



KENTUCKY TRANSPORTATION CENTER

EVALUATION OF THE WORK ZONE SAFETY AND MOBILITY RULE



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In all that we do.

**Research Report
KTC-09-10/SPR361-07-1F**

**EVALUATION OF THE WORK ZONE SAFETY
AND MOBILITY RULE**

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Kentucky Transportation Cabinet
Commonwealth of Kentucky

and

Federal Highway Administration
U.S. Department of Transportation

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16. Abstract <p>The Work Zone Safety and Mobility Rule (Rule) was published in the Federal Register in September 2004 indicating that all state and local governments receiving Federal-aid funding were required to comply with provisions of the Rule no later than October 2007. Kentucky received an extension to October 2008. The objectives of this study were to review the requirements of the Work Zone Safety and Mobility Rule and provide recommendations for implementation of the Rule to ensure a consistent approach for designing and managing the impacts of work zones. This report documents results from: a) a review of literature and Kentucky's policy, b) an analysis of work zone crashes in Kentucky, and c) an evaluation of the safety and training aspects of the Rule. The emphasis was on the safety aspect of the Rule.</p> <p>The requirements of this Rule relating to work zone safety were reviewed along with the related procedures adopted by other states. Crash data occurring in work zones in Kentucky for the past several years were summarized. A description of the training developed to meet the requirements of the Rule is described.</p> <p>Recommendations were made to implement the safety aspects of the Kentucky Transportation Cabinet "Policy and Procedures for the Safety and Mobility of Traffic through Work Zones." These include the duties of the District Work Zone Safety Coordinator (DWZSC) and the Statewide Work Zone Review Committee (SWZRC). To assist in the documentation of crashes occurring in a work zone, a form was developed to summarize information from each crash.</p>			
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EXECUTIVE SUMMARY

The Work Zone Safety and Mobility Rule (Rule) was published in the Federal Register in September 2004 indicating that all state and local governments receiving Federal-aid funding were required to comply with provisions of the Rule no later than October 2007. Kentucky received an extension to October 2008. The objectives of this study were to review the requirements of the Work Zone Safety and Mobility Rule and provide recommendations for implementation of the Rule to ensure a consistent approach for designing and managing the impacts of work zones. This report documents results from: a) a review of literature and Kentucky's policy, b) an analysis of work zone crashes in Kentucky, and c) an evaluation of the safety and training aspects of the Rule. The emphasis was on the safety aspect of the Rule.

The requirements of this Rule relating to work zone safety were reviewed along with the related procedures adopted by other states. Crash data occurring in work zones in Kentucky for the past several years were summarized. A description of the training developed to meet the requirements of the Rule is described.

Recommendations were made to implement the safety aspects of the Kentucky Transportation Cabinet "Policy and Procedures for the Safety and Mobility of Traffic through Work Zones." These include the duties of the District Work Zone Safety Coordinator (DWZSC) and the Statewide Work Zone Review Committee (SWZRC). To assist in the documentation of crashes occurring in a work zone, a form was developed to summarize information from each crash.

1.0 BACKGROUND

The Work Zone Safety and Mobility Rule (Rule) was published in the Federal Register in September 2004 indicating that all state and local governments receiving Federal-aid funding are required to comply with provisions of the Rule no later than October 2007. The Kentucky Transportation Cabinet received an extension to October 2008. The Rule updates and broadens the regulation initially published as 23 CFR, Part 630, Subpart J which provided guidance and established procedures to assure adequate consideration is given to motorists, pedestrians, and construction workers on all Federal-aid construction projects.

The changes as noted in the Federal Register encourage broader consideration of the safety and mobility impacts of work zones across project development, and the implementation of strategies that assist management of those impacts during project delivery. Each highway agency is required to develop and implement procedures consistent with the provisions of the Rule as well as the Manual on Uniform Traffic Control Devices (MUTCD).

Primary features to be included in the agency's procedures are: 1) a systematic approach to implement and sustain work zone safety and mobility policies, 2) work zone assessment and management procedures, 3) work zone crash and operational data, 4) training for personnel involved in work zone management and traffic control, and 5) access effectiveness of work zone safety and mobility procedures with performance of a process review.

The objectives of this study were to review the requirements of the Work Zone Safety and Mobility Rule and provide recommendations for implementation of the Rule to ensure a consistent approach for designing and managing the impacts of work zones. This report documents results from: a) a review of the literature and Kentucky's policy, b) an analysis of work zone crashes in Kentucky, and c) an evaluation of the safety and training aspects of the Rule. The emphasis was on the safety aspect of the Rule.

2.0 PROCEDURE

This study addressed the safety and training aspect of the Rule. The requirements of the Rule in these areas were reviewed. Procedures adopted by other states were reviewed.

Crash data occurring in work zones in Kentucky for the past several years were summarized. The types of crash data necessary to implement the Rule were determined. Methods to document crashes in work zones were developed and illustrated.

A procedure which could be used to implement the Rule, as it relates to safety, was developed. A form was prepared which can be used to document pertinent information for crashes occurring in work zones. A description of the training developed to meet the requirements of the Rule is described.

3.0 RESULTS

3.1 Review of Literature

The Federal Highway Administration published a series of documents to provide information and guidance to use to implement the Work Zone Safety and Mobility Rule (1, 2, 3, 4). These documents note that the Rule advocates a systematic approach to managing work zone safety and mobility. The primary components of the Rule are in three categories: policy, agency-level processes and procedures, and project-level procedures. The updated Rule requires agencies to use available work zone information and data to manage work zone impacts. The work zone data include mobility/operational data in addition to safety/crash data. Agencies are also required to analyze work zone crash and operational data from multiple projects.

At the project level, agencies are to use field observations, available work zone crash data, and operational information to manage the work zone impacts of individual projects while the projects are ongoing. At the process level, agencies are to analyze work zone crash and operational data from multiple projects to improve agency processes and procedures and continually pursue the improvement of overall work zone safety and mobility.

The Rule also has a training provision. There is a need to train personnel involved in the development, design, implementation, operation, inspection, and enforcement of work zone related transportation management and traffic control. The training is expected to be appropriate to an individual's job responsibilities and job decisions. Some agencies require the certification for certain personnel, such as flaggers and traffic control supervisors.

Work zone performance assessment can involve either the overall work zone management process or work zone field performance and management strategies. The process review can include an evaluation of work zone data at the agency level and a review of randomly selected projects across a variety of jurisdictions.

The Rule establishes a category of projects called "significant projects" that have a higher probability to have an effect on traffic conditions than other projects. In addition to projects meeting an agency's definition of significant, these projects are also to include all interstate system projects that occupy a location for more than three days. Significant projects should be identified during the systems planning phase of project delivery. Elements in the areas of project characteristics (type and schedule), travel and traffic characteristics (traffic volume and type), and work zone characteristics (capacity and safety impacts) should be considered when determining whether a project should be defined as significant.

A Traffic Management Plan (TMP) is required for all Federal-aid highway projects. The TMP describes a set of coordinated strategies and describes how these strategies will be used to manage the work zone impacts of a project. Keys to a successful TMP are starting as early as possible and using a multidisciplinary approach. The TMP development should begin during systems planning and continue through the design phase of a project. The elements of a TMP needed for a project are based on whether the project is determined to be significant.

Stakeholders should be identified to provide input to the agency on appropriate strategies to include in the TMP. Monitoring of the performance of the work zone during the construction phase should be conducted to determine if the predicted impacts represent the actual conditions observed in the field.

Work zone public information and outreach should be a component of a construction project. Public information is the process of making groups and individuals aware of work zones, their impacts, and possible mitigation strategies. Public outreach is the process of communicating with groups and individuals with the intent of both providing and obtaining information about the impacts of a proposed or in-progress work zone.

The Rule contains provisions that address work zone performance assessment. State and local agencies are to analyze work zone crash and operational data from multiple projects to improve processes and procedures. The agencies are to maintain the data necessary to conduct the assessment. States are to perform a process review at least every two years with the review including statewide work zone data and/or randomly selected project data. Examples of available data include project logs, field observations, crash records, operational data, enforcement data, and complaints.

A synthesis was prepared dated November 2005 to document the status of the various states in their effort to implement the Rule (5). The consistent weaknesses found in most states were: lack of agency policy level direction, lack of processes that identify the evaluations of work zone safety and mobility impacts throughout the project development, lack of processes to understand how various offices interact, and lack of consistent performance data collection processes to allow the comparison of work zone safety between locations and states.

Performance measures commonly used related to work zone safety include: crash rate, crash frequency, crash severity, incident frequency, and time before clearance of incidents. However, few states were found to routinely collect and compile performance measurements. A few case studies were described. For example, it was noted that in Ohio a comparison can be made between the crash frequency in the work zone segment and the crash frequency before the work zone was started. Ohio has performance measures that trigger steps to investigate the work zone for safety issues. Safety should be monitored (including conflicts, incidents, and crashes) while the work zone is active with appropriate corrections implemented.

A few states have formal end-of-the-year processes. For example, Kentucky was reported to have a team that evaluates at least 25 work zones annually with the findings become part of an annual construction evaluation.

It was noted that the lack of objective data after the project evaluations is largely due to the lack of performance data collected during the actual project.

The synthesis included a survey of 30 states. Examples of procedures used in various states were given. Colorado has initiated a program to evaluate work zones during and after the completion of the work zone. A traffic field review is conducted (by the resident engineer and

district safety engineer) to determine if each work zone complies with the traffic control plans and to observe work zone operations under traffic. The team rates the work zone on a scale of one to four with four being the safest work zone. Iowa has used crash location software to identify crash locations. The data are used in year-end project reviews. Fatal crash frequency is used as a preliminary performance measure for safety. Nebraska uses a team of safety engineers to evaluate the safety of work zones. The engineers evaluate half of the construction work zones each year. The Pennsylvania state police submit copies of work zone crash reports to the transportation district office on a weekly basis. The crash reports are given to the project inspector for investigation with the goal to achieve a timely adjustment to the traffic control. A collision database is used to analyze annual work zone crash data with this information used to determine safety benefits of different traffic control plans. The information is given to designers and planners for consideration in future projects.

The synthesis included a more detailed case study in a few states. Ohio was selected since they have implemented a comprehensive process which includes: assessing the potential impacts of work zones during project planning, providing early identification of problems, selecting a plan with maximizes traffic safety and minimizes traffic delay, analyzing historical and real-time work zone crash data, performing process reviews, and providing training appropriate to each individual's job description. A District Work Zone Traffic Manager is appointed for each highway district. Safety goals are established at the beginning of project construction with the objective to keep work zone crashes at or below the historical crash rate for the roadway section. A process was developed to compare "real-time" work zone crash data with historical pre-work zone data to identify and correct problem locations. This procedure has been automated using a "Real-Time Work Zone Crash Data Analysis" database program. Prior to work zone implementation, the historic crash data are input into the database and coordination is made with the local law enforcement agencies to have copies of future work zone crash reports set aside for pick-up every two weeks. After the work zone is implemented, new crash data are entered into the database using an entry form. The database performs a "before-after" comparison for each half-mile segment. Tables and graphs are generated automatically and used to identify high-crash locations.

Another case study was conducted for Virginia. Work zones are monitored on a daily basis to ensure that the work zone devices are in compliance. Work zone reviews are conducted on three levels. The project inspector examines the scenes of crashes. A further review is conducted if any deficiencies are found. Reviews of the contractor's performance and the performance of the plan are made after the end of the project. Secondary reviews are made and documented by the district manager when they drive through the project. Reviews are then conducted on randomly selected projects by engineers and work zone review teams. Approximately 15 to 20 percent of all projects within each district are reviewed each year.

3.2 Kentucky Transportation Cabinet Policy

The Kentucky Transportation Cabinet (KyTC) has developed a "Policy and Procedures for the Safety and Mobility of Traffic Through Work Zones." A copy of this policy is provided

in Appendix A.

Significant projects are defined as:

1. Any interstate system project which is anticipated to occupy a location for more than three days.
2. Any project on any multilane roadway which is anticipated to occupy a location for more than three days where the existing directional design hour volume (DHV) is over 1,000 vehicles per hour, per lane that would close a lane during the peak hours.
3. Any project on a two-lane roadway which is anticipated to occupy a location for more than three days where the existing DHV (both directions) is over 1,000 vehicles per hour that would close a lane during the peak hours.
4. Any project on the Interstate or National Highway System that would involve a detour.

All projects not meeting these requirements are referred to as other projects.

3.3 Work Zone Crash Data

A part of the Kentucky's implementation of a policy for safety of traffic through work zones is analyzing statewide crash data involving construction and maintenance zones. All crashes are maintained in the Collision Report Analysis for Safer Highways (CRASH) database. Codes are provided which identify crashes occurring in a construction or maintenance/utility zone. The investigating officer must place this code on the report to allow this identification. Following is a summary of data for the past several years. There are other crashes which occurred in work zones that were not identified because the code was not listed by the officer.

CONSTRUCTION/MAINTENANCE ZONE CRASHES

Year	Construction Zone			Maintenance/Utility Zone			Total		
	Fatal	Injury	Total	Fatal	Injury	Total	Fatal	Injury	Total
2008	3	68	486	0	8	98	3	76	584
2007	6	102	614	0	21	120	6	123	734
2006	6	90	512	2	18	127	8	108	634
2005	5	100	441	1	28	127	6	128	571
2004	4	104	490	0	19	104	4	123	594
2003	4	165	719	3	32	139	7	197	858
2002	4	133	544	0	23	107	4	156	651
2001	3	170	750	1	27	112	4	197	862
2000	6	156	738	0	38	149	6	194	887

The historical data do not show an increase in this type of crash over the past several years. There are many more crashes coded as occurring in a construction zone as opposed to a maintenance/utility zone. An alternative method of identifying crashes in construction zones would be to use the location (county, route, and milepoint range) of the work area and the dates when work was been conducted. This type of analysis could be conducted on a project basis.

Limiting factors which must be remembered when using location information are that the milepoint information can be inaccurate and crashes occurring in traffic backups related to the construction, extending outside the milepoint range, would not be included.

The coding provided for the crashes identifies pedestrian crashes with one code indicating the pedestrian was “working in the roadway.” The following data were obtained when this code was combined with the code for construction and maintenance/utility zones. This data also show all crashes with this code.

WORKING IN ROADWAY CRASHES

<u>Year</u>	<u>Construction Zone</u>			<u>Maintenance/Utility Zone</u>			<u>Total</u>		
	<u>Fatal</u>	<u>Injury</u>	<u>Total</u>	<u>Fatal</u>	<u>Injury</u>	<u>Total</u>	<u>Fatal</u>	<u>Injury</u>	<u>Total</u>
2008	0	1	1	0	1	1	0	29	36
2007	0	1	2	0	1	1	2	25	35
2006	0	3	3	1	1	2	2	41	51
2005	0	6	6	1	2	3	2	48	53
2004	0	1	2	0	0	0	0	31	41
2003	0	3	3	2	0	3	3	46	61
2002	0	5	5	0	0	0	1	31	37
2001	0	3	3	0	1	2	2	48	57
2000	0	8	8	0	2	3	2	43	53

The data show there were a very small number of these crashes involved a pedestrian in a work zone (11 percent of all crashes involving working in the roadway). Most of the crashes in this area involved an activity such as garbage collection.

To further document the location of construction zone crashes, the CRASH file was searched by location to determine specific routes in given counties which had the highest number of this type of crash. Following is a summary for 2006, 2007, and 2008 listing the counties and routes with the highest number of crashes coded as occurring in a construction zone. It is shown that the most common type of route with large numbers of this type of crash was an interstate. Some counties and routes were listed for each of the three years; for example, I 75 in Grant County.

COUNTIES AND ROUTES WITH HIGHEST NUMBER OF
CONSTRUCTION ZONE CRASHES

2008			2007			2006		
County	Route	Number	County	Route	Number	County	Route	Number
Scott	I 75	20	Fayette	I 75	29	Laurel	I 75	30
Grant	I 75	19	Simpson	I 65	29	Warren	I 65	23
Warren	I 65	17	Laurel	I 75	28	Bullitt	I 65	21
Boone	KY 237	14	Grant	I 75	25	Grant	I 75	16
Simpson	I 65	13	Fayette	KY 4	19	Fayette	I 75	14
Fayette	I 75	11	Pulaski	US 27	19	Simpson	I 65	13
Pulaski	US 27	10	Laurel	US 25	13	Hardin	I 65	12
Shelby	I 64	9	Boyd	KY 180	12	Jefferson	I 64	10
Boyd	KY 180	8	Jefferson	US 31E	11	Whitney	I 75	10
Fayette	KY 4	8	Kenton	I 75	10	Kenton	KY 1303	9
Christian	I 24	7	Jefferson	I 64	10	Boone	KY 1017	8
Laurel	KY 192	6	Rowan	KY 32	9	Fayette	KY 4	7
Laurel	I 75	6	Hopkins	WK Pkwy.	8	Ohio	WK Pkwy.	6
			Jefferson	KY 1447	8	Pulaski	US 27	6
			Boone	I 275	7			
			Boone	KY 1017	7			
			Boone	I 75	6			
			Boyd	I 64	6			
			Mason	KY 9	6			
			Shelby	I 64	6			

The crash report for all fatal crashes for 2006 through 2008 were reviewed. Following is a description of the details of fatal crashes coded as occurring in a work zone.

Fatal Crashes in Work Zones (2006-2008)

<u>Date</u>	<u>Location</u>	<u>Description</u>
3/4/08	Adair Co.; KY 80; MP 13.4	Rear end; bridge construction project
7/24/08	Laurel Co.; I 75; MP 49.2	Rear end; stopped due to road construction
10/13/08	Pulaski Co.; US 27; MP 29.4	Angle; did not stop at new intersection
10/29/07	Jefferson Co.; I 265; MP 30.9	Rear end; preparing for moving work zone; police vehicle with emergency lights
10/18/07	Fayette Co.; I 75; MP 115.5	Rear end; stopped due to road construction
10/11/07	Kenton Co.; KY 1829; MP 1.0	Worker hit by construction equipment
9/18/07	Laurel Co.; I 75; MP 50.5	Single vehicle; ran off road
9/1/07	Simpson Co. I 65; MP 6.2	Single vehicle; hit end of barrier
8/1/07	Carroll Co.; US 42; MP 9.2	Overcorrected and hit opposing vehicle
11/21/06	Laurel Co.; I 75; MP 49.1	Rear end; one vehicle stopped
9/14/06	Bullitt Co.; I65; MP 117.8	Worker hit by work vehicle
9/7/06	Lewis Co.; KY 8; MP 36.5	Rear end; stopped vehicles; fog

Fatal Crashes in Work Zones (2006-2007) (continued)

<u>Date</u>	<u>Location</u>	<u>Description</u>
7/4/06	Carter Co.; I 64; MP 179.0	Single vehicle; dropped off shoulder
6/26/06	Boyd Co.; KY 5; MP 3.1	Flagger; lost control when encountered stopped vehicles around curve
6/20/06	Hardin Co.; I 65; MP 85.0	Rear end; stopped due to road construction
5/30/06	Gallatin Co.; I 71; MP 59.2	Sideswipe in taper
1/28/06	Warren Co.; I 65; MP 24.3	Pedestrian (not worker); alcohol

3.4 Work Zone Training

The KyTC policy requires appropriate training for personnel involved in the development, design, implementation, operation, inspection, and enforcement of “work zone related” transportation management and traffic control. To assist in the implementation of this policy, flagger, technician, and supervisor courses were developed by the Technology Transfer Program of the Kentucky Transportation Center. Descriptions of these courses are provided in Appendix B. The class outline and agendas for the three courses are given in Appendices C, D, and E.

These series of courses are known as the Work Zone Traffic Control Employee Qualification Program. The titles of the three courses are: Basic Work Zone Traffic Control and Flagger; Work Zone Traffic Control Technician; and Work Zone Traffic Control Supervisor. All of the courses are one day in length. A test was developed for each course. An individual passing the flagging class is qualified for two years while passing the technician and supervisor classes qualify an individual for five years.

A committee of government and industry personnel was formed which reviewed the contents of the University of Kentucky courses. Through 2008, there have been 14 flagger classes with 327 persons qualified, 37 technician classes with 871 persons qualified, and 20 supervisor classes with 396 persons qualified. The percentage of persons failing the tests was five percent for the flagger class, 14 percent for the technician class, and 10 percent for the supervisor class. A person must pass the test for the technician class before taking the supervisor class. The distribution of individuals taking the flagger class was: 30 percent local government, 26 percent industry, and 44 percent state government. The technician class attendees were: 41 percent industry and 59 percent state government, and under one percent local government. The supervisor class attendees were: one percent local government, 39 percent industry, and 60 percent state government. Other training is provided through the American Traffic Safety Services Association (ATSSA).

For projects meeting the criteria to be classified as significant, an individual qualified as a supervisor must be designated by the contractor as the project traffic coordinator (PTC). The PTC must be present on site when the traffic control is set up, taken down, or changed. A technician can conduct traffic control reviews for maintenance purposes when under the supervision of the supervisor. For unclassified projects, either a supervisor or technician could be designated as the PTC and must be present when the traffic control is set up, taken down, or

changed. An appropriately trained inspector for the Cabinet must be present on each project.

4.0 RECOMMENDATIONS

The following recommendations are made to consider in the implementation the Kentucky Transportation Cabinet's "Policy and Procedures for the Safety and Mobility of Traffic through Work Zones."

1. Designate a District Work Zone Safety Coordinator (DWZSC) for each of Kentucky's 12 highway districts. For maximum effectiveness, this position should be separate from the district safety coordinator position.
2. Prepare an annual summary (by district) from the CRASH database of all reported construction and maintenance crashes (coded on the police report as an environmental factor). This would include a summary by county and route. The crash reports for the "county and route" locations having the highest number of crashes should be reviewed to determine if any patterns can be found. Combine the results from each district to develop a statewide summary. The analysis could be completed by each DWZSC with the results given to the Statewide Work Zone Review Committee (SWZRC) or a statewide analysis could be prepared with the results provided to each district. The SWZRC should include the statewide summary as part of their annual report.
3. The SWZRC should conduct an annual review of all reported fatal crashes in construction/maintenance zones using information about each fatal crash obtained from the DWZSC. The results would be included in their annual report.
4. Each year the DWZSC should select one significant project and one maintenance project in their district for a review by a group of district personnel. The analysis should involve visiting the project and reviewing the traffic control and its adherence to applicable traffic control plans. A review of any crashes within the project should also be included. The review and analyzes will result in a report sent to the SWZRC. Recommendations, using information obtained from each district, should be included in the annual construction evaluation report from the SWZRC using both the CRASH analysis and project monitoring data as input.
5. The training for the work zone supervisor (WZS) should include a section emphasizing the need to coordinate with the appropriate police agencies so that reports for crashes occurring in work zones are obtained as soon as they are available. The training should also include the necessity to document the traffic control in effect when crashes occur. Each WZS and DWZSC should be provided with a camera to document the traffic control in place when a crash occurs.
6. For significant projects, the DWZSC should document the crash history for an approximate three-year period prior to the start of construction. A procedure to quickly obtain copies of crash reports occurring in the work zone should be established in the

pre-construction meeting. This involves coordination with the responsible police agencies. Each crash report should be reviewed with any subsequent changes made in traffic control documented. At the end of the project, the DWZSC should summarize crash data during construction to compare to the before crash history. Recommendations for changes in future work should be made and sent to the SWZRC.

7. Crash data should be collected in work zones not defined as a significant project. Also, a list of crashes occurring during maintenance projects should be obtained from maintenance engineers.
8. The SWZRC should prepare an annual report which contains: a) the statewide CRASH summary and review of fatal crashes, b) the evaluation of the sample of projects from each district (including the site visits), c) before and during crash data at significant projects, and d) a summary of crash data both at projects not defined as significant and at maintenance projects. This information will be obtained using the summary of the information obtained from each DWZSC.
9. An annual meeting of the SWZRC and the DWZSC from each district should be conducted to discuss results from the analysis and evaluations of the previous year.
10. Standard language should be provided in contract proposals to allow liquidated damages if contactors do not respond to identified traffic control problems in a specified time.

Following is a summary of the annual reports which should be prepared by the DWZSC and provided to the SWZRC.

1. Provide an annual summary of all reported construction and maintenance crashes in their district (using the environmental contributing factor codes from CRASH). Develop a table providing a summary by county (with a total for the district) for fatal, injury, and all related crashes in the specific district. Produce another table showing the highest number of construction zone crashes (code 2) for specific counties and routes. An alternative is that this report is prepared on a statewide basis and provided to each DWZSC.
2. For projects defined as significant, provide an annual summary of crashes before and during construction. Review copies of the police report for crashes with construction listed as an environmental factor. Provide recommendations to reduce crashes related to construction activity.
3. Provide a list of crashes occurring at projects not defined as significant and on maintenance projects.
4. Report the results of the review of the selected significant construction project and maintenance project in each district.

Following is a list of other duties which should be performed by the DWZCS.

1. Investigate all fatal crashes in their district in construction or maintenance zones.
2. Work with supervisors, technicians, and the district safety coordinator to document all crashes in construction and maintenance zones.
3. Ensure that all projects have an appropriately trained KyTC supervisor or technician.
4. Ensure that contractors have an appropriately trained employee for each project.
5. Establish communication with police agencies so that crashes in construction and maintenance projects are reported to the KyTC.
6. Communicate with district maintenance engineers so that an annual summary of crashes in maintenance projects are obtained.
7. Maintain access to the CRASH data base so appropriate summaries can be prepared.
8. Review the CRASH data base weekly to determine any newly reported crashes in which construction or maintenance activity was listed as a factor (environmental codes 2 and 9).
9. Attend pre-construction meetings.
10. Communicate with the district safety coordinator concerning traffic control issues and crashes occurring in work zones related to utility and permit work.
11. Conduct random inspections of traffic control at both significant and other projects.

In addition to reviewing crashes in which construction or maintenance activity was listed on the police report, a weekly summary of crashes could be obtained for those coded as occurring at locations where construction is ongoing. To obtain such a summary, a list of all current projects must be maintained with appropriate location information (county; route; beginning and ending milepoints).

To assist the documentation of crashes occurring in a work zone, the following form was developed to summarize information from each crash. The form should be completed as quickly as possible after the crash. The form includes information relating to: the crash location, vehicle information, type of work zone, existing traffic control, crash description, and any recommended action. This form should be used along with the police report to document the crash.

WORK ZONE CRASH DOCUMENTATION REPORT

Date: _____ Investigating Police Agency: _____ Police Report No. _____
 Location: County _____ Route _____ Milepoint _____

Time: _____ Light Condition: _____
Weather Condition: _____ Pavement Condition: _____
Speed Limit: Regulatory _____ Advisory _____

Number of Vehicles: _____
Vehicle 1: Description _____ Direction of Travel: _____
Vehicle 2: Description _____ Direction of Travel: _____
Vehicle 3: Description _____ Direction of Travel: _____

Type of Work Zone: _____ Active Work Zone: Yes ___ No ___
Construction Equipment Involved: Yes ___ No ___ If yes, describe: _____
Construction Worker Involved: Yes ___ No ___ If yes, describe: _____
Traffic Control Device Contacted: Yes ___ No ___ If yes, describe: _____
Flagging Operation: Yes ___ No ___ If yes, type: _____

Location of Crash: Advance Warning Area: _____
Transition Area: _____
Activity Area: _____
Location of Area of Impact to Reference Point: _____

Description of Traffic Control Devices (Attach Diagram):

Signs: _____

Channelization: _____

Pavement Markings _____
Flashing Arrow: _____
Variable Message Signs: _____
Signals: _____
Other: _____

Brief Description of Crash: _____

Date of Last Inspection of Traffic Control: _____ Inspector: _____

Investigator: _____ Photographs: Yes ___ No ___ Date: _____

5.0 REFERENCES

1. "Implementing the Rule on Work Zone Safety and Mobility," Federal Highway Administration, FHWA-HOP-05-065, September 2005.
2. "Work Zone Public Information and Outreach Strategies," Federal Highway Administration, FHWA-HOP-05-067, November 2005.
3. "Developing and Implementing Transportation Management Plans for Work Zones," Federal Highway Administration, FHWA-HOP-05-066, December 2005.
4. "Work Zone Impacts Assessment: An Approach to Assess and Manage Work Zone Safety and Mobility Impacts of Road Projects," FHWA-HOP-05-068, May 2006.
5. Maze, T., Burchett, G. and Hochstein, J.; "Synthesis of Procedures to Forecast and Monitor Work Zone Safety and Mobility Impacts," The Center for Transportation Research and Education, November 2005.

APPENDIX A.

KENTUCKY TRANSPORTATION CABINET

POLICY AND PROCEDURES FOR THE SAFETY AND MOBILITY
OF TRAFFIC THROUGH WORK ZONES

KENTUCKY TRANSPORTATION CABINET

**POLICY AND PROCEDURES FOR THE SAFETY AND MOBILITY OF TRAFFIC
THROUGH WORK ZONES.**

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V. IMPLEMENTATION

I. DEFINITIONS

Whenever the following terms or abbreviations (or pronouns in place of them) are used in the document, the intent and meaning shall be interpreted as follows:

TRANSPORTATION ENGINEERING BRANCH MANAGER --- The engineer who is directly responsible through the Chief District Engineer or Division Director of the Department of Highways on all matters relating to activities of the division that is being supervised by the individual.

CONTRACTOR --- The individual, partnership, firms, corporation, or any acceptable combination thereof or joint venture contracting with the Cabinet for performance of prescribed work.

CABINET --- The Kentucky Transportation Cabinet.

DISTRICT --- An organization of the Cabinet in a geographical area of the state charged with all functions of the Cabinet as related to its respective area.

DISTRICT WORK ZONE SAFETY COORDINATOR --- The individual in the district responsible for coordinating activities related to work zone safety and mobility on all construction and maintenance projects.

CHIEF DISTRICT ENGINEER (EXECUTIVE DIRECTOR) --- The engineer in charge of a designated district of the Cabinet.

FHWA --- Federal Highway Administration.

MUTCD --- Manual on Uniform Traffic Control Devices for Streets and Highways.

PS&E --- The Plans, Specifications and Estimates assembly necessary for a contract letting.

PROJECT --- The specific section of the highway, including approaches, together with all appurtenances and construction to be performed under the contract.

PROJECT ENGINEER --- The engineer in charge of a designated project.

PROJECT TRAFFIC COORDINATOR (PTC) --- The person designated to be responsible for reviewing traffic control on a particular project.

RESIDENT ENGINEER --- The engineer in charge of the construction phase of a particular

project

SECRETARY --- The Secretary of the Kentucky Transportation Cabinet.

STATE --- The Commonwealth of Kentucky.

STATE HIGHWAY ENGINEER --- The State Highway Engineer of the Cabinet acting directly or through an authorized representative.

STATEWIDE WORK ZONE REVIEW COMMITTEE --- A committee established by the State Highway Engineer to be responsible for reviewing, revising, and overseeing the Cabinet's Traffic Control Policies and Procedures.

TEMPORARY TRAFFIC CONTROL PLAN (TTCP)--- A plan for handling traffic through a specific highway or street work zone.

TRANSPORTATION MANAGEMENT PLAN --- A set of coordinated strategies and an implementation plan for managing the work zone impacts of a project.

II. POLICY FOR TRAFFIC MANAGEMENT PLAN

It is the goal of the KYTC and the FHWA that the construction and maintenance work zones of the Commonwealth of Kentucky be designed, implemented, and maintained to provide a safe and efficient environment for workers and the traveling public. While providing a safe environment, significant effort will be made to ensure a minimum delay to the traveling public. The safety and mobility provided by the work zones will be evaluated both in the design and construction phases of the project. An annual system wide evaluation will be conducted to identify process improvements that can be implemented in work zones.

In defining procedures for determining the extent of planning, design, and operational activities required for an individual project to meet the KYTC's policy, a determination will be made, in the planning stages, whether a project is designated as either significant or other.

III. PROCEDURES

PRECONSTRUCTION

PROJECT CLASSIFICATION

Significant Projects shall be:

1. Any interstate system project which is anticipated to occupy a location for more than 3 days.
2. Any project on any multilane roadway which is anticipated to occupy a location for more than 3 days where the existing directional DHV is over 1000 vehicles per hour, per lane, that would close a lane during the peak hours.
3. Any project on a 2 lane roadway which is anticipated to occupy a location for more than 3 days where the existing DHV (both directions) is over 1000 vehicles per hour that would close a lane during the peak hours.
4. Any project on the Interstate or National Highway System that would involve a detour.

All projects not meeting the aforementioned requirements shall be referred to as other projects.

For significant projects, a Transportation Management Plan (TMP) shall be developed that details a strategy to manage the work zone impacts. The TMP will include a Temporary Traffic Control Plan (TTCP) and a Public Information Plan (PIP). TMPs for significant projects shall also be developed consistent with the Traffic Impact Guidelines listed below. For all other projects, the TMP will only consist of a TTCP unless the Project Team determines that a Public Information Plan is necessary.

The approval of the TMP will be the responsibility of the Project Development Team (PDT). The Project Manager and the District Branch Managers for Construction and Traffic shall approve and sign the TMP. The FHWA shall approve and sign the TMP for federally-funded interstate or other full oversight projects. The TMP must be approved by the time final plans are sent to the Plan Processing Section. A copy of the approved TMP will be retained in the project files by the District, with a copy transmitted to the Location Engineer in Central Office Design.

For other projects, not identified as significant, such as routine surfacing, bridge deck overlays, pavement marker installations, etc., for which the proposal is the only bidding document developed for the specific project, a TTCP shall be developed and approved by the Division in charge of managing the project.

TEMPORARY TRAFFIC CONTROL PLAN (TTCP)

The Temporary Traffic Control Plan may range in scope from being very detailed, designed

solely for a specific project, to referencing any number of specified documents. The degree of detail in a TTCP will depend on the project complexity and the relationship of traffic with the construction activities. When necessary, the TTCP shall include the specific phasing required for the particular project. Drawings and notes shall be developed and placed on traffic control sheets within the plans.

To assure consideration is given to traffic control from the inception of design activities, the proposed concept for traffic control shall be discussed at the preliminary line and grade inspection with appropriate notation included in the inspection report. The designer responsible for plan preparation shall expand on the concept recommended at the preliminary line and grade inspection, with the compilation of a detailed suggested sequence of construction. This is to be reviewed at the time of the final joint inspection.

The scope of the TTCP shall be determined at the time of the final joint inspection once the sequence of construction is considered firm. The TTCP will be developed using the Standard Specifications and Standard Drawings as a basis. Only those requirements not provided in the Standard Specifications required for maintaining and controlling traffic are to be written into the TTCP. The TTCP will clearly indicate all required phasing, methods of traffic control, and any time or construction limitations that will be placed on the contractor. Attention shall be given to developing strategies that will limit impact to the traveling public. As much as possible, the existing number of lanes shall be maintained throughout a construction project, particularly on the interstates and other major routes. Where it is determined that lane restrictions are necessary, assuring limited closures must be a primary consideration. Considerations for these decisions will include restricting work during peak periods of traffic flow on the route and demanding the use of nighttime construction. The TTCP shall also take into account other adjacent roadway sections that may be under construction and avoid conflict between competing phases of adjacent projects.

In developing a TTCP the following traffic impact guidelines shall be utilized:

Interstate Projects:

- a. Expected queue length due to lane closures shall be analyzed and should not exceed 3 miles more than what would normally be expected without the construction project.
- b. Total closures of an interstate segment should not be considered unless there is an interstate detour available that can safely accommodate the expected increased traffic.
- c. User costs shall be analyzed and the use of incentives/disincentives to encourage timely completion of the total project or critical phases should be considered.

Non-Interstate Projects:

- d. Expected queue length due to lane closures shall be analyzed and should not exceed 3 miles more than what would normally be expected without the construction project.
- e. Total closures of a segment should not be considered unless there is a detour available that can handle the expected increased traffic. Alternate travel routing should not exceed 10 miles.

In developing and implementing the TTCP, it is required that pre-existing roadside safety hardware be maintained at an equivalent or better level than existed prior to project implementation.

PUBLIC INFORMATION PLAN

On significant projects, the project team shall formulate a Public Information Plan that shall identify communication strategies that will be used to inform the affected road users, the general public, area residences, businesses, and appropriate public entities about the work zone traffic control measures of the project. The District's public information officer shall be included on the project teams for significant projects. Public Information should be provided through methods best suited for the project, and may include information on the project characteristics, expected impacts, closure details, and commuter alternatives. Some of the methods to be considered include public meetings, media stories or ads, web sites, highway advisory radio, changeable message signs, 511 messages, printed material at selected sites, rest area kiosks, etc. The Public Information Plan shall be implemented by Cabinet personnel, by hiring a public relations consultant, or by making it a part of the construction contract.

TRAINING

The Cabinet's training program will require appropriate training for personnel involved in the development, design, implementation, operation, inspection, and enforcement of work zone related transportation management and traffic control. This includes transportation planners, design engineers, traffic and safety engineers, construction project staff, and maintenance staff. In addition, because the KYTC contracts a significant portion of work to consultants, the Cabinet will require that appropriate consultant and contractor staff undergo the work zone traffic management training in order to obtain pre-qualification status. The Cabinet will require certification for certain personnel, such as flaggers and traffic control supervisors. For engineering consultant contracts, the Cabinet will identify needs and requirements through the proposal or consultant procurement process. For construction contracts, the Cabinet shall impose requirements through contract provisions. All designers, whether state employees or consultants, who are involved in the development or design of a project TTCP shall have completed an approved training course in work zone traffic control within the last 5 years. The Statewide Work Zone Review Committee will be the approval authority for these courses.

PROJECT IMPLEMENTATION

CONSTRUCTION

Each administrative District shall identify an individual as the District Work Zone Safety Coordinator. This individual will be responsible for coordinating the monitoring and reporting of all activities related to the safety and mobility of traffic through work zones in the district. As outlined in the Construction Guidance Manual, the Project Engineer, and other interested parties, shall review, discuss, and plan for traffic control at the pre-construction conference. Inspections required by the guidance manual shall be documented daily on the daily work report.

After a project is placed under contract, the contractor may be permitted to develop his own TTCP to be used in lieu of the TTCP provided in the construction plans. The contractor's plans will be approved for use only if the Cabinet and FHWA, if applicable, find that his plan is as good as, or better, than the plan provided in the construction plans. The contractor may also be permitted to offer a revision, for approval, to any portion of the existing TTCP. To receive approval for major changes to the TTCP, the contractor must submit his detailed alternate plan or revision to the Project Engineer. Depending on the complexity of the requested revision, the major change may be processed as a construction revision, change order, or other document satisfying the condition of written approval. Any major change or alternate TTCP must submit to the same level of traffic impact analysis as was required for the initial TMP. The contractor will not be permitted to implement any part of his alternate plan or revision until he has received written approval from the Cabinet. All major revisions to a project's TTCP shall be reviewed by the initial signers to the subject Plan before any revision is implemented. Minor changes may be approved and appropriately documented by the Project Engineer for immediate implementation as he or she deems necessary. The initiation of any change order that affects the flow of traffic through the project shall require a review and possible modification of the current TTCP. For each project, the Cabinet and the contractor must each designate a Project Traffic Coordinator who has the primary responsibility and sufficient authority for implementing the TMP and other safety and mobility aspects of the project. Both positions shall be established at the Preconstruction Meeting. Both the Cabinet's and the contractor's designated Project Traffic Coordinator shall be certified as a Work Zone Supervisor. Work Zone Supervisor Certification and Flagger Certification programs will be made a part of the standard specifications.

CRASH/SAFETY MONITORING

CONSTRUCTION PROJECTS

The Project Engineer shall be responsible for monitoring the crash history for work zones on construction projects. The Project Engineer may delegate this authority as necessary.

The Project Engineer shall review the existing traffic control if he/she becomes aware of a crash within a work zone on any project. This includes any collisions which may occur upstream of the work zone that are likely caused by features of the downstream work zone. When requested by the Project Engineer, the District Branch Manager for Traffic shall assist in this review. A written report of this analysis and any recommendations shall be sent to the District Branch Manager for Construction and the District's Work Zone Safety Coordinator. On all construction projects, the District's Work Zone Safety Coordinator (DWZSC) shall maintain a list of all reported crashes. The DWZSC shall locate and retain copies of crash reports for all work zone collisions and shall provide copies of the reports to the Project Engineer when necessary.

On significant projects, the Work Zone Safety Coordinator shall search for crash records of unreported collisions. These records can normally be found by routinely reviewing crash data for roadways under construction. These collisions shall be included on the overall list of project collisions, and crash records shall be retained.

MAINTENANCE PROJECTS

Maintenance Engineers shall be responsible for monitoring the crash history for work zones on maintenance projects conducted by state forces. The Maintenance Engineer may delegate this authority as necessary. The Maintenance Engineer shall review the existing traffic control if he/she becomes aware of a traffic crash within a work zone on any project. This includes any collisions which may occur upstream of the work zone that are likely caused by features (such as vehicle queuing) of the downstream work zone. A written report of this analysis and any recommendations shall be sent to the District Branch Manager for Operations and the DWZSC.

On all maintenance projects, the DWZSC shall maintain a list of all reported crashes. The Work Zone Safety Coordinator shall locate/retain copies of crash reports for all work zone collisions and shall provide copies of the reports to the Maintenance Engineer when necessary.

IV. PERFORMANCE ASSESSMENT

STATEWIDE WORK ZONE TRAFFIC REVIEW COMMITTEE

The Cabinet shall perform an annual process review to assess the effectiveness of the work zone safety and mobility procedures. The State Highway Engineer shall appoint a Statewide Work Zone Traffic Review Committee consisting of representatives of the Divisions of Construction, Traffic Operations, Maintenance, and Highway Design. The representative of the Division of Construction shall serve as the chairman of the review team and be responsible for organizing the team, scheduling the reviews, and reporting the results. This committee shall annually review randomly selected projects throughout the

State for the purpose of assessing the effectiveness of the procedures included in this document. The committee will review projects in at least six districts per year, trying to visit at least one significant project and one other type project in each district. Reviews shall include projects that represent a range of characteristics, such as day and night work; type of work being done; duration of the project; local traffic characteristics; and/or transportation management strategies used.

On all scheduled reviews, the following persons should accompany the review team and provide appropriate input:

- FHWA representative
- District Branch Manager for Construction
- Project Manager
- District Branch Manager for Traffic
- Branch Manager for Preconstruction
- Cabinet's Traffic Control Coordinator
- Contractor's Traffic Control Coordinator
- District Work Zone Safety Coordinator

On each project the committee shall also review the design process. This review may include, but not be limited to, such items as:

- Was the project properly classified as a significant or other project?
- Was the TMP plan approved by the required parties? Was it approved at the proper time?
- On significant projects, were queue length analysis and user costs considered in preparing the TMP?
- On significant projects, what Public Information items were included in the TMP and how were they implemented?
- If detours were involved, how were they analyzed to assure that the traffic could be accommodated?

At the end of each year, this committee shall also review the Project Engineers' Summary Reports for the significant projects statewide and be responsible for recommending revisions to this document when determined appropriate. Other procedural items, including any required training for work zones, should also be addressed by this committee.

The Cabinet will also complete an annual work zone performance assessment that will review incidents in the work zones.

By March 31 of each year, the District Work Zone Safety Coordinator shall submit a written report to the Central Office Division of Construction regarding the safety performance of work zones on construction/maintenance projects that have been completed within the

previous year. As a minimum, the report should include a collision summary and copies of the associated crash reports. The collision summary shall include (as a minimum): master file (crash report) number, county, roadway number, milepoint, collision date, collision time, # units involved, number of fatalities, number of injuries, road condition, and type of collision (such as sideswipe, run-off-road, fixed object, etc.).

The Division of Construction, in conjunction with the Statewide Work Zone Review Committee, will use these annual reports to evaluate the effectiveness of work zone traffic control. Based on this review, the division shall prepare a report recommending modifications to statewide traffic control and traffic management strategies. This report will be forwarded to the State Highway Engineer and Federal Highway Administration by May 31 of each year.

V. IMPLEMENTATION

Any project developed in the normal design process that has not progressed past the final joint inspection stage by the approval date of this document shall have an approved TMP before it is let to construction. Projects that have had a final joint inspection before the approval date of this document can be let to construction under the existing requirements if they are let by April 1, 2008. If the letting date is after April 1, 2008, a TMP shall be prepared and approved. Any other type project that may be developed under an abbreviated design process (such projects could include resurfacing, rehabilitation, signing, lighting, etc.) which are let after Oct. 1 2007 shall have an approved TMP. All designers that are involved in the development or design of work zone transportation management and traffic control, whether consultant or state employees, shall have attended an approved training course by January 1, 2008. The Work Zone Traffic Control Supervisors Certification and Flagger Certification requirements shall be incorporated into the specifications for projects let after Oct. 1, 2007.

APPENDIX B.
DESCRIPTION OF TRAINING COURSES



UNIVERSITY OF KENTUCKY
Kentucky Transportation Center
Technology Transfer Program

Work Zone Traffic Control Employee Qualification Program
Presented by: Technology Transfer Program, Kentucky
Transportation Center, University of Kentucky

The Kentucky Transportation Cabinet recently issued a policy and procedure for safe mobility through work zones with a primary goal of reducing crashes and injuries in and around highway work zones; as well as providing a safe and efficient environment for workers. Nationally, the Federal Highway Administration has brought renewed attention to this need by making changes to the regulations which govern work zone safety. With funding provided by the Kentucky Transportation Cabinet, the Technology Transfer Program has developed a series of courses aimed at qualifying workers under the Cabinet's new policy. This series, known as the Work Zone Traffic Control Employee Qualification Program, includes three courses: Basic Work Zone Traffic Control and Flagger; Work Zone Traffic Control Technician, and Work Zone Traffic Control Supervisor.

COURSE DESCRIPTIONS

Basic Work Zone Traffic Control and Flagger: This course is intended for individuals who perform flagging and temporary traffic control activities on Kentucky's roadways. Individuals seeking qualification as Traffic Control Technicians and Supervisors are encouraged to take this course prior to taking the Technician and Supervisor Courses. This training session includes lectures, videos, and hands-on exercises to present the following: proper use of personal protective equipment, work zone components and types of operations; flagging procedures, proper and improper flagging operations, as well as communicating with workers and the public. *Individuals performing flagging operations on any Kentucky roadway must be qualified and certified by the Kentucky Transportation Cabinet every two years.*

Work Zone Traffic Control Technician: This course is intended for individuals working for governmental agencies, utilities, and private industry who place, monitor, and maintain traffic control devices on public roadways in Kentucky. Included in the curriculum are concepts, techniques; and practices in the installation and maintenance of traffic control devices. Tort liability and risk management are discussed, as well as recognition and identification of deficiencies during the course of a construction or maintenance project. The principal course text is the *Manual on Uniform Traffic Control Devices (MUTCD)*. Individuals seeking qualification as Work Zone Traffic Control Technicians are encouraged to take the Basic Work Zone Traffic Control and Flagger Course prior to taking this Technician Course. This course is a prerequisite for the Work Zone Traffic Control Supervisor Course. *Technicians must be qualified through training and testing and certified by the Kentucky Transportation Cabinet every five years.*

Work Zone Traffic Control Supervisor: This course is intended for individuals who supervise traffic control technicians and other field personnel and who are responsible for implementing the Traffic Control Plan. It provides comprehensive training on work zone standards, guidelines, installation and removal procedures, inspection, and documentation. Students are taught how to read and interpret traffic control plans for implementation in the field, and how to correct and document deficiencies. The course expands on the concepts and techniques taught in the Traffic Control Technician Course, which is a prerequisite for the supervisor training. *Supervisors must be qualified through training and testing every five years.*

TESTING

At the conclusion of each one-day training course, a written exam will be offered to those individuals who have attended the entire course. Estimated completion time for the exam is one hour. To qualify in each category, an individual must correctly answer 80 percent of the questions. Should an individual fail the exam, he/she may re-take the exam one time. Should the individual fail the exam twice, he/she will be required to re-take the training course prior to testing again. Students will be notified of pass/fail within ten business days. A roster of individuals successfully completing the course and passing the exam will be provided to the Transportation Cabinet within ten business days of completion of the testing.

REGISTRATION AND ADDITIONAL INFORMATION

The fee for the Flagger Course is \$75 for local agency employees and \$85 for all other participants. The fees for both the Technician and Supervisor Courses are \$150 per participant per course. The course fees include materials, lunch, and breaks. If it is necessary to retake the exam, the individual may take it at the next available class without additional fee. If the individual fails the test a second time, the individual must retake the entire course and pay the full registration fee prior to testing again. Fees must be received prior to training and testing, with the exception of Kentucky Transportation Cabinet employees and Cabinet District employees. Kentucky Transportation Cabinet Central Office personnel must have the approval of their Division Directors. Cabinet District Employees must register through their District Training Coordinator.

Registration is limited to 30 individuals on a first-come basis.

APPENDIX C.
BASIC WORK ZONE TRAFFIC CONTROL AND FLAGGER
CLASS OUTLINE

Basic Work Zone Traffic Control and Flagger Course

UK Transportation Center Technology Transfer Program

Instructor Agenda with Notes

8:30 a.m. INTRODUCTION (15 minutes)

1. Coordinator welcomes & introduces speaker
2. Instructor asks students to introduce themselves to include where the students are from and their basic job responsibilities
3. Instructor explains the purpose of workshop: How many people are killed in work zones each year? Renewed interest at all levels in eliminating these deaths.
 - a. FHWA Report: With nearly a 40% increase in work zone fatalities between 1997 and 2005, work zone safety is a growing roadway safety concern. In 2005, there were 1,074 work zone fatalities; this figure represents 2.5% of all roadway fatalities for the year. Over four out of every five-work zone fatalities were motorists. In all, in 2004, there were an estimated 115,000 (1.3% increase from 2003) work zone crashes and an estimated 49,620 (a 2.1% increase from 2003) people were injured in work zone crashes (1.8% of all roadway injuries). This is one work zone fatality every 8.2 hours (3 a day) and one work zone injury every 9 minutes (160 a day).
4. Give an overview of the Work Zone Traffic Control Employee Qualification Training Program: The Technology Transfer Program has developed and is delivering three levels of training and qualification, flagger, traffic control technician and traffic control supervisor. The purpose of the training program is to assist highway contractors, consultants, utility companies and governmental workers in complying with the Cabinet's Policy and Procedures
5. Explain the Role of the Flagger – to protect the motoring public and the crew.
6. Review a case study of an accident occurring in a work zone. Participants need to understand their responsibility on the site, for the safety of the crew and motoring public.
7. Review acronyms. Ask for participants to raise hand if they know the answer before proceeding.

8:45 a.m. POLICY AND PROCEDURE OF KyTC (10 minutes)

1. Explain the Cabinet's Policy and Procedures and how they came about because of a new federal regulation that went into effect October 12, 2007
2. Show a copy of the Cabinet's policy and explain the basics of the document. Copies are available.

8:55 a.m. MANUAL ON UNIFORM TRAFFIC CONTROL –
MUTCD (15 minutes)

1. What it is? How it was developed? Explain that the Commonwealth of KY has adopted the MUTCD as law. Every state must have a WZTC law and some are even stricter than MUTCD, but all MUST meet MUTCD. This document is available online at <http://mutcd.fhwa.dot.gov/>.
2. The Flagging Handbook follows the MUTCD and is a handout in the participant's packet.
3. The Kentucky Transportation Cabinet has created the Employee Safety and Health Manual that covers job safety and traffic control. Chapter 16 covers "Jobsite Safety and Traffic Control." It includes signs and cones, flagging procedures, typical jobs where flaggers are needed and when they are not.
4. The Kentucky Transportation Center has created pocket manuals in accordance with the MUTCD as helpful tools in maintaining work zones. They are *Guidelines for Traffic Control in Work Zones* and *Guidelines for Traffic Control in Short Duration / Mobile Work Zones*.

9:10 a.m. PERSONAL PROTECTION EQUIPMENT (20 minutes)

1. Have examples on site to show students the proper equipment to have while flagging.
 - a. Examples of attire are Class II and Class III vests, shirts and hats.
 - b. Explain that a hat is required to be worn by Cabinet employees.
2. Explain the difference between Class II and Class III and between daytime and nighttime clothing.

9:30 a.m. WORK ZONE TRAFFIC CONTROL COMPONENTS (30 minutes)

1. Two handouts will be given to participants that show the component parts of a temporary traffic control zone. One handout will be for two lanes of four lane road and the other will be a two lane road. (Page 4 of the WZ Guideline)
2. Instructor will explain the zones and where the flagger will be placed on the layout.
3. Instructor will give options of how a flagger can alert coworkers of errant driver and explain an escape route for the flagger.

10:00 a.m. BREAK (15 minutes)

10:15 a.m. FLAGGER LOCATIONS (15 minutes)

1. Instructor will explain the flagger locations.

- a. Standing on the Shoulders
- b. Flagger/Motorist Visibility
- c. Standing in a Clear Area

10:30 a.m. FLAGGER PROCEDURES / SIGNALS (15 minutes)

1. Instructor will explain and display the proper equipment to have onsite to include a STOP/SLOW Paddle that is 18 in. x 18 in. and a 24 in. x 24 in. square red flag for emergency flagging.
2. Instructor will show different signals and demonstrate them to include hand signals and where the flagger should stand including different situations.
3. Instructor will ask for a class volunteer to demonstrate the different signals

10:45 a.m. FLAGGING OPERATION (30 minutes)

1. The instructor will explain specific flagging operations.
 - a. Single-Flagger Operation
 - b. Two-Flagger Operation
 - c. Pilot Car Escort
 - d. Nighttime Flagging
 - e. One- Direction Control
 - f. Emergency Flagging

11:15 a.m. VIDEO (15 minutes)

1. Flagging Operations and Procedures from the Institute for Transportation Research and Education from North Carolina State University.

11:45 a.m. LUNCH (45 minutes)

12:30 p.m. HANDS-ON FLAGGER EXERCISES (45 minutes)

1. Instructor will split the group into five groups (depending on size of class) to work on hands-on flagger exercises. Each group will work five different scenarios while the instructor walks around the class to offer suggestions of improvement.
2. Instructor will then have each group present one scenario to the class.

1:45 p.m. FLAGGING DO'S AND DON'TS (15 minutes)

1. Proper attire
2. Use of cell phones, headphones
3. Communicating with public
4. Breaks

2:00 p.m. Q & A (15 minutes)

2:15 p.m. BREAK (15 minutes)

2:30 p.m. TEST (60 minutes)

1. There is a twenty question test with an hour to take the test. 80% or more is passing.

APPENDIX D.
WORK ZONE TRAFFIC CONTROL TECHNICIAN
CLASS AGENDA

Work Zone Traffic Control Technician

Agenda

- 8:30 a.m. Introduction
- 9:00 a.m. General Terms and Procedures
- 9:30 a.m. Traffic Control Devices
- 10:15 a.m. *Break*
- 10:30 a.m. Flagging
- 11:15 a.m. Traffic Control Zones
- 12:00 p.m. *Lunch*
- 12:45 p.m. How to Read and Interpret Work Zone Plans
- 1:15 p.m. Hands-on Work Zone Layout
- 2:00 p.m. *Break*
- 2:15 p.m. Video
- 2:30 p.m. Liability Issues
- 3:00 p.m. Questions and Answers
- 3:15 p.m. *Break*
- 3:30 p.m. Test
- 4:30 p.m. *Adjourn*

APPENDIX E.
WORK ZONE TRAFFIC CONTROL SUPERVISOR
CLASS AGENDA

Work Zone Traffic Control Supervisor

Agenda

- 8:30 a.m. Introduction to FHWA work zone safety and mobility requirements, Cabinet's Policy and Procedures, the WZTC Employee Qualification Training Program and the MUTCD and the Cabinet's Standard Drawings and Specifications
- 9:00 a.m. Fundamental Principles of Temporary Traffic Control
- 9:30 a.m. Traffic Control Devices
- 10:15 a.m. *Break*
- 10:30 a.m. Traffic Control Zones, Safety Considerations and Different Tapers and Participant Activity on Tapers
- 11:00 a.m. Participant Activity on Reading Plans and Making Corrections; Inspecting and Evaluating Work Zones
- 11:45 p.m. *Lunch*
- 12:30 p.m. Work Duration and Location of Work; Participant Activity on Development of a Traffic Control Plan
- 1:30 p.m. Other Work Zone Considerations to include Mobile Operations, Nighttime Work, Railroad Crossings, Selecting Qualified Flaggers and Procedures, Automated Flagger, Pedestrians and Bicyclists, and Public Information
- 2:00 p.m. *Break*
- 2:15 p.m. Legal Liability Video
- 2:30 p.m. Liability Issues to include Sovereign Immunity, Protection from Liability, Cabinet Policy and Procedure with focus on Work Zone Crashes, and Cases Studies
- 3:00 p.m. Question and Answer
- 3:15 p.m. *Break*
- 3:30 p.m. Test

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