Divion of Professional Services Portal Training

KYTC's Division of Professional Services offers training videos that guide users through various Professional Services Portal functions, including dashboard use, consultant management, pending tasks, project-specific contracts, production hour estimate submittal, and project-specific contract modifications. The videos can be found at this link.

A User Guide offers more detailed instructions on how the Professional Services Portal is used by KYTC PMs, consultant PMs, and Professional Services staff. This guide covers both statewide project contract administration and the administration of contracts on projects advertised individually.

1.5. Communication / Soft Skills

PMs spend most of their time communicating with project development team members, SMEs, project stakeholders, the public, and KYTC leadership. Soft skills help PMs communicate effectively with others. Oxford Languages defines **soft skills** as personal attributes that enable someone to interact effectively and harmoniously with other people. KYTC offers several classes through the Kentucky Enterprise Learning Management System (KELMS) that address communication and soft skills.

2. Associated Articles

PMGB – Managing Consultant Contracts
HKP – Department of Highways Training Resources

3. Sources

1. Project Managers Bootcamp Book 2023. https://ktc.uky.edu/publications/bootcamp-book/
2. FHWA NEPA Transportation Decisionmaking. https://www.environment.fhwa.dot.gov/nepa/trans_decisionmaking.aspx
3. National Highway Institute's Mission. https://www.nhi.fhwa.dot.gov/about-nhi
4. A Guide to the Project Management Body of Knowledge (PMBOK Guide), Sixth Edition, 2017

4. Definitions

Leadership – the ability to guide, motivate, and direct a team.

Soft Skills – Personal attributes that enable someone to interact effectively and harmoniously with other people.