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<b>HIGHWAY DESIGN</b>	<i>Chapter</i> INTRODUCTION
	<i>Subject</i> Purpose of This Guidance Manual

**HD-102      PURPOSE**

The purpose of the *Highway Design Manual* is to present detailed or descriptive design information for Kentucky road projects. This manual has been prepared to provide guidance to personnel of the Transportation Cabinet and primarily to the road designer. The guidance supplied in this manual is based upon Kentucky common practice and relies on guidance from other resources when appropriate.

This *Highway Design Manual* places an emphasis on flexibility. The goal is to be permissive by default and explicit where needed. Sufficient flexibility should encourage independent designs tailored to particular situations. This manual should not supersede the application of sound engineering principles by experienced design professionals.



<b>HIGHWAY DESIGN</b>	<i>Chapter</i>  INTRODUCTION
	<i>Subject</i>  Highway Design Philosophy

**HD-103.1 MISSION STATEMENT**

The mission of the Division of Highway Design is “the timely delivery of engineering solutions and construction documents that maximize the use of highway funds and enhance the safety and operations of the highway system, the natural environment, and the human environment.”

**HD-103.2 PHILOSOPHY**

The design philosophy presented in this manual is intended to promote flexibility in the design of highways. The design of highways should incorporate community values and safety and be efficient, effective mechanisms for the movement of people and goods. The Project Development Branch Manager’s (PDM’s) challenge is to balance preserving and protecting the environmental and cultural values in communities while also providing a highway facility that is safe and that provides the necessary mobility to ensure economic opportunities and an improved quality of life.

Design is a key ingredient in the project delivery process, and it is important to realize that the different functional components must work together to deliver projects. Environmental analysis, right-of-way acquisition, utility relocation, etc. are also key components of project delivery, and each component must be considered in the project decision. The National Environmental Policy Act of 1969 (NEPA) is the backdrop for the Cabinet’s transportation decision-making process. The NEPA process requires decision-makers to use a systematic and interdisciplinary approach. They should consider the environment, along with economic and technical considerations. In short, they should consider the three E’s—Engineering, Environment, and Economics—in all decisions. Highway designers should work with the different functional units to determine the best transportation decision.

There is discussion throughout this manual about the roles of project development teams (PDTs), PDMs, and the Central Office. The Central Office Division of Highway Design is in place to participate and provide support for the

PDMs in the transportation decision-making process. The division will ensure that processes and procedures are followed appropriately.

The Code of Federal Regulations (CFR) Title 23, "Highways," Chapter 1, "Federal Highway Administration, Department of Transportation," should be consulted for all federal-aid projects.

Designers should be flexible in decision-making concerning the design decisions made about each project. The PDM has the responsibility of weighing all the particulars of a given project and making design decisions accordingly. Design decisions should consider safety, mobility, and preserving scenic, aesthetic, historic, environmental, and community values. Design criteria shown in AASHTO's "A Policy on Geometric Design of Highways and Streets" (Green Book) are intended as a guide allowing flexibility to encourage independent designs. Ranges of values are key in Green Book criteria, with the utilization of higher values in the ranges where social, economic, and environmental impacts are not deemed critical.

During the early project development or conceptual design process, key decision points are made that will help determine the outcome of a project. These key decision points are in line with the NEPA decision-making process. The product of the conceptual design phase is a transportation decision with an approved environmental document based on an alternate and not just the preliminary line and grade plans. There is only one product: the transportation decision documented in the environmental document and reflected in the engineering plans.

### HD-103.3 KEY DECISION POINTS

The following steps are key to the development of the project to ensure a shared transportation decision-making process:

- Purpose and Need
- Range of Alternatives
- Scope of Impacts
- Selected Alternative

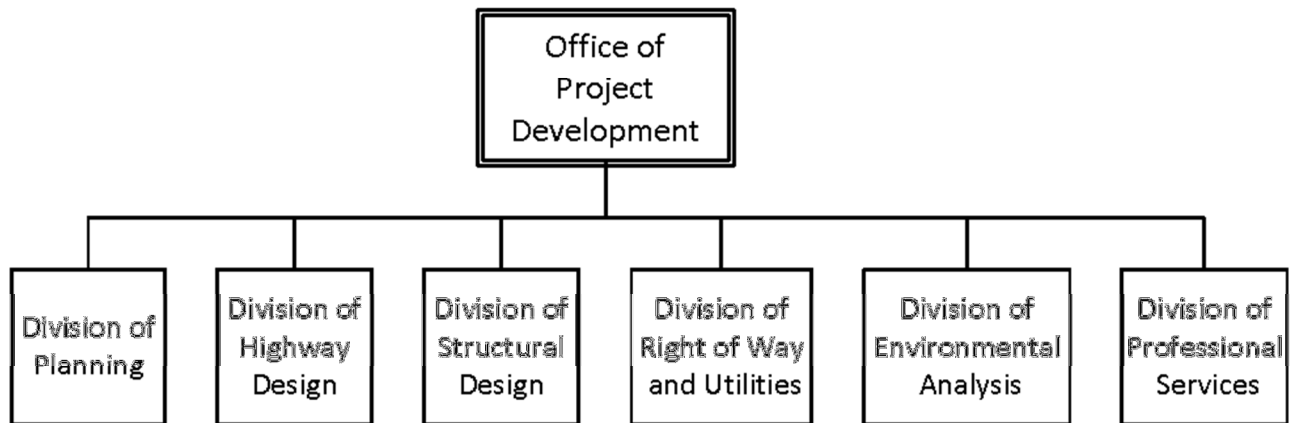
HD-203, "Preliminary Design," provides a detailed example of each step.



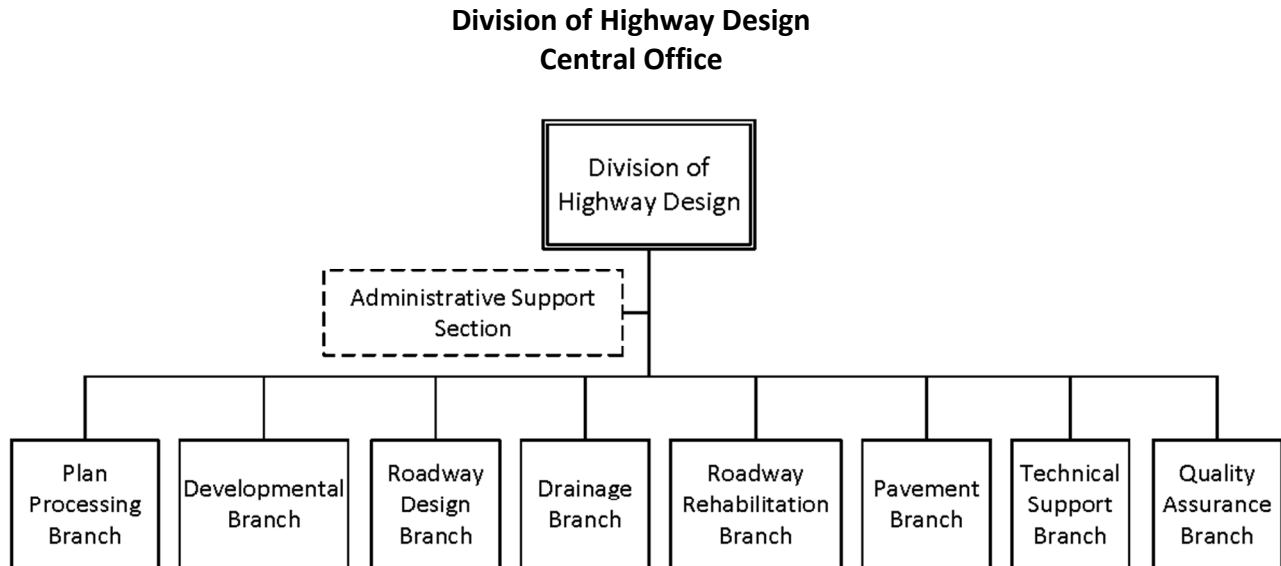
<b>HIGHWAY DESIGN</b>	<i>Chapter</i> INTRODUCTION
	<i>Subject</i> Organization

HD-104.1 ORGANIZATIONAL CHARTS

KYTC Division Offices  
Central Office



The Division of Highway Design is one of the divisions under the responsibility of the Executive Director for the Office of Project Development. The Division of Highway Design, in conjunction with the district design offices, is responsible for the roadway design activities for the Cabinet's Highway Plan projects. This responsibility includes conducting the studies, computations, and analyses necessary to support the preparation, assembly, and production of the construction plans for a project's award.

**HD-104.2 CENTRAL OFFICE**

The primary functions of the Division of Highway Design in the Central Office are:

- Assemble the contract plan set and deliver the plan set to the letting process
- Develop criteria, procedures, and policies for highway/roadway design and ensure consistency in their application
- Offer technical expertise and assistance
- Provide or facilitate training

The director's office includes the director and an assistant director, as well as the Administrative Support Section, which provides administrative support to the whole division. The Director of the Division of Highway Design is accountable for all procedures and quality assurance for all roadway design items.

The Central Office Division of Highway Design comprises eight branches:

- Plan Processing Branch
- Developmental Branch
- Roadway Design Branch
- Drainage Branch
- Roadway Rehabilitation Branch
- Pavement Branch
- Technical Support Branch
- Quality Assurance Branch

**HD-104.2.1 Plan Processing Branch**

This branch is responsible for delivering the contract plan set to the letting. The branch works with the Project Development Branch Manager (PDM) and contributing divisions for final assembly and review of the complete project plan set at the time of letting. The branch ensures that the contract plans are complete and suitable for letting and that all notes and standard drawings are current. The branch also works with the Division of Construction Procurement to ensure clarity and uniformity in the letting process.

**HD-104.2.2 Developmental Branch**

This branch is responsible for the Statewide Highway Design Services Contract and the following three functions:

1. The **CADD (Computer-Aided Drafting and Design)** function is responsible for:

- Highway Plan project design and management
- Studies, reports, and displays requested by executive leadership
- Technical support and software beta testing
- CADD Standards

CADD engineers and technicians provide design services and project management for the district offices and the State Highway Engineer's office, on an as-needed basis and for aspects of the highway design process. They also provide technical assistance for the highway design software, in conjunction with the Technical Support Branch, and test new software prior to implementation. This includes managing the highway design preferences for the Cabinet's CADD Standards.

2. **Standard Drawings** function is responsible for:

- Standard Drawings and subsequent Sepia Drawings
- Research for new products
- Inspection of existing product performance
- As-needed special detail drawings and specifications

The Standard Drawings function maintains and updates the Standard Drawings on a four-year cycle and provides revisions in the interim through Sepia Drawings. The Standard Drawings function also works closely with other divisions and product manufacturers to evaluate existing products and materials and provide new drawings and specifications if needed.

3. **Survey Support** works closely with district survey crews and construction inspectors to provide appropriate equipment and training. Survey support also provides technical expertise for all aspects of survey services and

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manages professional service contracts to supplement in-house survey functions. These include:

- Technical support for software and equipment
- Management of Statewide Aerial & Photogrammetric Services Contract
- Management of Statewide Surveying Services Contract, including Subsurface Utility Engineering (SUE) Services
- Management of Survey Preferences for CADD Standards
- Maintenance/Management of KY Continuously Operating Reference Station (KY-CORS) Network

#### **HD-104.2.3 Roadway Design Branch**

This branch is responsible for oversight of projects in the project development phase and working with the project manager to develop an appropriate design. The branch has the following responsibilities:

- Technical support and reviews
- Budget, scope, and schedule oversight
- Liaison (Central Office to/from districts) for project teams through all stages of design

Location engineers work on behalf of project managers to coordinate with outside agencies, such as FHWA and other state agencies, to facilitate design activities. Location engineers should participate in project meetings from the preliminary engineering phases through the final plan development phases.

#### **HD-104.2.4 Drainage Branch**

This branch works with project managers and consultants to provide practical, cost-effective drainage solutions. The review and approval of drainage folders is conducted by this branch. A project drainage folder is a legal document that contains the hydrologic and hydraulic analysis, as well as other drainage-related rationale, which contributes to the design of each project. The branch is responsible for:

- Review of drainage design on roadway projects and encroachment permits
- Technical expertise and training to Cabinet and consultant technical staff
- Design recommendations for special drainage situations
- Assistance to the Office of Legal Services with drainage-related claims

#### **HD-104.2.5 Roadway Rehabilitation Branch**

This branch is responsible for:

- Managing and coordinating programs for structural rehabilitation of pavements



- Management of a statewide contract for design of pavement rehabilitation projects
- Developing in-house pavement rehabilitation projects on interstates, parkways, and other National Highway System routes
- Design for the Interstate Widening Program
- Reviewing consultant prequalification submittals for purposes of prequalifying firms for engineering-related services in the areas of rural roadway design, urban roadway design, and surveying
- Management of the statewide contract for roadway sign design, which provides for the design of signing plans for interstates, parkways, and other high-volume roads where panel signs are needed

**HD-104.2.6 Pavement Branch**

This branch:

- Prepares, oversees, and/or reviews the preparation of pavement designs on all highway projects
- Develops criteria and procedures used for design of pavements, including structural design, life-cycle cost analyses, and analyses for pavement type selection
- Provides technical assistance with pavement design issues in other areas such as construction, maintenance, and planning
- Works with other agencies in the development and refinement of structural design criteria and procedures for pavement designs

**HD-104.2.7 Technical Support Branch**

This branch:

- Supports and provides training of the highway design software and correlated hardware for the Central Office and district offices
- Works closely with the Developmental Branch to evaluate engineering-based highway design software and hardware into the project design and development process
- Submits requests to Office of Information Technology (OIT) for software, hardware, and computer services
- Maintains document management system for projects
- Maintains historic files of completed projects

**HD-104.2.8 Quality Assurance Branch**

This branch:

- Conducts and participates in constructability reviews of projects prior to letting

- Administers value engineering (VE) studies on special projects, projects over \$50 million, and bridge projects over \$40 million on the National Highway System
- Facilitates post construction reviews to “learn” from project experiences and to document and publish the results
- Maintains Lessons Learned geodatabase

