COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET
FRANKFORT, KY 40622

MANUAL TITLE: ***Traffic Operations Guidance Manual*** **REVISION NO.:** **14**

DATE REQUESTED: **August 2020** **REPRINT:**

REQUESTED BY: **Kim Jasper** **NEW:**

NEW & REVISED POLICIES

CHAPTER/ SECTION	EXPLANATION	OLD PAGES TO BE DELETED	NEW PAGES TO BE ADDED
	The purpose of this printing is to include the following new and revised policies and procedures in the *Traffic Operations Guidance Manual*. This revision also includes two exhibit updates and a Table of Contents update.		
TO-500	Introduction	TO-501	TO-501
	Pavement Marking Installation & Maintenance Responsibilities	TO-502	TO-502
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COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET
FRANKFORT, KY 40622

MANUAL TITLE: ***Traffic Operations Guidance Manual*** **REVISION NO.:** **13**

DATE REQUESTED: **November 2019** **REPRINT:**

REQUESTED BY: **Kim Jasper** **NEW:**

NEW & REVISED POLICIES

CHAPTER/ SECTION	EXPLANATION	OLD PAGES TO BE DELETED	NEW PAGES TO BE ADDED
	The purpose of this printing is to include the following new and revised policies and procedures in the *Traffic Operations Guidance Manual*. This revision also includes a Table of Contents update.		
TO-400	Sheeting	TO-401-3	TO-401-3
Produced & Distributed by Organizational Management Branch			

COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET
FRANKFORT, KY 40622

MANUAL TITLE: ***Traffic Operations Guidance Manual*** **REVISION NO.:** **12**

DATE REQUESTED: **May 2018** **REPRINT:**

REQUESTED BY: **Kim Jasper** **NEW:**

NEW & REVISED POLICIES

CHAPTER/ SECTION	EXPLANATION	OLD PAGES TO BE DELETED	NEW PAGES TO BE ADDED
	The purpose of this printing is to include the following new and revised policies and procedures in the *Traffic Operations Guidance Manual*. This revision also includes index updates and one exhibit update.		
TO-00	Table of Contents	TO-01	TO-01
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	Runaway Truck Ramp Signing and Markings	Exhibit 20	
	Runaway Truck Ramp Signing and Markings		Exhibit 18
Produced & Distributed by Organizational Management Branch			

COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET
FRANKFORT, KY 40622

MANUAL TITLE: ***Traffic Operations Guidance Manual*** **REVISION NO.:** **11**

DATE REQUESTED: **August 2016** **REPRINT:**

REQUESTED BY: **Kim Jasper** **NEW:**

NEW & REVISED POLICIES

CHAPTER/ SECTION	EXPLANATION	OLD PAGES TO BE DELETED	NEW PAGES TO BE ADDED
	The purpose of this printing is to include the following new and revised policies and procedures in the *Traffic Operations Guidance Manual*. This revision also includes 2 index updates and 10 exhibit updates.		
TO-00	Table of Contents	TO-01	TO-01
	Alphabetical Index	TO-02	TO-02
TO-300	Safety Management Process	TO-301	
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COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET
FRANKFORT, KY 40622

MANUAL TITLE: ***Traffic Operations Guidance Manual*** **REVISION NO.:** **10**

DATE REQUESTED: **May 1, 2016** **REPRINT:**

REQUESTED BY: **Kim Jasper** **NEW:**

NEW & REVISED POLICIES

CHAPTER/ SECTION	EXPLANATION	OLD PAGES TO BE DELETED	NEW PAGES TO BE ADDED
	The purpose of this printing is to include the following revised policies and procedures in the *Traffic Operations Guidance Manual*.		
TO-00	Table of Contents	TO-01	TO-01
TO-700	Responsibilities	TO-702	TO-702
Produced & Distributed by Organizational Management Branch			

COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET
FRANKFORT, KY 40622

MANUAL TITLE: ***Traffic Operations Guidance Manual*** **REVISION NO.:** **9**

DATE REQUESTED: **February 25, 2015** **REPRINT:**

REQUESTED BY: **Brad Webb** **NEW:**

NEW & REVISED POLICIES

CHAPTER/ SECTION	EXPLANATION	OLD PAGES TO BE DELETED	NEW PAGES TO BE ADDED
	The purpose of this printing is to include the following new and revised policies and procedures in the *Traffic Operations Guidance Manual*. This revision also includes three index updates and eight exhibit updates.		
TO-00	Table of Contents	TO-01	TO-01
	Alphabetical Index	TO-02	TO-02
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	Approval Authority	TO-203	TO-203
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	HES Project Submittal Form	Exhibit 3	
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	Inspection Form for Review of Bridge Navigational Aids		Exhibit 28
Produced & Distributed by Organizational Management Branch			

COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET
FRANKFORT, KY 40622

MANUAL TITLE: ***Traffic Operations Guidance Manual*** **REVISION NO.:** **8**

DATE REQUESTED: **July 18, 2013** **REPRINT:**

REQUESTED BY: **Brad Webb** **NEW:**

NEW POLICY

CHAPTER/ SECTION	EXPLANATION	OLD PAGES TO BE DELETED	NEW PAGES TO BE ADDED
	The purpose of this printing is to include the following new policy in the *Traffic Operations Guidance Manual*. This revision also includes two index updates.		
TO-00	Table of Contents Alphabetical Index	TO-01 TO-02	TO-01 TO-02
TO-800	Work Zone Traffic Control		TO-808
Produced & Distributed by Organizational Management Branch	APPROVED AS TO FORM AND LEGALITY Office of Legal Services Michael Hancock Secretary 7/31/13 Date		

COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET
FRANKFORT, KY 40622

MANUAL TITLE: ***Traffic Operations Guidance Manual*** **REVISION NO.:** **7**

DATE REQUESTED: **December 3, 2012** **REPRINT:**

REQUESTED BY: **Brad Webb** **NEW:**

REVISED PROCEDURE

CHAPTER/ SECTION	EXPLANATION	OLD PAGES TO BE DELETED	NEW PAGES TO BE ADDED
	The purpose of this printing is to revise the following procedure in the *Traffic Operations Guidance Manual*. This revision also includes one index update.		
TO-00	Table of Contents	TO-01	TO-01
TO-400	Naming of Highways & Bridges	TO-404-28	TO-404-28
Produced & Distributed by Organizational Management Branch			

COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET
FRANKFORT, KY 40622

MANUAL TITLE: ***Traffic Operations Guidance Manual*** **REVISION NO.:** **6**

DATE REQUESTED: **March 7, 2012** **REPRINT:**

REQUESTED BY: **Brad Webb** **NEW:**

REVISED POLICY

CHAPTER/ SECTION	EXPLANATION	OLD PAGES TO BE DELETED	NEW PAGES TO BE ADDED
	The purpose of this printing is to include the following revised policy in the *Traffic Operations Guidance Manual*. This revision also includes two index updates and one new exhibit.		
TO-00	Table of Contents	TO-01	TO-01
TO-400	Warning Signs: Roadway Surface Condition Signs	TO-403-2	TO-403-2
TO-9900	Table of Exhibits Signing for Flood Areas	TO-9900	TO-9900 Exhibit 24
Produced & Distributed by Organizational Management Branch	APPROVED AS TO FORM AND LEGALITY Office of Legal Services Michael Hancock Secretary 3/14/12 Date		

TRAFFIC OPERATIONS GUIDANCE MANUAL

COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET

JUNE 2005

Division of Traffic Operations **Transportation Cabinet**

Produced by the Organizational Management Branch
Office of Human Resource Management

Ernie Fletcher
Governor

TRANSPORTATION CABINET
Frankfort, Kentucky 40622
www.kentucky.gov

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Commissioner of Aviation

Roy Mundy
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Vehicle Regulation

OFFICE OF THE SECRETARY

OFFICIAL ORDER 103129

SUBJECT: *TRAFFIC OPERATIONS GUIDANCE MANUAL*

This manual has been prepared to provide information and guidance to personnel of the Transportation Cabinet. Its purpose is to give uniformity in the interpretation and administration of laws, rules, and regulations applicable to the operation of the *Division of Traffic Operations* and its relationship with other units of the Cabinet.

The rules and regulations contained within are approved and declared effective unless officially changed.

All previous instructions, written and oral, relative to or in conflict with this manual are hereby superseded.

Signed and approved this 10th day of August, 2005.

Bill Nighbert
Acting Secretary

Approved as to Form and Legality:

Office of Legal Services

TRAFFIC OPERATIONS

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TRAFFIC OPERATIONS

Chapter

INTRODUCTION

Subject

Design of This Guidance Manual

ORGANIZATION & NUMBERING:

Chapter Title—The subject matter in this manual is divided into chapters. The chapter title appears in the upper right-hand corner of the first page of a subject and in the upper left-hand corner of any subsequent page.

Subject Title—The title of a subject appears in the upper right-hand corner of the first page of a subject and in the upper left-hand corner of any subsequent page.

"TO" Prefix—Preceding each subject number, this prefix stands for the manual title *Traffic Operations.*

Date—The latest issuance date of a subject appears at the bottom of each page of the subject. This date agrees with the latest issuance date shown for the subject in the Table of Contents (**TO-01**).

Page Numbering—Each subject has its own page numbering, which appears at the bottom of each page.

LOCATING INFORMATION:

Two indexes appear at the front of the manual, and one index appears at the back:

- **Table of Contents (TO-01)**—This index at the front lists the titles of the manual's chapters and their subjects, as well as other information, in numerical order. It includes the latest issuance dates of all the subjects. As the manual matures, these dates change.

- **Alphabetical Index (TO-02)**—This index at the front alphabetically lists key information in the manual. Generally, it directs the user to subject titles and to margin, paragraph, and subparagraph headings within subjects.

- **Table of Exhibits (TO-9900)**—This index at the back lists the manual's exhibits, including forms, worksheets, diagrams, etc., by number and title.

CROSS-REFERENCES IN MANUAL:

Subject Numbers within Narrative—A subject number within the narrative on a page directs the user to more information about the subject.

QUESTIONS:

Whom to Contact—For answers to questions about the contents of the manual, please contact:

Division of Traffic Operations
Transportation Cabinet Office Building
200 Mero Street
Frankfort, KY 40622
(502) 564-3020

For copies of the manual, please contact:

Organizational Management Branch
Transportation Cabinet Office Building
200 Mero Street
Frankfort, KY 40622
(502) 564-4610

TRAFFIC OPERATIONS

Chapter

ADMINISTRATION

Subject

Organization

DIVISION OF TRAFFIC OPERATIONS:

The Division of Traffic Operations is a work unit within the Office of Project Delivery and Preservation within the Transportation Cabinet. The mission of the division is to improve the safety and operation of the highway system through traffic-operational programs and projects. The division is responsible for the formulation, distribution, and interpretation of the policies, rules, and regulations that relate to the traffic functions of the Transportation Cabinet.

The division is divided into the following three engineering branches:

- System Operations Branch (which includes an electronics repair shop)
- Traffic Design Services Branch
- Traffic Engineering Branch (which includes the Highway Safety Improvement Program)

An administrative section reports directly to the director and is responsible for providing the necessary administrative support to the division.

DISTRICT:

Traffic functions of the district are conducted based on the organizational structure of each individual district.

TRAFFIC OPERATIONS

Chapter

ADMINISTRATION

Subject

Responsibilities

SYSTEM OPERATIONS BRANCH:

The System Operations Branch investigates, deploys, operates, and maintains technology applications on the state-maintained highway system. The goals of the branch are to manage congestion and improve safety. Specific duties include but are not limited to:

- Installing, operating, and maintaining traffic signal systems
- Implementing, operating, and maintaining the statewide traffic signal monitoring software
- Implementing, operating, and maintaining a communications network
- Providing technical advice and training to the districts and Central Office
- Developing hardware and software to improve traveler safety and efficiency
- Repairing and testing traffic signal equipment

TRAFFIC DESIGN SERVICES BRANCH:

The Traffic Design Services Branch is primarily responsible for designing traffic signal and roadway lighting projects for letting to contract. Other duties of the branch include:

- Performing final inspections on completed projects
- Providing technical advice and training to the districts and Central Office
- Performing research on new software and hardware products used for traffic control electrical devices and lighting
- Reviewing plans and permits prepared by others
- Writing specifications for products used in traffic signal and roadway lighting design

TRAFFIC DESIGN SERVICES BRANCH (cont):

- Developing standards (including standard detail sheets) for the design of electrical traffic control devices
- Developing district contracts for traffic signal and lighting maintenance

TRAFFIC ENGINEERING BRANCH:

The Traffic Engineering Branch is responsible for the following duties in the areas of traffic engineering and highway safety:

- Providing traffic engineering expertise and training to the districts and others
- Conducting traffic engineering investigations, analyzing data, developing alternatives, and proposing solutions to traffic problems
- Reviewing plans and providing input on preconstruction activities
- Reviewing plans and proposals for installation and modification of panel signs
- Serving as team leaders/members on highway safety teams, design and construction activities, technical committees, and other work groups
- Drafting, reviewing, and interpreting policies, manuals, methods, and specifications relating to traffic engineering programs and activities
- Establishing the list of highways on the Raised Pavement Marker system
- Maintaining standard drawings for raised pavement markers, temporary traffic control, centerline rumble strips, delineation, and other traffic-related items
- Providing technical expertise on bicycle and pedestrian traffic issues
- Providing technical expertise on temporary traffic control
- Coordinating and administering the Highway Safety Improvement Program
- Coordinating engineering activities related to highway safety among various state and local agencies, other divisions, and FHWA
- Supporting traffic engineering and highway safety research

DISTRICT: Each district carries out the various traffic functions within its jurisdictional boundaries. Depending on their organizational structure, districts may be responsible for the following activities:

- Preparing and administering a budget for all traffic activities including materials, labor, and equipment
- Managing and directing the work of the district traffic crews and contractors
- Procuring and maintaining an inventory of traffic materials
- Reviewing, recommending, installing, inventorying, and maintaining the traffic control devices and roadway lighting in its district
- Acting as the initial contact for requests and complaints from the public and government officials
- Carrying out the policies and procedures of the Cabinet
- Conducting engineering studies and gathering data needed for engineering decisions
- Participating in project development teams and reviewing engineering plans, with emphasis on review of marking and signing plans
- Providing traffic engineering advice and consultation to other functions within the district
- Performing the duties specified in the *Permits Manual*
- Reviewing crash data, conducting reviews and investigations at identified high-crash locations, and participating in various highway-safety-related activities
- Providing traffic engineering services and work for local governments and other agencies through interagency agreements

TRAFFIC OPERATIONS

Chapter

ADMINISTRATION

Subject

Approval Authority

SECRETARY OF TRANSPORTATION:

The following traffic restrictions and regulations shall require the approval of the Secretary of the Transportation Cabinet:

- Speed limits (except those covered by statute or administrative regulation)
- Lane-use restrictions
- Naming of roadways and bridges (other than those approved by the legislative acts of the General Assembly)

These restrictions and regulations shall be established by an Official Order.

STATE HIGHWAY ENGINEER:

The following items shall require the approval of the State Highway Engineer:

- Use of six-inch lane line pavement markings on roadways other than interstates and parkways
- Modifications to the Raised Pavement Marker System

DEPUTY STATE HIGHWAY ENGINEER:

The installation or removal of the following traffic control devices shall require the approval of the Deputy State Highway Engineer for Operations and Maintenance:

- Traffic signals
- Flashing beacons
- School flasher assemblies
- Interchange lighting
- Unwarranted lighting recommended by project teams
- Continuous lighting to be maintained by the Cabinet

DEPUTY STATE HIGHWAY ENGINEER (cont.):

- Reversible lane signals
- LED-enhanced signs
- Bridge lighting

DIRECTOR OF THE DIVISION OF TRAFFIC OPERATIONS: The installation of the following traffic control devices/phasing shall require the approval of the Director of the Division of Traffic Operations (or his or her designee):

- Intersection and roundabout lighting to be maintained by the Cabinet
- Permanent transverse rumble strips
- Audible and exclusive pedestrian phases
- New panel signs installed by the Roadway Preservation Branch of the Division of Maintenance (includes modified legends of existing signs)
- Establishment or modification of vehicular traffic signal phasing (including decisions to use right-turn overlaps and variable phasing but excluding decisions to use lead-lag left-turn phasing)
- Centerline rumble strips on roadways that do not have a speed limit greater than 45 MPH and lane width of eleven feet
- Illuminated street name signs
- Adaptive traffic signal systems
- Uninterruptible power supplies

DISTRICT: Unless otherwise addressed in this manual, the installation, modification, and removal of all other traffic-control devices shall be made by the district based on the principles outlined in the *Manual on Uniform Traffic Control Devices* (*MUTCD*), current adopted edition. The division is available for advice and consultation on all traffic engineering decisions made by the district.

TRAFFIC OPERATIONS

Chapter

ADMINISTRATION

Subject

Uniform System of Traffic Control

MUTCD:

The *Manual on Uniform Traffic Control Devices* (*MUTCD*) is published by the Federal Highway Administration and is a national standard for traffic control devices. KRS 189.337(2) and 603 KAR 5:050 adopt the *MUTCD* as the standard for all traffic control devices installed on any street, highway, bicycle trail, or private road open to public travel in Kentucky. As a result, the *MUTCD* is considered as the standard for traffic control devices on highways maintained by the Cabinet. All references in the *Traffic Operations Guidance Manual* (*TOGM*) to the *MUTCD* refer to the edition adopted by 603 KAR 5:050.

ENGINEERING STUDIES:

In accordance with the *MUTCD*, an engineering study involves the comprehensive analysis and evaluation of available pertinent information and the application of appropriate principles, provisions, and practices as contained in the *MUTCD* and other sources, for the purpose of deciding upon the applicability, design, operation, or installation of a traffic control device. An engineering study shall be performed by an engineer or by an individual working under the supervision of an engineer, through the application of procedures and criteria established by the engineer. An engineering study shall be documented. In accordance with the Cabinet's records retention schedule (refer to **TO-208**), the division maintains permanent files of engineering studies that are submitted to the division for review. Engineering studies that are not submitted to the division for review shall be maintained permanently by the district. These studies are normally associated with requests for new or modified speed zones and electrical devices.

Common scenarios where engineering studies are required or recommended by the *MUTCD* include the installation of the following traffic control devices:

- Multi-way stop
- Speed limit (other than statutory limits)
- School speed-limit zone
- Advisory speed

ENGINEERING STUDIES (cont):

- Truck rollover warning sign (W1-13)
- No passing zones
- Crosswalk lines at locations away from a traffic control signal or an approach controlled by a STOP or YIELD sign
- Traffic control signals
- Accessible pedestrian signals
- Pedestrian and emergency-vehicle hybrid beacons
- Reversible-lane operation

TRAFFIC OPERATIONS

Chapter	ADMINISTRATION
Subject	Purchasing

POLICY: The Division of Traffic Operations shall establish and monitor master agreements for common materials and services used for lighting and electrical device maintenance. The division shall also maintain a stock of various other materials that cannot be feasibly purchased on a master agreement (such as poles, cabinets, and controllers). The district shall be responsible for stocking district facilities either by ordering directly from master agreements or from the transportation warehouse. When an item is not available from either of these sources, the district shall prepare the necessary purchasing documents and follow the guidelines set forth by the Division of Purchases. Proper procurement procedures are available in the *Purchases Guidance Manual*. Proper inventory guidelines are available in the *OMS* (Operations Management System) *Materials Policy and Procedures Manual*.

The Division of Maintenance establishes master agreements for common materials and services utilized in pavement marking and signing maintenance.

TRAFFIC OPERATIONS

Chapter

ADMINISTRATION

Subject

Local Participation

REGULATIONS: Traffic regulations required for the safe and expeditious movement of traffic are established in several different ways, including by statute, by Official Order, or by a local agency (city, county, or joint city/county agency). References are made throughout this manual to specific regulations where such a reference is essential to the proper performance of the traffic function.

The Cabinet prescribes by Official Order such regulations as may be required for state-maintained roads and streets. In cities of second—sixth classes, most but not all regulations are prescribed by ordinances of the cities. However, KRS 189.233 provides the procedure by which the Cabinet may act in such cases where the cities will not. In practice, it is seldom necessary to exercise this authority. To this end, the standard Maintenance and Traffic Contract between local agencies and the Cabinet provides as follows:

- The local agency agrees to pass no ordinance relating to state-maintained streets, viaducts, and bridges without first having submitted to the Cabinet a copy of the ordinance at least five days prior to the time of the vote on the ordinance.

- The local agency agrees to pass any necessary parking or other ordinances to ensure the maximum use of said highways for vehicle travel consistent with safety, as determined by the Cabinet.

LOCAL INPUT: Historically, there has been excellent cooperation with local agencies on matters pertaining to traffic regulations. Regulations should not be instituted or implemented without first having given the local agency an opportunity to review and comment upon the proposal, because the effectiveness of regulations will depend on the degree of local acceptance and enforcement. In addition, local agencies are frequently required to pay the utility costs for electrical devices.

The district should solicit input from the appropriate local agency on the Cabinet's findings regarding the following:

- Installation or removal of traffic signals
- Speed limits

LOCAL INPUT (cont.):

- School speed limits
- Flashing beacons (if local agency is required to pay utility cost)
- Changes in right-of-way control at intersections
- Road diet (four-lane to three-lane conversion)

If the local agency objects to the recommended action regarding these items, the district/division should submit their recommendation to the appropriate level of approval but acknowledge local agency opinions so the validity of any objections to the proposals can be determined.

If a road diet is being considered, the district shall not proceed without a public information/outreach effort to establish local support for the project.

MAINTENANCE & TRAFFIC AGREEMENTS:

The Secretary of the Transportation Cabinet may, by Official Order, assume the responsibility for regulating traffic and parking on streets accepted as a part of the state-maintained system and may contract with the local agency for the performance of this function. In the control of traffic at intersections on state-maintained highways, it is often necessary to place traffic control devices outside the state right of way. In all cases, these devices must be limited to those actually required to provide for the safety and convenience of the motorists using the state-maintained facility. Such devices shall not be installed outside the right of way, unless specific authorization has been given in the form of either a TC 71-11 form, *Maintenance and Traffic Contract* (**Exhibit 1**), or a completed TC 71-14 form, *Consent and Release*.

The district is responsible for negotiating a Maintenance and Traffic Contract with any local agency in the district. A new contract is to be negotiated when directed by the State Highway Engineer's office.

When it is determined that a new Maintenance and Traffic Contract is needed, the district shall have the contract prepared and submitted to the local agency for approval. After local agency approval, the original and four copies shall be forwarded to the State Highway Engineer's office for approval. The State Highway Engineer's office will withhold approval, pending approval of the Official Order of acceptance.

After approval by the State Highway Engineer's office, the original and two copies shall be returned to the district, one copy shall be sent to the Division of Maintenance, and one copy shall be sent to the Division of Traffic Operations.

The district shall forward one copy to the proper local agency and retain the original and one copy for its files.

TRAFFIC OPERATIONS

Chapter

ADMINISTRATION

Subject

Disposal of Material

SURPLUS PROPERTY:

Disposal of surplus property shall be handled in accordance with **GAP-1102**. **Exhibit 9075** of the *General Administration and Personnel* (GAP) *Manual* includes recommended methods of disposal for common traffic-related items.

Districts are encouraged to contact the division to discuss the preferred method of disposal for large quantities of items that may be of use to other districts or agencies. In some of these situations, transfer of the items within the Cabinet or to another state agency may be the preferred option of disposal.

SIGNS:

Aluminum signs considered unusable by the district shall be stored by the district and sold for scrap metal in accordance with Cabinet policy for the disposal of surplus material. Unusable signs constructed of other materials, such as wood or fiberglass, shall be disposed of in a landfill.

COMMEMORATIVE SIGNS:

In conformance with **GAP-1102**, temporary sign installations installed by legislative action (such as commemorative signs) may be given to legislators, upon request, to distribute to the honorees. When removed, such signs shall be secured in a location different from that of other scrap metals for possible distribution.

TRAFFIC OPERATIONS

Chapter

ADMINISTRATION

Subject

Records Retention

SCHEDULE: The official records retention schedule for the division can be found on the Kentucky Department of Library and Archives website within the State Government Records Retention Schedule (Record Group #2760S).

TRAFFIC OPERATIONS

Chapter

SAFETY

Subject

Highway Safety Improvement Program

OVERVIEW: The Kentucky Transportation Cabinet is dedicated to improving safety of all modes of transportation in the Commonwealth through education, engineering, enforcement, and emergency medical services initiatives. These strategies and targets are outlined in the Strategic Highway Safety Plan (SHSP), a plan which outlines measureable strategic opportunities to reduce fatalities and serious injuries on our roadways.

STRATEGIC HIGHWAY SAFETY PLAN: The SHSP is a multi-disciplinary plan addressing the 4Es of highway safety - engineering, enforcement, education, and emergency medical services. The SHSP is required to be data-driven and is developed in collaboration with a broad range of stakeholders. It is also performance-based with the adoption of strategic countermeasures and performance goals which are coordinated with other state safety programs.

In Kentucky, the SHSP is developed through the collaborative efforts of the Governor's Executive Committee on Highway Safety (GECHS), whose members are representatives of highway safety stakeholders; however, the responsibility for Kentucky's SHSP lies with the Cabinet. This document is available on the Kentucky Office of Highway Safety's website at:

http://transportation.ky.gov/Highway-Safety/Pages/Resources.aspx

HIGHWAY SAFETY IMPROVEMENT PROGRAM: The Highway Safety Improvement Program (HSIP) is a core Federal-aid program with the primary purpose of achieving a significant reduction in fatalities and serious injuries on all public roads through engineering initiatives. Located in the Traffic Engineering Branch, the HSIP staff seeks to implement projects with engineering countermeasures targeting predominant crash types experienced in Kentucky. HSIP projects are required to be consistent and aligned with the SHSP emphasis areas and strategies.

HIGHWAY SAFETY IMPROVEMENT PROGRAM (cont.):

A HSIP project shall consist of any strategy, activity, or project on a public road that meets **both** of the following criteria:

- Is consistent with Kentucky's SHSP
- Corrects or improves a hazardous road location or feature or addresses a highway safety problem

Workforce development, training, and education activities are also eligible uses of HSIP funds.

To obligate HSIP funds, a state must:

- Develop, implement, and update a SHSP
- Produce a program of projects or strategies to reduce identified safety problems
- Evaluate the SHSP on a regular basis

Requirements for a HSIP are defined in 23 CFR 924. Kentucky's HSIP may be flexible to meet the needs of the state but must include the following components:

- **Planning** – Including collection and maintenance of data, identification of hazardous locations and elements considering relative severity, conducting engineering studies, and establishing priorities to produce a program of projects or strategies to reduce identified safety issues.
- **Implementation** – Scheduling, funding, and implementing projects/ activities that are most likely to reduce the number of, or potential for, fatalities and serious injuries and that maximize opportunities to advance safety.
- **Evaluation** – Determining the effectiveness of safety improvements. Findings resulting from the evaluation process shall be incorporated as basic source data in the planning process to set priorities for future highway safety improvement projects.

The planning and implementation portion of Kentucky's HSIP are detailed in Kentucky's HSIP Investment Plan and in the HSIP Project Life Cycle (**Exhibit 2**). The HSIP Investment Plan can be found on the Division of Traffic Operations website available at:

http://transportation.ky.gov/Traffic-Operations/Pages/Highway-Safety-Improvement-Program-(HSIP).aspx

Kentucky's evaluation of the HSIP is outlined in an annual report to the Federal Highway Administration (FHWA).

HSIP PROJECT DELIVERY: It is FHWA's intent that HSIP federal funds be expended on safety projects that can be designed and constructed expeditiously and ensure all programmed projects are delivered in a timely manner. As a result, all HSIP projects should be let to contract through the construction procurement process. Details of the project delivery process are highlighted in the HSIP Project Life Cycle (**Exhibit 2**).

REPORTING: KYTC must submit reports to the FHWA on several elements of the HSIP. Reporting requirements include:

- Annual assessments of the progress and effectiveness of HSIP, including:
  - Fatalities
  - Serious Injuries
  - Fatalities per million vehicle miles traveled
  - Serious Injuries per million vehicle miles traveled
- Progress on implementing the Rail-Highway Grade Crossing Program (RHGCP) administered by the Cabinet's Division of Right-of-Way and Utilities, Utilities and Rail Branch.

OTHER ACTIVITIES: Through HSIP administration, HSIP staff strives to develop a data-driven highway safety culture for all phases of project development and delivery. While their primary focus is oversight of the Cabinet's HSIP (programming, development, letting preparation and evaluation of HSIP projects), there are several other activities they perform to support the goal of providing the safest transportation system possible through engineering. These activities include the following:

- Provide technical assistance to field personnel on engineering countermeasures to improve safety on existing roadway sections, including:
  - Countermeasure selection
  - Construction methods
  - Material Usage
  - Specifications
- Provide technical assistance in the review and analysis of crash reports for existing facilities to aid in efforts to improve safety on Kentucky's transportation system
- Provide funding and oversight in partnership with Kentucky's Local Technical Assistance Program for the Safety Circuit Rider program, which provides local governments with training and assistance to improve safety on local roads

OTHER ACTIVITIES (cont.):

- Provide programmatic support for the adoption of new engineering countermeasures and ensure proper application, placement, and utilization

- Provide funds and expertise for the development of training programs to assist in the education of staff and the implementation of highway safety methodologies throughout the KYTC project process

- Provide funds and expertise for the development of best practices training programs to assist field personnel in the inspection and installation of engineering countermeasures

- In partnership with the Kentucky Transportation Center, provide funds for and oversight of KYTC research projects in an effort to continuously improve the methods and technologies available for planning, implementation, and evaluation of engineering safety projects

- Engage the national highway safety community by serving on committees and expert panels sponsored by the Transportation Research Board, American Association of State Highway and Transportation Officials, FHWA, and other partners contribute experience to these efforts, become familiar with state of the practice for highway safety through engineering, and utilize these experiences to improve the Cabinet's safety efforts

All undertaken activities are in pursuit of the goal to reduce the number of highway fatalities and injuries toward zero.

TRAFFIC OPERATIONS

Section

GENERAL

Subject

General Sign Guidelines

OVERVIEW: This chapter includes requirements for signing on the state roadway system. Except as noted elsewhere in this chapter, all signs shall be fabricated, installed, and maintained according to FHWA's *Manual on Uniform Traffic Control Devices (MUTCD)*, current adopted edition, and the *Standard Highway Signs and Markings* book. The purpose of this chapter is to discuss any additions to or departures from the *MUTCD*.

DESIGN DETAILS: Design details for signs in the *MUTCD* can be found in the *Standard Highway Signs and Markings* book. Design details for signs mentioned in this manual, but not in the *MUTCD*, may be obtained from the Central Sign Shop.

FONTS: Clearview 5-W font shall be used for any destination legends composed of upper and lower-case letters on positive-contrast (white legend on a green, blue, or brown background) panel guide signs installed along expressways and freeways. Approved uses shall be limited to mixed case destinations on the major sign sequence, supplemental guide signs, destination/distance panel signs, and panel signing on crossroad approaches to interchanges. Clearview font shall not be used for numerals, action lines, or all-uppercase messages on panel signs. Standard Alphabets for Traffic Control Devices shall be used for all other signing.

SIGN POSTS: Section 832 of the *Standard Highway Specifications for Road and Bridge Construction* provides material details regarding sign posts.

SIGN SUBSTRATES: Section 833 of the *Standard Highway Specifications for Road and Bridge Construction* provides material details regarding sign substrates.

SIGN MESSAGE PRINTING: Standard signs that are capable of being mass produced should be ordered from the Central Sign Shop or using the existing master agreement for signing. Non-standard signs (such as specific guide signs) should be fabricated by the district.

LONGITUDINAL PLACEMENT: On conventional highways, a minimum of 200 feet should be maintained between sign assemblies. On freeways and expressways, a minimum of 800 feet should be maintained between sign assemblies. It is recognized that these recommended minimum values will not always be attainable.

DISPOSAL OF UNUSABLE SIGNS: **TO-207** addresses sign disposal guidelines.

SIGNS FOR OTHER AGENCIES: At the request of another state agency, the Cabinet may furnish and install signs on property under state control. If the lot or roadway involved has been accepted by the Cabinet for maintenance, the services may be provided at no cost to the requesting agency. In all other cases, the Cabinet shall be reimbursed for such work through an intergovernmental agreement.

LED-ENHANCED SIGNS: In accordance with the *MUTCD*, the Cabinet may elect to install signs with light emitting diode (LED) units within the border of the sign. Such signs shall require approval of the Deputy State Highway Engineer for Operations and Maintenance. To ensure uniformity in the application of these devices, districts shall not order or purchase these devices. Once these devices are approved, the division will order the necessary signs using existing master agreements. The signs shall be delivered to the appropriate district for installation.

PRIORITY: The *MUTCD* addresses the priority of warning and regulatory signs over guide signs where conflicts occur. In a similar manner, critical guide signing (typically signs maintained by the Cabinet) should be displayed over non-critical signs maintained by others, such as specific service (logo), tourist-oriented directional (TODs), and community wayfinding signs. Signs with information of a less critical nature should be moved to less critical locations or omitted.

TRAFFIC OPERATIONS

Section

GENERAL

Subject

Responsibilities

PERMITS BRANCH:

The Permits Branch of the Division of Maintenance handles requests for:

- Community wayfinding guide signs
- Limited supplemental guide signs with a brown background
- Tourist-oriented directional signs (TODs)
- Specific service (Logo) signs
- Other permitted signing initiatives

District traffic personnel shall be contacted to determine if they need to be involved with the review of sign requests that come through these programs.

The TODs and Logo signs are managed by a statewide contractor.

ROADWAY PRESERVATION BRANCH:

The Roadway Preservation Branch of the Division of Maintenance is responsible for the installation and maintenance of panel signs that do not have a brown background. Requests for new or modified signs shall be forwarded through the Division of Traffic Operations.

HIGHWAY DESIGN:

The Division of Highway Design is responsible for the development of signing plans for roadway projects. The districts and Division of Traffic Operations shall be contacted to determine if they need to be involved in the development of signing plans.

DISTRICT & TRAFFIC OPERATIONS:

All other signing requests are the responsibility of the district and Division of Traffic Operations.

WEBSITE: The Division of Traffic Operations provides additional information on the various signing programs within the Cabinet online at:

http://transportation.ky.gov/Sign-Programs-and-Standards/Pages/default.aspx

TRAFFIC OPERATIONS	Section GENERAL
	Subject Sheeting

APPROVED MATERIALS:

All sign sheeting shall be from the Cabinet's *List of Approved Materials*.

Permanent signs and sign components shall be fabricated using Type XI sheeting.

The following signs shall be fabricated using Type XI fluorescent yellow sheeting:

- Horizontal alignment signs and plaques
- All Advisory Speed plaques
- Warning messages on panel signs

The following signs shall be fabricated using Type XI fluorescent yellow-green sheeting:

- All school and school bus warning signs
- Bicycle Warning signs and SHARE THE ROAD plaques or diagonal downward pointing arrow plaques that supplement Bicycle Warning signs
- Pedestrian Warning signs and diagonal downward pointing arrow plaques that supplement Pedestrian Warning signs
- In-Street Pedestrian Crossing (R1-6) signs and Overhead Pedestrian Crossing (R1-9) signs
- Supplemental plaques to any of the previously listed signs

TRAFFIC OPERATIONS

Section

GENERAL

Subject

Retroreflectivity

MINIMUMS: Minimum retroreflectivity of signs shall be in accordance with the levels established in **Table 4-1** below.

TABLE 4-1
Minimum Maintained Retroreflectivity Levels

Sign Color	Minimum Retro Level ($cd/lx/m^2$)	Additional Criteria
White on Green	W ≥ 250; G ≥ 25	Overhead
	W ≥ 120; G ≥ 15	Post-mounted
Black on Yellow	Yellow ≥ 75	
Black on Orange	Orange ≥ 75	
White on Red	W ≥ 35; R ≥ 7	Minimum sign contrast ratio ≥ 3:1 (white retroreflectivity ÷ red retroreflectivity)
Black on White	W ≥ 50	
Special Cases		
W3-1 – Stop Ahead Sign: Red retroreflectivity ≥ 7 W3-2 – Yield Ahead Sign: Red retroreflectivity ≥ 7; White retroreflectivity ≥ 35 W3-3 – Signal Ahead Sign: Red retroreflectivity ≥ 7; Green retroreflectivity ≥ 7 W3-5 – Reduced Speed Limit Ahead Sign: White retroreflectivity ≥ 50		

TRAFFIC OPERATIONS

Section

GENERAL

Subject

Inspections

DAYTIME: Daytime inspections of signs should be conducted to evaluate signing needs.

NIGHTTIME: Daytime inspections are not adequate to evaluate the nighttime effectiveness of retroreflective materials. Therefore, nighttime inspections shall be conducted on a two-year cycle as part of each district's signing program. Nighttime visual inspections shall be conducted by certified inspectors. Certification shall be obtained from the Sign Retroreflectivity Employee Training Course which is available through the University of Kentucky Technology Transfer Program. Participants in this course learn parameters for nighttime visual inspection and are required to pass a certification exam at the conclusion of the course.

Nighttime visual inspections should be conducted by a two-person crew. Each member of the crew shall be a certified inspector. The inspectors should use a model year 2000 or newer SUV, pick-up, or similar vehicle, if available. The vehicle's headlights should be calibrated on a regular basis.

To properly track nighttime visual inspection, inspection teams shall charge time in the Operations Management System (OMS) to the appropriate route with the department object NTVI.

Prior to inspection, teams should select routes, print the appropriate inspection forms, and review minimum retroreflectivity calibration signs. Inspection forms are available in OMS. Inspectors shall evaluate the retroreflectivity (based on **Table 4-1** in **TO-401-4**) and the effectiveness of signs. Inspectors will be provided with minimum retroreflectivity coupons for signs that require closer retroreflectivity examination.

Signs with failing retroreflectivity should be replaced (based on priority of sign type) within a reasonable time frame. Signs marked as "unable to assess" or "ineffective" will require maintenance follow up to determine if the sign needs to be replaced. Replacement and maintenance follow up should be documented.

TRAFFIC OPERATIONS

Section	
	GENERAL
Subject	
	Barcodes

OVERVIEW: To secure data on reflective sheeting and sign installation, a foil barcode label shall be placed on all signs at the point of manufacture. The barcode labels are available through a vendor under a price contract established by the Division of Maintenance.

APPLICATION: When possible, barcodes should be applied to signs indoors at a temperature of 50 degrees Fahrenheit or higher. The application location should be clean (free of oils, dust, etc). If not clean, an alcohol swab should be used to clean the area. The area should be allowed to dry before application.

LOCATION: The location of the applied barcode should be in the lower right quadrant of the sign back. For signs where the bottom edge of the sign is not parallel to the ground, the lowest corner of the sign should be used. The barcode should be placed no less than one inch from the sign edges, and no more than three inches. The barcode shall be placed so that a sign post will not cover the label. If possible, barcodes should be kept in order, especially within a particular type of sign.

DATA: Data for each sign shall be entered into the Operation Management System (OMS) Sign Manufacture Module. Data entered at the point of manufacture includes: the barcode number, *MUTCD* reference number, sheeting manufacturer, sheeting type, manufacture date, and color of primary retroreflective surface.

All available data will be captured once sheeting is applied to the sign blank. If the Central Office Sign Shop transfers blank signs with sheeting, the district will receive a barcoded sign with existing data entered. Sign type shall be updated by the district as film is applied.

Contractors providing signs to the Cabinet shall provide all required data in a Microsoft Excel document (document template to be furnished by the Cabinet).

SIGN DATING STICKERS: While barcode labels are the primary mechanism for capturing sign information, districts may also utilize sign-dating stickers for a quick, visual identification of installation information. Such stickers also provide a warning to those who would deface or remove existing signs.

TRAFFIC OPERATIONS

Section

REGULATORY SIGNS

Subject

One-Way Signing on Bifurcated Highways

ONE-WAY SIGNING: To discourage wrong way travel from public roads or commercial entrances onto rural bifurcated highways where there is no median opening directly in front of the entrance, a ONE WAY sign (R6-1 or R6-2) should be installed on the opposite side of the road facing the entrance.

2 2 2

TRAFFIC OPERATIONS

Section

REGULATORY SIGNS

Subject

Passing Regulations

DO NOT PASS & PASS WITH CARE SIGNS:

While not normally used, DO NOT PASS (R4-1) and PASS WITH CARE (R4-2) signs may be used to supplement the NO PASSING ZONE sign (W14-3) at the discretion of the district.

DO NOT PASS signs should be installed for all downhill no-passing zones in conjunction with truck-climbing lanes. See **Exhibit 5** for placement.

PASS ONLY WHEN CENTER LANE IS CLEAR SIGNS:

A PASS ONLY WHEN CENTER LANE IS CLEAR sign should be installed at the end of no-passing zones on roads where a passing lane has been added for opposing traffic. See **Exhibit 5** for placement.

2 2 2

TRAFFIC OPERATIONS

Section

REGULATORY SIGNS

Subject

NO U-TURN Signs

NO U-TURN SIGNS: A NO U-TURN sign (R3-4) shall be installed on any approach of a multi-lane highway where U-turns on a protected left-turn phase conflict with a right-turn overlap on the cross street. A multilane highway is defined as any roadway with two or more through lanes in each direction. A NO U-TURN sign may also be installed on other roadways if a similar conflict is present. The sign may be installed overhead or post-mounted.

2 2 2

TRAFFIC OPERATIONS

Section

REGULATORY SIGNS

Subject

Truck Lane Restrictions

PROCESS: Prohibitions may be established by Official Order to restrict trucks with more than six wheels to the right two lanes of a fully controlled access highway with six or more lanes in rural areas. Requests for such restrictions should be sent to the division for evaluation.

SIGNING: Dual-mounted TRUCKS USE RIGHT 2 LANES signs shall be installed at:

- The beginning of the section
- The end of the sequence of post-interchange signs in each direction after each exit on the affected section of highway

Dual-mounted END TRUCK LANE RESTRICTION signs shall be installed at the end of the sections.

2 2 2

TRAFFIC OPERATIONS

Section

REGULATORY SIGNS

Subject

Speed Regulations

STATUTE: Kentucky Revised Statute (KRS) 189.390 establishes statutory speed limits and the procedures for altering such limits.

REQUESTS: Requests for speed limit revisions are to be reviewed by the district. The district shall perform an engineering study as outlined in Section 2B.11 of the *Manual on Uniform Traffic Control Devices* to determine the appropriate speed limit.

If the district feels that a speed limit revision is justified based on the results of the study, it shall forward the following information to the division with a recommendation:

- Results of speed studies including 85th percentile speeds
- Crash history for a three-year period
- Descriptions with milepoints for all proposed and existing speed zones

If the division agrees with the recommendations, the division shall ask the district to obtain local comment. Once this information is received, the division shall forward an Official Order to the Secretary of Transportation for approval. Once approved, the Official Order will be forwarded to the district for posting of signs. After posting Speed Limit signs (R2-1), the district shall send an e-mail to the division indicating the date the signs were installed.

GENERAL: Intersections and roads with undesirable alignment are not usually in themselves sufficient justification for reduced speed limits, as the speed reductions required for these conditions can usually be achieved by the installation of warning signs and advisory speed plates.

Generally, no reduced speed zone will be necessary through an area that does not meet the statutory requirements for a business or residential district. Speed zones are related to roadside development and have no relation to city limits.

CONT.

GENERAL (cont.): It is the continuing responsibility of the district to review all speed limits to determine if the limits are reasonable, adequate, and appropriate.

Copies of all Official Orders are kept by the division and are available upon request.

TRANSITION SPEED ZONES: Transition speed zones may be used to guide motorists from a higher rural speed limit to a lower urban speed limit. The normal speed transitions are from 55 mph to 45 mph and 35 mph to 25 mph.

Advance warning of speed transitions from rural to urban conditions shall be signed using the SPEED REDUCTION sign (W3-5, shown below). In situations where the transition in speed limits is greater than 10 mph, the SPEED REDUCTION signs and SPEED LIMIT signs should be dual-mounted.

W3-5

The speed limit displayed on the SPEED REDUCTION sign shall be identical to the speed limit displayed on the subsequent SPEED LIMIT sign.

SPEED LIMIT SIGNS IN COMMUNITIES: When transitioning from an area with a rural speed limit to an area with an urban speed limit on conventional highways, the first SPEED LIMIT sign encountered should be 36” x 48” to emphasize the location of the change in speed limit. If roadside conditions will not permit the installation of a 36” x 48” sign, dual-mounted 24” x 30” signs should be considered as an alternative. If dual-mounting is not possible, a single mounted 24” x 30” sign may be used.

Other SPEED LIMIT signs installed on conventional highways within a community should be 24” x 30”.

END XX SPEED LIMIT SIGN: At locations where the speed limit changes to 55 mph and the roadway alignment is undesirable, an END XX SPEED LIMIT sign may be installed instead of a 55 MPH SPEED LIMIT (R2-1) sign.

CONT.

SCHOOL SPEED LIMITS:

School speed limits may be established according to KRS 189.390 and 189.336 for public or private schools if both of the following criteria are satisfied:

- Ø The school property is adjacent to a state-maintained facility.
- Ø The student enrollment is equal to or greater than 100 in kindergarten through 12th grade.

SCHOOL SPEED LIMITS (cont.):

Preschools, day cares, head starts, and postsecondary facilities are not eligible.

The school speed limit should normally be 10 mph lower than the normal posted speed limit, not less than 25 mph and not more than 45 mph. Unusual sight distance restrictions, roadway conditions, or crash history may justify reductions greater than those listed above.

School speed-limit signing should normally consist of a SCHOOL SPEED LIMIT sign (S5-1) with yellow flashing beacons as discussed in **Chapter TO-611.**

An END SCHOOL ZONE sign (S5-2) shall be installed at the end of the school speed zone. A SPEED LIMIT sign (R2-1) for the following section of highway may be used instead of the END SCHOOL ZONE sign if conditions dictate.

2 2 2

TRAFFIC OPERATIONS

Section

REGULATORY SIGNS

Subject

STOP Signs at Railroad Crossings

STOP SIGNS AT RAILROAD CROSSINGS:

According to Kentucky Revised Statute 189.560, if a railroad crossing has been designated by Official Order as "unsafe," a 30-inch x 30-inch or larger STOP sign (R1-1) shall be installed at the marked stopping position or, if the stopping location is not marked on the pavement, not more than 25 feet in advance of the tracks.

2 2 2

TRAFFIC OPERATIONS

Section

REGULATORY SIGNS

Subject

Median Crossover Signs

MEDIAN CROSSOVER SIGNS:

The district shall install and maintain median crossover signs at each median crossover on limited-access facilities that are divided. The signs shall be the “No U-Turn” symbol sign (R3-4). At crossovers on medians 60 feet wide or less, signs for each direction of travel shall be mounted back-to-back in the center of the median and perpendicular to the roadway. At crossovers on medians over 60 feet wide, the signs for each direction of travel shall be mounted on separate posts. The signs shall be located at the median shoulder on the far side of the crossover.

2 2 2

TRAFFIC OPERATIONS

Section

REGULATORY SIGNS

Subject

Anti-Littering Signs

ANTI-LITTERING SIGNS: Black-on-white 48-inch x 60-inch $500 FINE FOR LITTERING signs may be installed on fully controlled access highways at the discretion of the district. On entrance ramps or conventional roads, 30-inch x 36-inch signs may be installed.

2 2 2

TRAFFIC OPERATIONS

Section

REGULATORY SIGNS

Subject

Stop Control at Intersections

RIGHT-OF-WAY ASSIGNMENT:

Kentucky Revised Statute (KRS) 189.330 assigns the right of way to certain traffic streams at intersections. It further provides that the State Highway Commissioner, with reference to state highways, may designate an intersection as a stop intersection or a yield intersection and erect STOP (R1-1) or YIELD (R1-2) signs at one or more approaches to such intersections. YIELD signs shall not be used to assign right of way for an entire approach at any intersection. However, they may be used to assign right of way for turning movements.

The district shall be responsible for the proper right-of-way assignments, including multi-way stop control, using an engineering study in accordance with the *Manual on Uniform Traffic Control Devices*.

CROSS TRAFFIC DOES NOT STOP SIGNS:

In all cases where multi-way stop control is converted to standard stop control at an intersection, black-on-white CROSS TRAFFIC DOES NOT STOP (W4-4P) plaques shall be installed under the remaining STOP signs.

COUNTY/CITY APPROACHES:

The installation/maintenance of STOP signs on county or city approaches to intersections with state-maintained roads shall be in accordance with KRS 189.330.

PUBLIC NOTIFICATION:

Along with any sign(s) changing the right-of-way assignment(s), the public shall be informed of the change in advance in the form of a press release to the media, variable message signs, and/or fixed signs.

2 2 2

TRAFFIC OPERATIONS

Section

REGULATORY SIGNS

Subject

KEEP RIGHT EXCEPT TO PASS Signs

KEEP RIGHT EXCEPT TO PASS SIGNS

Kentucky Revised Statute 189.340 requires vehicles to drive in the right-hand lane except to pass another vehicle on limited-access highways with four or more lanes and a posted speed limit of 65 mph. In an effort to inform motorists of this requirement, KEEP RIGHT EXCEPT TO PASS signs should be installed on all facilities that meet this definition. The signs should be installed at all ports of entry into Kentucky and at the end of the series of post interchange signs at each entrance ramp.

2 2 2

TRAFFIC OPERATIONS

Section

REGULATORY SIGNS

Subject

Weight Limit Signs

BRIDGE WEIGHT LIMIT SIGNS: Weight limit signs similar to R12-1 but a minimum of 24 inches x 30 inches in size carrying the appropriate weight restriction shall be installed at the leading edge of all bridges that have a weight limit less than that established by the class of roadway on which they are located. Appropriate weight restrictions can be obtained from the Division of Maintenance, District Bridge Engineer, and 603 KAR 5:066. These signs may be supplemented with advance-warning signs.

2 2 2

TRAFFIC OPERATIONS

Section

REGULATORY SIGNS

Subject

NO TURN ON RED Signs

AUTHORITY: Kentucky Revised Statute 189.338 permits vehicles facing red signal indications to turn right after stopping at all signalized intersections. In addition, left turns are permitted after stopping at signalized intersections from a one-way street to a one-way street. The Cabinet may install signs prohibiting such movement when it is determined that such turns would be hazardous or otherwise undesirable.

SIGNING: The sign used for this purpose shall be the NO TURN ON RED sign (R10-11a or R10-11b). The sign shall be mounted to the right of the right signal face for prevention of right turns and to the left of the left signal face for prevention of left turns. The sign may be post-mounted adjacent to the roadway when it is impractical to install the sign adjacent to the signal face.

CRITERIA: Turns on red should be prohibited in the following cases:

- Sight distance of vehicles approaching from the left is less than the following minimums:

Cross Street Speed Limit (mph)	Minimum Sight Distance (ft)*
25	240
30	290
35	335
40	385
45	430
50	480
55	530

*Sight distance is measured from the stop bar if pedestrian crosswalks are marked. If crosswalks are not marked, sight distance is measured from the edge of the cross street pavement or curb line.

- The intersection has more than four approaches or has restricting geometrics that cause additional conflicts. The restriction should apply to only those approaches that have multiple or unusual conflicts that are not easily identified by the motorists.

CONT.

CRITERIA (cont.):

- There is an exclusive pedestrian phase during which pedestrians can cross all crosswalks.

- The intersection is within 200 feet of a railroad grade crossing, and the signal controller is preempted during train crossings. The prohibition should apply only to the approach from which turns are made toward the railroad-crossing lane.

Turns on red may be prohibited where:

- Significant pedestrian conflicts result from turn on red maneuvers

- More than one turn on red accident per year has been identified for any particular approach

- There is an unusual movement, such as dual left turns, from opposing traffic that would not be anticipated by the right-turn on red driver

- There are school crossings or any areas where there are large numbers of children expected

APPROVAL: The district is responsible for the approval of these signs.

2 2 2

TRAFFIC OPERATIONS

Section

WARNING SIGNS

Subject

CONGESTED AREA Signs

CONGESTED AREA SIGNS:

The use of a CONGESTED AREA sign is authorized where congestion represents a hazard to motorists and where such congestion is not readily apparent to approaching traffic.

2 2 2

TRAFFIC OPERATIONS

Section

WARNING SIGNS

Subject

Roadway Surface Condition Signs

ICE POSSIBLE AHEAD SIGNS: At locations where water has a tendency to pond and freeze, ICE POSSIBLE AHEAD signs may be installed.

ROAD MAY FLOOD SIGNS: At locations with frequent flooding, permanent ROAD MAY FLOOD (W8-18) signs may be installed. These signs shall have a black legend on a yellow background. Signs shall be installed in advance of the limits of a typical high water event at an approximate distance of 200 feet plus the advance warning distance from **Table 2C-4** of the *MUTCD*. **Exhibit 24** includes a typical application drawing for signing of flood areas which illustrates the recommended location for these signs.

WATER OVER ROADWAY SIGNS: During weather events where water actually covers the highway, temporary WATER OVER ROADWAY signs may be installed at the discretion of the district. These signs shall have a black legend on a fluorescent orange background. Signs shall be installed in advance of the limits of the high water event at the advance warning distance from **Table 2C-4** of the *MUTCD*. **Exhibit 24** includes a typical application drawing for signing of flood areas which illustrates the recommended location for these signs.

SLIPPERY WHEN WET SIGNS: For site specific locations, the following process should be followed for SLIPPERY WHEN WET (W8-5) signs:

1. District traffic shall serve as the primary contact for requests involving pavement slickness. In order to minimize the number of unnecessary skid tests, the initial investigation should rule out other potential contributing factors to wet pavement crashes such as rutting, ponding of water, high shoulders, and other drainage issues. Representatives from the appropriate Project Delivery and Preservation office should be contacted to assist in evaluating these concerns. Other contributing factors may include poor visibility, signing, geometry, etc. If skid resistance is considered the likely problem upon completion of the initial investigation, testing shall be requested.

SLIPPERY WHEN WET SIGNS (cont.):

2. The district shall submit a request for skid testing directly to the Division of Materials. A copy of this request (along with supporting documentation) should be sent to the Division of Traffic Operations.

3. The Division of Materials shall conduct the test and forward the results to the Division of Traffic Operations, Division of Maintenance, and the district traffic engineer.

4. The district determines whether SLIPPERY WHEN WET signage is installed. The division is available to assist in this determination. Regardless of the results of the skid test, SLIPPERY WHEN WET signs may be installed by the district if the crash data suggests a crash pattern that may be addressed by the installation of these devices.

6. SLIPPERY WHEN WET signs shall be removed when the surface conditions that warranted the signing have been addressed.

In addition to site specific testing, the Division of Materials provides year-end skid data to the division. Once this information is received, the division shall conduct a crash analysis on relevant sections with particular attention to crashes involving wet pavement. If a section exhibits a wet crash pattern, the division shall forward the identified section and the results of the crash analysis to the appropriate district for further consideration/action.

TRAFFIC OPERATIONS

Section

WARNING SIGNS

Subject

NO PASSING ZONE Signs

NO PASSING ZONE SIGNS:

NO PASSING ZONE signs (W14-3) should be used to supplement no-passing pavement markings on roads with an ADT of 1,000 or greater. The signs may be used on other roads at the discretion of the district.

On those roads where the NO PASSING ZONE signs are used, the end of each passing zone may be marked with a delineator post with three white delineators or with the top six inches painted white. The purpose of the delineator is to assist with remarking the no-passing zone.

2 2 2

TRAFFIC OPERATIONS

Section

WARNING SIGNS

Subject

PREPARE FOR SUDDEN STOP Signs

PREPARE FOR SUDDEN STOP SIGNS: PREPARE FOR SUDDEN STOP signs may be installed to warn of the potential of stopped traffic at locations with a rear-end crash pattern or at locations that regularly experience traffic congestion.

2 2 2

TRAFFIC OPERATIONS

Section

WARNING SIGNS

Subject

Low Clearance Signs

CRITERIA: Clearances for structures shall be signed if less than 14 feet, 6 inches, above the surface of the roadway or shoulder. Special consideration may dictate the signing of clearances greater than one foot above the statutory maximum vehicle height (Kentucky Revised Statute 189.222). Care should be taken in determining actual vertical clearance from the roadway surface to ensure consideration is given to the most extreme legal vehicle dimensions that can be expected, especially on superelevated sections and sag vertical curves.

SIGNS: Standard warning signs (W-12-2 or W12-2P) shall be used to sign for low clearances. The dimension displayed on the sign shall be three inches less than the actual measured clearance.

PROJECTS: To determine if revised signing is necessary, District Construction/ Maintenance shall notify District Traffic upon application of new surface material.

2 2 2

TRAFFIC OPERATIONS

Section

WARNING SIGNS

Subject

Steel Bridge Deck Signing

CRITERIA: Steel bridge decks may present problems to motorcyclists, particularly when they are unaware of the condition before entering the bridge. The district shall install and maintain signs for the purpose of warning motorcyclists of the existence of such bridge decks.

LOCATION: These signs should be placed at the appropriate distance in advance of the bridge to give adequate warning of this condition. This placement should be in accordance with the normal installation of warning signs.

SIGNS: The sign assembly shall consist of warning sign with the message STEEL BRIDGE DECK AHEAD. A supplemental sign shall be added beneath this sign, which shall be a rectangular shape with the message ATTENTION MOTORCYCLISTS.

2 2 2

TRAFFIC OPERATIONS

Section

WARNING SIGNS

Subject

Transition Area Signing

TRANSITION AREA SIGNING: The transition area between four-lane and two-lane roadway sections should be signed according to **Exhibit 6.** Signs R4-7, W6-1, and W6-2 may be omitted if the four-lane roadway is undivided.

2 2 2

TRAFFIC OPERATIONS

Section

WARNING SIGNS

Subject

HILL/SLOW MOVING TRUCKS Signs

HILL/SLOW MOVING TRUCKS SIGNS: On high-speed roads having occasional steep grades for uphill traffic, it is sometimes necessary to warn motorists of slow-moving trucks to address rear-end collisions. The HILL (W7-1a) sign may be supplemented with a plaque displaying the message SLOW MOVING TRUCKS.

2 2 2

TRAFFIC OPERATIONS

Section

WARNING SIGNS

Subject

FALLEN ROCK ZONE Signs

FALLEN ROCK ZONE SIGNS: In deep cut sections and other locations where fallen rock presents a potential hazard, warning signs with the legend FALLEN ROCK ZONE may be installed.

2 2 2

TRAFFIC OPERATIONS

Section

WARNING SIGNS

Subject

BRIDGES FREEZE BEFORE ROADWAY Signs

BRIDGES FREEZE BEFORE ROADWAY SIGNS:

Use of BRIDGES FREEZE BEFORE ROADWAY signs should be limited to high-speed rural highways such as interstates, parkways, and major primary roads. On such facilities, these signs should be installed near the beginning of the route, after leaving metropolitan areas, and at 25- to 50-mile intervals along the route. They may also be installed on the approaches to bridges if additional emphasis is deemed necessary.

2 2 2

TRAFFIC OPERATIONS

Chapter

WARNING SIGNS

Subject

Share the Road Plaques

ELIGIBILITY: SHARE THE ROAD (W16-1) plaques may be used to supplement warning signs for other slower forms of transportation traveling along the highway. A SHARE THE ROAD (W16-1) plaque may be used with the following signs:

- Bicycle Traffic (W11-1)
- Equestrian Traffic (W11-7)
- Horse and Buggy Traffic (W11-14)
- Farm Machinery Traffic (W15-1)

SIZE: Standard SHARE THE ROAD (W16-1) plaques shall be used. When plaques supplement signs 36” x 36” or larger, plaque size shall be 24” x 30”. Plaques that supplement smaller warning signs shall be 18” x 24”.

COLOR: SHARE THE ROAD (W16-1) plaques shall match the color of the warning sign they supplement.

BICYCLE WARNING/SHARE THE ROAD SIGNS: The Bicycle Warning and Share the Road sign assembly should be installed where there is a need to warn motorists to watch for bicyclists traveling along the highway.

If requested, Bicycle Warning (W11-1) signs supplemented with SHARE THE ROAD (W16-1) plaques shall be installed on any federally, state, or locally approved bicycle routes. As a general rule, sections of highway with designated bicycle lanes shall not be eligible for this type of signing due to the unlikelihood of conflicts between vehicles and bicycles and since standard bike lane signing and markings provide sufficient warning of bicycle activity. Likewise, highways with paved shoulders wide enough to accommodate bicycle traffic are normally not eligible for this type of signing unless special safety hazards or road courtesy problems exist.

CONT.

To have maximum effect, these signs should not be installed indiscriminately. They should only be installed in areas where one or more of the following criteria are met:

- Documented crash history involving bicyclists
- High concentration of bicycle traffic
- Geometric deficiencies in roadway that might result in increased conflicts between vehicles and bicycles

Requests for Bicycle Warning and Share the Road sign assemblies should normally come from a municipality or other responsible party (such as a recognized bicycle board or committee). The following process should be followed for such requests:

1. The requesting agency shall fill out a Bicycle/Share the Road Warning Sign Request Form **(Exhibit 21)**.
2. The requesting agency shall forward the request form to the Bicycle and Pedestrian Coordinator in the Office of Special Programs.
3. The Bicycle and Pedestrian Coordinator shall forward the request to the Division of Traffic Operations.
4. The Division and District shall review the request and notify the Bicycle and Pedestrian Coordinator of their recommendation.
5. The Bicycle and Pedestrian Coordinator shall notify the requesting agency of the results of the Cabinet's review.

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Introduction

OVERVIEW: The guide sign section in this chapter primarily addresses signing on conventional highways unless otherwise specified. In these sections, the term *conventional highway* refers to state highways except interstates, parkways, or roads with an ADT of less than 400.

COLOR: Guide signs shall consist of a white message and border on a green background unless otherwise specified.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Route Signs

INSTALLATION: Route signs and Route Sign assemblies, including Junction, Advance Route Turn, and Directional assemblies, shall be installed for all numbered state routes with the exception of frontage roads and other roads that are numbered mainly for maintenance purposes. Confirming assemblies should be installed for all numbered state routes and shall be supplemented with Cardinal Direction auxiliary signs to indicate the general direction of the route. The direction signed shall be the same as the direction listed in the *Official Milepoint Route Log*.

The decision to install these signs shall not be based on whether the route number is greater or lower than a certain number. However, routes with low volumes of traffic should have a low priority.

SIGNS: Colors and layouts of Route signs vary depending on the type of highway.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

FORMERLY Signs

INSTALLATION: When route numbers are changed on any state highway, the old route number should be posted along with the new route number as a convenience to motorists.

The procedure for installation is as follows:

1. Install new route marker.
2. Add a sign with the message FORMERLY below the new route marker.
3. Install the old route marker below the FORMERLY sign.

TIMEFRAME: The FORMERLY signs should be left in place for approximately one year.

COLOR: The FORMERLY signs shall have a black message and border on a white background.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Destination & Distance Signs

PURPOSE: Destination and Distance signs supply the road user with information concerning the destinations that can be reached by highways.

DESTINATIONS: Normally, city and town names should be used on Distance and Destination signs. In rare cases, other traffic generators may be used as destinations. However, privately operated commercial developments shall not be used as destinations on these signs.

LOCATIONS: Destination or Distance signing should be provided at intersections with numbered highway routes to inform motorists of destinations that can be reached from the intersecting route.

Destination or Distance signing shall be provided at ramp termini for cities and other destinations that are referenced on the Advance or Supplemental Guide signs for an interchange.

DISTANCE MEASUREMENTS: Measurements on Distance signs for cities and towns should be the distance between the sign location and the center of the community (examples include courthouses, central business districts, etc.).

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Street Name Signs

INTERSECTION SIGNS:

The Cabinet allows cities or counties to install Street Name (D3) signs at intersections with state highways. These signs should have a white legend and border. While green is preferred for the background color, other background colors (with the exception of red) are acceptable.

SPAN-MOUNTED SIGNS:

The district may install or permit the local agency to install span-mounted Street Name signing at signalized intersections on multi-lane state highways. Signs may be installed using one of the following methods:

- By the district at its own expense
- By a local agency through the permit process
- By the district with reimbursement from a local agency for the costs associated with the installation

ADVANCE SIGNS:

Advance Street Name signs may be installed at signalized intersections on multi-lane state highways where Street Name signing has been installed at the intersection. These signs may be installed using one of the following methods:

- By the district at its own expense
- By a local agency through the permit process
- By the district with reimbursement from a local agency for the costs associated with the installation

Condition A of Table 2C-4 of the *Manual on Uniform Traffic Control Devices* should be used to determine the appropriate location of these signs in advance of the intersection.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Numbering of Signalized Intersections

INSTALLATION CRITERIA:

The district may install or permit the local agency to install span-mounted signs for the purpose of numbering signalized intersections within a community. These signs may be installed using one of the following methods:

- By the district at its own expense
- By a local agency through the permit process
- By the district with reimbursement from a local agency for the costs associated with the installation

Such signing shall not be installed if span-mounted Street Name signing is installed at the intersection.

NUMBERING SYSTEM:

Before installing such signing, the district should consider the problems associated with the future addition of signals between existing signals along the corridor. Such an installation may require an extensive renumbering effort and/or affect citizens and businesses that have grown accustomed to or printed business materials utilizing the original signal number.

Due to the potential impacts of this type of signing, the district will be required to develop its own numbering system.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Emergency Service Signs on Conventional Highways

ELIGIBLE SERVICES: Emergency Service signing shall be provided only for the following services:

- Police
- Hospitals

LOCATIONS: Emergency Service signs should be provided only along major state highways within a 10-mile radius of the emergency facility.

In cases where Emergency Service signs have been installed at an interchange for an interstate or parkway, signs shall be installed from the ramp termini to the facility or to the last intersection with a state-maintained highway. If the main entrance to the facility is not located directly off a state-maintained highway, signing shall not be installed unless sufficient signing has been installed off the state-maintained system to direct motorists to the facilities.

COLOR: Emergency Service signs shall have a white legend and border on a blue background.

POLICE SIGNS: The district shall install signs only on conventional highways for the following law enforcement facilities:

- State Police Posts
- Other public law-enforcement facilities that are open to the public 24 hours per day, 7 days a week

The sign legend may include the name of the State Police Post or law-enforcement agency.

CONT.

HOSPITAL SIGNS:

The district shall install signs only on conventional highways for licensed hospitals that satisfy the following criteria:

- Provide 24-hour service, 7 days per week
- Have emergency facilities with a physician or emergency-care nurse on duty who is trained in emergency medical procedures

The name of the hospital shall not be included in the sign legend.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Tourist-Oriented Directional Signs

PURPOSE: Tourist-oriented directional signs (TODS) provide directional information for tourist activities offering goods and services that are of significant interest to the traveling public.

PLACEMENT: The Cabinet may permit the installation and maintenance of TODS on conventional routes only.

PROCEDURES: 603 Kentucky Administrative Regulation 4:040 sets forth the procedures to be followed in the installation and maintenance of these signs.

COLOR: Signs shall have a white legend and border on a blue background.

CONTACTS: All questions regarding TODS issues should be forwarded to the Permits Branch of the Division of Maintenance or the statewide contractor selected to administer the TODS program. The contractor is responsible for the marketing, determination of eligibility, maintenance, installation, and removal of these signs.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Reference Location Signs

INSTALLATION & MAINTENANCE: The district shall install Reference Location signs on state highways based on the *Official Milepoint Route Log*. Since the *Official Milepoint Route Log* is the basis for the identification of many field activities, Reference Location signs should be maintained to a high standard.

LOCATIONS: When a Reference Location sign cannot be erected in its correct location, it may be moved in either direction as much as 50 feet. If it cannot be placed within 50 feet of its correct location, it shall be omitted.

MOUNTING: Signs shall be mounted at a minimum height of four feet and at a lateral placement equal to that used for normal roadway signing.

UNDIVIDED HIGHWAYS: On undivided highways, signs shall be located on the right-hand side of the road for traffic heading in the cardinal direction listed in the *Official Milepoint Route Log*. Signs shall be mounted back-to-back so that the number is visible from both directions of travel.

DIVIDED HIGHWAYS: On divided highways, signs shall be set for both directions of travel. The sign for the southbound or westbound direction of divided highways shall be set at locations directly opposite the sign for the northbound or eastbound direction.

RECONSTRUCTED OR NEW ROUTES: The construction of new routes or reconstruction of existing routes will require the installation of new Reference Location signs. Reconstruction may require the relocation of Reference Location signs on existing routes beyond the reconstruction. The location of new or relocation of existing Reference Locations signs should be coordinated with District Planning.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Enhanced Intermediate Reference Location Signs

PURPOSE: Enhanced Intermediate Reference Location signs (EIRLS) serve as aids in providing location information to assist road users. These signs also provide a means for identifying the location of emergency incidents and traffic crashes.

PROCEDURES: Based on available funding and determination of need, EIRLS may be installed and maintained by the Cabinet. The division shall maintain a listing of highways eligible for EIRLS.

Local governmental agencies may install EIRLS on highways not on the EIRLS listing through the permitting process. The permit application shall contain a plan for the installation of the signs including the number of signs and their locations. Installation and maintenance of the signs, including replacement, shall be the sole responsibility of the local governmental agency seeking approval for installation. All permits for such signing shall be submitted to the division for review and comment.

LOCATIONS: EIRLS may be installed in urban areas on the mainline and interchange ramps of limited-access multilane highways and other highways covered by freeway service patrols. When mainline EIRLS are installed, additional signs shall be installed on freeway-to-freeway or other complex interchanges including large collector distributor systems. Signs may be installed at other interchanges as needed.

Outside of urban areas, these signs may be installed in the presence of elevated structures, median barriers, or any other natural or man-made impediment to emergency-vehicle access to either side of a freeway facility. These impediments include bifurcated alignments, extra-wide medians, and wooded medians.

CONT.

LOCATIONS (cont.): Locations of sign installations shall be based on the following:

- Signs shall be spaced 0.2 miles apart unless a different spacing is approved by the division.
- Signs should be installed on median barrier wall when present; otherwise on the right-hand side of the roadway. Where conditions limit or restrict the use of signs on the right-hand side of the roadway, they may be installed in the median.
- On two-lane highways, signs shall be installed on one side of the roadway only and shall be installed back-to-back.
- Signs shall not be placed farther than 30 feet from the edge of the pavement.

COLOR: EIRLS shall have a blue background. For the legacy systems in Louisville/Southern Indiana (TRIMARC) and Northern Kentucky/Cincinnati (ARTIMIS), the existing design for the existing EIRLS may be used.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

County Line Signs

COUNTY LINE SIGNS:

County Line signs shall be installed at county borders on interstates, parkways, and highways on the National Highway System. At its discretion, the district may install these signs on other state highways.

2 2 2

TRAFFIC OPERATIONS

Section	GUIDE SIGNS
Subject	City Limits Signs

CRITERIA: In accordance with Kentucky Revised Statute 177.037, the district may install City Limits signs on state highways to recognize the boundary of a city, town, or community that has a post office, whether incorporated or unincorporated. Signs shall be installed regardless of whether the community has a post office if the Cabinet had previously erected signs recognizing the city, town, or community. Signs shall not be installed for fire districts, water districts, areas with obscure political boundaries, or communities within cities (such as East Manchester).

LEGEND: The legend on these signs shall include only the place name. However, the legend CITY LIMITS may be included under the place name if desired. The use of other copy shall not be permitted.

LOCATIONS: Signs shall be located at the official community boundaries. The boundaries shall be determined by official city maps or by local officials if maps are not available. In qualifying communities that do not have official boundaries, signs shall be installed at the limits of the built-up area.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Community Boundary Signs for Cities or Unincorporated Urban Places

PROCEDURES: The district shall install signs at the boundaries of any city of the first through sixth class or an unincorporated urban place if the official governing body of the city, town, community, or unincorporated urban place submits a written request to the district for such signing. Boundary signs may be installed to honor an event or accomplishment important to the area (including sports accomplishments) or the birthplace of a person important to the area.

Detailed procedures regarding the installation of these signs are outlined in Kentucky Revised Statute 177.037 and 603 Kentucky Administrative Regulation 4:045.

INSTALLATION COSTS: The cost of the preparation and installation of these signs shall be the responsibility of the local government requesting the signs. The district shall not install these signs until payment has been received.

MAINTENANCE RESPONSIBILITY: Maintenance of these signs shall be the responsibility of the district.

COLOR: Signs shall have white copy on a green background. The color of the legend and background shall not be modified to match school colors for signs honoring school accomplishments.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Community Boundary Signs for Counties

DISCUSSION: In addition to the rules and regulations set forth in Kentucky Revised Statute 177.037 and 603 Kentucky Administrative Regulation 4:045, the district may install and maintain community boundary signing at county borders on state highways other than interstates or parkways.

QUALIFYING CRITERIA: Qualification for this type of signing shall be based on the following criteria:

- These signs shall honor the birthplace or home of an important individual or an event or accomplishment (including school accomplishments) important to the county.
- Only one event, accomplishment, or person may be honored per county.
- Signs installed to honor school accomplishments shall be limited to academic and athletic teams (including bands) of public and private schools. Qualifying teams shall be composed of 10 or more individuals and have won a statewide or nationwide competition.
- These signs shall not be permitted at county lines if boundary signs have been erected to honor the same individual or accomplishment at a city or unincorporated urban place within the county borders.

PROCEDURES: The following procedures should be followed when installing these signs:

1. Written requests for such signing shall come from the local county government and include the following:
   - Proposed message on the sign
   - Specific historical significance of the event, individual, or accomplishment that is being honored
   - Official resolution from county government in support of the sign installation
   - Commitment from the local government to reimburse the Cabinet for the cost of making and installing the signs

CONT.

PROCEDURES (cont.):

2. The district shall submit an itemized bill to the requesting governing body for labor and materials associated with making and installing these signs.

3. Signs shall not be installed until payment has been received.

MOUNTING & LEGENDS: Sample legends for these signs include HOME OF (EVENT), HOME OF (TEAM AND ACCOMPLISHMENT), or BIRTHPLACE OF (INDIVIDUAL).

These signs shall be mounted below the standard County Line signs. If desired, the County Line and boundary sign messages may be combined onto a single sign. If the message is on a separate sign, the minimum mounting height shall be maintained from the ground to the bottom of the lowest sign.

COLOR: Signs shall have white copy on a green background. The color of the legend and background shall not be modified to match school colors for signs honoring school accomplishments.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Certified Sign Assemblies

QUALIFYING PROGRAMS: Programs approved for this type of signing include: Certified Clean, Certified Healthy, Certified Ready and Prepared, and Storm Ready Communities.

APPROVAL AGENCIES: The following agencies shall determine eligibility for this type of signing:

- Certified Clean – Environmental and Public Protection Cabinet
- Certified Healthy – Governor's Office of Wellness and Physical Activity
- Certified Ready and Prepared – Kentucky Office of Homeland Security
- Storm Ready – Kentucky Weather Preparedness Committee

LOCATIONS: The location of signs shall be installed in accordance with the following criteria:

- Signs shall only be installed for a community that qualifies the approved programs.
- Signs shall only be installed by the District when notified by an approval agency.
- Signs shall not be installed on interstates or parkways.
- Signs shall be installed on no more than two routes on both approaches to a community (no more than four total sign assemblies).
- The District shall contact local officials for concurrence on the location of these signs.
- Signs shall be installed beyond but no closer than 200 feet to the community boundary sign.

CONT.

SIGN ASSEMBLIES:

Sign assemblies shall be constructed using 42” x 10” white on green signs and a 5” legend. The top sign shall have the legend CERTIFIED. If the qualifying community is a city, the legend on the bottom sign in the assembly shall be CITY. If the qualifying community is a county, the legend on the bottom sign in the assembly shall be COUNTY. Approved legends for signs in between the top and bottom signs include:

- CLEAN
- HEALTHY
- READY & PREPARED
- STORM READY

If a community qualifies for more than one of these programs, the appropriate signs shall be installed from top to bottom in the order shown (CLEAN on top, STORM READY on bottom). Minimum vertical clearance shall be maintained as additional signs are added. Sample layouts of sign assemblies for qualifying communities are shown below:

RESPONSIBILITY FOR COSTS:

The Cabinet shall be responsible for the costs of installing and maintaining these signs.

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

School Accomplishment Signs

PROCEDURES: The district may install signs to recognize accomplishments of school teams near the entrance to the school.

The following procedures should be followed when installing these signs:

1. Written requests for such signing shall come from a school agency and include the following:

   - Proposed message on the sign
   - Verification that the qualifying criteria are satisfied
   - Commitment to reimburse the Cabinet for the cost of making, installing, and maintaining the signs

2. No more than two accomplishments shall be signed for at each school.

3. The district shall submit an itemized bill to the school agency for the costs associated with making and installing these signs.

4. Signs shall not be installed until payment has been received.

5. Signs shall be installed for one year. At the end of this time period, the signs shall be removed and given to the school agency that originally requested the signs.

QUALIFYING CRITERIA: Signs shall be installed only if the following criteria are satisfied:

- Accomplishment involved an academic or athletic team (including bands) of a public or private school
- Accomplishment involved a team composed of 10 or more individuals that won a statewide or nationwide competition

CONT.

QUALIFYING CRITERIA (cont.):

- Championship was won within the last 12 months
- The school's entrance is located on a state highway

LOCATION: Signs shall be installed within 500 feet of the main school entrance.

COLOR: Signs shall have white copy on a green background. The color of the legend and background shall not be modified to match school colors.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

WELCOME TO KENTUCKY Signs

CRITERIA: WELCOME TO KENTUCKY signs shall be installed at each port of entry into Kentucky on interstates, parkways, and highways on the National Highway System. At their discretion, the districts may install these signs at the ports of entry on other state highways.

LAYOUT: Layout and color of these signs vary. Copies of the sign layout are available from the Central Sign Shop.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Educational Institution Signs on Conventional Highways

DETAILS: Colleges, universities, and other educational institutions are regarded as destinations that are deserving of guide signs. The extent of the signing to be provided is based on the amount and type of traffic expected to be generated by the various types of institutions. Signing should only be installed at intersections when there is adequate space for additional signs.

LEGENDS: Symbols, logos, or advertising shall not be permitted on these signs. The color and background shall not be modified to match school colors.

COLLEGES & UNIVERSITIES: State-supported colleges and universities, including the Kentucky Community and Technical College System, and not-for-profit independent colleges and universities that are licensed by the Kentucky Council on Postsecondary Education are eligible for signing. Enrollment figures shall be verified using the most recent information published by the Kentucky Council on Postsecondary Education. For-profit institutions shall not be eligible for signing.

Institutions with total enrollments of 1,000 students or greater for at least one reporting period (quarter, semester, etc.) of the most recent school year should be signed as follows:

- Signing should be installed at major intersections within a 5-mile radius for institutions with enrollments greater than 5,000 students. For enrollments lower than 5,000 students, a 2-mile radius should be utilized. Signing should not be provided on roads of local usage only.

- Signing should be provided at the main entrance to the institution unless the institution has installed on-site signing that would eliminate the need for signs on the roadway.

- If the school qualifies for signing at interchanges under the criteria listed in **Section TO-404-38,** adequate signing shall be provided from the interchange to the institution.

CONT.

COLLEGES & UNIVERSITIES (cont.):

Institutions with total enrollments of fewer than 1,000 students for one reporting period (quarter, semester, etc.) of the most recent school year should be signed as follows:

- Signing should be provided at the main entrance to the institution unless the institution has installed on-site signing that would eliminate the need for signs on the roadway.
- Signing may be provided one intersection away from the main entrance if conditions indicate a need or if the main entrance is not from a state-maintained roadway.

Branches of the college or university's main campus are eligible for signing according to the above policy except that the enrollment figures used for evaluation shall be that of the branch campus only.

AREA TECHNOLOGY CENTERS:

Area technology centers are eligible for signing as follows:

- Signing should be provided at the main entrance to the institution unless the institution has installed on-site signing that would eliminate the need for signs on the roadway.
- Signing may be provided one intersection away from the main entrance if conditions indicate a need or if the main entrance is not from a state-maintained roadway.
- Signing may be provided at other locations within a two-mile radius of the institution in cases where the facility is difficult to locate.

HIGH, MIDDLE, & ELEMENTARY SCHOOLS:

Public or private high, middle, and elementary schools with an enrollment of at least 100 students are eligible for one sign per direction as follows:

- Signing should be provided at the main entrance to the institution unless the institution has installed on-site signing that would eliminate the need for signs on the roadway.
- If signs are not installed at the main entrance, signing may be provided one intersection away from the main entrance if conditions indicate a need or if the main entrance is not from a state-maintained roadway.

Signing shall not be provided for pre-schools, "head start" programs, or day-care facilities.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Airport Signs on Conventional Highways

AIR CARRIER/ COMMERCIAL AIRPORTS: Airport signs should be installed on major state routes leading directly to the airport within a 15-mile radius of the airport. Signs may also be provided at intersecting routes on approaches to the primary routes within a 10-mile radius of the airport.

GENERAL AVIATION AIRPORTS: Airport signs should be installed on primary state routes leading directly to the airport within a 7.5-mile radius of the airport. Signs may also be provided at intersecting routes on approaches to the primary routes within a 7.5-mile radius of the airport.

PRIVATE AIRPORTS: Guide signs for privately owned airports shall not be installed on state highways.

SIGNS: The Airport (I-5) symbol sign shall be used to sign for airports on conventional state highways. Sign assemblies shall include white-on-green Directional Arrow Auxiliary Signs (M-6 series).

A white-on-green supplemental name plaque with the name of the airport may be included on the trailblazing assemblies to ensure adequate identification for motorists.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Stream & River Name Signs

CONVENTIONAL HIGHWAYS: Stream name signs may be installed where a conventional highway crosses a blue-line stream. Signs for other bodies of water may be installed if they appear on the official state highway map.

INTERSTATES & PARKWAYS: On interstates and parkways, signs shall be installed to identify rivers that appear on the official state highway map. Signs for other bodies of water may be installed if they appear on the official state highway map.

MOUNTING: A separate mounting post for these signs is preferable. When well placed, the sign can serve a dual function by delineating the obstruction near the roadway. Extreme care should be exercised if these signs are affixed to a structure.

2 2 2

TRAFFIC OPERATIONS

Section	GUIDE SIGNS
Subject	Time Zone Signs

LOCATION: To assist motorists, signs shall be installed at the boundary of official time zones on all limited-access highways and other major state highways.

LEGEND: Legends for these signs shall be EASTERN (OR CENTRAL) TIME ZONE.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Signs for Government & Quasi-Government Facilities

QUALIFYING FACILITIES:

The district shall install signs on conventional highways for the following facilities:

- Fire training centers
- Juvenile detention centers
- National and state veterans' cemeteries

The Cabinet may install guide signs on conventional highways for other government or quasi-government facilities that generate a high number of non-local motorists unfamiliar with the area and/or location of the facility. In this section, quasi-government facilities are defined as facilities of nonprofit agencies that receive funding from the government.

Facilities that would commonly qualify for this type of signing include:

- Park and ride lots
- Libraries
- Animal shelters/humane societies
- Landfills
- Department of Highways maintenance facilities
- Transportation Cabinet district offices
- Government facilities with large numbers of general-public visitors (such as courthouses, jails, prisons, driver-licensing facilities, military facilities, post offices, veterans' facilities, parks, etc.)

CONT.

INSTALLATION PROCEDURES:

Engineering judgment should be used to determine if any signs are necessary. If justified, signing should be installed according to the following procedure:

1. Signing should be provided at the main entrance to the facility unless on-site signing has been installed, which would eliminate the need for signs on the highway.

2. If signing is not necessary at the main entrance, signing may be provided one intersection away from the main entrance if conditions indicate a need or if the main entrance is not from a state-maintained highway. Typically, one set of signs will be sufficient for each facility. In rare cases, more signs will be necessary when the facility is difficult to locate. Signs shall not be installed unless other signs have been erected off the state-maintained highway to direct motorists from the intersection to the facility.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Signs for Industrial Parks

PURPOSE: Highways that provide access to industrial parks typically have a significant percentage of truck traffic, and guide signing may improve safety on these routes by minimizing the confusion of truck drivers seeking these facilities. Truck drivers who miss the industrial park access may find themselves traveling on routes with limited options to turn around.

INSTALLATION CRITERIA: The district may install guide signs on conventional highways to assist motorists in finding industrial parks. These signs are not meant to advertise for industrial parks and shall not be installed unless industrial developments have already moved into the park.

LEGEND: Typically, the name of the industrial park should not be included in the sign legend. However, the district may decide to include the name on the sign when:

- Signing for an extremely large industrial park
- Multiple industrial parks are located in the same area and could confuse motorists looking for a particular facility
- The industrial park name has been approved for supplemental guide signs at an interchange

The division is available to assist the district in determining the appropriate legend for industrial park signing on conventional highways.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Adopt-a-Highway Signs

PURPOSE: Adopt-a-Highway signs inform motorists that organizations have taken responsibility for picking up litter along a section of a state highway.

INSTALLATION: These signs are permissible on state highways and shall be installed by the district when notified by their Adopt-a-Highway coordinator.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

WATER PROTECTION AREA Signs

INSTALLATION: These signs shall be installed when requested by the Environmental and Public Protection Cabinet (EPPC), Division of Water. The request will include the desired sign location for the district's review and approval.

RESPONSIBILITY FOR COSTS: The EPPC shall pay for the cost of the signs, and the Cabinet shall pay for the installation costs.

REPLACEMENT OF SIGNS: Replacement signs shall be provided by the EPCC.

LEGEND: Signs shall have the message WATER PROTECTION AREA REPORT SPILLS, with a 1-800 telephone number. Signs that specify the name of a specific watershed area shall not be permissible.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Crossroad Signs

INSTALLATION CRITERIA: The district shall install signs along interstates and parkways to identify crossing highways without direct access to the interstate or parkway through an interchange.

LEGEND: The identifying signs shall include the system designation and route number of state-maintained highways that cross an interstate or parkway. For local roads, the signs shall include the local road name or route number.

MOUNTING: The signs should be installed near the right-hand bridge pier or end post.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Naming of Highways & Bridges

SIGN LEGEND:

Signs for memorial highways and bridges shall have word messages only and shall not have logos, except as otherwise noted.

NAMING BY PETITION:

Kentucky Revised Statute (KRS) 177.074 allows any unit of local government, civic organization, or other interested party to petition the Cabinet to name a road or bridge on the state primary road system after an individual or historic event or to use any other name that may be of significance to the history of the Commonwealth or any of its counties or communities. 603 Kentucky Administrative Regulation 5:240 includes detailed procedures to be followed for signs installed in this manner.

The costs associated with the preparation and installation of these signs shall be the responsibility of the petitioner. Maintenance of these signs shall be the responsibility of the Cabinet.

When roadways and bridges are named through the petition process, the petitioner shall either reimburse the Cabinet for the costs associated with sign installation or erect their own signs in accordance with Cabinet standards. If the petitioner chooses to reimburse the Cabinet for sign installation, the district shall secure a signed copy of the TC 71-223 form, *Agreement for Services to Be Performed in Conjunction with Governmental Agencies*. The district shall submit the completed TC 71-223 to the Division of Accounts so that a task order number can be assigned.

A task order number shall be established before the district submits paperwork to the Division of Traffic Operations requesting approval of the proposed road or bridge naming. The assigned task order number is required to be entered into the task order field in eMARS documents, OMS, or the payroll system to charge labor, equipment, and material costs. District crews will send the TC 31-555 form, *Maintenance Task Order Charge Sheet for Services Performed for Governmental Entities*, to the district bookkeeper after completion of the task. Upon the task's completion, the district bookkeeper shall submit the TC 31-554 form, *Task Order Agreement Completion Notification* to the Division of Accounts to generate an invoice in the eMARS system.

As an alternative method, the petitioner may install signs through the encroachment permit process. In such cases, the design and placement of the signs shall be approved by the district.

NAMING BY LEGISLATION:

In accordance with KRS 177.074, roads and bridges may be named upon direction by joint resolution of the General Assembly.

The fabrication, installation, and maintenance of these signs shall be the responsibility of the Cabinet.

NAMING FOR SLAIN STATE TROOPERS:

Roads or segments of state roads may be named after Kentucky state troopers killed in the line of duty. The procedures for the naming of these highways are outlined in KRS 177.074 (2) through (4).

Signs honoring a state trooper killed in the line of duty shall be white on blue and may contain the official logo of the Kentucky State Police.

The fabrication, installation, and maintenance of these signs shall be the responsibility of the Cabinet.

REQUIRED INFORMATION FOR NAMING REQUESTS:

All bridge and road naming requests shall be submitted to the Division of Traffic Operations and shall include the following:

- Resolution of support from local agency
- Specific location of the road or bridge to be named (including county, route, and mile point)
- Written statement from petitioner, if agreeing to fabricate and install signage as approved by the Department of Highways through encroachment permit process.
- Copy of signed TC 71-223 form (including task order number), if petitioner is reimbursing the Cabinet for costs associated with the fabrication and installation of signage as opposed to applying for an encroachment permit.

Upon completion of the task, the district shall submit copies of TC 31-555 and TC 31-554 forms to the division; or if the permit process is chosen, a copy of the permit shall be submitted to include in division files.

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Historic Trails

INSTALLATION & MAINTENANCE: Signs for historic trails that have been designated by legislation from the General Assembly shall be installed and maintained by the district unless specific instructions are issued to the contrary.

LEGENDS: If requested by the petitioner, historic trails may be signed using unique signs or shields approved by the Cabinet.

2 2 2

TRAFFIC OPERATIONS

Section	GUIDE SIGNS
Subject	Scenic Byway Signs

INSTALLATION & MAINTENANCE: In accordance with Kentucky Revised Statute 177.575, the district shall install and maintain appropriate scenic highway identification signs on highways designated as a scenic byway or scenic highway or when notified by the Division of Planning.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Bicycle Route Signs

INSTALLATION CRITERIA: Bicycle Route Guide (D11-1) signs shall be installed on any highway that has been designated as a local, statewide, or national bicycle route, unless Bicycle Route Markers (M1-8 or M1-9) are more appropriate. The signs should be installed at intervals frequent enough to keep bicyclists informed of changes in route direction and to ensure that bicyclists entering from side streets know they are on a bicycle route. These signs may be supplemented with an educational plaque with the specific name of the route.

CONTACT: To verify the eligibility of a highway, the district should contact the coordinator for Bicycle/Pedestrian Programs in the Division of Multimodal Programs.

2 2 2

TRAFFIC OPERATIONS

Section	
	GUIDE SIGNS
Subject	
	State Park & Historic Site Signs

RESPONSIBILITY: The costs associated with signs for state parks and historic sites shall be the responsibility of the requesting agency. The requesting agency can address sign installation and maintenance through the encroachment permit process or through an agreement to reimburse the Cabinet for sign installation and maintenance.

SIGN LOCATIONS: Recommended sign locations for state parks and historic sites include:

- Trailblazing signs from an interchange to the state park or historic site or to the last intersection with a state-maintained highway when Supplemental Guide signs for the destination have been installed on an interstate or parkway
- At major intersections within 25 miles of the entrance to the state park or historic site
- At the entrance to the state park or historic site if an elaborate entrance sign has not been constructed

If the main entrance is not located directly on a state-maintained highway, no signing shall be installed until sufficient signing has been installed off the state-maintained system to direct motorists to the state park or historic site.

COMMUNITY WAYFINDING: If signs for state parks and historic sites are needed in areas with an existing community wayfinding sign program, efforts should be taken to incorporate the state park and historic site signs into the community wayfinding sign program, if possible. In such cases, the signs shall be the same color and design as the community wayfinding signs.

COLOR: Other than signs incorporated into a community wayfinding sign program, signs for state parks and historic sites shall have a white legend and border on a brown background.

SHEETING: Legends shall be fabricated with Type IX retroreflective sheeting. Backgrounds shall be fabricated with Type III or Type IV retroreflective sheeting.

SIGN DESIGN:

Lettering shall be a combination of lower-case letters with initial upper-case letters.

Lettering shall be standard highway fonts and shall have the following minimum heights:

Road Characteristics	Upper-case	Lower-case
Less than 400 ADT	4”	3”
Urban, speed limit 25 MPH or less	4”	3”
Conventional roads	6”	4.5”
Expressways	8”	6”

Type B arrows shall be used. Arrows shall be between 1.5 and 1.75 times the height of the upper-case letter in the principle legend on the sign.

Sign layouts should normally exclude mileage to the destination. In situations where mileage is deemed necessary, the mileage should be incorporated into the sign layout in one of the following ways:

- Distance below the directional arrow (similar to placement on TODS, see Figure 2K-1 of the *MUTCD*)
- Distance to the right of destination (similar to placement on distance signs, see Figure 2D-7 of the *MUTCD*)

LEGACY SIGNS:

Existing signs for state parks and historic sites may remain in place for their remaining useful life. As significant maintenance or changes to their existing signing becomes necessary, districts should work with representatives from the state parks and historic sites to establish an encroachment permit or agreement for installation and maintenance of their complement of signs. New signs should comply with the requirements of this section.

LIMITED SUPPLEMENTAL GUIDE SIGNS:

State parks and historic sites are potentially eligible for Limited Supplemental signs on interstates and parkways in accordance with TO-404-39.

TRAFFIC OPERATIONS

Section	
	GUIDE SIGNS
Subject	
	Community Wayfinding

GENERAL: Community wayfinding signs are to be part of a coordinated and continuous system of guide signs that direct road users to key civic, cultural, and recreational attractions and other destinations within a city, downtown area, area of adjoining municipalities, county, or other identifiable geographic entity that is conducive to a cohesive system of guide signs.

If possible, districts should attempt to incorporate other guide signs programs (green, brown, and blue guide signs) into the community wayfinding sign application to provide a comprehensive and consistent guide sign system for the community. If space for guide signing is limited, the order of priority for guide signs should be: green signs (highest), community wayfinding signs, and TODS (lowest).

SIGN DESIGN: Community wayfinding signs within an overall wayfinding guide sign plan shall have a common color and may include an identification enhancement marker to help identify the community wayfinding signs system for a given area.

If an identification enhancement marker is used, the area of the marker shall not exceed one-fifth of the area of an individual sign panel in the community wayfinding sign assembly that it supplements. Identification enhancement markers may consist of shapes, colors, and/or pictographs.

Pictographs, as defined by the *MUTCD*, are a pictorial representation used to identify a governmental jurisdiction, an area of jurisdiction, a governmental agency, a military base or branch of service, a government-approved university or college, a toll payment system, or a government-approved institution. If used on individual sign panels, pictographs shall not exceed two times the height of the upper case letters of the principle legend on the sign.

Sign layouts should normally exclude mileage to the destinations. In situations where mileage is deemed necessary, the mileage should be incorporated into the sign layout in one of the following ways:

- Distance below the directional arrow (similar to placement on TODS, see Figure 2K-1 of the *MUTCD*)
- Distance to the right of destination (similar to placement on distance signs, see Figure 2D-7 of the *MUTCD*).

SHEETING: Signs, including any identification enhancement markers, shall be retroreflective. Legends shall be fabricated with Type IX retroreflective sheeting. Backgrounds shall be fabricated with Type III or Type IV retroreflective sheeting.

COLOR: The standard colors of red, orange, yellow, purple, or the fluorescent versions thereof, fluorescent yellow-green, and fluorescent pink shall not be used as background colors for community wayfinding signs. These color restrictions do not apply to identification enhancement markers unless the marker would be mistaken as being a traffic control device.

LETTERING: Lettering for destinations on community wayfinding signs shall be a combination of lower-case letters with initial upper-case letters. All other word messages on community wayfinding signs shall be in all upper-case letters.

Lettering shall be standard highway fonts. For the principle legend on community wayfinding signs, letters shall have the following minimum heights:

Road Characteristics	Upper-case	Lower-case
Less than 400 ADT	4”	3”
Urban, speed limit 25 MPH or less	4”	3”
Conventional roads	6”	4.5”
Expressways	8”	6”

ARROWS: Type B arrows shall be used. Arrows shall be between 1.5 and 1.75 times the height of the upper-case letter in the principle legend on the sign.

DESTINATIONS: Community wayfinding guide signs shall be limited to three destinations per sign assembly. No more than two sign assemblies should be allowed per intersection approach.

Destinations shall be ordered by direction, with those lying straight ahead listed on top, followed by destinations to the left, and then destinations to the right at the bottom. Multiple destinations in the same direction shall be sub-ordered by distance, with the nearest destination listed on top. Normally, signs would not be installed more than three turns from the destination.

In instances where the number of desired destinations exceeds the number of allowable signs/assemblies, preference should be given to the following:

- Trailblazing signs for destinations with Limited Supplemental signing at interchanges
- Governmental destinations
- Quasi-governmental destinations
- Destinations that require a turning maneuver as opposed to destinations that involve a through movement

Horizontal lines of the same color as the legend shall be used to separate all destinations from each other.

INSTALLATION: The Cabinet may allow the installation of community wayfinding signs within the right of way of expressways and conventional roads. Community wayfinding signs shall not be permitted along the mainline or ramps of freeways.

Regulatory, warning, and other guide signing shall have priority over placement of community wayfinding signs. In general, regulatory, warning, and other guide signs should be located in accordance with normal standards for advance placement, and community wayfinding should be placed so there is no conflict with these more critical signs. Community wayfinding signs shall not be installed where adequate spacing (200 feet) cannot be provided between community wayfinding signs and other higher priority signs. Community wayfinding sign assemblies should be located at least 200 feet in advance of intersections. Community wayfinding signs shall not be installed in a position where they would obscure motorists' view of other traffic control devices.

PERMIT APPLICATION: The installation and maintenance of community wayfinding signs shall be addressed through the encroachment permit process. Applications for community wayfinding signs shall originate from a city/county government or an equivalent jurisdictional level.

The applicant shall be responsible for the cost of the fabrication, installation, and maintenance of these signs. Signs shall not be erected until a completed application and permit are approved.

QUALIFYING CRITERIA: Generally speaking, the applying agency may define qualifying criteria for inclusion into their community wayfinding sign program. However, districts shall have ultimate approval authority as to qualifying criteria and approved destinations. As needed, the division is available to assist in the review and approval of community wayfinding applications/permits.

At a minimum, the eligibility criteria shall include the following:

- Operating hours shall be regular and reasonable for the type of facility. Hours shall not be by appointment or reservation only.
- Adequate parking is available.
- Public bathroom facilities shall be available during open hours of operation.
- Destination signs should be within 10 miles of the attraction. Longer distances (up to 25 miles) may be acceptable for county or regional signing permits.
- The attraction shall not have illegal signs posted in the Commonwealth of Kentucky.
- The attraction shall comply with all local, state, and federal statutes and administrative regulations including those prohibiting discrimination based on race, religion, color, sex, age, disability, or national origin.

APPLICATION ITEMS: A complete program application shall be submitted to the district Traffic Engineering & Permits Section. Applications should include:

- Application for Encroachment Permit form (**TC 99-1A**)
- Clearly defined eligibility criteria
- List of proposed attractions that meet the defined criteria
- Overall map of the city, area, or jurisdiction with proposed sign locations clearly marked
- Detailed map of each new sign assembly location, showing all existing signs with existing spacing between signs labeled along with any signs scheduled to be removed
- Sign design details in color that illustrate:
  - Sign message(s)
  - Background colors
  - Type/manufacturer of retroreflective sheeting
  - Any pictographs and/or identification enhancement markers
  - Sign font(s)
- Sign post or support details for each sign assembly
- Approved omni-directional breakaway sign base

REMOVAL: The Cabinet reserves the right to remove community wayfinding signs or sign assemblies for any reason including, but not limited to, the following:

- Signs are installed, damaged, and/or leaning in a manner that might present a hazard to motorists.
- Signed attractions are no longer open for business.
- Signs are not maintained to provide adequate retroreflectivity.
- Signs no longer comply with requirements of the *MUTCD*.
- Signs no longer comply with this section.
- The need arises for a sign panel to a destination with a higher priority as established in this section.

For signs that pose an immediate hazard to the public, the Cabinet reserves the right to remove signs and/or sign assemblies immediately and shall notify the applicant of the removal within a reasonable timeframe. For other signs that are inadequately maintained, the district should give applicants appropriate notice that signs need to be fixed or they will be subject to removal. Notice of sign removal shall be adequately documented, and applicants should be given a reasonable amount of time, as determined by the district, to address non-compliant signs. If the applicant does not address or provide a plan to address non-compliant signs within the timeframe established by the district, the district may remove non-compliant signs. Removed community wayfinding signs shall be retained by the districts for at least one month. If there is no further action or contact by the applicant, the district may dispose of the signs in a manner consistent with disposal methods of state-owned signing.

Encroachment permits for community wayfinding signs should include language to establish the Cabinet's removal rights.

TODS: If Tourist Oriented Directional Signs (TODS) need to be removed or relocated to accommodate placement of community wayfinding signs, the district should contact the TODS contractor to coordinate removal or relocation.

LEGACY SIGNS: Existing signs installed under the old Cultural and Recreational (C&R) sign program may remain in place for their remaining useful life. As significant maintenance for old C&R signs becomes necessary, districts should work with representatives from these communities to replace C&R signs with installations that comply with the community wayfinding sign policy.

New sign installations should meet the requirements of community wayfinding signs. If a new community wayfinding sign needs to be installed on assemblies with existing C&R signs, all signs on the C&R assembly should be replaced with signs that are compliant with this section.

TRAFFIC OPERATIONS

Section	
	GUIDE SIGNS
Subject	
	511 Signs

BACKGROUND: Kentucky's 511 program is an automated traffic, travel, and weather information service. The 511 telephone service is part of a nationwide program where motorists who wish to obtain traffic and transportation information can do so by dialing 511 in areas where the service is available. In Kentucky, the system has been modified to provide tourism information in areas where tourism is promoted by the Southern and Eastern Kentucky Tourism Association (SEKTA).

LOCATIONS: The district shall install and maintain 511 signs on interstates, parkways, and major state highways to inform motorists of this service.

COLOR: These signs have a white legend and border on a blue background.

LEGENDS: The three possible 511 messages are:

- 511/TRAFFIC AND/TRAVEL INFO/DIAL 511—These signs shall be installed on highways that are part of the CARS-511 System.
- 511/TRAFFIC AND/TOURISM INFO/DIAL 511—These signs shall be installed on highways that are part of the CARS-511 System and are served by the SEKTA.
- 511/(blank line)/TOURISM INFO/DIAL 511—These signs shall be installed on certain highways that are not part of the CARS-511 System and are served by SEKTA.

INSTALLATION PROCEDURES: The following procedure should be followed when installing these signs:

1. The division shall determine the legends and approximate locations.
2. Signs should be installed behind guardrail if possible. If this is not possible, the district should exercise judgment to find a convenient and safe location for the sign installations.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Hydrant Location Signs

BACKGROUND: Rapid location of fire hydrants can be hindered by high fills, noise walls, fencing, and shrubbery or trees blocking the view from fire apparatus on the traveled way. Hydrant Location signs are not traffic control devices but aid fire officials in locating fire hydrants. Uniformity in application is essential for locating purposes and to ensure they do not distract from official traffic control devices.

INSTALLATION & MAINTENANCE RESPONSIBILITY: The fabrication, installation, and maintenance of the signs shall be the responsibility of the local governmental agency or other entity seeking approval for installation. These signs shall be installed via the permitting process.

PERMIT PROCESS: Permit applications shall contain a plan for the installation of the signs including the number of signs, their locations, and locations of the adjacent hydrants. All applications for such signing shall be submitted to the division for review and comment.

INSTALLATION CRITERIA: Signs should be installed in accordance with the following criteria:

- Fire hydrants within 300 feet of the traveled way may be marked.
- White-on-blue 8-inch x 8-inch signs with a hydrant symbol shall be used.
- Signs should be placed back to back.
- Signs shall be installed only on the side of the roadway where the hydrant is located.
- Signs shall not be installed farther than 30 feet from the edge of pavement.
- Signs shall be placed on the right-hand wall facing traffic on elevated structures.
- Signs may be installed on fence or sound walls.

CONT.

MARKINGS/ DELINEATORS: **Chapter TO-507** of this manual includes guidance on the use of pavement markings and delineators to identify fire hydrant locations.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Historical Highway Markers

MARKER PROGRAM: The Kentucky Historical Highway Marker Program is administered by the Kentucky Historical Society in cooperation with the Cabinet. The program commemorates historic sites, events, and personalities throughout the Commonwealth.

INSTALLATION: District forces shall install historical markers on or near public roadways. Requests for the district to install these markers come from the Kentucky Historical Society through a coordinated effort with their chairman for the particular county.

LOCATIONS: General locations and inscriptions for markers are approved by the historical society in conjunction with its county chairman. However, the final decision for placement of a marker on public highways rests with the Cabinet.

No marker shall be erected where it will create a traffic hazard or in any location not agreeable to the property owner or the governmental agency having jurisdiction.

INSTALLATION PROCEDURE: The district shall install historical highway markers in accordance with the procedure outlined below:

1. The district will be contacted by the manager of the Kentucky Historical Highway Marker Program when the marker is ready and will be given the name of the person to contact concerning the location of the marker.

2. The marker will be provided by the historical society and shipped to the district directly from the marker manufacturer.

3. The manager of the Kentucky Historical Highway Marker Program will send a copy of the proposed text to the district for verification of the text on the marker.

CONT.

INSTALLATION PROCEDURE (cont.):

4. The manager of the Kentucky Historical Highway Marker Program will inform the district of the date of the dedication ceremony.

5. The district shall coordinate the installation of the marker in advance of the scheduled dedication ceremony.

MAINTENANCE PROCEDURE:

The district shall participate in the maintenance of historical markers according to the following procedure:

1. If the activities associated with a nearby construction project may potentially damage an existing historical marker, the district should remove the marker for storage until the project is completed. In such cases, the district shall contact the manager of the Kentucky Highway Marker Program regarding the temporary removal of the marker. The manager of the Kentucky Highway Marker Program shall also be notified of the reinstallation date of the marker.

2. Damaged markers shall be reported to the manager of the Kentucky Historical Highway Marker Program.

3. No attempt should ever be made to polish or paint an existing marker.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Permanent Temporary Detour Signs

BACKGROUND: In times of emergency, a need may exist to guide road users away from and around high-risk incidents on or near the traveled way.

PROCEDURE: "Temporary detour" signing may be installed on a permanent basis on highways that would serve as detour routes for limited-access multi-lane facilities and on facilities covered by freeway service patrols.

Local governmental agencies desiring to install permanent detour signs shall obtain approval from the district through the permitting process. The application shall contain a plan for the installation of the signs, including the number of signs and their location. Nothing in this section shall prohibit the Cabinet from installing and maintaining "temporary detour" signage.

LOCATIONS: Permanent "temporary detour" signing should be installed on the right-hand side of the roadway facing traffic. Where conditions prevent the installation of permanent "temporary detour" signs on the right-hand side of the roadway, they may be installed on the left-hand side of the road.

LEGACY SYSTEMS: For legacy systems, existing signs shall be used.

INSTALLATION & MAINTENANCE RESPONSIBILITY: The fabrication, installation, and maintenance of the signs shall be the responsibility of the local governmental agency seeking approval for installation unless the Cabinet has installed the signs.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Interchange Guide Signs

APPROVAL: Destinations on interchange guide signs shall be approved by the division.

NON-FREEWAY INTERCHANGES: Interchanges on highways other than interstates and parkways should be signed as expressways in accordance with Section 2E of the *Manual on Uniform Traffic Control Devices*.

ROUTE MARKERS: Kentucky route markers, U.S. route markers, interstate shields, and parkway shields shall be used (if applicable) on the major sign sequence of Interchange Guide signs to denote the interchange crossroad.

ROAD NAMES: If an existing name for the road is known and space is available on the sign, it may supplement the route marker as information. Road names indicating business, shopping center, or other commercial or industrial establishments shall not be used.

In rare cases, a local road name may be used as the primary destination on the Interchange Guide signs. The most common examples include situations where the crossroad is not a state-maintained highway or where there are no qualifying communities to use as destinations.

QUALIFYING CITIES: The major sign sequence of Interchange Guide signs should include the names of incorporated cities accessible from the interchange to direct motorists to these destinations.

Only incorporated cities meeting the following criteria should be considered for the major sign sequence of Interchange Guide signs or for Supplemental Guide signs:

- The city shall be located not more than two miles per 1,000 population from the facility

CONT.

QUALIFYING CITIES (cont.):

- Signs shall not be provided for cities that are located a greater distance than 25 miles from the facility

- Signs shall not be provided for cities of less than 2,000 population

When more cities satisfy the above criteria than can be included on the major sign sequence, the qualifying cities must be ranked in order to determine which cities are placed on the major sign sequence.

The following procedure can be used to rank cities in order of importance:

1. County seats should receive priority over other cities. The highest-priority destination should be the county seat of the county where the interchange is located.

2. Cities shown on the official state highway map should be the next priority.

3. The ratio of the city's population to the number of miles from the interchange should be checked. Cities with ratios that are significantly higher than those of other cities should receive priority.

4. Cities significantly closer to the interchange than other cities should receive priority.

5. If appropriate destinations for the signs are still not obvious, populations of the cities should be used to determine higher-priority locations.

The highest cities on the priority list should be selected as destinations on the major sign sequence of Interchange Guide signs. Supplemental Guide signs may be considered for the highest-ranked cities not included on the major sign sequence.

In urban areas with numerous interchanges, it may be desirable to include only the route marker and corresponding road name on the major sign sequence without signing for specific communities.

In rare instances, there may be no qualifying cities at a rural interchange. In such cases, nonqualifying cities may be used as a destination on the major sign sequence in lieu of only signing for the route number of the crossing highway.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Supplemental Guide Signs

NUMBER OF SIGNS: No more than two Supplemental Guide signs shall be installed on the approach to an interchange. Two signs shall be permitted only if there is physical space, in accordance with spacing criteria in the *Manual on Uniform Traffic Control Devices*, on both the mainline roadway and ramp area.

NUMBER OF MESSAGES: No more than two messages shall appear on any Supplemental Guide sign without the approval of the Secretary of Transportation.

APPROVAL: All requests for white-on-green Supplemental Guide signs shall be forwarded to the division for approval.

QUALIFYING COMMUNITIES: Occasionally, it is necessary to provide motorists with additional information regarding incorporated cities accessible from an interchange other than places shown on the major sign sequence. These additional destinations may be shown on a Supplemental Guide sign.

Only incorporated cities satisfying the qualifying criteria for the major sign sequence of Interchange Guide signs should be considered for Supplemental Guide signs (see **Section TO-404-38).** Supplemental Guide signs may be considered for the highest-ranked cities not included on the major sign sequence.

COLLEGES & UNIVERSITIES: Not-for-profit colleges and universities may be used as destinations on the supplemental signs for a given interchange provided all of the following requirements are satisfied:

- The college or university is recognized as an institution of higher learning by the Council on Postsecondary Education.

CONT.

COLLEGES & UNIVERSITIES (cont.):

- The total enrollment for at least one reporting period (quarter, semester, etc.) of the most recent school year is at least 1,000 students. Both full- and part-time students may be considered. The enrollment figures shall be verified using the most recent information published by the Council on Postsecondary Education.

- The institution is within 25 miles of the interchange where signing will be provided.

These signs shall not be installed until sufficient signs have been installed from the interchange to the school in accordance with **Section TO-404-19.**

AIRPORTS:

Supplemental Guide signs for air carrier/commercial service airports may be installed at interchanges within a 15-mile radius of the airport. The message AIRPORT, airport symbol, and/or name of the airport may be included on these signs.

Adequate signing from the interchange to the airport shall be installed prior to the installation of the supplemental signs (see **Section TO-404-20).**

Supplemental Guide signs for general aviation or private airports shall not be installed at interchanges. Such signing could potentially mislead motorists who are unfamiliar with the area and looking for a commercial airport.

If an interchange is located within a 7.5-mile radius of a general aviation airport, trailblazing signs should be provided from the ramp termini to the airport (see **Section TO-404-20).**

GOVERNMENT & QUASI-GOVERNMENT FACILITIES:

Supplemental Guide signs may be installed for certain government and quasi-government facilities. Refer to AASHTO's *Guidelines for the Selection of Supplemental Guide Signs for Traffic Generators Adjacent to Freeways* for guidance on determining if facilities would qualify for such signing.

INDUSTRIAL PARKS:

Highways that provide access to industrial parks typically have a significant percentage of truck traffic. Signs for industrial parks may improve safety on these routes by minimizing the confusion of truck drivers seeking these facilities. These signs are not meant to advertise the industrial parks and shall not be installed unless industrial developments have already moved into the park.

These signs shall not be installed until sufficient signs have been installed from the interchange to the industrial park.

CONT.

INDUSTRIAL PARKS (cont.):

Typically, the name of the industrial park should not be included in the sign legend. However, the division may decide to include the name on the sign when:

- Signing for an extremely large industrial park
- Multiple industrial parks are located in the same area and could confuse motorists looking for a particular facility

ROAD NAMES:

Roads named to indicate a business, shopping center, or other commercial or industrial establishment shall not be used as a road name on supplemental signs.

LIMITED SUPPLEMENTAL GUIDE SIGNS:

Limited Supplemental Guide signs are official guide signs installed on the approaches to interchanges on interstates, parkways, and other fully controlled access highways that guide motorists to historic sites; cultural, recreational, or entertainment facilities; or areas of natural phenomenon or scenic beauty.

The Cabinet shall control the installation and maintenance of Limited Supplemental Guide signs. These signs count toward the maximum number of supplemental messages/signs allowed at interchanges.

Limited Supplemental Guide signs shall have a white legend and border on a brown background.

603 Kentucky Administrative Regulation 4:050 sets forth the procedures to be followed in the installation and maintenance of these signs. All requests for such signs shall be reviewed by the division in conjunction with the Transportation and Tourism Interagency Committee.

Limited Supplemental signs shall be installed by contract. The applicant shall participate in the cost of installing these signs, and payment shall be made prior to the Cabinet's releasing a work order to the statewide contractor for the installation of these signs.

The district shall report all damaged signs to the Division of Highway Design. All other questions regarding Limited Supplemental signs for cultural and recreational activities should be forwarded to the division.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Emergency-Service Signs at Interchanges

QUALIFYING SERVICES: The Cabinet may install and maintain emergency-service signs for the following services at interchanges on interstates and parkways:

- Police
- Hospitals

APPROVAL: All requests for emergency-service signs at interchanges shall be forwarded to the division for approval.

LOCATIONS: Signs for emergency services should be installed in accordance with the following criteria:

- Signs should be installed only if the emergency facility is within a 10-mile radius of the interchange.
- Emergency-service signs shall not be installed at major interchanges involving freeway-to-freeway connections.
- Emergency facilities accessible from more than one interchange should be signed for at only one of the exits for each direction of travel. The preferred exit shall be selected by the Cabinet, giving consideration to the most direct or best access to serve the motorists' interests.

Adequate signing from the interchange ramp to the facility shall be installed prior to the installation of the signs on the interstate or parkway. The distance shall be shown on the directional signs at the ramp termini if the distance to the facility is greater than one mile. Trailblazing assemblies shall not be installed on the mainline portion of interstates or parkways because their size makes it difficult for motorists to read and comprehend the information on the sign.

POLICE SIGNS: Signs shall be installed only for state police posts. The sign layout may include the official name of the state police post.

CONT.

HOSPITAL SIGNS: Signs shall be installed only for hospitals that satisfy the following criteria:

- Provide 24-hour service 7 days per week
- Have emergency facilities with a physician or emergency-care nurse on duty who is trained in emergency medical procedures

The hospital name shall not be included on Hospital signs.

COLOR: Emergency-service signs shall have white letters and borders on a blue background.

DAMAGED SIGNS: The district shall report all damaged panel signs to the Division of Highway Design.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Cultural & Recreational Post-Interchange Signs

PURPOSE: Cultural and Recreational Post-Interchange signs are placed miles in advance of the interchange to give motorists notice of an upcoming attraction. This allows motorists time to decide whether to visit an attraction before they actually have to exit the roadway. These signs are considered experimental in Kentucky with approval from the FHWA.

PROCEDURES: The Cabinet shall control the installation and maintenance of Cultural and Recreational Post-Interchange signs within the right of way of fully controlled-access highways. Signs shall be installed only for activities involving a historic site or tourist area/attraction that have a Limited Supplemental sign at an interchange.

All requests for Cultural and Recreational Post-Interchange signs shall be reviewed by the division in conjunction with the Transportation and Tourism Interagency Committee. These signs shall be installed by contract. The applicant shall participate in the cost of installing these signs, and payment shall be made prior to the Cabinet's releasing a work order to the statewide contractor for the installation of these signs.

COLOR: Cultural and Recreational Post-Interchange signs shall have a white legend and border on a brown background.

LEGEND: Signs may list up to three traffic generators. The signs may list either mileage to the attraction/area or the exit number. Exit numbers are more likely to be used in urban areas. Mileage is more common in rural areas.

LOCATION: Each attraction/area may be displayed on up to two signs per approach to the interchange. The signs should be placed approximately 10 and 20 miles in advance of the interchange. Spacing may be adjusted if necessary.

CONTACTS: The district shall report all damaged signs to the Division of Highway Design. All other questions regarding Cultural and Recreational Post-Interchange signs should be forwarded to the Division of Traffic Operations.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

Specific Service (Logo) Signs

PURPOSE: Specific Service (Logo) signs inform motorists of the availability of travel-related goods and/or services and provide directional information for business establishments offering these goods and services.

PROCEDURES: The Cabinet shall permit the installation and maintenance of Logo signs for qualifying services within rights of way of fully controlled access highways.

603 Kentucky Administrative Regulation 4:035 sets forth the criteria to be followed in the installation and maintenance of these signs.

QUALIFYING SERVICES: Specific Service signs may be installed for the following types of services:

- Gas
- Food
- Lodging
- Camping
- Attractions

COLOR: Logo signs shall have a blue background with a white border.

CONTACTS: All questions regarding these signs should be forwarded to the statewide Logo contractor. The contractor is responsible for the marketing, determination of eligibility, maintenance, installation, and removal of Specific Service signs. Should there be any conflicts or unresolved issues, the Permits Branch of the Division of Maintenance should be contacted.

2 2 2

TRAFFIC OPERATIONS

Section

GUIDE SIGNS

Subject

NEXT REST AREA Signs

PROCEDURES: In addition to the standard sequence of signs, a supplemental panel reading NEXT REST AREA/XX MILES shall be installed below the REST AREA advance guide sign that is closest to the exit. Such placement shall not impair the breakaway characteristics of the sign.

COLOR: This sign shall have a white legend and border on a blue background.

2 2 2

TRAFFIC OPERATIONS

Chapter

GUIDE SIGNS

Subject

Alternate Truck Routes

PURPOSE: These signs provide guidance regarding alternate truck routes. The installation of these signs does not establish regulatory authority to prohibit truck traffic along a route.

PROCEDURE: The district may install signing to encourage truck traffic to use an alternate route. The following procedure shall be followed when installing such signs:

1. The local governmental entity must pass a resolution in favor of the alternate truck route designation. If the alternate truck route passes through multiple jurisdictions, resolutions shall be required from each governmental entity.

2. The district shall conduct a review of the "bypassed" route to determine the need for an alternate truck route and shall conduct a review of the proposed alternate truck route to determine if the route is acceptable from an engineering perspective.

3. If the district determines that the alternate route is necessary and acceptable from an engineering perspective, it shall submit a request to the division for the development of a signing plan. With the assistance of the district, the division shall develop and approve the signing plan for the alternate truck route.

4. The district shall install the recommended signs along the alternate route.

5. After installing the signs, the district shall notify the Division of Traffic Operations and Division of Planning of the limits of the alternate route (including milepoints) and the installation date of the signs.

2 2 2

TRAFFIC OPERATIONS

Chapter

PAVEMENT MARKINGS & DELINEATION

Subject

Introduction

OVERVIEW*:* Set forth are the requirements for pavement markings and delineation devices on the state highway system. Except as noted in this chapter, all markings and delineation devices shall conform to the *Manual on Uniform Traffic Control Devices (MUTCD)*, current adopted edition. The purpose of this chapter is to discuss any additions to or departures from the *MUTCD* and to provide emphasis to certain *MUTCD* content.

PAVEMENT MARKINGS: Pavement markings include:

- Striping (centerlines, lane lines, edge lines, and gore markings)
- Intersection markings (transverse markings, symbols, cross-hatching, and word markings)
- Curb and parking-space markings
- Pavement Markers

DELINEATION DEVICES: Delineation devices include:

- Post-mounted delineators
- Surface-mounted delineators
- Guardrail delineators
- Barrier wall delineators

TRAFFIC OPERATIONS

Chapter

PAVEMENT MARKINGS & DELINEATION

Subject

Pavement Marking Installation & Maintenance Responsibilities

GENERAL: This section describes some of the responsibilities of the Division of Traffic Operations, Division of Materials, Division of Maintenance, and the districts when it comes to providing pavement markings on state-maintained highways.

DIVISION OF TRAFFIC OPERATIONS: The Division of Traffic Operations is generally responsible for the following functions:

- Providing recommendations and interpretations of the *Manual on Uniform Traffic Control Devices* with regard to pavement markings
- Establishing policy and advising districts on the selection of specific pavement marking materials
- Establishing price contracts for the purchase of pavement marking materials for use by the districts
- Establishing price contracts for the purchase of pavement marking contract services for use by the districts
- Developing and maintaining a list of roadway sections that make up the Pavement Marker System
- Approving use of non-standard pavement marking materials
- Preparing pavement marker contracts for new installations and lens replacement
- Investigating new and innovative pavement marking products and concepts
- Coordinating experimental projects and research involving pavement markings
- Developing Standard Drawings for pavement markings

DIVISION OF MATERIALS: The Division of Materials is generally responsible for the following functions:

- Developing specifications, special notes, and Kentucky Methods for various pavement marking materials
- Establishing list of approved materials for pavement markings
- Developing, coordinating, and providing training on quality control and inspection activities
- Testing pavement marking materials used on construction projects
- Certifying contractors' striping equipment
- Reviewing new and experimental products (KyPEL)
- Providing technical assistance
- Resolving disputes

DIVISION OF MAINTENANCE: The Division of Maintenance is responsible for the development of annual long-line restriping contracts.

DISTRICT: Each district is generally responsible for the following functions:

- Determining routes to be addressed with annual long-line restriping contracts and frequency of restriping efforts
- Utilizing state crews or contract forces under master agreement to install and maintain pavement markings
- Providing eligible sections of roadway, typical sections, estimated quantities and other required information for inclusion in projects prepared by the Central Office
- Conducting both daytime and nighttime inspections and condition assessments of the pavement markings in its district
- Providing advice and reviewing striping plans as part of the preconstruction process
- Providing advice and assistance with the layout of pavement markings on construction and resurfacing projects

TRAFFIC OPERATIONS

Chapter

PAVEMENT MARKINGS & DELINEATION

Subject

Striping

TRAVELED WAY: In this section, *traveled way* means the portion of the roadway for the movement of vehicles, exclusive of the shoulders.

WIDTH: Six (6) inch normal width striping shall be used on the following highways:

- Interstates and their ramps
- Parkways and their ramps
- Other highways on the State Primary Road System (SPRS)
- Non-SPRS two-lane highways with:
  - A traveled way width of twenty (20) feet or greater, and
  - ADT greater than or equal to 1,000

Four (4) inch normal width striping may be used on all other highways.

MATERIALS: Durable pavement markings shall be used on interstates, parkways, and other highways on the SPRS.

EDGE LINES: Left edge line pavement markings shall consist of a normal width, solid yellow line. They shall be installed on divided highways, one-way streets, and ramps to delineate the left-hand edge of the roadway.

Right edge line pavement markings shall consist of a normal width, solid white line. They shall be installed on multi-lane highways, one-way streets, and ramps to delineate the right-hand edge of the roadway.

Right edge line pavement markings should be installed on two-lane, two-way roadways with a traveled way width less than sixteen (16) feet but may be omitted with the approval of the division.

For two-lane, two-way highways with a traveled way width that is greater than or equal to sixteen (16) feet but less than twenty (20) feet, roadways shall be striped with either edge lines or centerlines based on engineering judgment. The division is available to assist with the determination of the preferred marking arrangement for such roadways.

For two-lane, two-way highways with a traveled way width of twenty (20) feet or greater, right edge line pavement markings shall be installed if the ADT is greater than or equal to 1,000. Right edge line pavement markings may be omitted on such roadways if the route is not on the SPRS and the ADT is less than 1,000.

EDGE LINES (cont.):

Edge line striping may be excluded, based on engineering judgment, in areas where the edge of the pavement is delineated by physical objects such as curbs, parking spaces, or other markings. Edge line striping should be installed on roadways with curb and gutter when the posted speed limit is 45 MPH or greater.

CENTERLINES:

Centerlines shall not be installed on roadways with a traveled way width less than sixteen (16) feet.

For two-lane highways with a traveled way width that is greater than or equal to sixteen (16) feet but less than twenty (20) feet, roadways shall be striped with either centerlines or edge lines based on engineering judgment. The division is available to assist with the determination of the preferred marking arrangement for such roadways.

Centerline striping shall be installed on two-lane, two-way highways where the width of traveled way is greater than or equal to 20 feet.

NO-PASSING ZONES:

The establishment of no-passing zone markings is addressed in the *Manual on Uniform Traffic Control Devices* (*MUTCD)*. If adequate passing sight distance is available, passing may be permitted in school zones, on bridges with a width greater than or equal to the width of approach pavements, through small communities, on downtown streets, and for the opposing lane of truck-climbing lane sections.

Successive no-passing zones should be connected if the distance between them is less than 400 feet.

No-passing zone markings should be installed on the approaches to all intersections with public roads and major commercial entrances if the ADT of the crossroad is 400 vehicles per day or greater. If traffic counts for the crossroad are not available, the ADT may be estimated using engineering judgment. The length of a no-passing zone installed on the approach to an intersection should be a minimum of 500 feet. If adequate sight distance is available, the pavement should be marked to indicate passing is allowed immediately following the intersection.

TWO-LANE TWO-WAY HIGHWAYS:

The contents of this policy, in regards to the placement, width, and materials used for striping on two-lane two-way highways, are summarized on the *Pavement Striping Details for Two-Lane Two-Way Roadways* Standard Drawing.

INTERSECTIONS:

Mainline striping shall be broken for intersections and major commercial entrances. Mainline striping should not be broken for minor driveways and minor commercial entrances.

GORES & INTERCHANGES: Refer to the pavement markings section of the *Kentucky Department of Highways' Standard Drawings* for information regarding the marking of gores and interchanges.

TRUCK-CLIMBING LANES: Truck-climbing lanes should be marked as shown in **Exhibit 5.**

LANE TRANSITIONS: Lane transitions should be marked as shown in **Exhibit 6**.

TWO-WAY LEFT TURN LANE MARKINGS: Refer to the pavement markings section of the *Kentucky Department of Highways' Standard Drawings* for information regarding the marking of two-way left turn lanes.

TRAFFIC OPERATIONS

Chapter

PAVEMENT MARKINGS & DELINEATION

Subject

Intersection, Symbol, & Word Markings

GENERAL: The *Typical Markings at Signalized Intersections* Standard Drawing provides guidance on line dimensions, colors, and placement of pavement markings commonly used at signalized intersections. Some aspects of this drawing may also apply to non-signalized intersections.

STOP LINES: Stop lines (stop bars) shall be used to mark the desired stopping location on all approaches to traffic signals. Stop lines may be used on approaches to intersections controlled by a stop sign. Stop lines shall not be used for yield conditions or in a left-turn lane on an uncontrolled intersection approach. If a marked crosswalk is present, stop lines should be placed a minimum of 4 feet in advance of the nearest crosswalk line. In the absence of a marked crosswalk, stop lines should not be placed more than 30 feet or less than 4 feet from the nearest edge of the intersecting traveled way. In left turn lanes, stop lines should be located so vehicles at the stop line do not interfere with left-turning vehicles from other approaches.

YIELD LINES: Yield lines may be used to indicate the point behind which vehicles are required to yield in compliance with a yield sign.

Yield lines should be used in advance of mid-block crosswalks crossing an uncontrolled multi-lane approach. If used at such locations, the yield lines should be placed 20 to 50 feet in advance of the nearest crosswalk line and shall be accompanied by YIELD HERE TO PEDESTRIANS (R1-5, R1-5a) signs.

LANE-USE ARROWS: At signalized intersections, lane-use arrows:

- Shall be used in all dedicated turning lanes
- Shall be used in any left/through combination lane
- May be used in any through or through/right combination lanes if deemed necessary based on engineering judgment

LANE-USE ARROWS (cont.): At interchanges, lane-use arrows should be used:

- In the turning lanes on the crossroad
- In each lane of multi-lane off-ramps to discourage wrong-way entry.
- At the end of single-lane ramps in situations where the potential for wrong way entries exists

Where opposing, positive-offset channelized left-turn lanes exist at unsignalized intersections, at least one lane-use arrow marking should be placed near the downstream terminus of each offset left-turn lane to reduce the potential for wrong-way movements.

Lane-use arrows may be used at other locations at the discretion of the district.

Refer to the pavement markings section of the *Kentucky Department of Highways' Standard Drawings* for further information on the placement of arrows.

LANE DROP MARKINGS: Turn arrows and the word marking ONLY shall be used in an alternating pattern when a through lane becomes a mandatory turn lane. Lane drop markings shall include the application of a wide dotted white line to warn motorists of the lane drop condition. Refer to the *Typical Markings for Turn Lanes* Standard Drawing for more information regarding lane drop markings.

WORD MARKINGS: Unless required by the *Traffic Operations Guidance Manual* or the *MUTCD*, the use of word markings should be limited to locations with a demonstrated need for additional warning or guidance to motorists, due to the costs associated with their installation and maintenance.

CROSSHATCH / CHEVRON MARKINGS: For flush or mountable islands and medians, crosshatch markings may be installed at the discretion of the district. Crosshatch markings are not recommended for medians less than 6 feet in width. Refer to the *Typical Markings for Islands and Medians* Standard Drawing for more information on crosshatching.

If the offset for left-turn lanes is greater than 6 feet, white chevron markings should be used to delineate the space between the left turn lane and through lanes. Refer to the *Typical Markings for Turn Lanes* and the *Typical Markings for Islands and Medians* Standard Drawings for more information regarding the placement of chevron markings.

ROUTE SHIELD MARKINGS:

Due to the costs associated with their installation and maintenance, elongated route shield pavement markings should be limited to locations with a demonstrated need for additional guidance. When used, these markings should be accompanied by a cardinal direction word message where applicable.

CROSSWALK MARKINGS:

The installation of crosswalk markings for controlled crossings at intersections should be based on engineering judgment.

Because pedestrian movements at midblock crosswalks or at crossings across uncontrolled approaches can be unexpected for road users, the installation of crosswalks at such locations should be based on an engineering study.

Factors that can be used to evaluate the need for crosswalks and to determine the appropriate countermeasures include:

- ADT
- Pedestrian Volumes and/or delays
- Profile of pedestrian traffic (proportion of children, elderly, or disabled)
- Roadway geometry (including the number of lanes to be crossed, overall crossing width, lack/presence of pedestrian refuge island, etc.)
- Speed Limit and/or vehicular speeds
- Availability of street lighting
- Opportunity to consolidate crossing points
- Distance to other marked and/or protected crossings
- Stopping sight distance
- Proximity to large pedestrian generators (stadiums, conventions, theaters, etc.)
- Functional classification of roadway
- Setting (urban or rural)
- Connection of pedestrian paths
- Need to direct pedestrians to proper crossing paths
- Uncontrolled versus controlled approach

Note: These factors can also be used to evaluate the need for other markings, signing, pedestrian signals, electrical traffic control devices, and lighting.

Crosswalks should be installed for crossings at signalized intersections with pedestrian signals and at intersections where engineering judgment indicates that they are needed.

Longitudinal style crosswalks are the most common approach for installing high visibility crosswalks. High visibility crosswalks should be used in the following situations:

- Mid-block crosswalks
- Crosswalks in school zones

CROSSWALK MARKINGS (cont.): Refer to the *Typical Markings at Signalized Intersections* Standard Drawing for more information on the design of crosswalks.

For mid-block crosswalks that cross an uncontrolled multi-lane approach, refer to the Yield Line section of this policy for additional information regarding other countermeasures.

DOTTED LANE LINE EXTENSIONS: For movements where multiple turn lanes exist, dotted lane line extensions shall be used through the intersection to provide guidance for motorists making a turn. Dotted lane line extensions shall be the same color and width of the line they extend and should consist of lines 2 feet in length with gaps of 2 to 6 feet between each line.

For movements where a single left-turn lane exists, dotted lane line extensions may be used if deemed necessary based on engineering judgment. If used in such situations, the dotted lane line extension shall be yellow and follow the inside of the desired turning movement.

Dotted lane line extensions should not be located inside the boundaries of a marked crosswalk. If used, they may continue after intersecting a crosswalk.

Dotted lane line extensions may be used across the taper of a turn lane. If used, these lines shall be white and should be 3 feet in length with a 9 foot gap between each line. For dual turning lanes, dotted lane line extensions should be used across the taper.

Refer to the pavement markings section of the *Kentucky Department of Highways' Standard Drawings* for more information on the use of dotted lane line extensions.

TWO-WAY LEFT-TURN LANE MARKINGS: A set of two-way left-turn lane-use arrows should be installed at the beginning and end of a two-way left-turn lane (TWLTL). Additional sets of arrows may be installed as necessary based on engineering judgment. At signalized intersections, the two-way left-turn lane markings shall transition to markings for a dedicated left-turn lane. Refer to the *Typical Markings for Turn Lanes* Standard Drawing for more details on how to mark TWLTLs.

BICYCLE LANE MARKINGS: If bicycle lane symbol markings are installed, they shall be the helmeted bicyclist symbol, as shown in Figure 9C-3 of the MUTCD.

GRADE CROSSING MARKINGS:

Identical grade crossing pavement markings shall be installed in each approach lane on all paved approaches to grade crossings where signals or automatic gates are located and at all other grade crossings where the speed limit is 40 mph or greater. Markings shall not be required in advance of other highway-rail grade crossings if an engineering study indicates that other installed devices provide suitable warning and control. In cases where lane width is 10 feet or less, the narrow grade crossing pavement marking symbol should be used.

TRAFFIC OPERATIONS

Chapter

PAVEMENT MARKINGS & DELINEATION

Subject

Curb & Parking Space Markings

RESPONSIBILITIES OF CITY:

On state highways located within a city, the installation and maintenance of all curb, parking-space markings, parking meters, and the establishment of time and usage restrictions for parking spaces are the responsibility of the local government. These responsibilities are outlined in KRS 189.390 and the Traffic Control Agreement with the city.

RESPONSIBILITIES OF CABINET:

On newly constructed or resurfaced roadways, the Cabinet reserves the right to review and approve the proposed parking plan. In order to establish proper parking control, the Cabinet may choose to install the initial curb and parking-space markings at the Cabinet's expense. In such cases, future maintenance of those markings becomes the responsibility of the local government.

In all cases, the Cabinet maintains the authority to prohibit parking in areas where safety and traffic flow could be compromised. Parking may be removed near intersections to improve safety, such as improving sight distance, or to reduce congestion, such as providing improved access to turning lanes.

In the absence of any local parking ordinance, the following guidance is recommended when considering the establishment of no-parking zones along highways:

- No parking within 15 feet of a fire hydrant
- No parking within 20 feet of a marked or unmarked crosswalk at an intersection
- No parking within 30 feet of any flashing signal, stop or yield sign, or traffic signal
- No parking within 50 feet of the nearest rail of a railroad crossing.
- No parking between a Stop or Yield line (if used) and a crosswalk that crosses a multi-lane uncontrolled approach

TRAFFIC OPERATIONS

Chapter

PAVEMENT MARKINGS & DELINEATION

Subject

Pavement Markers

GENERAL: Pavement markers are retroreflective devices used as positioning guides to supplement longitudinal line markings along the Cabinet's Pavement Marker (PM) System. The PM System is a subset of our highway system, which primarily includes interstates, parkways, major multi-lane highways, and roadway sections with a two-way left-turn lane (TWLTL).

ELIGIBLE ROUTES: Pavement markers shall only be installed on sections of highway listed on the Cabinet's PM System and highway sections with a TWLTL. The current approved PM System can be found on the division's webpage at the following link:

https://transportation.ky.gov/TrafficOperations/Memos/PavementMarkerSystem.pdf

If a district feels that pavement markers are warranted for a roadway that is not listed on the PM System, they shall contact the division. The division will review the request and will make a decision as to whether the roadway is to be added to the PM system.

INLAID MARKERS: Inlaid markers, in conformance with the Cabinet's Standard Specifications, are the only standard pavement marker option for new installations.

Type V (steel castings) raised pavement markers are no longer considered a standard pavement marker option. If a district wants to use Type V markers on a project, they shall obtain approval from the division for their use.

PLACEMENT: Refer to the pavement markers section of the *Kentucky Department of Highways' Standard Drawings* for information regarding the spacing, arrangement, and appropriate colors of pavement markers.

TRAFFIC OPERATIONS

Chapter

PAVEMENT MARKINGS & DELINEATION

Subject

Pavement Markings for Fire Hydrants

BACKGROUND: Rapid location of fire hydrants can be hindered by high fills, noise walls, fencing, and shrubbery or trees that block the view of hydrants. To aid emergency personnel in locating hydrants, pavement markers may be used to mark hydrant locations. Uniformity in application within the fire jurisdiction is essential for locating purposes and ensuring they do not distract from other traffic control devices.

MARKING: The only acceptable pavement marking for assisting emergency personnel in locating fire hydrants is a blue inlaid pavement marker.

INSTALLATION: Blue pavement markers may be installed by local governmental agencies through the encroachment permit process. Permit applications shall contain a plan for the installation of the markings, including the number of markers, marker type/design, proposed location in the roadway, and the location of the adjacent hydrants. Installation and maintenance shall be the sole responsibility of the local governmental agency seeking approval for installation.

SIGNS: The use of hydrant location signs to achieve a similar objective is included in **Section TO-404-35** of this manual.

TRAFFIC OPERATIONS

Chapter

PAVEMENT MARKINGS & DELINEATION

Subject

Delineators

PURPOSE: Delineators are used to indicate the alignment of the roadway and are considered guidance devices rather than warning devices.

LOCATION: Delineators shall be installed on the right-hand side of horizontal curves on freeways and expressways and on both sides of interchange ramps.

Delineators should be used to mark all median crossovers on divided highways.

Mono-directional red delineators shall be used to delineate both sides of an approach to a runaway truck ramp and the associated arrester bed (see **Exhibit 18**). Pavement markers may be used in lieu of delineators on the approach to runaway truck ramps.

Refer to the *Flexible Delineator Post Arrangement for Horizontal Curves* Standard Drawing for information on the delineation of horizontal curves.

Refer to the *Flexible Delineator Post Arrangements for Interchange Ramps and Crossovers* Standard Drawing for information on delineation of ramps and median crossovers.

MATERIALS: Flexible delineator posts from the Cabinet's *List of Approved Materials* shall be used.

SURFACE-MOUNTED DELINEATORS: Surface-mounted delineators may be used at the discretion of the district. Common applications include marking the ends of raised islands/medians or channelizing lanes of traffic.

BARRIER DELINEATORS: Delineators shall be installed on all longitudinal barriers (including guardrail, concrete wall, and cable barrier). Delineator details, placement, and spacing are shown in the *Kentucky Department of Highways' Standard Drawings*.

TRAFFIC OPERATIONS

Chapter

ELECTRICAL TRAFFIC CONTROL DEVICES

Subject

General

OVERVIEW: This chapter outlines requirements for electrical traffic control devices on the state roadway system and establishes guidelines under which the Cabinet approves, designs, installs, operates, permits, and maintains electrical traffic control devices on state highways. Except as noted elsewhere in this chapter, electrical traffic control devices shall conform to the *Manual on Uniform Traffic Control Devices* (*MUTCD*), current adopted edition available at:

http://mutcd.fhwa.dot.gov/

This chapter discusses additions to or departures from the *MUTCD*.

DEFINITION: Electrical traffic control devices are defined as electronic devices that assign right of way at intersections or warn motorists to take a specific action through the use of traffic signal indications. These devices include but are not limited to traffic signals, flashing beacons, and school flashers.

TRAFFIC OPERATIONS

Chapter

ELECTRICAL TRAFFIC CONTROL DEVICES

Subject

Approval

APPROVAL AUTHORITY: **TO-203** specifically addresses the approval authority for the installation, modification, and removal of electrical traffic control devices.

APPROVAL PROCESS FOR NON-PROJECTS: When installing or removing an electrical traffic control device that is not part of a design project or encroachment permit, the following steps shall be taken to obtain proper approval:

1. The district shall evaluate the initial request for the electrical traffic control device. Such evaluations should include a review of engineering data and a comprehensive study of the traffic conditions and characteristics of the location as outlined in this chapter and the *Manual on Uniform Traffic Control Devices* (*MUTCD*).

2. If the district determines the request needs further review, they shall submit a written request to the division, including the district's recommendation and supporting information as outlined in **TO-603**.

3. The division shall review the submitted request. If denied, the division shall send a written response to the district stating the basis for denial.

4. If the division supports the request, the district obtains local input concerning the installation of the device, especially if a local agency is required to pay for the resultant power bill.

5. After receipt of local input, the division shall make a recommendation to the Deputy State Highway Engineer for Maintenance and Operations.

6. If approval is granted by the deputy state highway engineer, the division shall send written approval and a completed TC 72-4 form, *Traffic Signal Checklist,* to the district.

7. If approval is denied, the division shall send a written response to the district stating the basis for denial.

APPROVAL PROCESS FOR PROJECTS:

When installing, modifying, or removing an electrical traffic control device as part of a design project, the following steps shall be taken to obtain proper approval and to ensure design plans are generated for inclusion in the project plan set:

1. The project manager notifies district traffic personnel and the appropriate liaison from the Division of Traffic Operations' Traffic Engineering Branch of team meetings for all projects that may include installation, modification, or removal of an electrical traffic control device.

2. The district and division send a representative to these project team meetings.

3. The project team, including representatives from the district and division, evaluates the need for the installation, modification, or removal of the electrical traffic control device. The evaluation should include a thorough review of the engineering data and a comprehensive study of the traffic conditions and characteristics of the location.

4. If the project team recommends the installation, modification, or removal of an electrical traffic control device, the district traffic engineer shall submit a written request to the division. The request should include the design team's recommendation and data as outlined in **TO-603**. The request should also identify whether the project manager wants the division or the project consultant to develop plans for approved electrical traffic control devices.

5. The division shall review the submitted request. If denied, the division sends a written response to the district's Traffic Engineering and Permits Section and the Project Development Branch stating the basis for denial.

6. If the division supports the request, the district obtains local input concerning the installation of the device, especially if a local agency is required to pay for the resultant power bill.

7. After receipt of local input, the division shall make a recommendation to the Deputy State Highway Engineer for Maintenance and Operations.

8. If approval is granted by the deputy state highway engineer, the division shall send written approval and a completed TC 72-4 form, *Traffic Signal Checklist*, to the district's Traffic Engineering and Permits Section and the Project Development Branch. The division shall also state whether the Design Services Branch (DSB) will develop in-house electrical plans.

APPROVAL PROCESS FOR PROJECTS (cont.):

If the division is not able to handle in-house electrical design, the DSB will contact the project manager to determine whether work should be assigned to the division's statewide traffic design consultant or the project's consultant. If consultants are utilized, they shall contact the division as early as possible for a preliminary review.

9. If denied by the deputy state highway engineer, the division shall send a written response to the district Traffic Engineering and Permits Section and the Project Development Branch stating the basis for denial.

10. The project manager coordinates with the DSB or the electrical design consultant as soon as possible to ensure pole base locations, if applicable, can be identified and shown on the right-of-way and utility drawings.

11. The division or electrical consultant completes the plan's design. All consultant design work shall be submitted to the division and district for review.

12. Final plans are submitted to the project manager for inclusion in the plan set. The project manager is ultimately responsible for ensuring that electrical plans are identified and included in the total plan package.

APPROVAL PROCESS FOR PERMITS: **TO-605** addresses the approval of permitted electrical traffic control devices.

APPEALS: All appeals shall be submitted to the next level of authority. For example, if the district denies the request for an electrical traffic control device, the next level of appeal is the division. If the division denies a request for an electrical traffic control device, the next level of appeal is the Deputy State Highway Engineer for Maintenance and Operations.

TRAFFIC OPERATIONS

Chapter

ELECTRICAL TRAFFIC CONTROL DEVICES

Subject

Engineering Study Requirements

TRAFFIC SIGNAL REQUESTS:

Traffic signal requests submitted to the division for review should include the following documentation:

- Twelve-hour traffic count data including hourly totals for each turning movement

  Note: For proposed signals on projects, construction year traffic forecasts may be submitted in lieu of traffic count data.

- TC 72-6 form, *Traffic Signal Warrant Analysis*

  Note: For traffic forecasts, the TC 72-106 form, *Signal Analysis Using Peak Hour/ADT Projections*, shall be used.

- If available, a TC 72-10 form, *Collision Diagram*, or crash summary for the most recent three-year period of time

  Note: Documentation of the crash history at an intersection should involve reviewing the crash reports and eliminating unrelated collisions from the diagram or summary.

TO-605 provides additional guidance on traffic signal requests involving encroachment permits.

SCHOOL FLASHER REQUESTS:

All school flasher requests submitted to the division for review should include the following documentation:

- Verification that the school qualifies for school flashers under current policy (as detailed in **TO-402-5**)

- Completed TC 72-107 form, *School Flasher Request*

- Description of proposed school speed zones including milepoints

OTHER REQUESTS:

All other electrical traffic control device requests submitted to the division for review should include the following documentation:

- If available, the TC 72-10 form, *Collision Diagram*, or crash summary for the most recent three-year period of time

  Note: Documentation of the crash history should involve reviewing the crash reports and eliminating unrelated collisions from the diagram or summary.

- Condition diagram showing existing traffic control devices

TRAFFIC OPERATIONS

Chapter

ELECTRICAL TRAFFIC CONTROL DEVICES

Subject

Plan Development

PLAN DEVELOPMENT: If the Design Services Branch does not provide design services for electrical traffic control devices on Cabinet projects, an engineering consultant preapproved by the Cabinet in Electrical Engineering Traffic Signal Services shall develop the plans. Plans designed by consultants shall be submitted to the division and district for review.

PLAN REQUIREMENTS: Plans shall meet current CADD standards and shall be developed in accordance with the current editions of the *Kentucky Standard Specifications for Road and Bridge Construction*, the Division of Traffic Operations' standard detail sheets, the National Electrical Code, and the National Electrical Safety Code.

For design projects, the plan set shall, at a minimum, consist of the following:

- A summary sheet with KYTC bid item codes and estimated quantities
- A bid item notes sheet describing all items on the summary sheet not addressed in the Standard Specifications
- Standard detail sheets
- Drawings, specifications, and construction methods for any items not addressed in the Standard Specifications or standard detail sheets
- Device layout

Note: **TO-609-1** details design requirements.

On projects designed by consultant, the following information shall be included as part of the project documentation and submitted to the division for review and approval:

- Calculations on attachment heights/elevations
- Conduit sizing calculations

PLAN REQUIREMENTS (cont.):

- Electronic files from Signal and Light Structural Analysis (SALSA) program

- "Signal Estimate" spreadsheet and "Project Install Items" spreadsheet

  Note: For permitted installations, the "Permit Install Items" spreadsheet shall be submitted in lieu of the "Project Install Items" spreadsheet.

- Documentation of non-impact from FAA/KAZC or determinations/permits (**TO-714**)

SALSA, standard detail sheets, and required spreadsheets are available from the division's website at:

http://transportation.ky.gov/Traffic-Operations/Pages/Design-Services-Branch-Standards-and-Tools.aspx

PERMITS: **TO-605** provides information for plan set requirements for encroachment permits.

TRAFFIC OPERATIONS

Chapter

ELECTRICAL TRAFFIC CONTROL DEVICES

Subject

Permitted Installations

OVERVIEW: Procedures established by the Division of Maintenance, Permits Branch shall be followed for installation or modification of an electrical traffic control device through the encroachment permit process.

CONSULTANT REQUIREMENTS: Engineering consultants preapproved by the Cabinet in Traffic Engineering Services shall develop traffic impact studies when installing or modifying an electrical traffic control device as part of an encroachment permit.

Engineering consultants preapproved by the Cabinet in Electrical Engineering Traffic Signal Services shall develop plan submittals.

IMPACT STUDY: Permit applicants for new or modified electrical traffic control devices~~,~~ shall submit a traffic impact study to the district. Requirements for traffic impact studies are available online at:

http://transportation.ky.gov/permits/pages/policy-memos.aspx

APPROVAL PROCESS FOR PERMITS: When installing or modifying an electrical traffic control device that is part of an encroachment permit, the following steps shall be taken to obtain proper approval:

1. The district shall evaluate the initial request for the electrical traffic control device. Evaluations normally include a review of the traffic impact study and a comprehensive study of the traffic conditions and characteristics of the location as outlined in this chapter and the *Manual of Uniform Traffic Control Devices (MUTCD)*.

2. If the district determines the request needs further review, the district shall submit the traffic impact study and a recommendation from the district to the division through the Division of Maintenance, Permits Branch.

APPROVAL PROCESS FOR PERMITS (cont.):

3. The division shall review the request and if denied, shall send a written response to the district stating the basis for denial.

4. If the division supports the request, the district obtains local input concerning the installation of the device, especially if a local agency is required to pay the resultant power bill.

5. When the division receives local input from the district, the division shall make a recommendation to the Deputy State Highway Engineer for Maintenance and Operations.

6. If approval is granted by the deputy state highway engineer, the division shall send written approval and a completed TC 72-4 form, *Traffic Signal Checklist*, to the district.

7. If approval is denied, the division shall send a written response to the district stating the basis for denial.

PLAN SUBMITTAL:

After approval for the installation or modification has been granted, the applicant shall provide a plan submittal for review and approval by the division. **TO-604** details plan development requirements, and **TO-609-1** provides physical design requirements. In addition to the requirements of **TO-604**, the plan set submittal and project documentation shall include the following:

- Plans developed, signed, and stamped by an engineering consultant prequalified by the Cabinet in Electrical Engineering Traffic Signal Services
- MicroStation-compatible electronic files
- Calculations on attachment heights/elevations (either spreadsheet version or through the Signal and Light Structural Analysis [SALSA] program)
- Completed “Permit Install Items” spreadsheet
- Shop drawing submittals for materials provided by contractors
- Shop drawing submittals and structural calculations for any decorative poles or pedestals

SALSA, standard detail sheets, and required spreadsheets are available from the division’s website at:

http://transportation.ky.gov/Traffic-Operations/Pages/Design-Services-Branch-Standards-and-Tools.aspx

REQUIREMENTS: Electrical traffic control devices, installed or modified by permit, shall be in accordance with the Cabinet's policies and specifications. When equipment (such as poles, cabinets, detectors, etc.) is installed off right of way, a permanent easement shall be provided. Upon release of the permit, all equipment shall become the property of and be maintained and operated by the Cabinet unless otherwise addressed by a Maintenance and Traffic Control Agreement with a city or other legal entity.

ATTACHMENTS: All equipment attached to Cabinet-owned devices (such as emergency-vehicle preemption systems) shall remain the property of the applicant. The applicant shall be responsible for all costs associated with the installation, maintenance, removal, and operation of the equipment. If the equipment is affected due to a construction project, the applicant is responsible for all costs associated with relocating, replacing, removing, and reinstalling the equipment.

COST PARTICIPATION: All labor, equipment, and materials required for the installation or modification of an electrical traffic control device shall be the sole responsibility of the applicant.

MATERIALS: To ensure the Cabinet is able to maintain devices installed by permit, the division has identified a list of key materials that shall to be supplied by the Cabinet's transportation warehouse. The applicant is responsible for reimbursing the Cabinet for the cost of these materials. The following process shall be followed to ensure material is available and that reimbursement is received from the applicant:

1. Applicant shall submit a completed "Permit Installed Items" spreadsheet and the plan set for review.

2. The "Permit Installed Items" spreadsheet will be used to develop an estimate for the materials to be provided by the Cabinet. This estimate will be used to complete the TC 99-22 form, *Agreement for Services to be Performed*.

   Galvanized steel strain poles are the only structural supports provided by the Cabinet. The applicant shall provide all other structural supports (such as decorative poles, mast arm poles, or monotubes). All supports require a detailed structural analysis performed by the Cabinet. Costs associated with the structural analysis shall be the sole responsibility of the applicant and should be included in the estimate on the TC 99-22 form, *Agreement for Services to be Performed*.

   The TC 99-22 form shall be signed by the applicant, and the division shall obtain required signatures by Cabinet personnel.

3. Upon receipt of the signed TC 99-22 form, the division shall initiate a task order for the installation or modification. When the task order is valid, the division shall send a copy of the "Permit Installed Items" spreadsheet (including task order number) to the transportation warehouse.

MATERIALS (cont.):

4. Prior to the pick-up of material, the applicant's contractor shall notify the transportation warehouse at least two days in advance of their arrival. Failure to provide this advance notification may result in long delays or refusal to distribute material upon arrival.

5. When material is picked up by the electrical contractor, the warehouse shall charge the material to the appropriate task order number.

6. When the division determines an electrical traffic control device installation or modification is complete (normally determined by a final inspection), charges applied to the task order number shall be billed to the applicant.

CONSTRUCTION: An electrical contractor prequalified by the Cabinet in the work category of Traffic Signals shall perform all work. The contractor shall meet with the district before any field work is started.

INSPECTION: Inspection of electrical traffic control devices installed or modified through the permit process shall be in accordance with **TO-607**. All required corrective work identified as part of inspections shall be completed prior to releasing the bond for the permit.

TRAFFIC OPERATIONS

Chapter

ELECTRICAL TRAFFIC CONTROL DEVICES

Subject

Initial Turn-On

DOCUMENTATION:

A representative from the district Traffic Engineering and Permits Section shall be present at the initial turn-on of all new electrical traffic control devices. The district documents the turn-on date in their files, preferably on a revised TC 72-4 form, *Traffic Signal Checklist*.

PUBLIC NOTIFICATION:

Prior to the initial turn-on date for new traffic signals, the public shall be notified using one or more of the following methods:

- Press release
- Portable changeable message signs
- Fixed signage

TRAFFIC OPERATIONS

Chapter

ELECTRICAL TRAFFIC CONTROL DEVICES

Subject

Inspections

REQUIREMENT: The division shall conduct an inspection of all electrical traffic control devices installed or modified through construction projects and permits.

Upon notification from the district traffic, permits, or construction personnel, the division shall complete the inspection and provide a list of required corrective work to the applicable personnel within 90 days.

Additional inspections of corrective work may be required.

TRAFFIC OPERATIONS

Chapter

ELECTRICAL TRAFFIC CONTROL DEVICES

Subject

Maintenance

RESPONSIBILITY: The Cabinet shall be responsible for the cost of maintenance and operation of all electrical traffic control devices on state-maintained highways except for the following situations:

- When the maintenance or operation of an electrical traffic control device has been accepted by a city or other legal entity through a written agreement or encroachment permit

- When a new electrical traffic control device with a new electrical service has been installed as part of a construction project and has not been formally accepted as complete by the Cabinet

  Note: When modifying or replacing existing electrical traffic control devices on construction projects and the existing service is to be reused, the Cabinet shall be responsible for the cost of operation of the electrical traffic control device.

MAINTENANCE/ REPAIR LOG: The district shall establish and maintain a maintenance/repair log for all electrical traffic control devices maintained by the Cabinet. The record shall include identification of device, date and time of repair, reason for maintenance or repair, and corrective action taken. These records shall be maintained in accordance with the Cabinet's record retention schedule.

PREVENTIVE MAINTENANCE: The district shall establish and perform a preventive maintenance program for traffic signal installations. Preventive maintenance should be performed yearly and include the following:

- Cleaning the interior of the cabinet and replacing the air filter

- Sealing the cabinet and conduits to prevent animals and insects from entering

- Inspecting the service and verifying the installation of warning stickers

- Replacing the conflict monitor and verifying the programming of the card

PREVENTIVE MAINTENANCE (cont.):

- Visually inspecting detection systems and verifying the operation of pedestrian detection
- Testing the fan and thermostat
- Visually inspecting support structures and span attachments
- Visually inspecting overhead equipment
- Inspecting the grounding and bonding
- Verifying that red-fail cable, if used, is properly installed

Each district shall create and use a preventive maintenance checklist that includes the following:

- Identification of the device
- Date and time of preventive maintenance inspection
- Name of person conducting the inspection

The preventive maintenance checklist shall be maintained in accordance with the Cabinet's record retention schedule.

TRAFFIC OPERATIONS

Section

OPERATIONAL DESIGN

Subject

Physical Design (Hardware)

SIGNAL HEAD PLACEMENT:

If a minor street or driveway is located within an area controlled by a traffic signal, and it has been determined that signal heads are not required due to low potential for conflict, the minor approach may be controlled by a STOP (R1-1) sign. In such cases, mainline signal heads should be positioned so that they are visible from the minor entrance.

SUPPLEMENTAL SIGNAL HEADS:

When the nearest signal head is located between 150 and 180 feet beyond the stop line, engineering judgment of the conditions, including the worst-case visibility conditions, shall be used to determine the benefit of a supplemental near-side signal head. If engineering judgment shows the need, supplemental signal heads should be used to achieve intersection visibility.

SIGNAL SUPPORT STRUCTURES:

All signal support structures (such as steel strain poles and mast arm poles) shall be designed to comply with AASHTO's *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*, current edition with interim revisions, and shall meet or exceed the specifications described in Section 835.07 of the current edition of the *Kentucky Standard Specifications for Road and Bridge Construction*, available online at:

http://transportation.ky.gov/Construction/Pages/Kentucky-Standard-Specifications.aspx

All signal support structures shall be designed using the Signal and Light Structural Analysis (SALSA) program. SALSA provides all information necessary to properly size the pole and pole base. When running SALSA for steel strain poles, a stringing tension should be utilized that creates a 3 percent sag in the messenger cable.

When practical, box span installations should be used for traffic signal and flashing beacon installations to locate primary signal heads on the far side of the intersection.

Installations should avoid overhead and underground utilities, drainage structures, ditches, and other obstructions.

SIGNAL SUPPORT STRUCTURES (cont.):

The nearest face of all support structures installed behind guardrail shall be a minimum of 4 feet behind the face of the guardrail.

Traffic signals and flashing beacons should be installed so that all above-ground equipment is located outside the "clear zone" as defined by AASHTO's *Roadside Design Guide*. Pedestrian poles mounted on break-away bases are an exception to this rule. When space is available to install equipment further from the travel way, consideration should be given to utilizing this space.

At the discretion of the district, signal heads mounted on messenger cable may be tethered to prevent excessive movement due to high winds.

To minimize conflicts between communications equipment and overhead utilities, consideration should be given to placing cabinets in locations free from overhead utilities.

JOINT USE OF POLES:

Where it is not practical to install support poles and where existing poles owned by others will suffice, joint use of poles is acceptable subject to owner approval. The Cabinet should enter into a General Joint-Use Agreement (**Exhibit 10**). When required by the owner, this agreement may be supplemented by a Pole Attachment Permit (**Exhibit 11**) for each instance the Cabinet makes an attachment.

BACKPLATES:

Backplates shall be used when any of the following conditions exist:

- The approach utilizes an advanced warning flasher (AWF)
- The approach utilizes a green extension system (GES)
- The speed limit on the approach is 45 MPH or greater

Backplates may also be used if conditions such as sun glare, bright sky, or complex or confusing backgrounds indicate the need for enhanced signal face target value.

When backplates are used, every signal head on the approach should have a backplate, including left-turn heads, right-turn heads, and five-section heads.

At the discretion of the district, retroreflective backplates may be installed to increase visibility in situations where background light makes the signal heads difficult to see or where a nighttime crash problem exists.

RED INTERFACE CABLE:

The red interface cable should be installed at each traffic signal location to enable Red Failure, Dual Indication, and Clearance Monitoring functions.

RIGHT-TURN LANE DETECTION:

Vehicle detection should be used for right-turn lanes on side-street approaches unless determined otherwise by an engineering study. **TO-609-3** provides details for recommended delay timing. Vehicle detection should be used for right-turn lanes on mainline approaches when any of the following conditions exist:

- The right-turn movement is the heaviest approach movement and the number of through-movement vehicles on the approach is not sufficient to extend the green to clear the right-turn movement
- There are multiple right-turn lanes on the approach

NON-STANDARD MATERIALS/ METHODS:

Non-standard materials or methods are defined as construction materials or methods that are not consistent with the typical installation practices of the Cabinet. Common examples include decorative poles, mast arm poles, and underground wiring. For design projects or encroachment permits, requests for non-standard materials or methods shall be forwarded to the division for evaluation and approval.

On design projects, all requests for non-standard materials shall be forwarded to the division by the project manager or traffic engineer. Requests on encroachment permits shall be included as part of the documentation required through the permit process.

Requests for non-standard materials shall include information necessary to perform a thorough evaluation of the request, including a detailed structural analysis. This analysis shall include, but not be limited to, the calculations outlined in Section 835.07.01 (strain poles) and Section 835.07.02 (mast arm poles) of the current edition of the *Kentucky Standard Specifications for Road and Bridge Construction*.

Additional costs for non-standard materials or methods in excess of a typical installation, including design and installation, shall be the responsibility of the requesting agency. A written agreement between the Cabinet and the requesting agency should be in place prior to the performance of any design work. The district shall be responsible for developing and securing such an agreement. **Exhibit 26** includes an example of a Non-Standard Materials Agreement that can be utilized to document the responsibilities of requesting agencies. This agreement shall address additional costs in excess of a typical installation and shall require the requesting agency be responsible for all future replacement costs for the non-standard materials.

TRAFFIC OPERATIONS	Section OPERATIONAL DESIGN
	Subject Phasing

INITIAL PHASING: After consultation with the district, the division determines initial signal phasing and records the decisions on a Traffic Signal Checklist (TC 72-4).

The General Phasing Diagram (**Exhibit 12**) explains Phase 2 should be designated for mainline through traffic on either the northbound or eastbound approach. In addition, phase 4 should be designated for side-street through traffic entering the intersection to the right of the phase 2 movement. In cases where a local phasing convention already exists, the existing convention may be utilized and shall be reflected on the TC 72-4 form, *Traffic Signal Checklist***.**

PHASING MODIFICATIONS: When an engineering study indicates changes are needed in existing signal phasing, the changes shall be made only with written approval from the division. Phasing modification requests from the district should include a recommendation with supporting data. When phasing changes are approved, the division will provide an updated TC 72-4 form, *Traffic Signal Checklist,* with the necessary modifications.

LEFT-TURN PHASING: Left-turn phasing should be considered on an approach if either of the following conditions exists:

- The cross product of the left-turning and opposing volumes during any hour exceeds 100,000 on a four-lane highway or 50,000 on a two-lane highway
- The crash history includes four or more left-turn crashes in one year, six or more left-turn crashes in two years, or eight or more left-turn crashes in three years

Protected-permitted left-turn phasing results in lower delays, therefore it is preferable to protected only left-turn phasing. However, protected only left-turn phasing may be considered if protected-permitted phasing does not achieve the desired results.

LEFT-TURN PHASING (cont.): Protected only left-turn phasing should be considered if any of the following conditions exist:

- The left-turn movement must cross three or more opposing through lanes

- The cross product of the left-turning and opposing volumes during peak hour exceeds 300,000 on a four-lane highway or 150,000 on a two-lane highway

- Sight distance is insufficient based on engineering judgment

  Note: Consideration should be given as to whether sight distance obstructions caused by vehicles in opposing left-turn lanes would support protected-only or protected-permitted left-turn phasing

- There are two or more left-turn lanes on an approach

If two or more left-turn lanes are constructed but an engineering study indicates that one lane with protected-permitted or permitted only left-turn phasing is more appropriate, one or more of the left-turn lanes should be striped out until traffic volumes warrant two or more left-turn lanes.

A Left-Turn Trap (LTT or yellow trap) is a safety concern that can lead a left-turning driver into a potentially unsafe intersection. An LTT can occur when a driver enters an intersection on a permitted green and waits to make a left turn until a sufficient gap occurs in the opposing traffic stream. If there are no acceptable gaps in the opposing traffic stream, the driver may be forced to turn during the left-turn clearance interval and may incorrectly presume the opposing through traffic is being stopped at the same time the adjacent through movement is being terminated. As a result, the driver may attempt to turn assuming that opposing through vehicles are going to stop when, in fact, the opposing vehicles are proceeding into the intersection with a circular green signal indication.

LTTs are not an issue in the following situations:

- Opposing left-turn movements are protected-only

- Opposing left-turn movements are prohibited or do not exist (such as T-intersection, one-way street, etc.)

- Protected-permitted phasing is installed only on the side street approaches provided that the mainline phases are operated in the recall mode

The district may contact the division for assistance in determining if an LTT exists at a signalized intersection.

LEFT-TURN PHASING (cont.): Where there is a dedicated left-turn lane, the preferred method for controlling protected-permitted and permitted-only left-turn traffic is the Flashing Yellow Arrow (FYA). The use of the FYA eliminates the potential of a left-turn trap. When a FYA is used, a 4-section FYA signal face shall be used for protected-permitted left-turn movements and a 3-section FYA shall be used for permitted-only left-turn movements. When using a FYA, the left-turn type (LTT) within the controller shall be (0).

A 5-section head may be used for left-turn movements when the signal is built in such a way that physically prohibits the use of the FYA. Examples include:

- Height limitations
- The inability to place a signal face over the center of a dedicated left turn lane

When using a 5-section head in locations where a left-turn trap may occur, the LTT setting within the controller shall be either (1) or (2). The preferred LTT setting is (2), which will not allow the controller to serve the opposing left-turn phase until a vehicle is detected on the cross street and the cross street is served. An LTT setting of (1) causes the controller to automatically place a call on the side street whenever a call is detected on the opposing left-turn phase and may be used at the district's discretion.

LEAD/LAG PHASING: The district may use lead/lag left-turn phasing without approval of the division. Common situations where lead/lag phasing may be advisable are:

- In coordinated signal systems
- At intersections where there is insufficient space to safely accommodate the simultaneous service of two opposing left-turn movements.

Lead/lag phasing may be used for protected only left-turn phasing or protected-permitted left-turn phasing. In the case of protected-permitted phasing, a FYA shall be used with lead-lag phasing to avoid the creation of a left-turn trap.

SPLIT PHASING: Split phasing of a traffic signal shall be approved by the division and may be considered at intersections when:

- Intersection geometry necessitates such phasing

  Example: Intersections where side streets are offset or where there is limited visibility of an opposing approach based on engineering judgment

SPLIT PHASING (cont.):

- Intersection capacity would improve with such phasing

  Example: Intersections where there is unbalanced flow and one approach has a significantly heavier volume than the opposing approach, or where the results of a capacity analysis indicate that split phasing would be preferable.

- Railroad preemption requires it

  Note: Full-time split phasing may be utilized at railroad preempted signals to expedite the clearance of vehicles during the vehicle clearance phase. Where split phasing is only beneficial during preemption and not desirable during normal operation, part-time split phasing may be utilized. In this situation a FYA should be used to eliminate the possibility of a left-turn trap (LTT).

- Requirements for left-turn phasing are met, but lane use prohibits separate left-turn lanes

  Example: Intersections where left-turn phasing is desirable but intersection geometry prohibits the use of a dedicated left-turn lane and a shared left/through left is utilized

VARIABLE PHASING:

Variable phasing, such as utilizing a FYA to change left-turn phasing from protected only to protected-permitted by time of day, should be considered on a case-by-case basis. Variable phasing shall be approved by the division.

RIGHT-TURN OVERLAPS:

A right-turn overlap is defined as a protected right-turn movement from a dedicated right-turn lane that operates concurrently with a protected left-turn movement on the intersecting street. Installation of a right-turn overlap is considered a phasing modification and shall be approved by the division.

Right-turn overlaps shall not be used on approaches that do not have a dedicated right-turn lane.

The appropriate controller timing settings for right-turn overlaps are determined based on the phasing of the opposing left-turn approach and the pedestrian phasing (if present) operating concurrently with the overlap approach.

Each right-turn overlap is assigned to one or two parent phases. One or both of the parent phases must be entered into signal timing under the associated overlap. The first parent phase is associated with the through movement on the overlap approach. The second parent phase is associated with the left-turn movement on the intersecting street that operates concurrently with the right-turn overlap.

RIGHT-TURN OVERLAPS (cont.):

The following options cover the majority of situations where a right-turn overlap may be considered (**Exhibit 13**):

- Option 1 – The left-turn movement opposing the right-turn overlap approach has permitted or protected-permitted phasing, with or without concurrent pedestrian phasing on the overlap approach. Use overlaps A through D (OVA, OVB, OVC, and OVD) and enter the parent phase associated with the left-turn that operates concurrently with the overlap approach in system timing.

- Option 2 – The left-turn movement opposing the right-turn overlap approach has protected-only or split phasing and no concurrent pedestrian phase exists on the overlap approach. Use overlaps A through D (OVA, OVB, OVC, and OVD) and enter both parent phases in system timing.

- Option 3 – The left-turn movement opposing the overlap approach has protected-only or split phasing and there is a pedestrian phase on the overlap approach. Use overlap E or F and enter both parent phases in system timing. In this case, one parent phase must be even numbered and one odd numbered.

In all other situations it is recommended that the district coordinate with the division on proper overlap use.

A right-turn overlap shall not be implemented by wiring the overlapping right-turn phase directly to the complementary protected left-turn movement rather than a phase overlap defined in the controller as this will adversely affect the operation of the conflict monitor.

When a right-turn overlap onto a multi-lane highway is used, a NO U-TURN (R3-4) or U-TURN YIELD TO RIGHT TURN (R10-16) sign shall be installed on the conflicting u-turn in accordance with **TO-402-3**.

FLASHING OPERATION:

Flashing operation of traffic signals may be used for the following:

- Prior to placing the signal in stop-and-go operation

- As an interim measure prior to removal of the signal

- Default operation during equipment failure

- Normal operation of a signal located at the entrance to a fire station where the signal only leaves flashing operation during preemption

FLASHING OPERATION (cont.):

- During unique situations (emergencies, special events, at night, during off-peak hours, etc.)

During flashing operation, red/yellow or all-red indications may be used. The flashing operation shall be established by the district.

TRAFFIC OPERATIONS

Section	
	OPERATIONAL DESIGN
Subject	
	Timing

RESPONSIBILITY: The district traffic engineer shall establish signal timing considering both safety and capacity. Periodic reviews of signal timing should be made to ensure effective operation. The division is available for consultation on signal timing for individual traffic signals or for coordinated traffic signal systems.

CLEARANCE & CHANGE INTERVALS: Yellow change and red clearance intervals obtained through the following methods are suggested values and may be modified based on engineering judgment.

YELLOW CHANGE:

Yellow change intervals warn traffic of an impending change in the right-of-way assignment. The calculation of yellow change intervals for through movements should be based on the following equation:

$$y = t + \frac{v}{2a + 64.4g}$$

Where:

y = yellow change time (sec)
t = perception/reaction time (set at 1.0 sec)
v = approach speed (feet/sec)
a = deceleration rate (set at 10.0 feet/sec^2)
g = approach grade (percent divided by 100, downhill is negative)

Values obtained from the equation should be rounded up to the nearest tenth of a second. Yellow change intervals for through movements should normally be between 3.5 and 5.0 seconds. However, yellow clearance intervals as low as 3.0 seconds and as high as 6.0 seconds may be used based on engineering judgment. Yellow change intervals of less than 3.0 seconds or greater than 6.0 seconds shall not be used.

For left-turn phases, yellow change intervals should be 3.5 seconds.

CLEARANCE & CHANGE INTERVALS (cont.):

At their discretion, districts may establish standard yellow change intervals for intersections based on a typical grade for their area. Change intervals established using this method should vary depending on approach speeds.

RED CLEARANCE:

Yellow change intervals shall be followed by a red clearance interval to increase the likelihood that vehicles clear the intersection before another vehicle enters the conflict zone. The calculation of red clearance intervals should be based on the following equation:

$$r = w/v$$

Where:

$r =$ red clearance interval (seconds)
$w =$ clearance distance (feet)
$v =$ approach speed (feet/sec)

While the clearance interval for through movements should normally be calculated using the posted speed limit, districts may elect to use 85th percentile speeds as the basis for clearance timing.

Red clearance intervals for left-turn phasing should be calculated using an approach speed of 20 mph.

Clearance distances should be rounded up to the nearest five feet. Clearance distances should be measured from the approach stop bar to the far side of the intersection or far side of the crosswalk (if present). Clearance distances for left-turn movements should be measured along a straight line as opposed to an arc. Further guidance on measuring intersection clearance distances is included in the Measurement of Clearance Distances (**Exhibit 14**).

Values obtained from the equation should be rounded up to the nearest tenth of a second. Red clearance intervals should normally be between 1.0 and 3.0 seconds. However, some situations (such as offset intersections, single point interchanges, etc.) may require red clearance intervals longer than 3.0 seconds based on engineering judgment.

Exhibit 15 provides a table of suggested traffic signal clearance intervals for common speeds, grades, and intersection widths.

CLEARANCE

& CHANGE INTERVALS (cont.):

SHARED PHASE:

For a shared phase (when a phase serves multiple movements needing different clearance intervals), the following procedure should be applied:

1. Calculate each movement's yellow change and red clearance intervals as if the movement had a dedicated phase to determine the largest total clearance time.

2. Use the largest calculated yellow change interval.

3. Subtract this value from the largest total clearance time to determine the red clearance.

CYCLE LENGTH & SPLITS:

Cycle lengths at isolated signals should typically be in the range of 50 to 120 seconds. Multiple-phase signals would normally have higher cycle lengths. System cycle lengths should not exceed 180 seconds unless determined by engineering judgment.

With the exception of green extension systems (GES) and advance warning flashers (AWF), the duration of each green interval should be set in proportion to the volume per lane for each phase. Both vehicular and pedestrian minimums should be considered. Typically, this results in the mainline split being two-thirds of the total cycle length. That is, the mainline greens and clearances and the mainline left-turn greens and clearances should total about two-thirds of the total cycle length. The remaining split would be for the side-street phases.

DELAY FOR SIDE STREETS:

To prevent a sudden traffic signal change when a vehicle is detected on the side street, a delay of 10 seconds should be used for all side-street approaches unless engineering judgment determines otherwise.

For locations in which the mainline has a left-turn phase, the delay placed on the side street must also be placed on the mainline left-turn. This prevents the mainline left-turn phase from being actuated during the side-street delay, causing the side street to wait for another mainline green phase following the left-turn phase.

Delay should not be used for traffic signals utilizing AWFs or for a traffic signal operating within a coordinated plan. Engineering judgment should be used to determine the need for delay.

TRAFFIC OPERATIONS	*Section* OPERATIONAL DESIGN
	Subject Pedestrian Accommodations

JUSTIFICATION: Traffic signals should be equipped to accommodate pedestrians at intersections where there is known pedestrian activity.

Pedestrian activity may include, but is not limited to, the following:

- A known pedestrian source exists within close proximity of a known pedestrian destination (such as an apartment complex within walking distance of a school)
- The presence of clear evidence of pedestrian activity (such as sidewalks in the area adjacent to a signalized intersection)
- Requests from local-government officials or citizen groups
- A demonstrated accident pattern involving vehicles and pedestrians that could be addressed with the installation of pedestrian signals

Pedestrian accommodations should not be provided at locations where the roadway design will not safely accommodate pedestrian movements or where the signal operation does not allow for reasonable pedestrian accommodation. If pedestrian accommodations are needed but cannot be provided, the Cabinet should make a reasonable attempt to modify the intersection or signal operation. If this cannot be accomplished, pedestrian traffic should be addressed in some other manner or discouraged from crossing at that location by using methods such as signs or fences.

DESIGN: When it is necessary to accommodate pedestrians, traffic signals should include pedestrian signal head indications and pedestrian detectors. Pedestrian detectors are not required if the traffic signal is fixed-time or the pedestrian movements are on recall.

ACCESSIBLE PEDESTRIAN EQUIPMENT: The installation of accessible pedestrian signals shall be based on an engineering study that considers the installation factors stated in the *Manual on Uniform Traffic Control Devices (MUTCD*). The signals should be installed when there is sufficient demand. This may include one individual who routinely uses the signal or several individuals who occasionally use the signal.

ACCESSIBLE PEDESTRIAN EQUIPMENT (cont.):

New requests for accessible pedestrian signals shall be sent to the division for review and approval. Each request should include the following:

- Traffic count, including volumes of turns-on-red, conducted during times when pedestrians might be present
- Diagram of the intersection
- Description of the signal phasing or a signal phasing diagram

If an installation is approved, the division will provide the district with all necessary equipment and technical or installation assistance.

TRAFFIC OPERATIONS	*Section* OPERATIONAL DESIGN
	Subject Advanced Warning Flashers (AWF)

PURPOSE: Advance warning flashers (AWF) are used to warn drivers that the green interval will terminate soon. This warning is accomplished through a combination of signing and flashing beacons. The signs and flashing beacons are placed at predetermined distances from the stop bar and are interconnected with the traffic signal controller.

GUIDELINES: The following factors should be considered when deciding whether to utilize an AWF:

- The signalized intersection has a high crash rate or a high percentage of angle crashes.
- Posted speed limit or 85th percentile speed is 45 mph or greater.
- The approach speed limit is over 45 mph, and the signalized intersection is on the extended-weight coal-haul system.

  Note: This information and the percentage of trucks can be obtained from the Division of Planning.
- Sight distance to the signal heads is restricted.
- The approach grade exceeds -4 percent.
- While observing the intersection, 12 percent or more of the total observed cycles resulted in at least one vehicle entering the intersection after termination of the yellow phase.
- The maximum green time is achieved for a substantial number of cycles based on engineering judgment.
- A bridge deck is adjacent to the signalized intersection where typical green extension system (GES) loops would be placed.

APPROVAL PROCESS: The district conducts the initial evaluation of the location to determine the benefit of the installation of an AWF. If the district recommends approval, they submit a request including the above information and their recommendation to the division for further consideration.

APPROVAL PROCESS (cont.):

The request shall include a completed TC 72-104 form, *Advance Warning Flasher Checklist*. The division makes the final determination as to whether an AWF will be installed. If the division approves the AWF, it will notify the district in writing and include an updated TC 72-4 form, *Traffic Signal Checklist*.

DESIGN:

AWF designs should include two signs. One sign should be a black on yellow warning sign with the text PREPARE TO STOP WHEN FLASHING. This sign should be installed overhead and shall have dimensions of 72 inches x 44 inches, supplemented with a 12-inch yellow flashing beacon on each side of the sign. The second sign should be a yellow SIGNAL AHEAD (W3-3) sign. This sign should be ground-mounted on the right-hand side of the road and shall have dimensions of 48 inches x 48 inches, supplemented with a 12-inch yellow flashing beacon on each side of the sign. The beacons shall flash alternately. At its discretion, the district may eliminate the supplemental yellow beacons for the SIGNAL AHEAD sign on a two-lane highway.

The sign assemblies should be located either 700 feet (for 45 mph highways) or 900 feet (for 55 mph highways) in advance of the approach stop bar. The flashing operations should begin either 9 seconds (for 700 feet) or 10 seconds (for 900 feet) before the start of yellow and continue to the end of the red phase. Modifications to the aforementioned time and distance figures may be necessary based on specific site conditions. The district should consult with the division for guidance regarding proper spacing and flashing times based on site-specific conditions.

A maximum spacing of 1,000 feet may be used on roads that appear on the extended-weight coal-haul system if the grade is 5 percent or steeper. If this spacing is used, the flashing operation should begin 11 seconds before the start of yellow.

AWF & GES:

A signal cannot have both AWF and GES capability. When an AWF assembly begins to flash, the signal changes in a preset amount of time and a GES system will not extend this time limit.

For new signals with an AWF, the district may elect to install one 6-foot x 6-foot loop between the AWF and the signal to act as a detection loop if actuation is desired. Common loop spacing, in this case, is 50 feet to 100 feet from the stop bar. For existing GES signals requiring modification to include an AWF system, one or both of the existing GES loops may be used for detection. If used, these detection loops are intended to extend the mainline green for capacity reasons but do not extend the green interval for dilemma zone conflicts.

TRAFFIC OPERATIONS

Section

OPERATIONAL DESIGN

Subject

Green Extension System (GES)

PURPOSE: A green extension system (GES) is designed to detect the presence of a vehicle as it enters the dilemma zone. The dilemma zone is defined as an area in advance of the traffic signal where the motorist can either decide to proceed or stop when the signal changes from green to yellow. If a vehicle is detected while in this zone, the green phase will be extended up to a maximum green time, which allows most vehicles to proceed through the intersection without having to stop abruptly or travel through the intersection during a red phase. A GES should normally be considered at isolated intersections or when the signal is the first in a series of signals and the speed limit is 45 mph or greater.

DESIGN: Vehicle detection shall be provided in each through lane on GES approaches. If vehicle detector loops are employed for detection, they shall have dimensions of 6 feet x 6 feet. The minimum green and maximum initial for these approaches should be between 20 and 30 seconds, and the maximum green time should be between 60 and 90 seconds.

Table 6-1 shows minimum gap/passage and distances from GES loops to the stop bar for various approach grades. When grades on each mainline approach are different, the grade that is most critical should be used to determine loop spacing for both approaches. Using the table, the critical grade will always indicate the farthest loop distance from the stop bar.

> **EXAMPLE:** An intersection where a GES is to be installed has an approach grade of -6% and an opposing grade of -4%. **Table 6-1** shows the loop spacing for the -6% grade to be farther from the stop bar than the -4% grade. Therefore, the -6% grade will be used, and the loop spacing for both approaches will be 259 feet (near loop) and 467 feet (far loop). Consequently, the passage and minimum gap will be set at 3.2 seconds.

Typically, when a GES signal is the first in a series of signals, the approach from the adjacent signal does not require GES capabilities, and one mainline loop per through lane is sufficient. That loop should be 6 feet x 6 feet, installed at the near-loop spacing.

DESIGN (cont.): Simultaneous gap shall be enabled for all approaches utilizing GES. If only one of two concurrent phases utilizes GES, both concurrent phases shall have simultaneous gap enabled.

There are times when certain traffic signals should be changed from GES operation to other operations (such as fixed-time, semi-actuated, or fully actuated). Examples are (1) when traffic signals have been installed adjacent to a GES signal or (2) when approach speeds have dropped to the point that a GES is no longer justified. When these conditions become known, the district should make recommendations, when appropriate, to the division for removal of the GES operation.

At the discretion of the district, GES signals may be operated in a coordinated system for certain times of day. During these times, the signal would not function in GES mode.

TABLE 6-1
GES Loop Spacing and Passage Time

Approach Grade (%)	Near Loop Distance from Stop Bar (feet)	Far Loop Distance from Stop Bar (feet)	Minimum Gap/Passage (seconds)
-8	278	506	3.5
-7	266	482	3.3
-6	259	467	3.2
-5	251	452	3.1
-4	244	439	3.0
-3	235	419	2.8
-2	228	406	2.7
-1	222	394	2.6
0	217	384	2.5
+1	210	369	2.4
+2	205	360	2.4
+3	201	352	2.3
+4	197	344	2.2
+5	193	336	2.2
+6	189	328	2.1
+7	185	320	2.0
+8	182	314	2.0

TRAFFIC OPERATIONS

Section

OPERATIONAL DESIGN

Subject

Railroad Preemption

PRELIMINARY REVIEW:

If conditions potentially justify the preemption of normal signal operation due to a highway-rail grade crossing, representatives from the district and the division shall meet to determine if preemption is necessary.

If a highway-rail grade crossing equipped with a railroad flashing-light signal system is located within 200 feet of a signalized intersection, railroad preemption should be provided. If preemption is necessary, representatives from the district, division, and associated railroad company shall meet to determine the preemption operation and any necessary modifications to the existing signal or railroad-warning system. Depending on the nature of the project, additional representation from other divisions may be required. At this level, involvement from the railroad company is essential to ensure the two systems complement each other. If the railroad is not responsive or is unable to participate, the district shall document efforts to include the railroad representative.

DESIGN:

When advance preemption is required, the *Railroad Preemption Worksheet* (TC 72-109) should be used to calculate the advance preemption time needed at a location.

When a track clearance phase is required to clear the crossing of vehicles, the preemption scheme should be designed to clear the track of vehicles before the gate arms begin to descend. This design will decrease the possibility of gate arms coming down on vehicles, which could cause motorists to panic and/or make inappropriate maneuvers. In addition, this design will decrease the likelihood of gate arms being broken. The district or division shall coordinate with the railroad company to receive an electrical circuit of the closed-circuit principle that begins the track clearance interval. As a train approaches the crossing, the electrical circuit shall be de-energized, which shall activate the preemption sequence.

To facilitate the clearance of the railroad tracks, temporary exclusive movements may be required during the track clearance interval. Appropriate signal displays shall be used in these situations.

DESIGN (cont.): Pedestrian clearance intervals and minimum green times should be terminated or shortened in order to expedite the beginning of the track clearance interval. However, there are some cases where it would not be advisable to terminate the pedestrian clearance intervals. Items to consider would be pedestrian volumes, number of trains per day, intersection geometry, nearby pedestrian traffic generators, etc. Pedestrian recall should not be used at preempted signals.

After the track clearance interval has been served, limited phasing may be used to keep traffic moving as efficiently as possible. During limited phasing, any vehicle or pedestrian phases that do not conflict with the train may be served. The district or division shall coordinate with the railroad company to receive an electrical gate-down circuit of the open-circuit principle that begins the limited phasing interval.

Changes or modifications to the signal phasing or timing at an existing signalized intersection with railroad preemption shall be approved in writing by the division. All phasing or timing modifications shall be documented in TransPHAT and the signal file maintained by the division.

To provide short-term operation during power failure, an uninterruptible power supply (UPS) shall be installed at all railroad-preempted traffic signals.

FLASHING OPERATION: For railroad preempted traffic signals, engineering judgment should be used to determine the optimal flashing operation. Typically, when the track crosses a side-street approach, the signal would flash all-red during a mechanical failure to minimize the potential for queuing traffic across the highway-rail grade crossing. However, if the track crosses a mainline approach, the typical flashing operation would be yellow on the mainline and red on the side street to minimize the potential for queuing traffic across the grade crossing.

SIGNING: Blank-out signs should be installed to prevent turning movements from the signalized intersection toward the grade crossing, which could potentially block the intersection during preempted signal operations.

Where a traffic signal is interconnected with the warning system of a highway-rail grade crossing, a DO NOT STOP ON TRACKS (R8-8) sign should be installed on approaches to the crossing to reduce the potential for vehicles stopping on tracks.

Where a traffic signal requires vehicles to stop in advance of the railroad tracks, a STOP HERE ON RED (R10-6) sign shall be installed to the right of the stop bar to emphasize the location of the intended stop.

Where a traffic signal requires motorists to stop in advance of the railroad tracks and there is insufficient distance between the tracks and stop bar for the design vehicle, a NO TURN ON RED (R10-11) sign shall be span-mounted adjacent to the signal head for the prohibited turning movement.

WARNING PLACARD: A Preemption Warning Placard (**Exhibit 17**) shall be posted in the controller cabinet of any traffic signal preempted due to a nearby highway-rail grade crossing. The warning placard serves as a reminder of the interconnection between the traffic signal and the railroad warning devices. The placard shall include phone numbers for contacting the district and the railroad company. Warning placards are available from the division upon request.

ANNUAL INSPECTIONS: The district shall perform annual inspections of the timing and operation of railroad-preempted traffic signals. The division and railroad company should be involved in these inspections. These inspections shall include a review of all associated pavement markings and signing. The intent of these inspections is to ensure that both traffic signal and railroad-warning devices continue to operate according to the mutually approved interconnection design.

The district shall prepare an inspection report. At a minimum, the report shall include the date of the inspection, any deficiencies in the operation of the traffic signal or railroad-warning devices, and any necessary actions.

PREEMPTION PRIORITY: Railroad preemption shall have priority for locations that may have railroad preemption circuitry and emergency-vehicle preemption equipment.

TRAFFIC OPERATIONS	*Section* OPERATIONAL DESIGN
	Subject Emergency Vehicle Preemption

TRAFFIC SIGNALS FOR EMERGENCY VEHICLE ACCESS: Upon written request from an emergency service agency, a traffic signal may be installed or modified to expedite the highway entry of emergency vehicles (fire trucks, EMS vehicles, etc.) from an emergency service facility. While other intersections may be considered, these signals are primarily intended for direct-access entrances to the emergency service agency.

EMERGENCY VEHICLE PREEMPTION SYSTEMS: Emergency vehicle preemption is a special traffic-signal operation that attempts to minimize the delay of authorized emergency vehicles approaching a signalized intersection by allowing special equipment to preempt the normal operation of the signal to provide a green signal indication for emergency vehicles' direction of travel. The special equipment's location is at the traffic signal and used in combination with other equipment mounted on an emergency vehicle or inside an emergency facility

DOCUMENTATION:

The requesting agency shall obtain a permit, as outlined in **TO-605**, for the installation of traffic signals for emergency vehicle access and the installation of emergency vehicle preemption systems. All requests for emergency vehicle access or emergency vehicle preemption systems on state-maintained routes shall be submitted to the division for review and approval.

COST PARTICIPATION: The requesting agency shall be responsible for all costs associated with signal installations that provide emergency vehicle access. When there is a need to modify an existing signal to provide preemption for emergency vehicle access, the requesting agency shall be responsible for all modification costs. The requesting agency shall be responsible for all costs of equipment, installation, maintenance, and operation of the emergency vehicle preemption system equipment. The requesting agency is also responsible for furnishing, installing, and maintaining all other preemption equipment associated with emergency vehicles or emergency facilities including, but not limited to, transmitters mounted on emergency vehicles.

EMERGENCY VEHICLE PREEMPTION OPERATIONS:

Traffic signals preempted by authorized emergency vehicles, shall operate according to Section 4D.27 of the *Manual on Uniform Traffic Control Devices* (*MUTCD*).

If the emergency vehicle's approach already displays a green indication when the initial preemption call is received, the display shall remain green throughout the preemption phase.

The signal shall resume normal operation after emergency vehicle preemption phasing.

Emergency vehicle preemption systems shall be equipped with confirmation lights to inform the emergency vehicles that their preemption request has been received by the traffic signal equipment.

Emergency vehicle preemption systems shall be designed and operated to allow only authorized emergency vehicles preemption capabilities.

The Cabinet reserves the right to remove or request the removal of any emergency vehicle preemption equipment that adversely affects signal operation, or if system abuse occurs. Before removing equipment, the Cabinet should notify the emergency service agency so that emergency vehicle operators are aware of the changes.

An all-red intersection display is normally an unacceptable method of emergency vehicle preemption.

PREEMPTION PRIORITY:

Railroad preemption shall have priority for locations having railroad preemption circuitry and emergency vehicle preemption equipment.

TRAFFIC OPERATIONS

Section

OPERATIONAL DESIGN

Subject

Coordinated Systems & Communications

COMMUNICATIONS: The division manages and coordinates the operation of a statewide traffic signal communications network. The district should notify the division if new signals need to be included in the network.

When needed, the division shall provide communications equipment. The division or district installs and maintains communications equipment. The division may utilize a contractor for the installation and maintenance of communications equipment. The division or contractor shall coordinate with the district prior to the installation of communications equipment.

The district should notify the division if assistance is needed for the installation or maintenance of communications equipment.

COORDINATED SIGNAL SYSTEMS: The division develops and manages a system that combines groups of traffic signals into coordinated signal systems. The district should recommend to the division any traffic signals or groups of traffic signals that need to be included in a coordinated signal system.

COORDINATION TIMING: Coordination timing shall be developed, tested, and implemented by the district traffic engineer, the division, or a consultant prequalified by the Cabinet in traffic engineering services. The division and the district traffic engineer shall coordinate prior to the development of coordination timing.

The district traffic engineer is responsible for coordination timing developed and implemented at the district level. If coordination timing is developed by the division or a prequalified consultant, the division or prequalified consultant shall notify the district traffic engineer prior to field implementation and adjustments. The district traffic engineer may elect to review the timing prior to implementation. Once the adjusted timing is in place, the district traffic engineer is responsible for the coordinated signal operation and should be the first-line responder for public inquiries.

The division should periodically evaluate arterial performance for needed modifications. The district should periodically observe coordinated signal systems and adjust coordination plans when traffic conditions change.

COORDINATION TIMING (cont.):

Signal timing modifications shall be immediately noted in the timing files by the individual making the changes. If timing is modified by a consultant, they shall notify their contact within the Cabinet. The Cabinet contact should immediately update the timing files. The division shall notify the district before making signal file changes.

The division develops a signal timing file for new traffic signals and adds the file to the signal timing network. The district then creates timing for the new signal and modifies the new signal timing file within the network.

DATA:

The division maintains:

- A GIS database of signals and coordinated signal system groups
- A central network location for the storage of the most current timing files
- Other documentation such as phasing diagrams and intersection photos

TIMING & COMMUNICATIONS MONITORING:

The division maintains an automated process to monitor field timing at signals with remote communications to ensure field timing matches current network timing. The division also maintains an automated process to monitor the status of remote communications to signals.

The division periodically generates digital reports for the division and district detailing which signals with remote communication have timing differences and the status of communications to each signal. The district should establish procedures to routinely review the reports and ensure field timing matches current network timing.

The division notifies the districts of any network events that could affect communications.

PERFORMANCE MONITORING & MEASUREMENT:

The division has established statewide performance measurements for signalized arterials. The performance of signalized arterials is monitored by the division and compared to statewide performance measurements.

STANDARDS:

The division establishes and maintains standards and specifications for all hardware, software, and firmware for electrical traffic control devices. The division will coordinate with other state agencies and local governments that maintain traffic signals or utilize the same technology to encourage statewide standardization whenever possible.

TRAINING & SUPPORT: When requested or deemed necessary, the division will provide training and support for communication and coordination to the districts, contractors, and consultants.

TRAFFIC OPERATIONS

Chapter

ELECTRICAL TRAFFIC CONTROL DEVICES

Subject

Flashing Beacons

DEFINITION: Flashing beacons include intersection control beacons and warning beacons that supplement warning and regulatory signs. School flashers are considered flashing beacons but are addressed in **TO-611**.

DESIGN: Devices shall conform to the *Manual on Uniform Traffic Control Devices* (*MUTCD*) with the following exceptions and additions:

- Flashing beacons shall be 12 inches in diameter.
- Intersection control beacon installations shall include a minimum of two horizontally aligned signal indications for each approach.
- Intersection control beacons should be installed on box-spans to maximize visibility.
- Intersection control beacons shall flash in a simultaneous pattern.
- Warning beacons used to supplement warning or regulatory signs shall be oriented horizontally with one signal indication on each side of the sign.
- Warning beacons used to supplement warning or regulatory signs, (other than STOP, WRONG WAY, and DO NOT ENTER signs) shall be yellow and flash alternately.
- Warning beacons used to supplement STOP, DO NOT ENTER, or WRONG WAY signs shall be red and flash simultaneously.
- Automatic dimmers should be provided for all warning beacon indications in which nighttime visibility of a warning device is compromised by the brilliance of the indications.

VISIBILITY: Backplates shall be used on intersection control beacon heads when the speed limit on the approach is 45 mph or greater. Backplates may be used if conditions (such as sun glare, bright sky, or complex or confusing backgrounds) indicate the need for enhanced target value for the beacon display.

VISIBILITY (cont.): The district may install retroreflective backplates to increase visibility of beacon displays when:

- Background light exists that can make the beacon indication difficult to see
- A nighttime crash problem exists

The district may utilize double beacons (two beacons horizontally mounted adjacent to each other) to increase visibility of beacon displays.

TRAFFIC OPERATIONS

Chapter

ELECTRONIC TRAFFIC CONTROL DEVICES

Subject

School Flashers

ASSEMBLIES: Assemblies should consist of a SCHOOL SPEED LIMIT sign (S5-1) and two 12-inch yellow signal indications: one mounted above the sign and one mounted below the sign. Indications shall flash alternately. School flasher assemblies may be installed on a pole located on the right-hand side of the roadway or overhead on a span wire or mast arm. An overhead installation should be used on four-lane undivided or wider facilities.

TO-402-5 provides additional guidance on school speed limits.

OPERATING TIMES: Due to the restrictive nature of school speed limits, school flasher assemblies should be in operation only during times of peak vehicular or pedestrian traffic. They should operate in the morning approximately 25 minutes before and 10 minutes after the school's convening time. In the afternoon, the period of operation should be 10 minutes before and 25 minutes after the school's dismissal time. These times may be adjusted based on site-specific conditions; however, school flasher assemblies should rarely be in operation longer than 35 consecutive minutes.

Although these devices should normally be placed in operation only for the school's convening and dismissal times, if school traffic is heavy, additional periods of operation may be justified.

TRAFFIC OPERATIONS

Chapter	
	LIGHTING
Subject	
	General

OVERVIEW:

Lighting is defined as the use of light sources along or near state-maintained facilities to improve nighttime visibility and safety.

This chapter establishes guidelines under which the Cabinet evaluates warranting conditions, grants approval, designs, installs, operates, and maintains lighting on state-maintained facilities.

ADDITIONAL REFERENCES:

The following list includes additional references for the design, installation, and maintenance of lighting:

- *Traffic Operations Standard Detail Sheets.* Kentucky Transportation Cabinet, Department of Highways, Division of Traffic Operations
- *Standard Specifications for Road and Bridge Construction.* Kentucky Transportation Cabinet, Department of Highways
- *Standard Drawings.* Kentucky Transportation Cabinet Department of Highways
- *National Electrical Code.* National Fire Protection Association (NFPA). Publication NFPA-70
- *National Electrical Safety Code.* Institute of Electrical and Electronics Engineers (IEEE)
- *Roadway Lighting Design Guide.* American Association of State Highway and Transportation Officials (AASHTO)
- *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals.* American Association of State Highway and Transportation Officials (AASHTO)
- *Roadside Design Guide.* American Association of State Highway and Transportation Officials (AASHTO)
- *Recommended Practice for Roadway Lighting.* Illuminating Engineering Society of North America (IESNA). Publication RP-8
- *Recommended Practice for Tunnel Lighting.* Illuminating Engineering Society of North America (IESNA). Publication RP-22

The division's Design Services Branch may be contacted to verify which edition of these references to utilize.

TRAFFIC OPERATIONS

Chapter

LIGHTING

Subject

Responsibilities

CABINET: The Cabinet is responsible for the approval, design, installation, operation (including utility costs), and maintenance of lighting on state-maintained routes for the following types of facilities:

- Fully controlled access highways
- Interchanges and underpasses
- Intersections outside city limits
- Roundabouts outside city limits
- Rest areas and weigh stations
- Bridges outside city limits
- Roadway tunnels (not including pedestrian tunnels)
- Navigation lighting on bridges
- Aviation obstruction lighting on structures

The Cabinet may enter into agreements with local governments or electric utility companies for any or all of these responsibilities.

The Cabinet may design and install standard bases, conduits, and junction boxes on state-maintained facilities in conjunction with a construction project for future lighting by others, regardless of the responsibilities listed in this manual. Even if lighting is unwarranted or not listed above, the Cabinet may elect to install complete lighting systems (excluding decorative fixtures) as part of a highway project if the project team supports installation, project funds are available for the lighting, and local officials sign an agreement to maintain the lighting (including utility costs). Such installations require the approval of the Deputy State Highway Engineer for Operations and Maintenance.

OTHERS: The Cabinet shall not be responsible for the design, installation, operation (including utility costs), or maintenance of aesthetic lighting, decorative lighting, delineation lighting, or lighting on any facility or type of project that is not listed in the preceding section.

RELOCATIONS: In accordance with KRS 177.035, the Cabinet is responsible for the cost of relocating existing lighting that is maintained by a municipality or municipally owned utility when the lighting needs to be relocated due to a highway project. Design and construction of such relocations may be provided by the utility or by the Cabinet depending on the preferred arrangement for each project.

RELOCATIONS (cont.):

For lighting installed/maintained by private utility companies (including lighting permitted by local agencies), relocation costs shall be the responsibility of the utility company. The design of such relocations shall not be the responsibility of the Cabinet.

TRAFFIC OPERATIONS

Chapter

LIGHTING

Subject

Warrants

OVERVIEW: The warranting conditions for lighting identified in this manual assist the Cabinet in evaluating locations for potential lighting installations by establishing a basis for when lighting may be justified. Satisfaction of these warrants does not mean that the Cabinet shall be required to install lighting.

In addition to the warrants listed in this manual, site-specific information such as roadway geometry, sight distance, crash rates, or frequent occurrences of fog, ice, or snow may influence the decision as to whether or not lighting is installed. Availability of funds may also influence the decision of whether to install lighting.

TRAFFIC OPERATIONS	*Chapter* LIGHTING
	Subject Approval

APPROVAL AUTHORITY:

TO-203 specifically addresses the approval authority for common types of roadway lighting projects.

The installation of lighting by others through the encroachment permit process shall require the approval of the district. The district's approval of an encroachment permit shall serve as approval of such lighting. However, the permits for such lighting shall be submitted to the division for review and comment. **TO-707** includes additional information on permitted lighting.

NON-PROJECT APPROVAL PROCESS:

When lighting is to be installed that is not part of a design project, the district shall submit requests to the division. At a minimum, the request shall include a narrative and any supporting data regarding warranting conditions. The division shall review the submittal, decide whether lighting is warranted, and secure the necessary approval if lighting is recommended. The division shall inform the district of decisions to either approve or deny the request.

This process normally only applies to smaller lighting projects (such as intersection lighting requests) that could be reasonably funded with traffic funds. Generally speaking, the division does not have a source to independently fund larger lighting projects (such as interchange lighting). Normally, larger lighting projects can only be funded as a part of highway projects in the Cabinet's six-year highway plan.

APPROVAL PROCESS FOR PROJECTS:

The following procedures should be followed when lighting or lighting plans are required as part of the project development process:

1. The project manager notifies district traffic personnel and the appropriate liaison from the division's Traffic Engineering Branch of meetings for projects that are likely to involve lighting plans.

2. The district and division send representatives to these project team meetings.

APPROVAL PROCESS FOR PROJECTS (cont.):

3. The project team evaluates the need for lighting and lighting plans on the project. This evaluation should include a thorough review of engineering data and a comprehensive study of the traffic conditions and characteristics of the location. For Cabinet-maintained lighting, need could include modifying or replacing existing lighting or the installation of new lighting. For lighting maintained by others, the project may include the installation of standard bases, conduits, and junction boxes for future installation. Likewise, the project team may recommend installation of complete lighting systems (excluding decorative lighting) as part of a highway project if the project team supports installation, project funds are available for the lighting, and local officials are willing to maintain the lighting (including utility costs). **TO-705** provides details on decorative lighting requests. In all cases and at any point during the review process, the project team may determine that lighting is not needed on the project based on engineering study or judgment. Such decisions should involve representatives from district traffic personnel.

4. When the project team recommends the installation of lighting or recognizes the need for lighting plans, the district traffic engineer shall submit a written request to the division for electrical devices or plans. The request should be submitted as soon as possible and shall specify the impacts and needs of the particular project when it comes to lighting. For new installations, the submittal should include traffic data/projections, crash history, and any other information that would typically be used for supporting documentation. If the project team also wants the division to develop plans for lighting, a request for development of the plans shall be included in their submittal.

5. The division shall review the submittal, decide whether lighting is warranted, and secure approval if necessary. In each case, the division shall inform the district Traffic Engineering and Permits Section and the Project Development Branch of recommendations and decisions.

6. The project manager contacts the division's Design Services Branch as soon as possible so electrical design can be initiated and pole base locations can be identified and shown on the right of way and utility plans. If lighting plans are not being developed by the Cabinet, the lighting consultant shall contact the Design Services Branch for a preliminary review.

7. For projects involving lighting that is to be maintained by local agencies or projects involving decorative lighting, the district shall secure agreements from the local agencies to address maintenance of these systems. Such documents shall be finalized as soon as possible in the design process.

APPROVAL PROCESS FOR PROJECTS (cont.):

Exhibit 25 includes an example of a lighting maintenance agreement for locally maintained lighting, and **Exhibit 26** includes an example of a non-standard materials agreement for decorative lighting requests. The content of these example agreements may be modified or combined to satisfy the needs of a particular project. For decorative lighting projects, the Design Services Branch can assist in the development of cost comparisons of non-standard and standard lighting materials so that local governments are aware of their financial commitment.

8. The division or consultant completes the design of lighting plans.

9. Final lighting plans should be submitted to the project manager for inclusion in the plan set. The project manager is ultimately responsible for ensuring that electrical plans are identified and included in the total plan package.

TRAFFIC OPERATIONS

Chapter

LIGHTING

Subject

Plan Development

LIGHTING PLANS:

The division's Traffic Design Services Branch normally designs all lighting for Cabinet projects. If they cannot provide this service, an engineering consultant preapproved by the Cabinet in Electrical Engineering Roadway Lighting Services shall develop the plans. Lighting projects designed by consultants shall be submitted to the division for review. The district should be given the opportunity to review lighting plans if time permits.

Plans shall be developed in accordance with Kentucky Transportation Cabinet (KYTC) CADD standards and the current edition of the *Kentucky Standard Specifications for Road and Bridge Construction*, the Division of Traffic Operations' Roadway Lighting Standard Detail Sheets, the *National Electrical Code*, and the *National Electrical Safety Code*.

When consultants develop lighting plans, the following documentation shall be submitted to the division for review:

- Full plan set including (in Microstation and pdf formats):
  - Summary sheet with KYTC bid item codes and estimated quantities
  - Bid item notes sheet to describe all items on the summary sheet that are not addressed in the *Kentucky Standard Specifications for Road and Bridge Construction*
  - Roadway Lighting Standard Detail Sheets
  - Drawings, specifications, and construction methods for any items not addressed in the Standard Specifications or Standard Detail Sheets
  - Lighting layout
- Voltage drop calculations
- Electronic files from lighting analysis

LIGHTING LAYOUTS:

Lighting analysis shall only be performed using software packages approved by the division. A list of approved lighting analysis software is available on the division's website.

Light loss factor (LLF) is a product of the lamp lumen depreciation (LLD) and the luminaire dirt depreciation (LDD). The photometric analysis shall use an LLF of 0.80 for open fixtures and 0.65 for closed fixtures. Point spacing should be a maximum of 4 feet transversely and longitudinally.

Since IES (Illuminating Engineering Society) distribution patterns vary significantly, it is important that the designer note the pattern used for the layout on the plans.

The designer shall calculate the voltage drop for each branch circuit. The wiring shall be sized such that the voltage drop for each branch circuit is less than 5 percent of the source voltage.

For pole-mounted cabinets, the maximum number of circuits allowed shall be five, not including the spare. For base-mounted cabinets, the maximum number of circuits allowed shall be nine, not including the spare.

All lighting poles placed behind guardrail shall be located a minimum of 5 feet from the face of the guardrail to the nearest edge of the pole or base.

When laying out the lighting, the designer should pay particular attention to decision points such as intersections, gore areas, overhead signs (reflection issues), etc. They should also avoid overhead and underground utilities, drainage structures, and other obstructions. Designers should limit poles on structures to as few as possible. For high mast lighting designs, the plans shall include station and offset for each pole. For conventional lighting designs, the plans shall include a station for each pole. In either case, the station and offset shall be determined from the nearest roadway alignment.

The installation of luminaires on signal poles shall not be allowed unless the poles have been designed to accommodate the added weight of the luminaires.

CONVENTIONAL VERSUS HIGH-MAST:

Conventional lighting systems are those using mounting heights of 30—40 feet. High-mast lighting consists of multiple luminaires installed in a ring configuration at the top of a pole 80—120 feet tall.

Depending on the application, high-mast lighting for interchanges can be less expensive to install than conventional lighting. This is often the case at a freeway interchange due to the smaller number of fixtures and poles required and the reduced complexity of conduit and conductor runs. For other roadway applications, such as intersection lighting, conventional lighting usually requires a smaller initial cost.

CONVENTIONAL VERSUS HIGH-MAST (cont.):

Conventional lighting is frequently damaged due to the close proximity to the roadway, and maintenance of conventional lighting systems often requires the use of a bucket truck and extensive traffic control. One or two persons with a pickup truck can usually perform maintenance on a high-mast lighting system. High-mast lighting also reduces the risks involved with having personnel working near high-speed traffic.

High-mast lighting should not be installed in areas where light trespass, sky glow, or glare is an issue. These are generally areas where residential development is located near the highway right of way. If high-mast lighting is used, special high-mast designs, such as the use of shielding devices, should be considered to avoid light trespass and glare.

Some important questions to consider when deciding whether to use conventional or high-mast lighting are:

- What is the proximity of residential areas?
- What is the proximity of airports and helipads?
- Would future upgrading of the roadway require relocating a conventional lighting system? Can a high-mast system be installed that will not require relocation and that can provide construction lighting for future roadway projects?
- What is the maintenance cost difference? Will lane closures be necessary for maintenance? What will be the effect on traffic?
- What are the installation and operational cost differences?

HIGH-MAST LIGHTS:

High-mast poles should be located such that they are out of the clear zone as defined by AASHTO's *Roadside Design Guide*. If poles must be located in the clear zone, they shall be protected by guardrail or barrier wall. For high-mast lighting, the typical design includes four to six 1000W luminaires mounted on a 120-foot pole. High-mast systems should be designed using ducted cable in lieu of wiring and conduit. If proposed high-mast poles are located in close proximity to an airport or helipad, the designer shall contact the Federal Aviation Administration (FAA) and the Kentucky Airport Zoning Commission to determine if aviation obstruction lighting is necessary.

CONVENTIONAL LIGHTS:

Conventional lighting poles may be located in the clear zone provided they are on breakaway supports and equipped with electrical disconnects. Non-breakaway supports may be used in low-speed (35 MPH or less) urban situations with significant pedestrian activity, if supported by an engineering study.

CONVENTIONAL LIGHTS (cont.):

Breakaway supports and base heights shall conform to the requirements of AASHTO's *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*. Conventional lighting supports should be located so that no part of the pole or base is within 1.5 feet of the face of the curb.

For conventional lighting, the typical design includes 250W—400W luminaires with a mounting height of 40 feet for the mainline or crossroad and 100W—150W luminaires with a mounting height of 30 feet for ramps. Maximum bracket length shall be 15 feet. Power for lighting on breakaway supports shall be fed underground.

When existing lighting installations are modified with a project, fixtures consistent with the existing lighting system should be utilized.

DECORATIVE LIGHTING:

The Cabinet does not install decorative lighting. Any requests for decorative lighting, to be installed by others, shall be submitted to the division. The division shall review and make recommendations regarding the use of such lighting. All additional costs in excess of a typical installation (including design, installation, and future maintenance) shall be borne by the requesting agency. Due to the lack of assurance for long-term maintenance, the Department shall not enter into a non-standard materials agreement with a private entity.

For lighting required by the Cabinet, the requesting agency shall be responsible for additional costs associated with decorative lighting, namely anything above and beyond the normal costs of installing non-decorative lighting. In such cases, the division's Design Services Branch can assist in the development of cost comparisons of non-standard and standard lighting materials so that local governments are aware of their financial commitment. The requesting agency shall also be responsible for future maintenance of decorative materials. Typical maintenance includes, but is not limited to, inspection and repair of any dents, structural failures, or other damage. The most critical aspect of maintenance is the timely replacement of damaged or downed materials.

For lighting not required by the Cabinet, the requesting agency shall be responsible for the total installation costs of decorative fixtures (including service fees), utility costs, and future maintenance.

For decorative lighting, a written agreement with the requesting agency or party, which addresses costs and future maintenance responsibilities, shall be in place. The district shall be responsible for developing and securing such an agreement. **Exhibit 26** includes an example of a non-standard materials agreement that can be utilized to document the responsibilities of requesting agencies associated with decorative lighting requests. This sample agreement covers a typical scenario of Cabinet-maintained lighting where the local agency wants decorative fixtures.

DECORATIVE LIGHTING (cont.): For other scenarios, such as locally maintained lighting that uses decorative materials, a modified agreement which combines relevant sections of **Exhibit 25** (lighting maintenance agreement) and **Exhibit 26** may be more appropriate.

TRAFFIC OPERATIONS

Chapter

LIGHTING

Subject

Inspections

REQUIREMENT: The division shall conduct an inspection of all lighting installed or modified through construction projects and encroachment permits. Upon notification from the district, the division shall complete the inspection within 90 days. The division shall prepare a list of required corrective work and send it to the applicable personnel. Additional inspections of corrective work may be required.

STRUCTURAL: The division will coordinate the periodic inspection of high-mast lighting structures. The inspection will be addressed through a consultant services contract. The division and district will determine an appropriate response to identified issues.

TRAFFIC OPERATIONS

Chapter

LIGHTING

Subject

Permitted Installations

OVERVIEW: An encroachment permit shall be required for any lighting installed on state right of way by others. Lighting may be installed or modified through the encroachment permit process as outlined below and in the *Permits Manual*.

APPROVAL: **TO-704** provides information regarding the approval of permitted lighting installations.

RESPONSIBILITIES OF APPLICANT: The applicant shall be responsible for securing the services for and all costs related to the design and installation of permitted lighting installations.

DESIGN DETAILS: All lighting installations to be installed through the permit process shall be designed by a consultant prequalified by the Cabinet in Electrical Engineering Roadway Lighting Services or by a utility company. Other options for obtaining such services on public lighting projects include city engineering staff or lighting vendors. In rare cases, the Traffic Design Services Branch may be able to provide design services for minor lighting projects in smaller communities.

The division may be contacted prior to the design of permitted lighting installations to determine the level of review and design requirements required for a particular project. Lighting installed or modified under this section shall be designed in accordance with **TO-705**.

If the applicant desires non-standard materials, such as decorative poles, the applicant shall follow the procedures outlined in **TO-705** for decorative materials.

REVIEW PROCESS: Roadway lighting permits (with the exception of certain intersection delineation lighting projects as defined in **TO-710**) shall be submitted to the division. Such submittals shall include a Permitted Lighting Submittal Checklist (**Exhibit 27**).

Upon receipt of plans, the division shall review and compile comments regarding any corrections that may be necessary. Depending upon the corrections required, additional submittals may be required.

MATERIALS: For lighting installed by permit, the applicant shall provide detailed submittals for materials, including but not limited to:

- Pole bases
- Poles (including breakaway details)
- Luminaires
- Arms/brackets
- Banner/flag brackets
- Electrical disconnects
- Shop drawings for non-standard materials

Contrary to the Standard Specifications, USE-2 wire shall not be required for permitted lighting. However, the insulation of the proposed wire shall conform to the National Electrical Code (NEC) with regards to use in wet areas.

CONSTRUCTION: All permitted lighting installations shall be installed by a contractor prequalified by the Cabinet in the work category of Lighting, with the exception of lighting projects installed by a utility company.

INSPECTION: Inspection of lighting by permit shall be performed in accordance with **TO-706**. All required corrective work identified as part of inspections should be completed prior to releasing the bond (if applicable) for the permit.

TRAFFIC OPERATIONS

Chapter

LIGHTING

Subject

Interchange Lighting

DEFINITIONS: Complete interchange lighting is defined as a lighting system that provides relative uniform lighting within the limits of the interchange. Partial interchange lighting is defined as a lighting system that provides illumination only in certain areas of the interchange.

WARRANTS: Complete interchange lighting is warranted if any of the following conditions are satisfied:

- The average daily traffic on the crossroad exceeds 5,000
- Continuous lighting has been installed on the through expressway or freeway

Partial interchange lighting is warranted if any of the following conditions are satisfied:

- The average daily traffic on the mainline through traffic lanes exceeds 25,000 for urban conditions and 10,000 for rural conditions
- The average daily traffic on the crossroad exceeds 1,000

ILLUMINANCE LEVELS: Interchange lighting should be designed to provide the following:

- Average maintained illuminance on all roadway surfaces of 0.80 foot-candles
- Minimum illuminance of 0.20 foot-candles
- Uniformity ratio less than or equal to 4:1

COVERAGE: For complete interchange lighting layouts, the designer should provide lighting:

- Along the mainline and crossroad, extending to the end of the farthest ramp taper in each direction
- Along each ramp including the gore areas

COVERAGE (cont.):

For partial interchange lighting layouts, the designer should provide lighting within the limits of intersections of ramps and crossroads. Intersection limits are normally considered to be the general area within stop lines (if present) or intersection radii.

Engineering judgment should be utilized to determine the exact limits of the lighting provided.

If the distance between two ramp intersections with partial lighting is less than 1,000 feet (measured from center of intersection to center of intersection), continuous roadway lighting between the intersections should be considered.

TRAFFIC OPERATIONS

Chapter

LIGHTING

Subject

Intersection Lighting

WARRANTS: Intersection lighting (full or partial) is warranted if the following conditions are satisfied:

- The nighttime critical rate factor is 2.0 or greater
- At least three or more nighttime crashes have occurred in a recent three-year period
- A study indicates that lighting may be expected to significantly reduce the nighttime crash rate
- High-speed intersection (speed limit greater than 45 MPH) has raised channelization or complex geometry

COVERAGE: Full intersection lighting should be provided for signalized intersections. Full intersection lighting includes approach lighting on the mainline approaches in addition to lighting within the limits of the intersection.

For unsignalized intersections, partial intersection lighting should be provided. Partial intersection lighting only includes lighting within the limits of the intersection with no approach lighting.

Intersection limits are normally considered to be the general area within stop lines (if present) or intersection radii.

Engineering judgment should be utilized to determine the exact limits of the lighting provided.

If the distance between two intersections with lighting is less than 1,000 feet (measured from center of intersection to center of intersection), continuous roadway lighting between the intersections should be considered.

ILLUMINANCE LEVELS: For intersection lighting layouts, the average maintained illuminance (AMI) values shall be based on Table 3-5a of AASHTO's *Roadway Lighting Design Guide*.

ILLUMINANCE LEVELS (cont.):

For lighting within the limits of the intersection, the designer shall determine the AMI values for both the mainline and crossroad based on their functional classification. Using the greater of the two AMI values, the designer shall multiply by a factor of 1.3 to determine the AMI that should be provided within the limits of the intersection. The limits of an intersection are defined as the area within the intersection stop bars (if present) or the area within the intersection radii (if no stop bars are present).

For approach lighting to intersections, the designer should provide an AMI based on the functional classification of the approach. When required, approach lighting should be provided on mainline approaches approximately 400 feet in advance of the limits of the intersection. Lighting is not required on the portion of the roadway where vehicles are travelling away from the intersection.

TRAFFIC OPERATIONS

Chapter

LIGHTING

Subject

Intersection Delineation Lighting

DEFINITION: Intersection delineation lighting involves the installation of one luminaire to provide guidance to motorists of the location of an upcoming intersection.

WARRANTS: Intersection delineation lighting is warranted if a local agency supports installation and is willing to install and maintain such lighting (including utility costs) through the encroachment permit process.

DESIGN DETAILS: Intersection delineation lighting shall not be installed on existing traffic signal poles. For intersection delineation lighting, luminaires may be installed on:

- Existing utility poles in the clear zone
- Breakaway supports within the clear zone
- Supports outside of the clear zone

Intersection delineation lighting should include a single luminaire mounted at least 5 feet and no further than 15 feet from the rightmost edge of the shoulder on both mainline and side street approaches. The luminaire shall be a 200- to 250-watt fixture and be mounted a minimum of 35 feet above the roadway. The luminaire shall be mounted either parallel to the mainline roadway or diagonal to the intersection.

APPROVAL: Intersection delineation lighting proposals that follow the above guidance regarding the type and number of luminaires do not need to be forwarded to the division. Permits that do not follow the above guidance shall be forwarded to the division for review and comment.

In accordance with **TO-704**, the district's approval of an intersection delineation lighting permit shall serve as approval of such lighting.

TRAFFIC OPERATIONS

Chapter

LIGHTING

Subject

Roundabout Lighting

WARRANTS: Due to the unique geometric layout of roundabouts, lighting is warranted for roundabouts on state-maintained highways.

COVERAGE: Full intersection lighting should be provided for roundabouts. Full intersection lighting includes approach lighting in addition to lighting within the limits of the roundabout.

ILLUMINANCE LEVELS: For roundabout lighting layouts, the average maintained illuminance (AMI) values shall be based on Table 3-5a of AASHTO's *Roadway Lighting Design Guide*. Within the limits of the roundabout, the designer shall determine the AMI values for both the mainline and crossroad based on their functional classification. Using the greater of the two AMI values, the designer shall multiply by a factor of 1.3 to determine the AMI that should be provided within the limits of the roundabout. The limits of a roundabout are defined as the area encompassed by the circular roadway within the yield lines on each approach.

For approach lighting to roundabouts, the designer should provide an AMI based on the functional classification of the approach. Approach lighting should be provided approximately 400 feet in advance of the yield line for entering the circular roadway or from the beginning of the splitter island, whichever distance is greater.

The Traffic Design Services Branch shall be contacted to determine the appropriate level of lighting in crosswalks at roundabout locations.

On the portions of the roadway where vehicles are travelling away from the roundabout, engineering judgment should be utilized to determine the limits of lighting that is provided. If splitter islands are relatively short in length, it is desirable to provide lighting to the end of the splitter island. If splitter islands are longer, lighting should be provided a minimum of fifty feet beyond pedestrian crossings (if present) or a minimum of fifty feet beyond the circulatory roadway if pedestrian crossings are not present.

Engineering judgment should be utilized to determine the exact limits and levels of the lighting to be provided.

TRAFFIC OPERATIONS

Chapter

LIGHTING

Subject

Continuous Freeway Lighting

WARRANTS: Continuous lighting is warranted on freeways if any of the following conditions are satisfied:

- Sections in and near cities where the current average daily traffic is 30,000 or greater
- Sections where three or more successive interchanges are located with an average spacing of 1.5 miles or less

With the exception of short sections of roadway (less than 1,000 feet) between intersections with state-maintained lighting, continuous lighting along non-freeway routes is not typically installed or maintained by the Cabinet.

ILLUMINANCE LEVELS: Continuous freeway lighting should be designed to provide the following:

- Average maintained illuminance on all roadway surfaces of 0.80 foot-candles
- Minimum illuminance of 0.20 foot-candles
- Uniformity ratio less than or equal to 4:1

TRAFFIC OPERATIONS

Chapter

LIGHTING

Subject

Bridge, Tunnel, & Underpass Lighting

BRIDGE LIGHTING:

Bridge lighting is warranted if any of the following conditions are met:

- Bridge is located within a section of freeway where continuous lighting is warranted
- Bridge accommodates pedestrian movements

Bridge lighting should include the illumination of the roadway and any pedestrian facilities. Designers should utilize engineering judgment to determine if lighting is necessary on the approaches to the structure.

To minimize vibration, designers should minimize arm lengths on bridge lighting designs and shall incorporate a dampening device within the light poles. Designers shall also incorporate a grounding system for light poles installed on bridges.

TUNNEL LIGHTING:

Nighttime lighting for tunnels is warranted if luminaires adjacent to the tunnel cannot provide adequate lighting. Daytime lighting for tunnels is warranted if user visibility requirements are not satisfied by sunlight.

Tunnel lighting shall be designed in accordance with *Recommended Practice for Tunnel Lighting*, IESNA Publication RP-22-05.

UNDERPASS LIGHTING:

Underpass lighting is warranted if luminaires adjacent to the underpass cannot provide adequate lighting and any of the following occur:

- The underpass has frequent nighttime pedestrian traffic
- Unusual or critical roadway geometry occurs adjacent to or in the underpass area

Underpass lighting should illuminate the roadway and any adjacent pedestrian facilities.

TRAFFIC OPERATIONS

Chapter

LIGHTING

Subject

Navigation Lighting

WARRANTS: Navigation lighting on bridges is warranted when recommended by the United States Coast Guard.

DESIGN DETAILS: The Cabinet shall follow all applicable sections of *33 CFR Bridge Administration Manual of the United States Coast Guard* when navigation lighting is required. The Cabinet shall meet the requirements of the lighting plan provided by the United States Coast Guard for each navigation lighting location. The district shall request an updated lighting plan from the United States Coast Guard before modifying the navigation lighting at any location.

New designs for navigation lighting systems should allow reasonable means of access to maintain and repair all hardware. New designs shall include LED fixtures, back-up power supply (preferably solar), and automatic monitoring. The monitoring system shall monitor the light output of the fixture. If solar power is used, the monitoring system shall also monitor the voltage of solar panels and batteries and the charging rate of the batteries. Solar panels should be placed in locations to maximize sun exposure, such as the top of the bridge or on the south side of the bridge. Batteries for solar power navigation lighting should be placed in locations that are easily accessible from the roadway and that avoid the use of a ladder for maintenance. All hardware shall be stainless steel.

Approved lighting plans may include a combination of any or all of the following types of lights:

- 360-degree green channel center (two lights placed over center of navigable channels, mounted just below the lowest edge of steel of the structure)
- 180-degree red channel margin (placed to show the margin of the navigable channel)
- 180-degree red pier (marking each end of the pier, not lower than 2 feet above the navigable high-water mark)
- 180-degree white main channel lights (displayed in a vertical line of 3 lights, located above the green light for the main channel)

NAVIGATION PANELS: Navigation lighting plans include retroreflective navigation panels to provide a redundant warning system when navigation lights are inoperable. Installation details of navigation panels (such as location, size, color, etc.) shall be in accordance with the approved lighting plan. Navigation panels shall be fabricated with retroreflective sheeting in accordance with **TO-402**.

MARKINGS: **MAIN-800** of the *Maintenance Guidance Manual* addresses the inspection and maintenance of bridge markings, gauges, or paint specified in the navigation lighting plan. Questions regarding the maintenance of these markings should be directed to the Bridge Preservation Branch of the Division of Maintenance.

MAINTENANCE: The district shall be responsible for maintaining navigation lighting systems, including navigation panels. The district should perform routine maintenance on all hardware. The district should replace batteries for solar navigation lighting within the time frame specified by the battery manufacturer. Solar panels should be cleaned at least once per year. If navigation lights are not in working order, the district shall make repairs as soon as possible.

INSPECTIONS: The district should perform a monthly inspection of each navigation lighting location to ensure that all navigation lights are properly lit. The district should perform in-depth inspections of each navigation lighting location on a semi-annual basis. In-depth inspections should verify the condition of: navigation panels, solar panels, batteries, cabinets, wire, conduit, and hardware. An example of an in-depth navigation lighting inspection form is shown in **Exhibit 28**.

The district shall retain records of all in-depth and monthly inspections of navigation lighting. Districts are encouraged to maintain these records within the Kentucky Encroachment Permit Tracking (KEPT) program. These records shall be destroyed three years after removal of the devices.

OUTAGES & REPORTING: When the district is notified of navigation lighting outages, they shall immediately notify the United States Coast Guard. The district shall respond to reported outages as soon as conditions would permit a safe possible situation based on engineering judgment. The district should make any necessary repairs within twenty-four hours of notification of the outage. If the necessary repairs cannot be completed within twenty-four hours of notification of the outage, the district shall contact the United States Coast Guard of the issue and provide an estimated completion date of corrective work. The district shall notify the United States Coast Guard when the navigation lighting system is repaired and working properly. The district shall notify the United States Coast Guard of any condition that causes the navigation lighting system to appear differently to mariners, such as a change from incandescent bulbs to LEDs.

NEW STRUCTURES: **SD-204** of the *Structural Design Guidance Manual* addresses the application process for navigation lighting plans on new structures.

CONSTRUCTION PROJECTS: Districts are encouraged to include maintenance or installation of navigation lighting systems as part of the contractor's responsibility for any construction project where permanent or temporary navigation lighting is required. Requiring contractors to maintain such lighting systems should help clarify responsibilities within active construction projects, ensure that navigation lighting is maintained properly throughout various phases of construction, and facilitate project delivery.

TRAINING: The division will provide training on navigation lighting approximately every three years. District personnel, who support the maintenance of navigation lighting systems, should attend this training if possible. Individuals that support maintenance of navigation lighting systems and that have not attended the most recent training session shall review the current navigation lighting policy. Upon request, the division can supply updated training course materials to districts for the purpose of training employees on navigation lighting systems.

DOCUMENTATION:

The district shall maintain a copy of the approved lighting plan for each navigation lighting location. Districts are encouraged to maintain this information within the Kentucky Encroachment Permit Tracking (KEPT) program.

TRAFFIC OPERATIONS

Chapter

LIGHTING

Subject

Aviation Obstruction Lighting

WARRANTS: Aviation obstruction lighting is warranted on structures when recommended by the Federal Aviation Administration (FAA) or the Kentucky Airport Zoning Commission (KAZC).

FAA GUIDANCE & JURISDICTION: FAA criteria regarding aviation obstruction lighting is addressed in *14 CFR Part 77* of the Code of Federal Regulations.

The FAA has an online Notice Criteria Tool that may be used to help assist in determining whether the Notice Criteria is satisfied for a particular structure. If any of the above conditions are satisfied, notice shall be filed at least 45 days in advance of construction using FAA Form 7460-1, *Notice of Proposed Construction or Alteration*. When the notice is received, FAA will issue a determination stating whether the proposed construction or alteration would be a hazard to air navigation including any conditional provisions, limitations necessary to minimize potential problems, and marking and lighting recommendations that may be required. Standards for obstruction marking and lighting are addressed in Federal Aviation Administration Advisory Circular 70/7460-1K, *Obstruction Marking and Lighting*.

KAZC GUIDANCE & JURISDICTION: In accordance with 602 KAR 50:030, KAZC has zoning jurisdiction over the following:

- Airspace over and around the public use and military airports within the Commonwealth which lies above the imaginary surface that extends outward and upward at one of the following slopes:
  - 100:1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway of each public use airport and military airport with at least one runway 3,200 feet or more in length
  - 50:1 for a horizontal distance of 10,000 feet from the nearest point of the nearest runway of each public use and military airport with its longest runway less than 3,200 feet in length
- The use of land and structures within public use airports within the state

KAZC GUIDANCE & JURISDICTION (cont.):

- From the ground upward within the limits of the primary and approach surfaces of each public use airport and military airport as depicted on airport zoning maps approved by KAZC

- The airspace of the Commonwealth that exceeds 200 feet in height above the ground

In accordance with 602 KAR 50:030, any owner or person with control of a structure that penetrates or that may penetrate the airspace over which the KAZC has jurisdiction shall apply for a permit from KAZC. The procedure that employees shall follow to obtain a permit to erect or alter a structure is addressed in 602 KAR 50:090. If a traffic-related structure falls within KAZC's jurisdiction, then a signed and completed TC 56-50 form, *Application for Permit to Construct or Alter a Structure*, or a TC 56-54 form, *Notification of Change in Oversight or Ownership of a Structure*, shall be submitted to the Administrator of the KAZC. The application shall be submitted at least 90 days prior to the date that the proposed construction or alteration is scheduled to begin.

OUTAGES & REPORTING:

Districts shall immediately report any failure or malfunction of aviation obstruction lights that lasts more than 30 minutes and affects a top light or flashing obstruction light, regardless of its position, to the FAA through the Lockheed-Martin NOTAM desk. The NOTAM desk is the first point of contact and will issue a Notice to Airmen (NOTAM) to all pilots that are flying in the vicinity of that structure. Once the NOTAM desk has been notified, Districts shall also notify the KAZC to advise that a NOTAM has been reported.

The NOTAM desk is an automated system and will prompt the caller for the needed information. The district should follow the below procedures to report an aviation obstruction lighting outage to the Lockheed-Martin NOTAM desk:

1. Dial Lockheed-Martin NOTAM desk (877-487-6867).
2. Lockheed-Martin will answer with an automated voice. It will ask the caller to say what state they want to file a NOTAM. Employee will need to say, "Kentucky."
3. Then the caller will be connected to a live person.
4. Employee will give their complete name.
5. Employee will give the company name (Kentucky Transportation Cabinet).
6. Employee will say if the obstruction is a bridge, high-mast light pole, or antenna.

   Examples: If filing a NOTAM for a bridge, say, "obstruction bridge." If it is for a high-mast light pole, say, "obstruction pole."

OUTAGES & REPORTING (cont.):

7. Employee will say obstruction lighting is out.
8. Employee will give the latitude and longitude in degrees, minutes, and seconds.
9. Employee will give the height of the bridge, light pole, or antenna in feet AGL (Above Ground Level).
10. Employee with give the site elevation in MSL (Mean Sea Level).
11. Employee will say how long it will take to fix the obstruction lighting (how many days are needed).

    Note: Antennas are limited to 15 days.

A NOTAM is only good for a limited amount of time. The expiration date is based on the estimated number of repair days reported by the district to the NOTAM desk. The district should be aware of the expiration date and shall contact the NOTAM desk to extend the NOTAM if it expires before the outage is repaired. When the repairs are completed, districts should contact both the Lockheed-Martin NOTAM desk (to cancel remaining days of the NOTAM) and KAZC.

CONSTRUCTION PROJECTS:

Districts are encouraged to include maintenance and installation of aviation obstruction lighting systems as part of the contractor's responsibility for any construction project where permanent or temporary navigation lighting is required. Requiring contractors to maintain such lighting systems should help clarify responsibilities within active construction projects, ensure that aviation obstruction lighting is maintained properly throughout various phases of construction, and facilitate project delivery.

DOCUMENTATION:

Determinations from FAA and KAZC regarding the need or lack of need for aviation obstruction lighting shall be maintained by the Cabinet.

In cases where aviation obstruction lighting is required, the district shall maintain a copy of the required marking and lighting plans and permits.

TRAFFIC OPERATIONS

Chapter

LIGHTING

Subject

Weigh Station & Rest Area Lighting

WARRANTS: Lighting is warranted for weigh stations and rest areas located adjacent to state-maintained roadways.

DESIGN DETAILS: Rest area and weigh station lighting shall be designed in accordance with Chapter 9 of AASHTO's *Roadway Lighting Design Guide*.

TRAFFIC OPERATIONS	*Chapter* MISCELLANEOUS
	Subject Rumble Strips

GENERAL: Rumble strips are bands of raised material or indentations formed or grooved in the traveled lanes or shoulders. Rumble strips can call attention to standard warning or regulatory devices by alerting the driver through sound and vibration of the vehicle. This section is not intended to address prefabricated, portable rumble strips for work zone applications.

TRANSVERSE RUMBLE STRIPS: Transverse rumble strips are placed across lanes of traffic perpendicular to approaching vehicles. They are normally used to warn of stop or near-stop conditions on high-speed highways (speed limit 45 MPH or greater). Some applications where transverse rumble strips have been used include:

- End of freeways
- Locations where the motorist is not expecting to stop such as mid-block crosswalks, intersection approaches with limited sight distance, and intersection approaches where unexpected stop control has recently been established or is planned
- Within construction zones in advance of the work area
- On approaches to roundabouts

Some disadvantages of transverse rumble strips are:

- They present problems to bicyclists and motorcyclists.
- They can result in noise complaints from nearby residents.
- Motorists may make unusual maneuvers to avoid rumble strips.
- They can reduce tire contact with the roadway surface.
- Durability of thermoplastic rumble strips can be negatively impacted by snow plow operations.

TRANSVERSE RUMBLE STRIPS (cont.):

Permanent transverse rumble strips are usually only considered if other countermeasures (signing, beacons, etc.) have been installed to warn motorists of unusual vehicular traffic conditions and those existing countermeasures have proven ineffective in addressing crash patterns. Permanent transverse rumble strips shall be approved by the division. When approval to install transverse rumble strips is requested by the district, all available supporting data should be submitted to the division for evaluation. This submittal should include items such as crash data, sight-distance limitations, and other relevant information.

Temporary transverse rumble strips may be installed at the discretion of the district based on engineering judgment. They are normally used where other traffic control devices (signs, markings, beacons, etc.) are deemed insufficient to warn motorists of unexpected conditions and there is a perceived need for enhanced, non-permanent warning of the conditions. The most common application of temporary transverse rumble strips is on approaches where unexpected stop control has recently been established or is planned.

Methods of installation for transverse rumble strips include:

- Extruded thermoplastic material—Such installations should include 2 layers of thermoplastic material, providing a total thickness of 3/8 inch. The width of the individual strips should be 6 inches with a 24-inch space between strips.

- Preformed thermoplastic material—Manufacturer's recommendations should be considered for such installations.

- Cut or milled strips—Such installations should have a maximum depth of 3/8 inch, width of 7 inches, and spacing of 24 inches between strips.

In most cases, the preferred method of installation for transverse rumble strips is the use of extruded or preformed thermoplastic material. White material should not be used in areas where the rumble strips could be mistaken for other transverse markings such as stop lines or crosswalks. In such cases, the thermoplastic shall be either black or gray to match the color of the pavement.

Temporary installations shall utilize extruded or preformed thermoplastic material. Temporary installations may be allowed to wear naturally and shall not be reinstalled. Reapplication of material will be considered a permanent installation and shall require approval of the division.

Installations of transverse rumble strips should contain three sets of eight strips with sets spaced approximately 200 feet apart.

TRANSVERSE RUMBLE STRIPS (cont.):

Since rumble strips can potentially result in tires breaking contact with the roadway surface, it is important that rumble strips not be located in curves or within the stopping distance for actual stop conditions. Some unusual situations may be encountered in which modifications are necessary to the number of sets of rumbles, strips per set, and/or spacing of sets and strips. The specific strip design is dependent on the roadway conditions and the selected method of installation.

Since all roadways may have cyclists, installation of transverse rumble strips should not be made within the outer two feet of the traveled lane unless there is a minimum of four feet of paved shoulder, outside the normal shoulder rumble strips, along the roadway.

SHOULDER RUMBLE STRIPS:

Information regarding the use, installation, and location of shoulder rumble strips is discussed in the *Kentucky Standard Specifications for Road and Bridge Construction* and *Kentucky Department of Highways' Standard Drawings*.

CENTERLINE RUMBLE STRIPS:

Information regarding the use, installation, and location of centerline rumble strips is included in the *Kentucky Standard Specifications for Road and Bridge Construction* and the *Kentucky Department of Highways' Standard Drawings*.

EDGE LINE RUMBLE STRIPS:

Information regarding the use, installation, and location of edge line rumble strips is addressed in the *Kentucky Standard Specifications for Road and Bridge Construction* and the *Kentucky Department of Highways' Standard Drawings.*

INCLUSION ON PROJECTS:

Normal practice would be to include centerline, edge line, and/or shoulder rumble strips on projects involving long sections of qualifying roadway. The nature of certain projects (such as guardrail installation, bridge replacement, etc.) would not require installation of rumble strips with the project. Likewise, rumble strips would not be installed when only short, sporadic sections of a roadway meet the qualifying criteria. If a majority of a roadway does not meet the qualifying criteria, rumble strips may be eliminated from consideration. For projects involving small sections of qualifying roadway (such as the approaches to bridges on bridge replacement projects), rumble strips should be included in the project if the remainder of a roadway already has rumble strips installed.

TRAFFIC OPERATIONS

Chapter

MISCELLANEOUS TOPICS

Subject

Runaway Truck Ramps

SIGNING & MARKINGS: Runaway truck ramps shall be marked and signed in accordance with **Exhibit 18.**

TRAFFIC OPERATIONS

Chapter

MISCELLANEOUS TOPICS

Subject

Work Zone Traffic Control

MINIMUM: Unless documentation (such as contracts, plans, permits, etc.) specifies otherwise, the minimum for work zone traffic control within state right of way shall be Part 6 of the *Manual on Uniform Traffic Control Devices (MUTCD)*. Additional traffic control, beyond the minimums established by the *MUTCD*, may be implemented based on engineering judgment.

SIGN SHEETING: Warning signs for work zone traffic control applications shall be fluorescent orange in color and fabricated using products from the Cabinet's *List of Approved Materials* under the category of Construction Sign Sheeting for sheeting signs or Type VI Retroreflective Sheeting for roll-up signs.

Sheeting for regulatory and guide signs in work zones shall conform to **TO-401-3**.

WORK ZONE SPEED LIMITS: In accordance with KRS 189.390 and 603 KAR 5:320, the Department may temporarily reduce the posted speed limit in a highway work zone. For work zones located on a section of highway with a speed limit of seventy (70) miles per hour, the Department shall not reduce the speed limit in a highway work zone by more than fifteen (15) miles per hour without an engineering study. For work zones located on a section of highway with a speed limit of sixty-five (65) miles per hour or less, the Department shall not reduce the speed limit in a highway work zone by more than ten (10) miles per hour without an engineering study.

In cases where an engineering study is not required, the district shall use engineering judgment to determine if a work zone speed limit is desirable. In such cases, no official documentation is required, and the work zone speed limit is established when speed limit signs are posted. In accordance with 603 KAR 5:320, the engineer in charge of the maintenance or construction project may approve or deny speed limit reductions that do not require an engineering study.

For speed limit reductions in work zones that are significant enough to require an engineering study, the district shall submit a request for the reduction to the Division of Traffic Operations as such reductions require an Official Order to be signed by the Secretary of the Transportation Cabinet.

WORK ZONE SPEED LIMITS:

As a minimum, the request shall address:

- Normal posted speed limit
- Recommended work zone speed limit
- Description of the work activity/conditions that justify a significant reduction in the speed limit, and
- Limits of the reduced speed zone (including milepoints, if available)

If the division agrees with the recommendation, they shall forward an Official Order to the Secretary of the Transportation Cabinet for approval. Once the Official Order is signed, it will be forwarded to the district.

Signing details for work zone speed limits are addressed on Standard Drawing No. TTD-120.

DOUBLE FINES:

Specific guidance for the use of double fine signs within work zones is addressed in 603 KAR 5:320. In accordance with this KAR, a highway work zone shall be eligible for double fines if a worker is not routinely protected by a barrier wall or if a condition exists which exposes a worker to traffic hazards. As a result, double fine signs shall only be placed along the portion of highway work zone where a worker is exposed to traffic hazards, and the double fine signs may be relocated as the work zone progresses.

If the highway on which double fine signs are to be placed is not a divided highway, the fine shall be doubled for both directions of travel.

Signs shall be removed or covered so that the DOUBLE FINE message is not visible or legible when the highway work zone does not have a worker present for more than a two (2) hour period of time.

Signing details for double fine zones are addressed on Standard Drawing No. TTD-120.

TRAFFIC OPERATIONS

Chapter

EXHIBITS

Subject

Table of Exhibits

EXHIBIT NUMBER	FORM TITLE	FORM NUMBER
01	Maintenance and Traffic Contract	TC 71-11
02	HISP Project Life Cycle	*(none)*
05	Typical Truck Lane Signing and Markings	*(none)*
06	Typical Transition Signing and Markings	*(none)*
07	Striping of 100:13 Right-Turn Tapers	*(none)*
08	Typical Markings at Signalized Intersections	*(none)*
09	Raised Pavement Marker System	*(none)*
10	General Joint Use Agreement	*(none)*
11	Pole Attachment Permit	*(none)*
12	General Phasing Diagram	*(none)*
13	Right Turn Overlap	*(none)*
14	Measurement of Clearance Distances	*(none)*
15	Traffic Signal Clearance Intervals	*(none)*
17	Railroad Preemption Warning Placard	*(none)*
18	Runaway Truck Ramp Signing and Markings	*(none)*
24	Signing for Flood Areas	*(none)*
25	Lighting Maintenance Agreement	*(none)*
26	Non-Standard Materials Agreement	*(none)*

EXHIBIT NUMBER	FORM TITLE	FORM NUMBER
27	Permitted Lighting Submittal Checklist	*(none)*
28	Inspection Form for Review of Bridge Navigational Aids	*(none)*

Kentucky Transportation Cabinet
Division of Maintenance

MAINTENANCE AND TRAFFIC CONTRACT

THIS CONTRACT made and entered into this _____ day of _____, 20_____, by and between the Commonwealth of Kentucky, through its agent, the Transportation Cabinet, hereinafter referred to as the Cabinet, party of the first part, and the City of _____, hereinafter referred to as the City, party of the second part.

WITNESSETH:

WHEREAS, the Cabinet has designated certain streets, viaducts and bridges or portions thereof and which are enumerated in paragraph eight of this contract as connecting links to roads on the State Primary Road System or as necessary feeder streets thereto and which the Cabinet, therefore, will assume the maintenance of the vehicular traveled portion of such roads, streets, bridges and viaducts and storm sewers and storm sewer appurtenances constructed by it, except as provided in this contract. Vehicular traveled portion of roads and streets is defined as follows: where curbs exists, the traveled portion will extend from back of curb to back of curb; where no curbs exist, the traveled portion will include the street surface plus the normal shoulders; and

WHEREAS, the Cabinet is charged by law with maintaining the State Primary Road System; and

WHEREAS, in maintaining such a system and the connecting links and the necessary feeder streets thereto, it is necessary that traffic control devices be located in the public roads of the City in proximity to the intersection of such roads with the State Primary Road System or with the connecting links thereof on roads in the City which are a part of the State Primary Road System;

NOW THEREFORE, for and in consideration of the premises and the following undertakings, the parties mutually agree as follows:

1. Except as otherwise provided in the contract, the Cabinet shall assume the maintenance of the vehicular traveled portion of such roads, streets, viaducts and bridges to which this contract applies and which are enumerated in paragraph eight of this contract and those storm sewers and storm sewer appurtenances constructed by it.

2. The Cabinet will provide snow and ice control on these City streets specifically listed in paragraph ten. The City will assist in this operation by providing control over parking and traffic patterns when requested by the Cabinet.

3. The City will not pass any ordinances or resolution concerning those roads, streets, viaducts and bridges to which this contract applies without first having submitted to the Cabinet a copy of such ordinance or resolution at least five days prior to the time such ordinance is to be voted on and this shall include ordinances and resolutions relating to changes in the City limits.

4. The City shall pass any necessary parking or other ordinance or resolution so as to ensure the maximum use of such roads, streets, viaducts and bridges for vehicle travel consistent with the standards of safety as formulated by the Cabinet.

5. The City will permit the Cabinet to install and maintain traffic devices such as, but not limited to, vehicle detectors, signs, island and pavement markings within the City so as to regulate the flow of traffic to and from the roads of the City to and on the roads constructed, reconstructed and maintained by the Cabinet.

Kentucky Transportation Cabinet
Division of Maintenance
MAINTENANCE AND TRAFFIC CONTRACT

6. The City will pay all costs of the purchase of power for the operation of traffic signals and street lights, except highway lighting and sign lights on interstate routes and toll roads, and for sweeping, removal of debris and snow and ice removal unless specifically listed in paragraph ten. The City shall maintain all sidewalks and sanitary sewers. The City shall maintain all storm sewers and storm sewer appurtenances that were not constructed by the Cabinet. The City shall also maintain all traffic signals and flashing beacons.

7. If the City is unable to perform the maintenance required of it by this contract, the necessary maintenance shall be performed by the Cabinet and the City will reimburse the Cabinet for the expenses incurred by the Cabinet by performing such maintenance.

8. The provisions of this contract shall apply to the portions of the following routes which are now or shall in the future by annexed in the City:

   _____
   _____
   _____

9. The City shall not issue building permits for any private or commercial construction that requires access to a street or road listed in this contract until an access permit has been issued by the Kentucky Department of Highways.

10. SPECIAL PROVISIONS

    _____
    _____
    _____
    _____
    _____

11. This contract supersedes all maintenance and traffic contracts (excluding Form TC 61-39) between the Kentucky Transportation Cabinet and the City of _____ executed prior to the execution date appearing hereon.

_____ _____
SECRETARY OF TRANSPORTATION TITLE
OR DESIGNATED REPRESENTATIVE

City of _____
PARTY OF SECOND PART

_____

_____

Kentucky Transportation Cabinet
Division of Maintenance
MAINTENANCE AND TRAFFIC CONTRACT

I, _____, of the City of _____, do hereby certify that the _____ of the City of _____, whose signature appears above, was authorized to execute this agreement by action of the City legislative body on_____, 20_____, and as recorded in _____ Book, page_____.

_____
Signature

_____
Title

HSIP Project Life Cycle

(Project Identification through Project Letting)

HSIP Project Identification

- Potential project identified
- Consider relationship between SHSP and HSIP
- Central Office HSIP Liasion review
- Central Office HSIP approval

Program Project

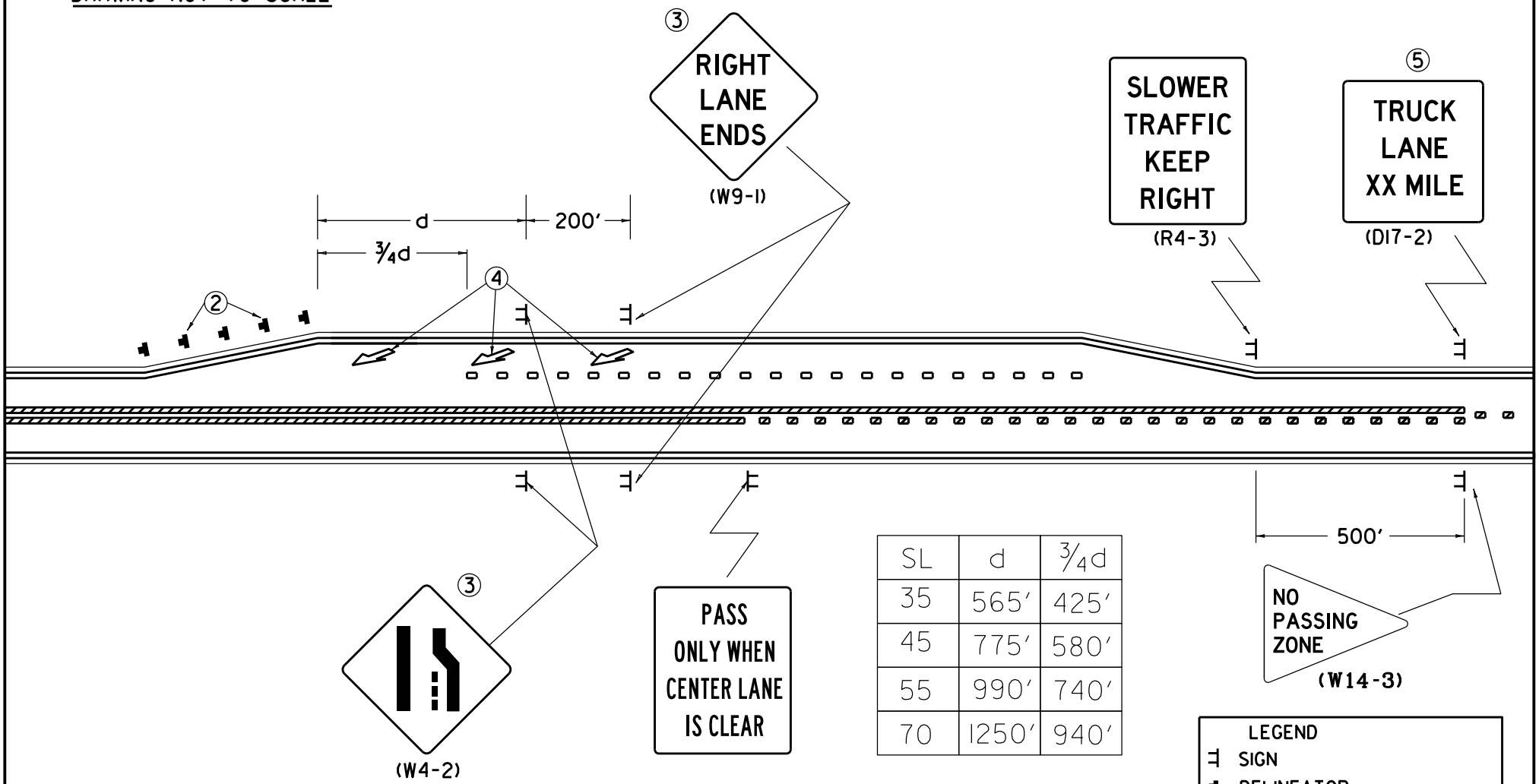
- Communicate project information with Program Management
- Scope
- Project Manager
- Projected Letting Date
- Update status at quarterly District Project Review Meeting with Project Development Staff

Prepare Project for Letting

- Gather documentation needed to let project to contract
- Obtain project estimate (with pertinent information for Environmental, Utilities and ROW staff)
- Obtain environmental document from the District EC or DEA
- Request funding from Program Management and send project information to appropriate PIO(s)
- Obtain ROW Clearance / Utility Note(s) and/or agreements
- Obtain proposal items
- Create project and proposal in PES/LAS prior to deadline for assigned letting date

REV. 06/20

DRAWING NOT TO SCALE



SL	d	¾d
35	565′	425′
45	775′	580′
55	990′	740′
70	1250′	940′

LEGEND
- SIGN
- DELINEATOR

MARKINGS
- WHITE
- YELLOW
- LANE REDUCTION ARROW

NOTES:

1. REFER TO SECTION 2C.05 OF THE MUTCD FOR GUIDANCE ON ADVANCE WARNING SIGN PLACEMENT DISTANCE (d). CONDITION "A" SHALL BE USED WHEN USING TABLE 2C-4.

② DELINEATORS MAY BE PLACED THRU THE ENTIRE LENGTH OF THE TAPER FOR LANE REDUCTION. REFER TO SECTION 3F.04 OF THE MUTCD FOR GUIDANCE ON THE SPACING OF DELINEATORS.

③ SIGNS W4-2 AND W9-1 SHOULD BE DUAL-MOUNTED WHERE POSSIBLE. INSTALL W9-1 AT FIRST LANE REDUCTION ARROW. INSTALL W4-2 APPROXIMATELY 200′ BEYOND THAT.

④ THREE LANE REDUCTION ARROWS SHALL BE INSTALLED AS SHOWN, SPACED AT APPROXIMATELY 500′.

⑤ MAY BE ALTERED FOR PASSING OR CLIMBING LANES. SHOULD BE LOCATED AT EITHER ½ MILE OR 500 FEET.

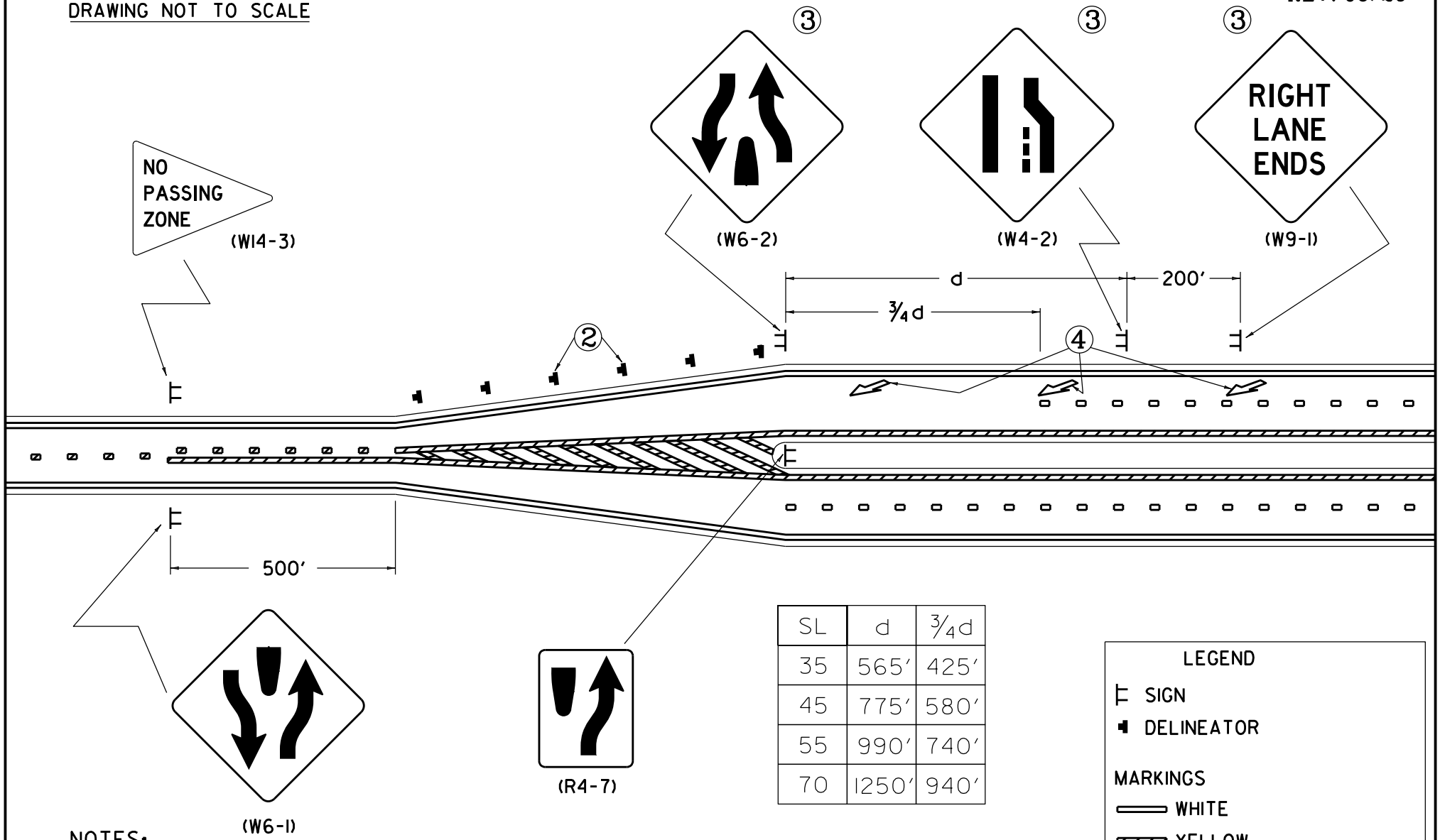
REFER TO SECTIONS TO-402-2 AND TO-503

EXHIBIT 5

TYPICAL TRUCK LANE SIGNING AND MARKINGS

DRAWING NOT TO SCALE

REV. 06/20



SL	d	3/4 d
35	565'	425'
45	775'	580'
55	990'	740'
70	1250'	940'

LEGEND

SIGN

DELINEATOR

MARKINGS

WHITE

YELLOW

LANE REDUCTION ARROW

NOTES:

1. REFER TO SECTION 2C.05 OF THE MUTCD FOR GUIDANCE ON ADVANCE WARNING SIGN PLACEMENT DISTANCE (d). CONDITION "A" SHALL BE USED WHEN USING TABLE 2C-4.

② DELINEATORS MAY BE PLACED THRU THE ENTIRE LENGTH OF THE TAPER FOR LANE REDUCTION. REFER TO SECTION 3F.04 OF THE MUTCD FOR GUIDANCE ON THE SPACING OF DELINEATORS.

③ SIGNS W6-2, W4-2, AND W9-1 SHOULD BE DUAL MOUNTED WHERE MEDIAN WIDTH PERMITS. INSTALL W9-1 AT FIRST LANE REDUCTION ARROW. INSTALL W4-2 APPROXIMATELY 200' BEYOND THAT.

④ THREE LANE REDUCTION ARROWS SHALL BE INSTALLED AS SHOWN, SPACED AT APPROXIMATELY 500'.

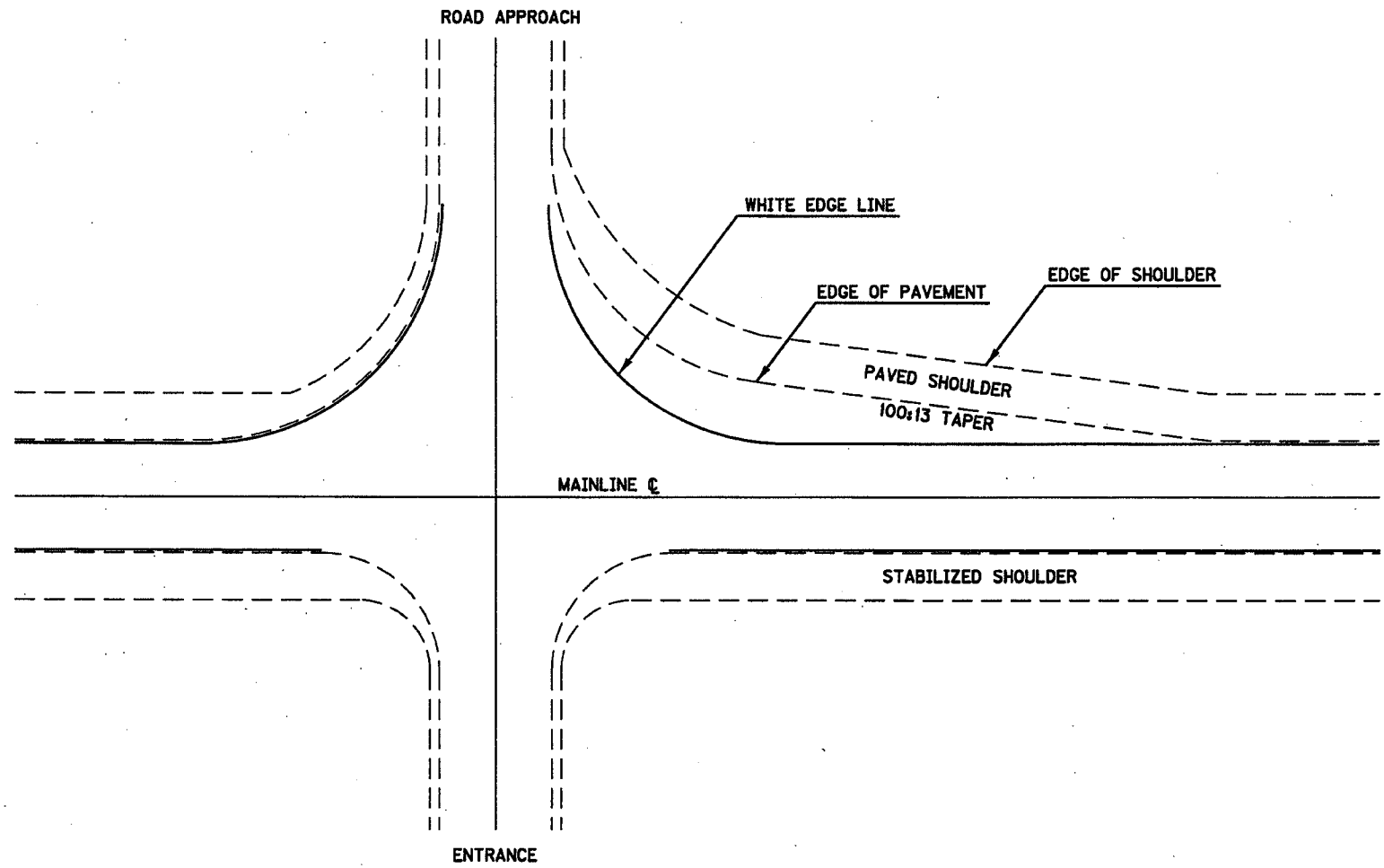
REFER TO SECTIONS TO-403-7 AND TO-503

EXHIBIT 6

TYPICAL TRANSITION SIGNING AND MARKINGS

DRAWING NOT TO SCALE

REV. 06/05

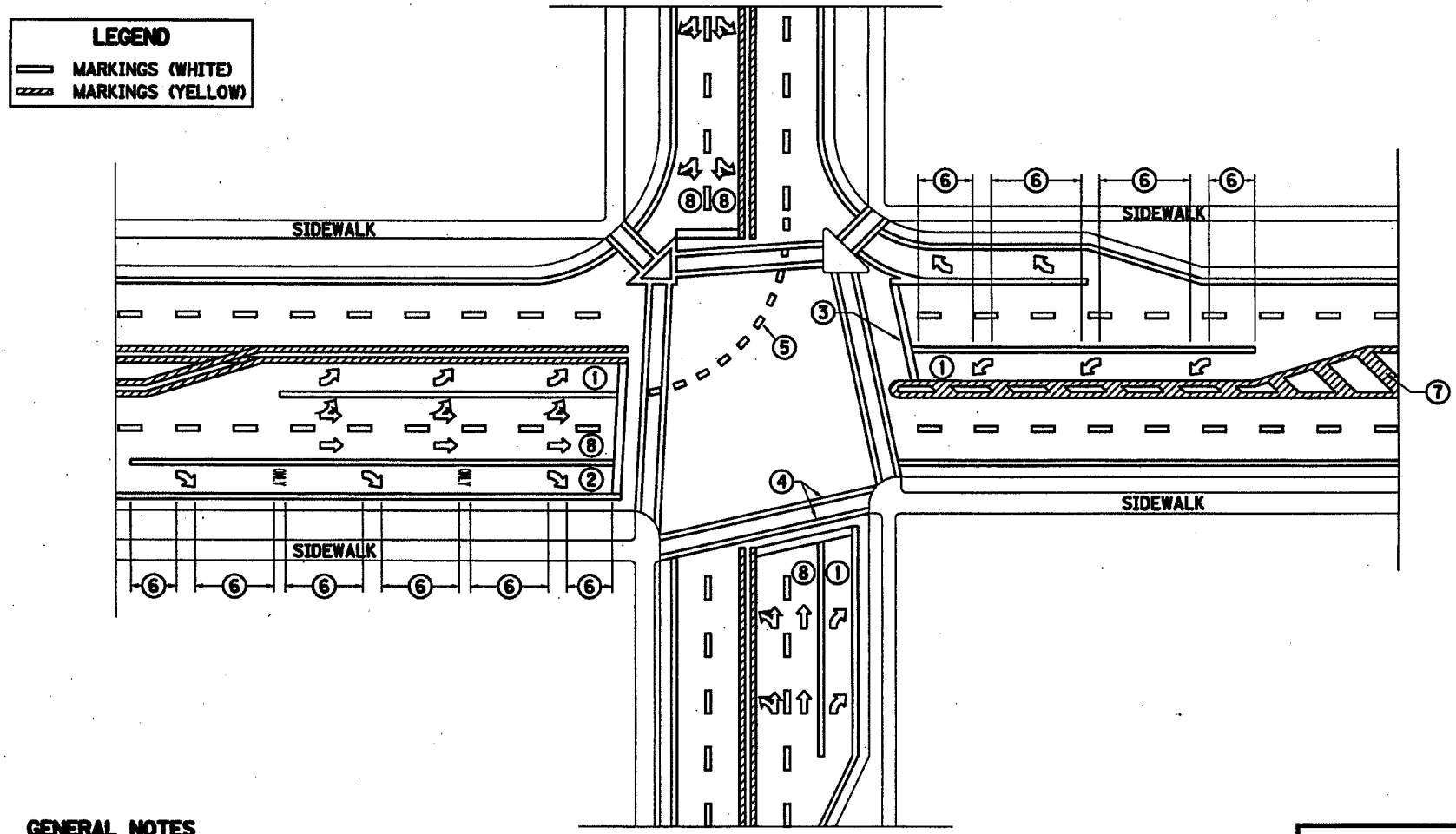


REFER TO SECTION TO-503

EXHIBIT 7

STRIPING OF 100:13
RIGHT-TURN TAPERS

REV. 06/05



GENERAL NOTES

1. LANE-USE ARROW MARKINGS SHALL BE USED IN RIGHT AND LEFT-TURN BAYS AT SIGNALIZED INTERSECTIONS.
2. LANE-USE ARROW MARKINGS SHALL BE USED FOR MANDATORY LANE-DROPS. THEY SHALL BE ACCOMPANIED THE WORD "ONLY".
3. STOP BARS SHALL BE SOLID WHITE AND EITHER 12" OR 24" WIDE. THEY SHOULD EXTEND ACROSS ALL APPROACH LANES AND SHOULD BE PLACED A MINIMUM OF 4' IN ADVANCE OF THE NEAREST CROSSWALK LINE. IN THE ABSENCE OF A MARKED CROSSWALK, STOP BARS SHOULD BE PLACED NO MORE THAN 30' OR LESS THAN 4' FROM THE NEAREST EDGE OF THE INTERSECTING ROADWAY.
4. CROSSWALK LINES SHALL BE SOLID WHITE. THEY SHALL BE EITHER 6" OR 12" IN WIDTH AND SHOULD NOT BE SPACED LESS THAN 6' APART. BOTH LINES SHOULD EXTEND ACROSS THE FULL WIDTH OF THE APPROACH PAVEMENT.
5. DOTTED LINE EXTENSIONS SHALL BE THE SAME COLOR AND WIDTH AS THE LINE THEY EXTEND AND SHOULD CONSIST OF SEGMENTS 3' IN LENGTH AND GAPS OF 6'.
6. SPACING BETWEEN SYMBOLS AND LEGENDS SHALL BE NO MORE THAN 80' OR LESS THAN 32'. SPACING SHOULD BE SELECTED TO MINIMIZE THE NUMBER OF SYMBOLS AND LEGENDS PER LANE.
7. WIDTH AND SPACING OF CROSS-HATCHING SHALL BE AS SHOWN IN PLANS OR AS DIRECTED BY THE ENGINEER.
8. ARROWS IN THIS LANE ARE OPTIONAL.
9. SOME ASPECTS OF THIS DRAWING MAY ALSO APPLY TO NON-SIGNALIZED INTERSECTIONS.

REFER TO SECTION TO-504

DRAWING NOT TO SCALE

EXHIBIT 8
TYPICAL MARKINGS AT SIGNALIZED INTERSECTIONS

Raised Pavement Marker System

DISTRICT 1

ROUTE		BEGIN MP	END MP
BALLARD			
US	51	0.000	8.297
US	60	0.000	16.937
KY	121	0.000	8.689
KY	286	0.000	14.415
CALLOWAY			
US	641	0.000	17.444
KY	121	0.000	24.156
CARLISLE			
US	51	0.000	12.655
KY	121	0.000	9.714
CRITTENDEN			
US	60	0.000	23.018
US	641	0.000	7.494
FULTON			
JC	9003	0.000	3.412
US	51	0.000	4.682
GRAVES			
JC	9003	8.352	34.487
US	45	17.219	17.952
US	45	19.045	31.580
KY	58	5.530	14.881
KY	80	9.742	11.461
KY	121	0.000	23.975
HICKMAN			
JC	9003	3.434	8.352
US	51	0.000	15.095
LIVINGSTON			
I	24	29.352	33.880
US	60	0.000	29.059
US	62	0.000	2.854
LYON			
I	24	33.880	54.842
WK	9001	0.000	5.610
US	62	0.000	10.465
US	641	0.000	5.715

Raised Pavement Marker System

DISTRICT 1 (cont.)

ROUTE		BEGIN MP	END MP
McCRACKEN			
I	24	0.000	17.320
US	45	0.000	10.806
US	45X	2.119	2.946
US	60	0.000	19.830
US	60X	0.000	5.065
US	62	3.269	15.513
US	68	0.000	2.677
KY	286	0.000	2.281
MARSHALL			
I	24	17.320	29.352
JC	9003	34.487	52.333
US	62	8.816	12.081
US	68	0.000	28.146
US	641	0.000	19.250
US	641S	0.000	3.519
KY	58	0.000	2.156
KY	402	0.000	16.859
TRIGG			
I	24	57.389	69.830
US	68	0.000	28.115

Total Miles for District 1 =	**539.246**

Raised Pavement Marker System

DISTRICT 2

ROUTE		BEGIN MP	END MP
		CALDWELL	
I	24	54.842	57.389
WK	9001	5.610	21.764
US	641	0.000	4.629
		CHRISTIAN	
I	24	69.830	93.373
EB	9004	7.000	28.095
US	41	0.000	10.395
US	41	11.909	12.441
US	41A	0.000	13.516
US	68	0.000	21.114
KY	380	0.000	3.613
KY	1682	0.000	4.979
		DAVIESS	
AU	9005	15.883	23.441
WN	9007	59.473	70.184
US	60	0.000	28.288
US	60B	0.000	10.212
US	431	0.000	14.670
KY	54	0.000	2.554
KY	81	11.860	14.493
KY	2121	0.000	1.780
KY	2155	0.000	4.427
		HANCOCK	
US	60	0.000	17.696
		HENDERSON	
EB	9004	65.305	78.306
AU	9005	0.000	15.883
US	41	0.000	12.888
US	41	13.641	21.041
US	41A	0.000	17.397
US	60	0.000	10.435
US	60	10.608	25.345
KY	425	0.000	5.528

Raised Pavement Marker System

DISTRICT 2 (cont.)

ROUTE		BEGIN MP	END MP
HOPKINS			
WK	9001	21.764	43.424
EB	9004	28.095	55.003
US	41	12.083	27.705
US	41A	0.000	13.278
KY	281	0.000	0.712
MCLEAN			
US	431	0.000	11.573
MUHLENBERG			
WK	9001	43.424	65.675
US	62	8.780	12.729
US	62	14.667	17.930
US	431	0.000	27.779
KY	176	0.000	7.930
KY	189	8.750	17.748
OHIO			
WK	9001	65.675	87.544
WN	9007	35.063	59.473
UNION			
US	60	0.000	26.069
KY	56	0.000	13.480
KY	109	0.000	1.536
WEBSTER			
EB	9004	55.003	65.305
US	41	0.000	12.226
US	41A	0.000	19.657
KY	109	2.876	14.664
KY	670	0.000	2.712

Total Miles for District 2 =	**627.887**

Raised Pavement Marker System

DISTRICT 3

ROUTE		BEGIN MP	END MP
ALLEN			
US	31E	0.000	19.189
US	231	1.100	8.875
BARREN			
I	65	42.890	43.307
I	65	45.935	53.956
LN	9008	0.000	22.357
US	31E	0.000	25.857
US	31EX	1.461	1.516
US	68	11.741	12.650
KY	63	2.327	14.569
KY	70	5.178	5.359
KY	90	0.000	22.022
BUTLER			
WK	9001	87.544	88.433
WN	9007	18.166	35.063
US	231	0.000	8.228
EDMONSON			
I	65	43.307	45.935
KY	70	9.939	12.388
KY	101	0.000	4.180
KY	259	9.242	22.277
KY	728	0.000	12.017
LOGAN			
US	68	0.000	29.223
US	79	0.000	12.135
US	431	0.000	31.050
METCALFE			
LN	9008	22.357	36.159
KY	90	0.000	11.719
MONROE			
KY	163	0.000	8.530
SIMPSON			
I	65	0.000	13.711
US	31W	0.000	13.984
KY	73	7.169	9.234
KY	100	9.675	10.648

Raised Pavement Marker System

DISTRICT 3 (cont.)

ROUTE		BEGIN MP	END MP
		TODD	
US	41	0.000	12.458
US	68	0.000	14.422
US	68X	0.000	4.786
US	79	0.000	10.606
		WARREN	
I	65	13.711	42.890
WN	9007	0.000	18.166
US	31W	0.000	17.471
US	31W	27.869	28.794
US	68	0.000	13.060
US	231	0.000	15.510
US	231X	0.000	3.889
KY	101	7.865	12.850
KY	446	0.000	0.970
KY	880	0.000	3.646

Total Miles for District 3 =	**466.613**

Raised Pavement Marker System

DISTRICT 4

ROUTE		BEGIN MP	END MP
BRECKINRIDGE			
US	60	0.000	31.811
KY	79	5.294	14.990
KY	259	0.000	7.901
GRAYSON			
WK	9001	88.433	119.649
US	62	20.787	21.296
KY	259	0.000	21.459
GREEN			
US	68	11.954	18.411
KY	61	0.000	24.344
HARDIN			
I	65	78.661	103.308
WK	9001	119.649	136.796
BG	9002	0.000	8.837
US	31W	0.000	37.367
US	31WB	0.000	3.758
US	62	14.580	17.500
KY	61	0.000	5.309
KY	313	0.000	11.987
KY	3005	0.000	8.674
HART			
I	65	53.956	74.622
US	31E	0.000	21.575
LARUE			
I	65	74.622	78.661
US	31E	0.000	20.651
KY	61	0.000	13.603
MARION			
US	68	0.000	10.698
KY	49	17.621	17.774
KY	55	0.000	4.669
MEADE			
US	31W	0.000	3.530
US	60	0.000	14.944
KY	79	8.237	9.912
KY	144	25.496	28.771
KY	448	0.000	4.392
KY	1051	0.000	2.218

Raised Pavement Marker System

DISTRICT 4 (cont.)

ROUTE		BEGIN MP	END MP
		NELSON	
BG	9002	8.837	39.267
US	31E	0.000	27.310
US	62	14.294	14.653
US	62	24.989	27.286
US	150	0.000	7.682
KY	55	3.085	6.975
KY	245	0.000	12.597
		TAYLOR	
US	68	0.000	13.531
KY	55	0.000	10.293
		WASHINGTON	
BG	9002	39.267	44.807
US	150	0.000	20.892
KY	55	0.000	4.551
KY	555	0.000	14.738

Total Miles for District 4 =	**534.237**

Raised Pavement Marker System

DISTRICT 5

ROUTE		BEGIN MP	END MP
BULLITT			
I	65	103.308	123.180
US	31E	0.000	5.162
KY	44	0.000	22.999
KY	245	0.000	6.805
FRANKLIN			
I	64	46.303	59.431
US	60	10.667	14.038
US	127	0.000	21.400
US	421	0.000	17.886
US	460	0.000	6.114
KY	151	0.000	2.141
KY	676	0.000	5.287
HENRY			
I	71	24.727	38.086
US	42	0.000	1.122
US	421	0.000	24.973
KY	22	7.420	7.522
KY	55	0.000	4.490
JEFFERSON			
I	64	0.000	23.974
I	65	123.180	137.318
I	71	0.000	11.315
I	264	0.000	22.927
I	265	10.236	34.727
US	31E	0.000	12.031
US	31W	0.000	14.776
US	42	5.779	11.835
US	60	3.543	17.375
KY	22	0.438	6.517
KY	146	7.000	8.825
KY	155	0.000	6.889
KY	841	0.000	10.250
KY	841	34.727	37.006
KY	1934	2.301	9.894

Raised Pavement Marker System

DISTRICT 5 (cont.)

ROUTE		BEGIN MP	END MP
		OLDHAM	
I	71	11.315	24.727
US	42	0.000	19.359
KY	22	3.505	3.544
KY	146	0.000	6.073
		SHELBY	
I	64	23.974	46.303
US	60	8.324	11.398
US	421	0.000	0.790
KY	53	6.085	19.609
KY	55	0.000	17.825
		SPENCER	
US	31E	0.000	2.741
KY	44	8.451	8.997
KY	55	0.000	13.566
KY	155	0.000	4.247
		TRIMBLE	
I	71	38.086	38.808
US	42	0.000	14.520
US	421	0.000	19.287

Total Miles for District 5 =	**498.720**

Raised Pavement Marker System

DISTRICT 6

ROUTE		BEGIN MP	END MP
BOONE			
I	71	69.890	77.724
I	75	169.439	183.312
I	275	1.582	13.858
BRACKEN			
KY	9	0.000	19.857
CAMPBELL			
I	275	73.061	77.579
I	471	0.000	5.016
US	27	0.000	22.208
KY	9	0.000	17.978
KY	1120	1.960	3.503
KY	1998	1.738	3.939
CARROLL			
I	71	38.808	53.433
US	42	9.574	16.500
GALLATIN			
I	71	53.433	69.890
US	42	0.000	1.600
GRANT			
I	75	143.239	166.263
HARRISON			
US	27	0.000	19.416
KY	353	0.000	2.331
KENTON			
I	75	166.263	169.439
I	75	183.312	191.777
I	275	0.000	1.582
I	275	77.579	83.780
KY	16	13.786	16.666
PENDLETON			
US	27	0.000	19.340
KY	9	0.000	4.339
ROBERTSON			
US	68	0.000	1.357

Total Miles for District 6 =	**239.023**

Raised Pavement Marker System

DISTRICT 7

ROUTE		BEGIN MP	END MP
		ANDERSON	
BG	9002	44.807	52.315
BG	9002	56.287	61.947
US	127	0.000	2.535
US	127	8.897	11.120
US	127B	0.000	6.656
KY	151	0.000	4.587
		BOURBON	
US	27	0.000	15.435
US	68	0.000	10.814
US	68X	0.000	2.772
US	460	0.000	21.933
KY	353	0.000	6.496
KY	627	0.000	9.276
		BOYLE	
US	68	6.390	6.499
US	127	0.000	5.428
US	127	8.083	10.319
US	127B	0.000	5.270
US	150	0.000	18.766
US	150B	0.000	2.272
KY	34	13.629	18.993
KY	52	0.000	5.114
		CLARK	
I	64	89.480	104.260
KY	9000	0.000	11.913
KY	627	0.000	6.383
KY	627	9.592	15.017
KY	1958	0.000	2.751

Raised Pavement Marker System

DISTRICT 7 (cont.)

ROUTE		BEGIN MP	END MP
FAYETTE			
I	64	71.000	74.729
I	64	81.037	89.480
I	75	97.543	120.792
US	25	8.244	15.133
US	27	0.000	2.412
US	27	8.450	15.767
US	60	0.000	8.162
US	68	0.000	3.110
US	421	0.000	1.798
KY	4	0.000	19.283
KY	353	0.000	11.113
KY	418	0.000	2.520
KY	922	0.000	2.860
GARRARD			
US	27	0.000	16.417
KY	34	0.000	1.610
KY	52	0.000	16.624
KY	1295	0.000	6.972
JESSAMINE			
US	27	0.000	15.278
US	68	0.000	12.008
MADISON			
I	75	73.408	97.543
US	25	2.863	3.810
US	25	12.027	20.255
US	421	0.000	12.445
KY	21	0.000	14.196
KY	52	0.000	0.202
KY	52	5.444	10.910
KY	52	12.970	22.869
KY	627	0.000	6.074
KY	876	7.166	9.998
KY	1295	0.000	4.529
MERCER			
BG	9002	52.315	56.287
US	68	6.752	20.104
US	127	0.000	17.150

Raised Pavement Marker System

DISTRICT 7 (cont.)

ROUTE		BEGIN MP	END MP
MONTGOMERY			
I	64	104.260	115.647
US	460	0.000	22.151
KY	686	0.000	3.506
SCOTT			
I	64	67.106	71.000
I	75	120.792	143.239
US	62	6.000	10.641
US	460	0.000	17.658
US	460B	0.000	1.026
WOODFORD			
I	64	59.431	67.106
BG	9002	61.947	71.134
US	60	0.000	13.039

Total Miles for District 7 =	**591.538**

Raised Pavement Marker System

DISTRICT 8

ROUTE		BEGIN MP	END MP
		ADAIR	
LN	9008	36.159	57.791
KY	55	10.059	18.909
KY	61	13.402	21.935
KY	80	11.775	22.058
		CASEY	
US	127	0.000	23.715
KY	80	0.000	5.144
		CLINTON	
US	127	0.000	20.967
KY	90	0.000	12.816
		CUMBERLAND	
KY	61	0.000	13.701
KY	90	0.000	22.450
		LINCOLN	
US	27	0.000	21.982
US	127	0.000	10.686
US	150	0.000	18.680
		McCREARY	
US	27	0.000	22.252
KY	90	0.000	11.920
		PULASKI	
LN	9008	72.087	88.547
US	27	0.000	30.693
KY	80	0.000	17.794
KY	80	21.579	40.100
KY	80B	0.000	2.315
KY	90	0.000	4.169
KY	461	0.000	8.441
KY	1225	0.000	0.256
		ROCKCASTLE	
I	75	50.767	73.408
US	25	0.000	16.000
US	150	0.000	10.511
US	421	0.000	0.483
KY	461	0.000	9.404

Raised Pavement Marker System

DISTRICT 8 (cont.)

ROUTE		BEGIN MP	END MP
RUSSELL			
LN	9008	57.791	72.087
US	127	0.000	26.927
KY	76	7.445	7.985
KY	80	0.000	10.564
WAYNE			
KY	90	0.000	25.235

Total Miles for District 8 =	**468.861**

Raised Pavement Marker System

DISTRICT 9

ROUTE		BEGIN MP	END MP
		BATH	
I	64	115.647	128.955
		BOYD	
I	64	180.812	191.507
US	23	0.000	21.042
US	60	4.023	12.360
KY	180	0.800	2.518
		CARTER	
I	64	148.665	180.812
KY	1	4.134	12.804
KY	7	0.000	10.865
KY	9	0.000	18.262
		ELLIOTT	
KY	7	0.000	18.890
		FLEMING	
US	68	0.000	5.423
KY	11	10.630	17.105
KY	32	10.612	28.293
		GREENUP	
US	23	0.000	28.760
KY	1	0.000	17.336
KY	10	0.000	11.582
		LEWIS	
KY	9	0.000	31.218
KY	10	6.788	19.834
		MASON	
US	62	12.672	16.526
US	62 X	0.000	3.634
US	68	0.000	11.854
KY	9	0.000	17.402
KY	11	0.000	11.225
		NICHOLAS	
US	68	0.000	12.132

Raised Pavement Marker System

DISTRICT 9 (cont.)

ROUTE		BEGIN MP	END MP
		ROWAN	
I	64	128.955	148.665
KY	32	0.000	8.429

Total Miles for District 9 =	**363.695**

Raised Pavement Marker System

DISTRICT 10

ROUTE		BEGIN MP	END MP
BREATHITT			
KY	15	0.000	27.505
KY	52	0.000	9.674
ESTILL			
KY	52	0.000	7.588
KY	82	0.000	5.029
KY	89	11.372	17.903
LEE			
KY	11	0.000	14.845
KY	52	0.000	24.524
MAGOFFIN			
KY	9009	63.084	75.627
US	460	0.000	20.426
KY	114	0.000	5.026
MENIFEE			
US	460	0.000	19.386
MORGAN			
KY	9009	57.681	63.084
US	460	0.000	28.691
KY	7	0.000	11.378
KY	203	0.000	3.761
OWSLEY			
KY	11	14.343	17.444
KY	30	0.000	11.146
PERRY			
DB	9006	51.026	59.088
KY	15	0.000	25.179
KY	80	7.910	15.862
POWELL			
KY	9000	11.913	36.000
KY	11	0.000	3.504
KY	15	4.083	4.157
KY	82	0.000	2.058

Raised Pavement Marker System

DISTRICT 10 (cont.)

ROUTE		BEGIN MP	END MP
		WOLFE	
KY	9000	36.000	43.104
KY	9009	43.104	57.681
KY	11	0.000	5.317
KY	15	0.000	9.515
KY	15S	0.000	1.054
KY	191	0.000	10.317
KY	203	0.000	1.323

Total Miles for District 10 =	**336.680**

Raised Pavement Marker System

DISTRICT 11

ROUTE		BEGIN MP	END MP
		BELL	
US	25E	0.000	18.651
US	119	0.000	15.880
		CLAY	
DB	9006	10.593	35.929
US	421	0.000	32.841
KY	80	7.301	7.537
		HARLAN	
US	119	0.000	39.182
US	421	0.000	27.632
		JACKSON	
US	421	0.000	29.585
KY	30	0.000	20.919
		KNOX	
US	25E	0.000	26.197
		LAUREL	
I	75	27.943	50.767
DB	9006	0.000	10.593
US	25	13.556	16.379
US	25E	0.000	2.024
KY	30	1.356	9.781
KY	80	0.000	24.697
KY	192	18.243	22.041
KY	490	0.000	1.021
		LESLIE	
DB	9006	35.929	51.026
US	421	0.000	22.513
KY	118	0.000	3.524
		WHITLEY	
I	75	0.000	27.943
US	25W	22.183	29.610
KY	90	0.000	8.328

Total Miles for District 11 =	**397.496**

Raised Pavement Marker System

DISTRICT 12

ROUTE		BEGIN MP	END MP
		FLOYD	
US	23	0.000	21.878
KY	80	0.000	14.435
KY	114	0.000	11.425
		JOHNSON	
US	23	0.000	16.938
US	460	0.000	7.809
KY	40	8.741	23.439
		KNOTT	
KY	15	0.000	9.380
KY	80	0.000	20.093
KY	160	0.000	12.468
		LAWRENCE	
US	23	0.000	29.069
KY	645	0.000	5.205
		LETCHER	
US	23	0.000	7.319
US	119	0.000	28.225
KY	7	13.497	14.157
KY	15	0.000	10.675
		MARTIN	
KY	3	11.245	11.405
KY	40	0.000	20.280
KY	645	0.000	4.682
		PIKE	
US	23	0.000	32.828
US	119	0.000	27.542
US	460	0.000	25.345
KY	80	0.000	6.941
KY	1426	6.602	9.636
KY	1460	0.000	7.112

Total Miles for District 12 =	**338.201**

EXHIBIT 10

THIS AGREEMENT, made as of the ____ day of _____, 20___, by and between KENTUCKY POWER COMPANY, a Kentucky corporation, (herein called "Owner") and the TRANSPORTATION CABINET, STATE OF KENTUCKY, (herein called "Licensee"),

WITNESSETH,
THAT:

WHEREAS, Owner operates and maintains an electric distributing system consisting of various pole lines extending in and through the Commonwealth of Kentucky, some of which are located on state owned right-of-way, and

WHEREAS, certain wires and/or other attachments, herein collectively called attachments, owned by Licensee, are attached or are to be attached to those certain poles of Owner, more specifically identified on the Pole Attachment Permit signed by Owner and Licensee and attached hereto as part hereof, and

WHEREAS, permission to make additions to or changes in such attachment may be requested from time to time by Licensee and if granted such Permit, shall be revised to include such additions or changes and substituted in the place of the attached Permit or any prior revised Permit, and

WHEREAS, Owner is willing to permit Licensee to place and/or maintain such attachments on such poles under and subject to the conditions hereinafter set forth.

NOW, THEREFORE,

Owner, for and in the consideration of using state owned right-of-way does hereby license and permit Licensee to place and/or maintain the attachments described in the attached Pole Attachment Permit, or any revision thereof, on the poles of Owner identified therein. Such attachments are to be placed and/or maintained on such poles in the manner and upon the conditions hereinafter set forth, all of which Licensee accepts and agrees to abide by and perform, viz.:

1. Such attachments are to be placed and/or maintained on the poles of Owner in a manner satisfactory to Owner and so as not to interfere with the present and/or any future use which Owner may desire to make of such poles or wires attached thereto. Such attachments shall be installed and at all times maintained by Licensee strictly in accordance with the provisions of the National Electrical Code and/or any other applicable regulations or codes promulgated by state, local or other governmental body or authority having jurisdiction thereover. In case of dispute between Owner and Licensee as to whether or not Licensee's attachments comply with such codes and regulations, Owner shall be the sole judge. Owner shall be the sole judge as to the

requirements for the present and/or future use of its attachments and equipment and of any interference therewith.

2. Where it is necessary for Owner to install a new pole for joint use hereunder, such new pole being taller or stronger than considered by Owner to be adequate to accommodate the attachments of Owner and its other licensees to be placed on the new pole, Licensee covenants and agrees to pay to Owner a sum equal to the difference between the cost in place of such new pole and the current cost in place of a pole considered by Owner to be adequate to accommodate the attachments of Owner and its other licensees, under the following conditions:

    a. Where the new pole is installed to establish joint use hereunder and the extra height or strength is necessary solely to adequately accommodate the attachments of Licensee in accordance with the codes and/or regulations referred to in Paragraph 1 hereof.

    b. Where the new pole is installed to replace an existing jointly used pole hereunder and the extra height or strength of the new pole over that of the old pole is provided to adequately accommodate the attachments of Licensee in conformance with the codes and/or regulations referred to in Paragraph 1 hereof.

    c. Where a new pole is installed to replace an existing jointly used pole hereunder and the replacement is made to adequately accommodate additional attachments of both Licensee and Owner or its other licensees in accordance with the codes and/or regulations referred to in Paragraph 1 hereof.

    d. Where a new pole of the same size as the existing pole is installed to replace an existing pole jointly used hereunder on account of damage or decay, and the old pole was taller or stronger than considered by Owner to be adequate to accommodate the existing attachments of Owner and its other licensees for the purposes of adequate accommodating the existing attachments of Licensee in accordance with the codes and/or regulations referred to in Paragraph 1 hereof. However, the Licensee shall in no event pay more than the amount required to replace said facility with like kind.

3. In the event a new pole is needed to accommodate the Licensee's attachments, said poles shall become the property of the Owner and the Licensee shall acquire no right except the use of the same subject to the conditions set forth herein.

4. Where a new pole is erected hereunder to replace an existing pole solely to adequately provide for the attachments Licensee proposes to place on the new pole, Licensee covenants and agrees to pay Owner, in addition to the amount called for in Paragraph 2 hereof, a sum equal to the then value in place of the pole which is replaced subject to credit for expended life, plus the cost of its removal, minus the salvage value of the removed pole. Licensee shall also pay to the respective owners thereof the cost of removing all existing attachments from the existing pole and reestablishing the same attachments on the newly installed pole.

5. Licensee hereby releases Owner from any and all liability for loss of or damage to such attachments of Licensee and for any interruption to or failure of any service in which such attachments are used. Any action against the Licensee for injury to any person, including death or damage to or destruction to any property, including loss of use thereof, arising out of Licensee's use of Owner's poles, shall be brought against the Licensee through the Board of Claims, pursuant to KRS 44.010 through KRS 44.990. Nothing in this paragraph is to be construed as relieving the owner of liability through any act of negligence.

6. Owner reserves the right to discontinue the use of, remove, replace or change the location of any or all of its poles or attachments thereon regardless of any occupancy of Owner's poles by Licensee and Licensee shall at its sole cost, upon thirty (30) days written notice by Owner, make such changes in or removal of its attachments as shall be required by any such action of Owner as aforesaid and Owner shall not be obligated to furnish or substitute other poles, facilities or accommodations in the place of those vacated by Licensee.

7. Whenever in the judgement of Owner, Licensee's attachments shall interfere with the operation of the equipment of Owner or constitute a hazard to the service rendered by Owner and upon thirty (30) days written notice to Licensee of such interference or hazard, Licensee shall either immediately rearrange, change or remove its attachments as Owner may direct. In case of emergency, Owner reserves the right to remove, rearrange or disconnect the attachments of Licensee without notice and no liability to any person therefor shall be incurred by such action.

8. Owner shall not be required to secure any right, license or permit from any governmental body or authority or other person or persons which may be required for the construction and/or use and maintenance of said attachments of Licensee and Owner does not guarantee any easements, rights-of-way or franchises for the construction and/or use and maintenance of such attachments.

9. If Licensee should desire to add to the number of its authorized attachments or relocate an existing attachment, it shall make application therefor by submitting a revised Pole Attachment Permit to Owner and if said revised Permit is granted by Owner, it shall supersede all permits issued prior thereto and shall be considered a part of this agreement.

10. This agreement shall continue in force and effect for a period of one year from and after the date hereof and thereafter until terminated by either party by giving to the other written notice at least ninety (90) days in advance of the termination date therein specified. Upon termination of this agreement as herein provided, Licensee shall remove its attachments from the poles of Owner without undue delay and complete such removal prior to the specified termination date.

11. This agreement cancels and supersedes any previous joint use agreement, Licensee or joint use affecting Owner's poles and Licensee's attachments covered hereby and shall be binding upon and inure to the benefits of the parties hereto, their respective successors and/or assigns.

IN WITNESS WHEREOF, the parties hereto have caused this agreement to be executed as of the day and year first above written.

KENTUCKY POWER COMPANY

By:_____
Vice President

TRANSPORTATION CABINET
Department of Highways

By:_____
Secretary of Transportation

Approved for form and legality:

_____
Office of Legal Services
Transportation Cabinet

Exhibit 11

POLE ATTACHMENT PERMIT

NO._____

DATE_____

Supersedes Permit No._____DATE_____

The undersigned licensee (Licensee) hereby applies to below named power company (Owner) for the use of Owner's poles described below, for a license and permission to place and/or maintain attachments described in the following table on the poles of Owner therein described.

TABLE DESCRIBING ATTACHMENTS AND
POLES COVERED BY THIS PERMIT

Pole Number	Height and Class	Location	Number and Kind of Attachment

Said attachments are to be placed and/or maintained on the said poles in the manner and under the conditions set forth in the attached agreement, dated_____, between Licensee and Owner.

TRANSPORTATION CABINET
STATE OF KENTUCKY (Licensee)

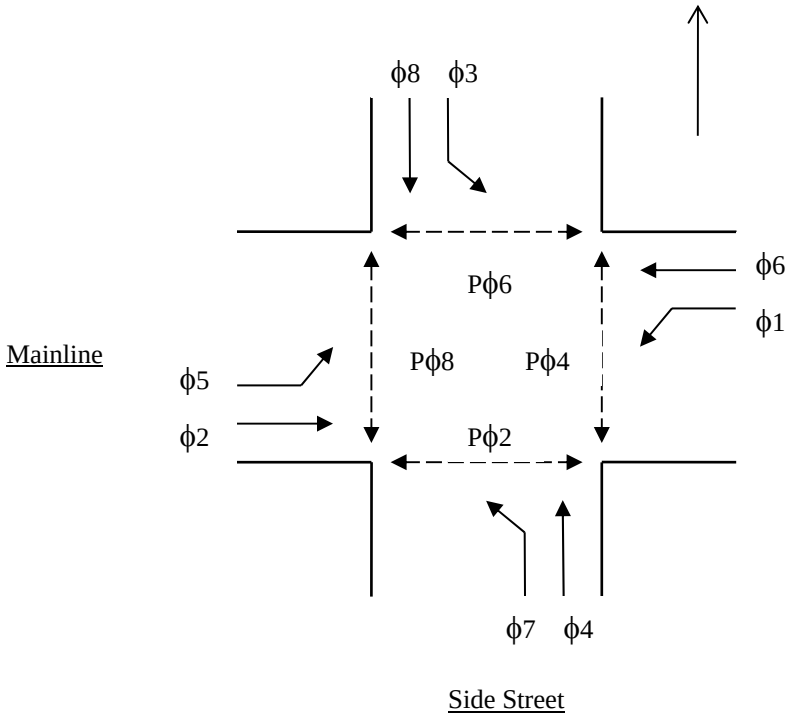
By_____

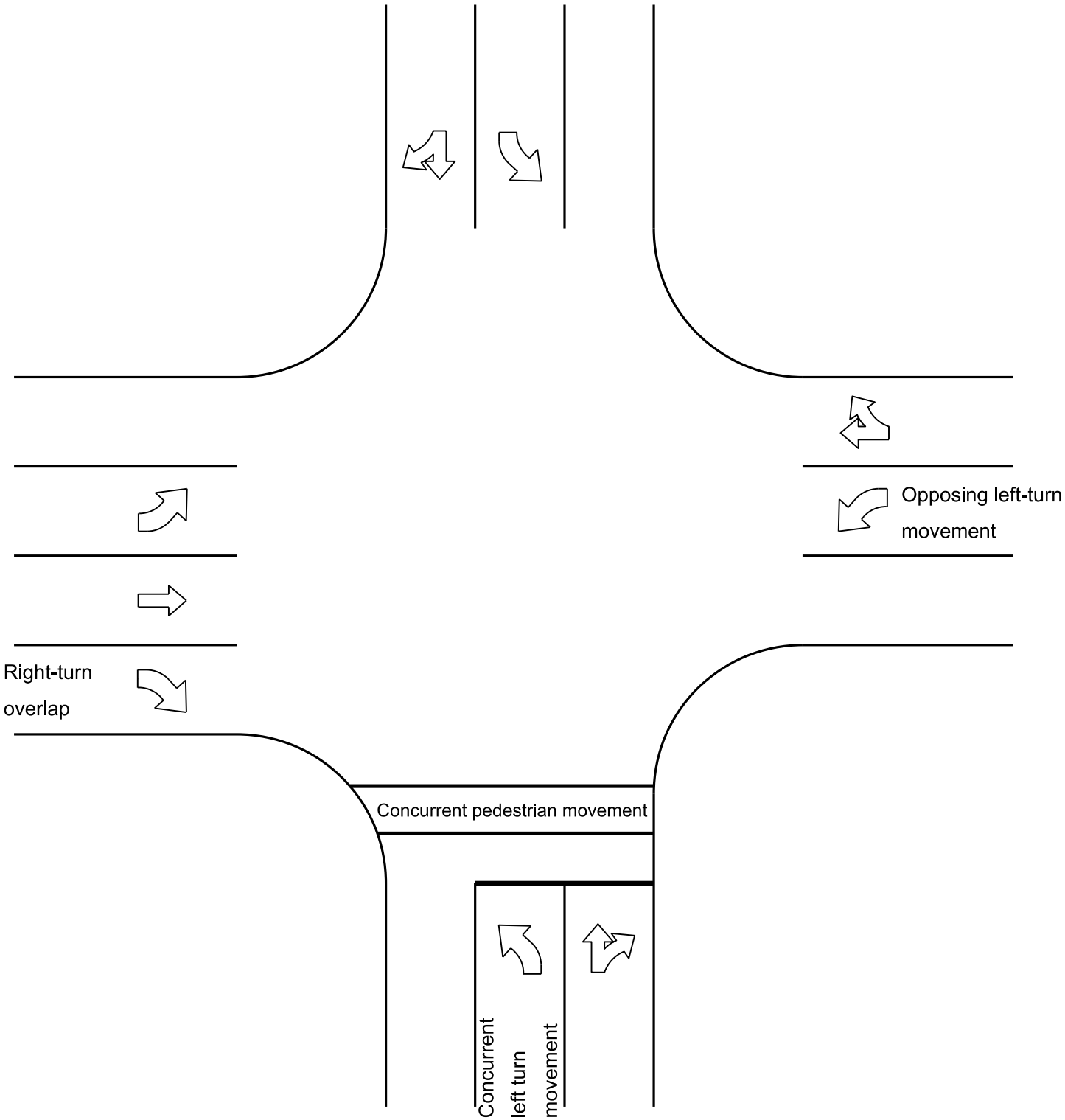
Owner does hereby grant the License and permission above applied for upon the terms and conditions specified in said agreement.

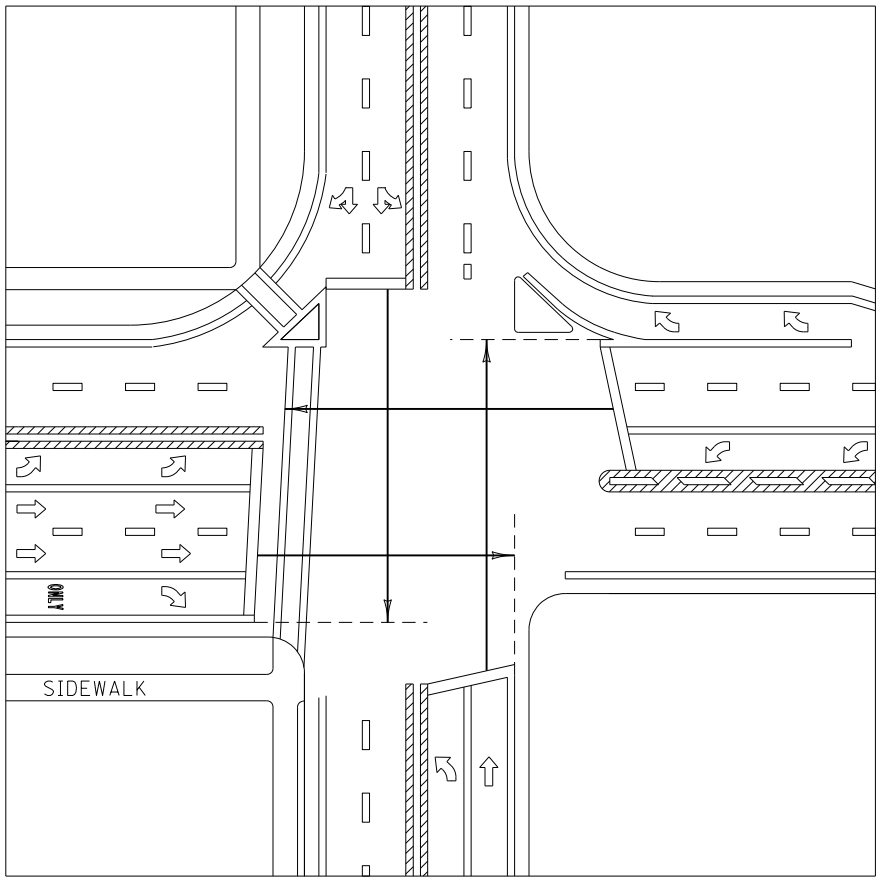
KENTUCKY POWER COMPANY (Owner)

By_____

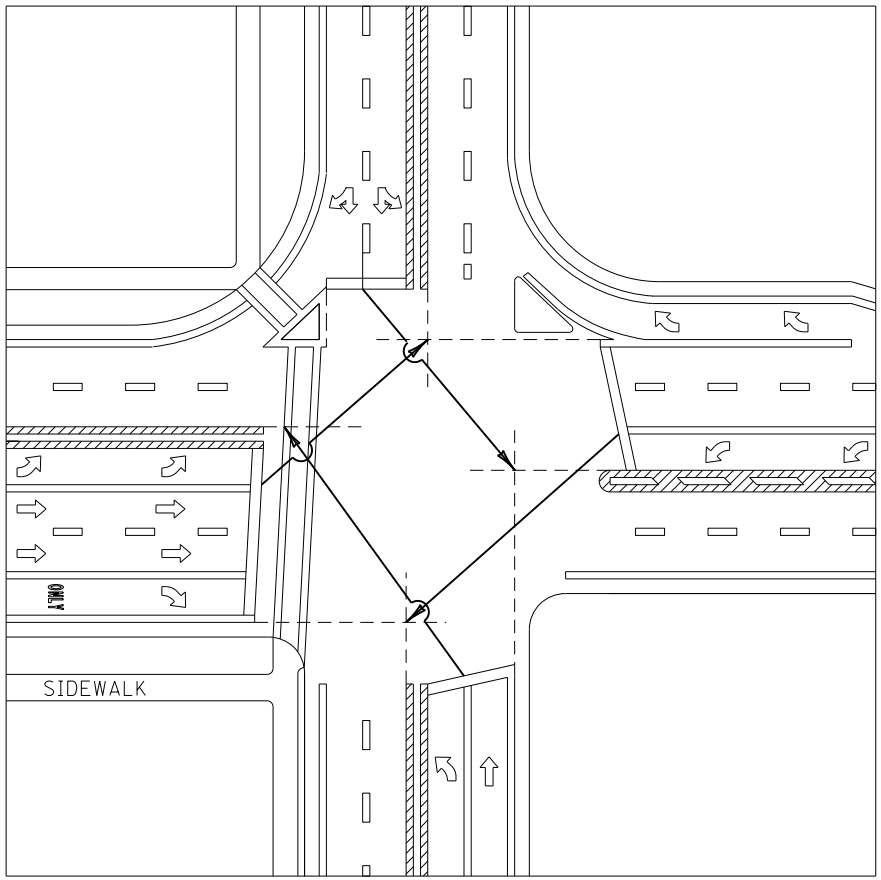
General Phasing Diagram




Opposing left-turn movement
Right-turn overlap
Concurrent pedestrian movement
Concurrent left turn movement



MEASUREMENT OF CLEARANCE DISTANCES FOR THROUGH MOVEMENTS



MEASUREMENT OF CLEARANCE DISTANCES FOR LEFT-TURN MOVEMENTS

1. ROUND MEASUREMENTS UP TO NEAREST 5′.
2. CLEARANCE DISTANCES FOR LEFT-TURN MOVEMENTS SHOULD BE MEASURED ALONG A STRAIGHT LINE FROM THE RIGHT EDGE OF THE LEFT-TURN LANE TO THE INTERSECTING POINT OF THE FAR EDGE OF THE TWO CONFLICTING TRAFFIC STREAMS.
3. WHEN RIGHT-TURN LANES ARE PRESENT, MEASURE TO FAR SIDE OF RIGHT-TURN LANE.
4. WHEN CROSSWALKS ARE PRESENT, MEASURE TO FAR SIDE OF CROSSWALK.
5. LANES UNDER YIELD CONTROL SHOULD NOT BE TAKEN INTO ACCOUNT WHEN MEASURING CLEARANCE DISTANCES.

EXHIBIT 14
MEASUREMENT OF CLEARANCE DISTANCES

YELLOW CLEARANCE INTERVALS

Speed (MPH)	Grade of Approach								
	Uphill				*Level*	*Downhill*			
	+4%	+3%	+2%	+1%	0%	-1%	-2%	-3%	-4%
20	2.3	2.4	2.4	2.5	2.5	2.6	2.6	2.7	2.7
25	2.7	2.7	2.8	2.8	2.9	2.9	3.0	3.1	3.2
30	3.0	3.1	3.1	3.2	3.2	3.3	3.4	3.5	3.6
35	3.3	3.4	3.5	3.5	3.6	3.7	3.8	3.9	4.0
40	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4
45	4.0	4.1	4.2	4.2	4.3	4.5	4.6	4.7	4.8
50	4.3	4.4	4.5	4.6	4.7	4.8	5.0	5.1	5.3
55	4.6	4.7	4.8	5.0	5.1	5.2	5.4	5.5	5.7

Calculated yellow clearance is less than 3.5 seconds or greater than 5.0 seconds.

RED CLEARANCE INTERVALS

Speed (MPH)	Clearance Distance (Feet)										
	20	30	40	50	60	70	80	90	100	110	120
20	0.7	1.1	1.4	1.8	2.1	2.4	2.8	3.1	3.5	3.8	4.1
25	0.6	0.9	1.1	1.4	1.7	2.0	2.2	2.5	2.8	3.0	3.3
30	0.5	0.7	1.0	1.2	1.4	1.6	1.9	2.1	2.3	2.5	2.8
35	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4
40	0.4	0.6	0.7	0.9	1.1	1.2	1.4	1.6	1.8	1.9	2.1
45	0.4	0.5	0.7	0.8	1.0	1.1	1.3	1.4	1.6	1.7	1.9
50	0.3	0.5	0.6	0.7	0.9	1.0	1.1	1.3	1.4	1.5	1.7
55	0.3	0.4	0.5	0.7	0.8	0.9	1.0	1.2	1.3	1.4	1.5

Calculated red clearance is less than 1.0 second or greater than 3.0 seconds.

RAILROAD PREEMPTION CHECKLIST

TRAFFIC SIGNAL INFORMATION

District _____

County _____

Mainline Route _____

ADT _____

Crossroad Route _____

Milepoint _____

Traffic Contact _____

Phone _____

RAILROAD INFORMATION

Railroad _____

Crossing DOT # _____

Number of Tracks _____

Gates? YES ☐ NO ☐

Train Speed _____

# of Trains _____ per _____

Railroad Contact _____

Phone _____

Clear Storage Distance (CSD) _____ feet from stopbar ☐ 4' from crossroad ☐
CSD = Distance from signal stopbar or 4' from crossroad edge to 6' from near rail

Minimum Track Clearance Distance (MTCD) _____ feet from stopbar ☐ device ☐ 12' from RR ☐
MTCD = Distance from end of CSD to railroad stopbar, railroad device or 12' beyond railroad centerline

L = CSD + MTCD _____ feet

Will vehicles be allowed to stop between the intersection stopbar and the railroad stopbar (L) ◉ Yes ○ No
If you answered 'no', no Advanced Preemption Time is required.

ADVANCED PREEMPTION TIMING

Minimum Green Time (MIN GR) _____ seconds (typically zero)

Walk + Pedestrian Clearance (PED) _____ seconds (typically zero)

Yellow Change for Parallel Street (YEL) _____ seconds

Red Clearance for Parallel Street (RED) _____ seconds

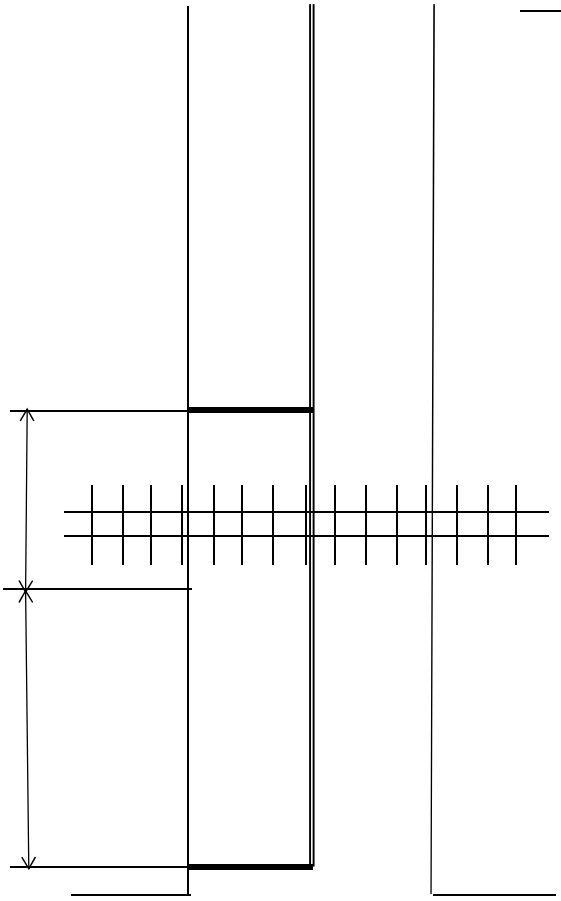
Maximum Right-of-Way Transfer Time (MRTT) _____ **seconds**
MRTT = MIN GR + PED + YEL + RED

QUEUE CLEARANCE TIME (QCT)

QCT _____ **seconds**

TOTAL ADVANCE TIME NEEDED (before gates descend) = **MRTT + QCT** _____ **seconds**

Street Name Crossing Track



Parallel Street Name

WARNING!

HIGHWAY-RAIL GRADE CROSSING WARNING SYSTEM AND HIGHWAY TRAFFIC SIGNALS ARE INTERCONNECTED

BEFORE MODIFICATION is made to any operation which connects to or controls the timing of an active railroad warning system and/or timing and phasing of a traffic signal, the appropriate party(ies) shall be notified and, if necessary, a joint inspection conducted.

Intersection: _____

U.S. DOT/AAR Crossing Number: _____

Highway Agency: _____

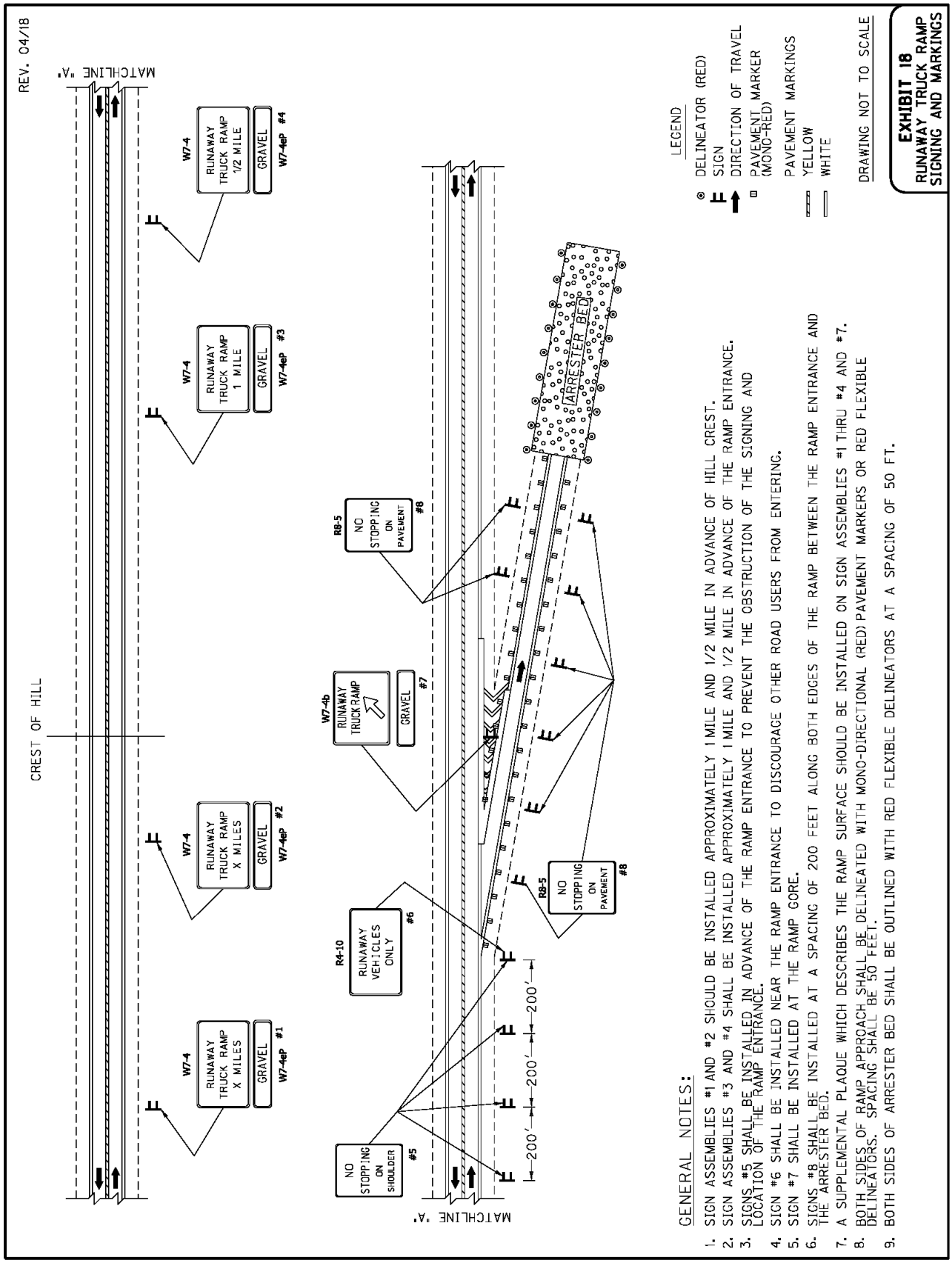
Contact Name: _____

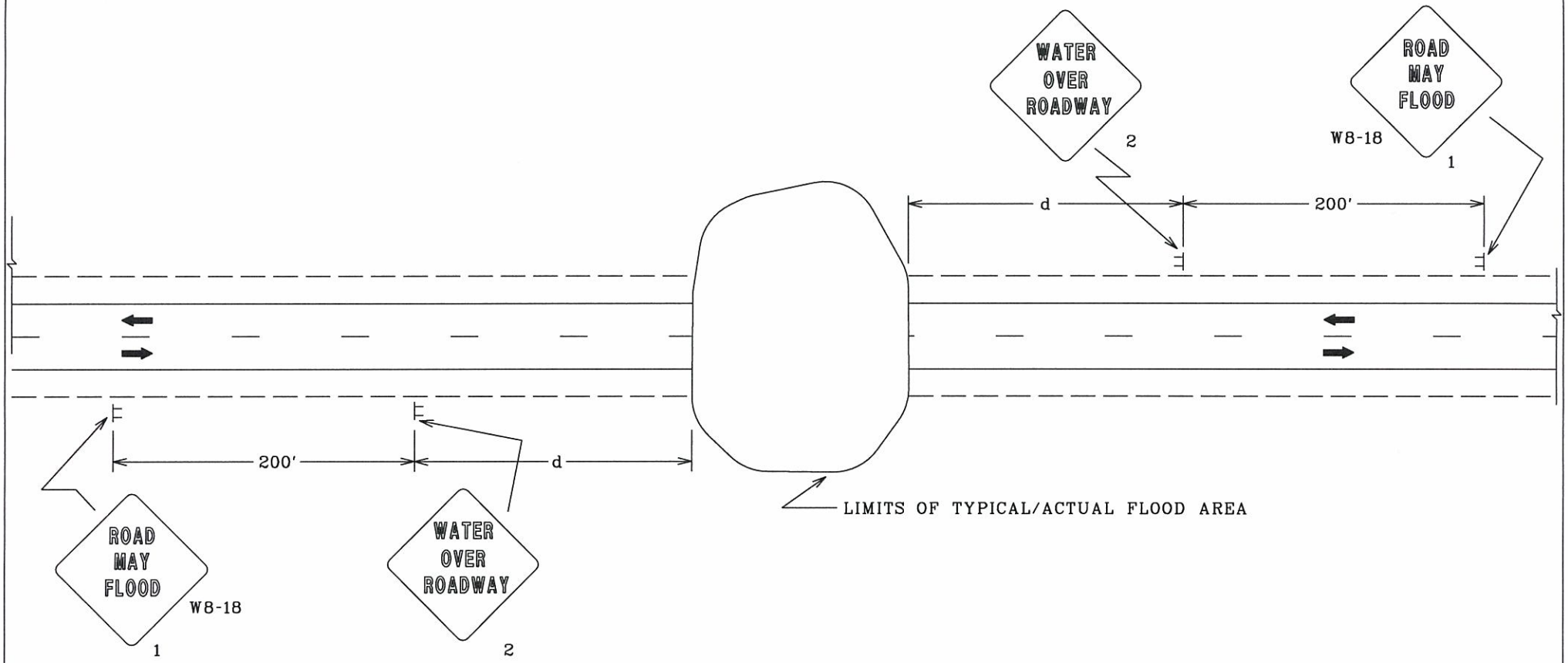
Phone Number: _____

Railroad: _____

Contact Name: _____

Phone Number: _____


REV. 04/18
MATCHLINE "A"
CREST OF HILL
W7-4
RUNAWAY TRUCK RAMP X MILES
GRAVEL
W7-4eP #1
W7-4
RUNAWAY TRUCK RAMP X MILES
GRAVEL
W7-4eP #2
W7-4
RUNAWAY TRUCK RAMP 1 MILE
GRAVEL
W7-4eP #3
W7-4
RUNAWAY TRUCK RAMP 1/2 MILE
GRAVEL
W7-4eP #4
NO STOPPING ON SHOULDER
#5
R4-10
RUNAWAY VEHICLES ONLY
#6
W7-4b
RUNAWAY TRUCK RAMP
GRAVEL
#7
R8-5
NO STOPPING ON PAVEMENT
#8
R8-5
NO STOPPING ON PAVEMENT
#8
ARRESTER BED
200'
200'
200'
MATCHLINE "A"
LEGEND
DELINEATOR (RED)
SIGN
DIRECTION OF TRAVEL
PAVEMENT MARKER (MONO-RED)
PAVEMENT MARKINGS
YELLOW
WHITE
DRAWING NOT TO SCALE
EXHIBIT 18
RUNAWAY TRUCK RAMP SIGNING AND MARKINGS
GENERAL NOTES:
1. SIGN ASSEMBLIES #1 AND #2 SHOULD BE INSTALLED APPROXIMATELY 1 MILE AND 1/2 MILE IN ADVANCE OF HILL CREST.
2. SIGN ASSEMBLIES #3 AND #4 SHALL BE INSTALLED APPROXIMATELY 1 MILE AND 1/2 MILE IN ADVANCE OF THE RAMP ENTRANCE.
3. SIGNS #5 SHALL BE INSTALLED IN ADVANCE OF THE RAMP ENTRANCE TO PREVENT THE OBSTRUCTION OF THE SIGNING AND LOCATION OF THE RAMP ENTRANCE.
4. SIGN #6 SHALL BE INSTALLED NEAR THE RAMP ENTRANCE TO DISCOURAGE OTHER ROAD USERS FROM ENTERING.
5. SIGN #7 SHALL BE INSTALLED AT THE RAMP GORE.
6. SIGNS #8 SHALL BE INSTALLED AT A SPACING OF 200 FEET ALONG BOTH EDGES OF THE RAMP BETWEEN THE RAMP ENTRANCE AND THE ARRESTER BED.
7. A SUPPLEMENTAL PLAQUE WHICH DESCRIBES THE RAMP SURFACE SHOULD BE INSTALLED ON SIGN ASSEMBLIES #1 THRU #4 AND #7.
8. BOTH SIDES OF RAMP APPROACH SHALL BE DELINEATED WITH MONO-DIRECTIONAL (RED) PAVEMENT MARKERS OR RED FLEXIBLE DELINEATORS. SPACING SHALL BE 50 FEET.
9. BOTH SIDES OF ARRESTER BED SHALL BE OUTLINED WITH RED FLEXIBLE DELINEATORS AT A SPACING OF 50 FT.



1. ROAD MAY FLOOD SIGN IS A PERMANENT SIGN WITH YELLOW BACKGROUND. SIGN SHOULD BE INSTALLED IN ADVANCE OF AREAS PRONE TO FLOODING.
2. WATER OVER ROADWAY IS A TEMPORARY SIGN WITH FLUORESCENT ORANGE BACKGROUND. SIGN MAY BE INSTALLED AT THE DISCRETION OF THE DISTRICT DURING A WEATHER EVENT WHERE WATER IS IN THE ROADWAY.
3. ADVANCE PLACEMENT DISTANCE "d" SHALL BE DETERMINED FROM TABLE 2C-4 OF THE MUTCD.

EXHIBIT 24

Signing for Flood Areas

EXHIBIT 25

(*COUNTY NAME*)
(*CITY NAME*)
(*PROJECT DETAILS, IF APPLICABLE*)

LIGHTING MAINTENANCE AGREEMENT BETWEEN
COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET
DEPARTMENT OF HIGHWAYS
AND
CITY OF (*City Name*)

THIS AGREEMENT, entered into by and between the Commonwealth of Kentucky, Transportation Cabinet, Department of Highways, hereinafter referred to as the "**Department**", and the City of (*City Name and Address)*, hereinafter referred to as the "**City**".

WITNESSETH:

WHEREAS, roadway lighting within the limits of cities is not typically installed or maintained by the **Department**; and

WHEREAS, in certain cases the **Department** may elect to install lighting within city limits on projects, regardless of warrants or need for such lighting, if funding is available and the **City** is willing to maintain the lighting and pay for associated utility costs; and

WHEREAS, in such cases, the **Department** will only fund lighting that utilizes standard materials that the Cabinet utilizes to install and maintain their own lighting systems; and

WHEREAS, the Department has a design project underway at (*project details*), which shall hereinafter be referred to as the "**Project**"; and

WHEREAS, the **City** desires that lighting be installed at the intersection of (*location information*) as part of the **Project**, and the **Department** agrees that it is worthwhile to include lighting at this location and is willing to fund and construct the lighting as part of the **Project**.

NOW, THEREFORE, in consideration of these premises and the mutual covenants contained herein, the parties hereby agree as follows:

1. The **Department** shall install intersection lighting at (*location information*) as part of the **Project**.

2. The **Department** will be responsible for all costs associated with design and installation of the lighting.

3. The **Department** shall install lighting using standard lighting materials utilized by the **Department**. If non-standard materials are desired (such as decorative poles), the **City** shall be responsible for the additional costs of the desired materials and enter into an agreement with the **Department** for the installation and maintenance of these materials.

4. The **City** will be responsible for the maintenance and utility costs associated with lighting installed as part of this Agreement throughout the life of the installation. Maintenance includes providing materials to prevent deterioration of any component, repair damage due to knock downs, and replacement of a component if one or more fail.

5. To the extent permitted by law, the **City** shall indemnify and hold harmless the **Department** and all of its officers, agents, and employees from all suits, actions, or claims of any character because of any injuries or damages received by any person, persons, or property resulting from the lighting installed through this Agreement.

6. The **Department** reserves the right to cancel this Agreement at any time deemed to be in the best interest of the **Department** by giving thirty (30) days written notice of such cancellation to the **City** and reserves the right to remove lighting at its discretion, including (but not limited to) situations where the **Department** feels lighting is not being properly maintained by the **City**.

7. Any work performed by the **City** within **Department** right-of-way must be done under an approved encroachment permit. Furthermore, any work performed to install, repair, or revise lighting must be coordinated through the **Department**.

IN WITNESS WHEREOF, the parties have caused these presents to be executed by their officers thereunto duly authorized.

CITY OF (*City Name*)

_____
(*Mayor's Name*)
Mayor

Date:_____

APPROVED FOR FORM
& LEGALITY

_____
City of (*City Name*)

Date:_____

COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET

_____
(*Secretary's Name*)
Secretary

Date:_____

APPROVED FOR FORM
& LEGALITY

_____
Office of Legal Services
Transportation Cabinet

Date:_____

EXHIBIT 26

(*COUNTY NAME*)
(*CITY NAME*)
(*LOCATION DETAILS*)

NON-STANDARD MATERIALS AGREEMENT BETWEEN
COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET
DEPARTMENT OF HIGHWAYS
AND
CITY OF (*City Name*)

THIS AGREEMENT, entered into by and between the Commonwealth of Kentucky, Transportation Cabinet, Department of Highways, hereinafter referred to as the "**Department**", and the City of (*City Name and Address)*, hereinafter referred to as the "**City**".

WITNESSETH:

WHEREAS, non-standard materials, such as mast arms, decorative poles, etc., are not typically installed by the **Department**; and

WHEREAS, the **Department** recognizes that local governments often desire non-standard materials for aesthetic purposes. However, non-standard material costs typically exceed the costs of standard materials and are difficult for the **Department** to maintain. Consequently, the **Department** will not pay costs above those required to install standard systems. The **Department** will allow the installation of non-standard materials only in those instances where the **City** enters into an agreement with the **Department** concerning installation and maintenance of the non-standard materials; and

WHEREAS, the **City** desires (*description of specific non-standard materials*) at (*intersection/location information*) and agrees to be responsible for the additional cost and maintenance of such materials.

NOW, THEREFORE, in consideration of these premises and the mutual covenants contained herein, the parties hereby agree as follows:

1. The **City** agrees to pay the difference in costs between non-standard and standard materials or to provide non-standard materials for installation. This responsibility includes any related costs, in addition to the actual material costs, associated with the actual installation, such as the cost of additional conduit required by mast arm installation.

2. All work and materials shall meet **Department** standards and specifications and conform to the Manual on Uniform Traffic Control Devices (MUTCD) and National Electrical Code (NEC).

3. Any installation or maintenance work performed by the **City** within **Department** right-of-way must be performed under an approved encroachment permit.

For traffic signal projects advanced by the **City** through an encroachment permit, the **City** agrees to provide plans developed by a consultant prequalified by the **Department** in Electrical Engineering Traffic Signal Services. Any installations or maintenance shall be done by a contractor prequalified by the **Department** in Traffic Signals.

For lighting projects advanced by the **City** through an encroachment permit, the **City** agrees to provide plans developed by a consultant prequalified by the **Department** in Electrical Engineering Roadway Lighting Services. Any installations or maintenance shall be done by a contractor prequalified by the **Department** in Lighting.

For work performed under an encroachment permit, the **City** or the contractor shall contact the **Department's** District Traffic Engineer at least two weeks prior to beginning work. The **City** shall be responsible for maintenance of the signal and/or lighting during installation through an encroachment permit and responsible for any work required until a final inspection by the **Department** has been performed and the project has been officially approved as complete by the **Department**.

4. The **Department** reserves the right to approve or disapprove the design/color of any non-standard materials.

5. The **City** agrees to be responsible for maintenance, repairs, and replacement of non-standard materials throughout the use at the identified location(s). Typical maintenance includes, but is not limited to, inspection and repair of any dents, structural failures, or other damage. The most critical aspect of maintenance is the timely replacement of damaged or downed materials.

6. For installations with non-standard materials, the **City** shall perform an annual inspection to certify that materials are in good repair. A copy of the inspection forms shall be sent to the **Department's** District Traffic Engineer, along with photos. Any visual damage shall be detailed on the inspection forms. For locations with deficiencies, the **City** shall identify a plan for corrective work including an estimated timeframe for completion.

7. When a location with non-standard materials is damaged or knocked down, the **Department** will contact the **City** to schedule repairs. If spare materials are not readily available from the **City**, the **Department** will remove the damaged material and install standard materials to restore operation. The **Department** will not be liable for any further damage to non-standard materials upon removal. Ultimately, the **City** is responsible for providing replacement, non-standard materials for reinstallation. At any time, the **Department** may make the determination that the **City** is not going to provide replacement materials and elect to permanently install standard materials.

8. The **Department** reserves the right to cancel this Agreement at any time deemed to be in the best interest of the **Department** by giving thirty (30) days written notice of such cancellation to the **City** and reserves the right to remove non-standard materials at its discretion, including

(but not limited to) situations where the **Department** feels non-standard materials are not being properly maintained by the **City**.

9. When the **Department** plans to replace, modify, or upgrade installations with non-standard equipment, the **City** agrees to provide the necessary resources for replacement of non-standard materials. All non-standard materials must meet the current **Department** specifications in place at the time of replacement, modification, or upgrade.

10. To the extent permitted by law, the **City** shall indemnify and hold harmless the **Department** and all of its officers, agents, and employees from all suits, actions, or claims of any character because of any injuries or damages received by any person, persons, or property resulting from the non-standard materials installed through this Agreement.

11. Any work performed by the **City** within **Department** right-of-way must be done under an approved encroachment permit. Furthermore, any work performed to install, repair, or revise lighting must be coordinated through the **Department**.

IN WITNESS WHEREOF, the parties have caused these presents to be executed by their officers thereunto duly authorized.

CITY OF (*City Name*)

_____

(*Mayor's Name*)
Mayor

Date:_____

APPROVED FOR FORM
& LEGALITY

_____

City of (*City Name*)

Date:_____

COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET

_____

(*Secretary's Name*)
Secretary

Date:_____

APPROVED FOR FORM
& LEGALITY

_____

Office of Legal Services
Transportation Cabinet

Date:_____

Kentucky Transporation Cabinet

Division of Traffic Operations

Permitted Lighting Submittal Checklist

EXHIBIT 27

Location Information

County _____

Mainline Route _____

Side Street Route _____

Milepoint _____

Date _____

Reviewer _____

What are the roadway widths? Mainline _____ feet
Side Street _____ feet

How far from the edge of the edge of the outermost driving lane does the clear zone extend? _____ feet

Are poles located in the clear zone? ☐ Yes ☐ No

Do breakaway supports for poles in the clear zone comply with AASHTO requirements? ☐ Yes ☐ No ☐ N/A

What is the Roadway Classification? ☐ Interstate ☐ Arterial ☐ Collector ☐ Local

What is the General Lane Use in the vicinity per AASHTO Roadway Lighting Design Guide? ☐ Commercial ☐ Intermediate ☐ Residential

What are the distances between poles? Mainline _____ feet
Side Street _____ feet

What is the Average Maintained Illuminance of the Lighting Layout? _____

What is the Uniformity Ratio (Avg/Min) of the Lighting Layout? _____

What luminaire (brand and model) were used in your calculations? _____

What photometric files (.ies) were used for your calculations? _____

What is the light output (watts or lumens) of the proposed luminaires? _____

Have you attached a scaled drawing of the proposed roadway lighting layout? ☐ Yes ☐ No

Have you attached cut sheets for proposed installation items (poles, luminaires, etc.)? ☐ Yes ☐ No

Have you attached the results of a photometric analysis of the proposed layout? ☐ Yes ☐ No

Have you attached the voltage drop? ☐ Yes ☐ No

References (contact Design Services Branch for appropriate editions):

AASHTO Roadside Design Guide

AASHTO Roadway Lighting Design Guide

AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals

NFPA 70: National Electrical Code

Inspection Form for Review of Bridge Navigational Aids

Bridge Name:	River:
Route:	River MP:
Additional:	Date:

Does lighting plan match plan on file in district office:
If no, what are differences:

Cabinet Items

Location of Cabinet:

Condition of Cabinet:

Condition of Cabinet Hardware and Wiring:

Bridge Items

Rigid Conduits:

Flex Conduit:

Expansion connectors:

Junction boxes, LBs:

Navigational Light Items

Bulbs:

Housing:

Lens:

Hangers, Connectors, Chains, Etc.:

Note: Provide specific comment in every section of form. If section does not apply, insert "N/A".

Inspection Form for Review of Bridge Navigational Aids

Solar Lighting

If bridge has solar lights, fill in following items

Condition of Solar Panels:

Condition of Batteries:

Accessibility

Condition of Ladders, Catwalks, Etc.:

Signs

Retroflective Panels (Red, Yellow, Green):

Draft Markings on Piers

Condition of Markings on Piers:

Aviation Lights

Condition and Accessibility:

Inspector Signature: _____ Date: _____

Additional Comments:

Note: Provide specific comment in every section of form. If section does not apply, insert "N/A".