EVALUATION OF PILOT PROJECT: EMERGENCY TRAFFIC CONTROL FOR RESPONDERS
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Evaluation of Pilot Project: Emergency Traffic Control for Responders

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U. S. Department of Transportation

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Abstract

Traffic control is an essential component of incident response in order to move road users safely and expeditiously past or around a traffic incident, and to reduce the likelihood of secondary crashes. Emergency responders, with the exception of law enforcement, are provided limited or no training in traffic control, but by nature of their job often have to perform such duties. There is a need to provide basic knowledge and equipment to on-scene responders in order to reduce traffic delays, secondary crashes, and injuries to those involved in response activities. This report summarizes the results of a pilot project where local fire departments were provided with emergency traffic control equipment and training. The objective was to determine if the equipment would be sufficiently utilized and to summarize the benefits of the use of the equipment by responders.
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EXECUTIVE SUMMARY

Effective traffic control for incidents is an essential part of a good incident management program. Proper traffic control provides for a safer working environment for responders and also provides for adequate warning to oncoming motorists. Unfortunately, many if not most emergency responders have very little, if any training in proper traffic control techniques. In addition, most do not have quick access to the equipment that would be beneficial for effective traffic control.

Kentucky’s statewide Incident Management Task Force recognized the need to provide better training and resources to emergency responders for traffic control and sought ways to fund training and equipment for responders. In the spring of 2009, the Kentucky Transportation Cabinet (KYTC) and the Federal Highway Administration (FHWA) announced that they would fund a $100,000 pilot project providing emergency traffic control equipment and training to specific fire departments in Kentucky. Key interstate corridors were identified by the KYTC and the FHWA for inclusion in this pilot project. Those corridors were primarily chosen based on volume of traffic, number of incidents, and the presence of a local incident management team. Corridors included in the pilot project were:

- I-65: Bullitt County to the Tennessee line
- I-75: Rockcastle and Laurel Counties
- I-64: Franklin, Shelby and Carter Counties
- I-24: Livingston, McCracken, Lyon and Trigg Counties

The KYTC then worked with the Kentucky Fire Commission to identify fire departments for each of these segments of interstates. Any fire department that responded to these segments was eligible to participate. Departments who agreed to participate had to first receive a four hour training course entitled, “Emergency Traffic Control for Responders”. This training was developed specifically for Kentucky’s emergency responders and outlined proper traffic control at an incident scene based on the Manual on Uniform Traffic Control Devices (MUTCD). Departments were also offered another course to supplement their training entitled, “Highway Crash Site Management”. Both courses were delivered by the Kentucky Fire Commission and continue to be made available to all responders. Participating fire departments also had to agree to assist with the evaluation of the pilot project. In all, 33 departments participated in the pilot project.

Once trained on the proper procedures, the fire departments received their emergency traffic control kit. Each kit included:

- Ten safety vests,
- Two flagger paddles,
- Eighteen traffic cones (three sets of six, each contained in a tote), and
- Six advanced warning signs (two “Emergency Scene Ahead”, two “Be Prepared to Stop”, and two flagger (symbol) flags) in carrier bags.
The pilot project began on January 1, 2010 and ended on December 31, 2010. The purpose of the evaluation was to determine if the equipment would be sufficiently used by the fire departments and to identify the benefits obtained by utilizing the equipment. Data collection occurred in several forms, including: equipment use log sheets; online surveys; interviews with fire departments and other agencies as needed; and analysis of Kentucky’s CRASH database. The findings of the pilot project evaluation showed great disparity across fire departments on how often the equipment was utilized. Some used the equipment on nearly every run while three departments did not report any use of the equipment at all. Some of this seemed to be related to their familiarity and comfort-level with the equipment. Departments that already had some exposure to the use of this equipment were typically the ones who used it more often. This was also true on the other end of the spectrum. It is also expected that the use of the equipment was not always reported, and that some departments had more difficulty reporting use due to manpower and resource issues. In addition, some fire departments had much more opportunity to utilize the equipment than others. Of the equipment provided, the most utilized items (in order) were: vests, cones, advanced warning signs, and paddles. When looking at all departments, there was an overall trend of increased use of the equipment over the one year pilot period.

Issues with utilizing the equipment that were identified early on in the pilot project were finding space on their vehicles to store the equipment and having the manpower to properly deploy the equipment when necessary. Some departments worked through these issues as the pilot project progressed by storing equipment on more than one vehicle or by working with neighboring fire departments to assist each other with traffic control. Others were plagued with these problems throughout the pilot project and did not find solutions.

Additional surveys showed that equipment was utilized on various types of incidents, and that fire departments did not generally have any problems deploying the equipment. They did not feel like it increased their time on scene and they did continue to request assistance with traffic control if they were going to be on scene for an extended period of time. In general, the fire departments deploying the equipment felt like the equipment created a safer working environment, improved visibility for responders, and improved notification to motorists. Other responding agencies on scene when the equipment was utilized also responded that they felt the equipment had created a safer working environment, had improved visibility for responders, and had improved notification to motorists. Other responding agencies on scene indicated that time on scene may have been increased as a result of utilizing the equipment.

At the end of the pilot project, the fire departments were asked a series of questions about their experience with the equipment. Almost every department responded that the kits provided were sufficient for their needs. The most beneficial equipment identified (in order) was the: advanced warning signs, vests, cones, and paddles. The most critical issues identified (in order) were: lack of man-power to deploy equipment; limited time to deploy equipment; limited storage space for equipment, and lack of procedures in place to routinely utilize the equipment. All departments responding to the survey stated they would continue to utilize the kits and nearly half stated that they would purchase additional equipment. More than half of the departments also stated that
they had changed some of their policies and procedures as a result of participating in the pilot project.

As a result of the pilot project, the following recommendations were made with regard to training and equipment:

- All fire departments should be trained in Emergency Traffic Control (ETC) and roadway scene safety.
- Other responding agencies (besides just fire departments) should be trained in the basics of ETC and roadway scene safety.
- A refresher course highlighting key points from the Emergency Traffic Control for Responders training course should be provided to all fire departments participating in the pilot project.
- The current training course should be enhanced to provide a better learning experience and more valuable resources to participants.
- Within the training sessions, more time should be spent emphasizing the importance of using the equipment.
- Encourage mutual aid between fire departments; especially volunteer departments who may not be adequately staffed to deploy the equipment.
- All fire departments should obtain a minimal amount of ETC equipment to improve safety at the scene of an incident.
- If possible, KYTC and FHWA should continue providing grant opportunities to fire departments for ETC equipment.
- If space allows, the equipment kits should be supplemented with:
  - Diversion signs and lane change signs
  - Additional cones
- Public safety five-point break-away vests should replace the three-point breakaway vests that were provided in the original kits.
- Mark storage bags accordingly to make the signs more easily identifiable in emergency situations.
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CHAPTER ONE

INTRODUCTION

Traffic control is an essential component of incident management in order to move road users safely and expeditiously past or around a traffic incident, and to reduce the likelihood of secondary crashes. Emergency responders, with the exception of law enforcement, are typically provided limited to no training in traffic control, but by nature of their job often have to perform such duties. First responders must often work in the roadway or alongside the roadway with no formally established traffic control. Agencies such as the Kentucky Transportation Cabinet (KYTC) that have been adequately trained in traffic control and have traffic control equipment on-hand may also respond to the scene, but their response may come an hour or two after the initial response. During this period, and for short or mid-term incidents that are managed without the assistance of the KYTC, emergency responders need adequate training and resources to perform traffic control. This basic knowledge and equipment is essential to prevent secondary crashes, reduce injuries to responders, and reduce traffic delays.

1.1 Background

In October of 2006, the Kentucky Transportation Center (KTC) completed the development of curriculum entitled, “Emergency Responder Traffic Control Training” on behalf of the KYTC. This training followed the guidelines established for temporary traffic control in emergency situations outlined in the Manual on Uniform Traffic Control Devices (MUTCD). The purpose of the training was to enhance public and responder safety by establishing guidelines for safe traffic flow at highway crashes.

Though the training was publically available, there was no clear way to get this training to the responders. Various agencies showed interest in the curriculum, but there was not wide spread distribution of the material. Kentucky’s statewide Incident Management Task Force recognized the problem, and began to search for opportunities to get this training to more responders.

In the spring of 2009, the KYTC and the Federal Highway Administration (FHWA) announced that they would utilize highway safety funds to distribute emergency traffic control (ETC) kits to a select group of fire departments. This pilot project initially focused on segments of Interstates 65, 64, and 75 (I-65, I-64, and I-75). Later in the evaluation, additional segments of I-64 and Interstate 24 (I-24) were added. The KYTC also funded an update to the curriculum and the printing of additional handbooks entitled, “Guidelines for Emergency Traffic Control”. The training was provided and funded by the Kentucky Fire Commission / State Fire Rescue Training and was a requirement for all fire departments participating in the pilot project.

1.2 Objectives

The objectives of this evaluation were to determine if ETC equipment kits are sufficiently
utilized by emergency responders and to document the benefit of their use for responders and motorists.

1.3 Methodology

The data for this study were collected using three basic methods: interviews with participating fire departments, collection of log sheets to provide a record of use at the end of each month for a one year period, and completion of four different online surveys by participating fire departments and other emergency responders. Interviews with the majority of the fire departments were conducted in April 2010, after the initial 4 months of data collection. KTC staff contacted all participating fire departments at that time and set-up meetings at the local fire department or other convenient location.

There were four online surveys in total. The first survey was for the exclusive use of fire departments. This survey was completed after both training and equipment were received. The second online survey, also for the exclusive use of the fire departments was completed each time the ETC kits were used on the pilot corridors (I-65, I-64, I-75 and I-24). The third online survey was completed by any first responder attending the scene of an incident, other than a member of the fire department that filed a report for using the equipment at the same scene, to ascertain their opinion as to the effectiveness of the ETC equipment in use, and the manner in which it was deployed. In order to determine the appropriate personnel to contact, the CRASH report was obtained for each incident reported by the fire departments occurring on the pilot corridors. The fourth and final survey was an “Exit Survey” administered to all the participating departments in March 2011 to determine their overall opinion of the equipment and pilot project, and to ascertain if the equipment was still in use.

1.4 Structure of the Report

This report is organized into six sections. Chapter 1 outlines the background and purpose of the project. Chapters 2, 3, and 4 provide findings from the study. Chapter 2 provides an overview of the equipment provided to each fire department and the training they received. Chapter 3 identifies the pilot corridors where the data collection took place, the participating fire departments and other first responding agencies providing information. Chapter 4 provides the results of each of the data collection methods; those are the online surveys, meetings and log sheets. Chapter 5 presents the conclusions of the report, and Chapter 6 provides recommendations as to future use of the equipment and the training provided.
CHAPTER TWO

AN OVERVIEW OF THE ETC KITS AND TRAINING

Funding of $100,000 was secured to purchase the equipment for the pilot program. The equipment was purchased utilizing a state contract. Two separate contracts were in place, one for the equipment and the second for the vests. The composition of the kits was determined based on guidelines set out by the MUTCD and the ETC curriculum developed by the KTC, and administered by the Kentucky Fire Commission. The kits were intended to provide minimal equipment needed to set up traffic control in emergency situations. They were also chosen with a priority to minimize the space needed for storage of the equipment on the fire apparatus. Forty-three kits were purchased. Kits were distributed to the thirty-three participating fire departments, with the remaining kits being used for training purposes or for use by KYTC Division of Incident Management. This pilot project focuses on the use of the kits by the fire departments. In order to receive a kit, each of the fire departments had to go through the training program and agree to provide the information necessary to complete the pilot evaluation.

2.1 Content of the ETC Kits

Each ETC kit contains:
- Ten safety vests,
- Two flagger paddles,
- Eighteen traffic cones (three sets of six, each contained in a tote), and
- Six advanced warning signs (two “Emergency Scene Ahead”, two “Be Prepared to Stop”, and two flagger (symbol) flags) in carrier bags.

Additional detail on the equipment included in the kits is described in the sections following.

2.1.1 Safety Vests

American National Standards Institute (ANSI) Class 2 safety vests were purchased from the Strong Group. Each vest was constructed of a mesh fabric. The fabric was fluorescent lime-yellow in color and flame retardant. It also had two inch wide fluorescent stripes of sectioned micropismatic reflective elements bonded to a smooth back surface of a flexible vinyl film. The safety vests are V-neck style with two front panels and a single back panel (with a Velcro fastener sewn vertically on the front center of the vest for front closure).

Figure 1: ANSI Class 2 Safety Vest
2.1.2 Flagger Paddles

The sign paddles consist of an 18-inch by 18-inch octagonal panel with 6-inch legend height, and are in compliance with the current edition of the MUTCD. The sign layouts are based upon Standard Highway Signs for Stop-Slow Paddles. The Stop side of the paddle is fabricated using both white and red high intensity retroreflective sheeting. The slow side of the sign is fabricated using fluorescent orange high intensity retroreflective sheeting.

2.1.3 Traffic Cones

The cones are all constructed of bright orange knitted PVC coated polyester mesh. The mesh is held in vertical position by means of a spring. This spring is constructed of steel and is rust resistant. Each cones weighs between 4.5 to 5 pounds, and the dimensions satisfy those laid out for 28-inch cones in the MUTCD. The cones include retroreflective white sheeting. A cone tote is supplied with each set of six cones. The tote is constructed of heavy duty wire and a sewn sleeve of heavy-duty polyester mesh material. The tote system is designed so that one individual can deploy and secure the cones. When holding the six cones, the total weight of the system does not exceed 45 pounds.

2.1.4 Advanced Warning Signs

Each of the advanced warning signs comes self-contained within a storage bag. The sign system is a combination of both the sign and the sign stand, which is deployed and stored as one integrated unit; capable of being deployed and taken down in the field by one individual. The sign component of the system is a 48-inch by 48-inch diamond-shaped warning sign. It is a flexible roll-up traffic sign made from fabric backed vinyl microprismatic sheeting. The legend height on the sign is 6 inch. The background color on each of the signs is fluorescent pink. The
sign and sign layout is compliant with the current edition of the MUTCD and the Standard Highway Signs manual. The sign has a permanently attached foldable crossbrace for sign stability. The crossbrace is the same color as the sign and is not visible to approaching motorists. The crossbraces are constructed of fiberglass and they facilitate the folding action of the sign for deployment and takedown. The system allows the sign to be locked in place for deployment and released for foldup and storage. The stand component of the system securely supports the sign. The stand has four telescoping legs. Each leg has a steel kick release pin with a spring mechanism completely enclosed inside the leg. Each leg is adjustable by pushing the kick release pin and can accommodate uneven terrain. The legs also have rubber anti-skid foot pads. The sign system is capable of resisting wind gusts up to 50 mph without requiring additional ballast or tie downs.

![Advanced Warning Sign](image)

Figure 4: Advanced Warning Sign

### 2.2 Training Program

To obtain the ETC kits, each fire department was required to take a four hour class entitled, “Emergency Traffic Control for Responders”. This course was originally developed in October of 2006 by the KTC with grant funding provided by the FHWA and the KYTC. In 2009 the curriculum was updated and a train-the-trainer session was taught to Kentucky State Fire Rescue Training instructors. This group of instructors taught the class to all participating fire departments prior to receiving their kits. They also continue to offer this course to all fire departments and other responders throughout the state. Trainers were also provided with curriculum for “Highway Crash Site Management” and continue to offer this course to all responders.

The “Emergency Traffic Control for Responders” curriculum follows the guidelines established for temporary traffic control in emergency situations outlined in the MUTCD. The purpose of the course was to enhance public and responder safety by establishing guidelines for safe traffic flow at highway crashes. The training also included a handbook that can be used as a quick reference for establishing safe traffic control measures. The handbook contains basic principles, a description of standard traffic control devices, guidelines for the application of the devices, and typical application diagrams.
Specific topics covered include:
- Reasons for traffic control
- Components of the incident management areas
- Traffic control devices
- Advanced warning area
- Transition area
- Buffer space
- Incident space
- Incident zone procedure
- Flagging
- Equipment list
- Safety clothing
- Typical application diagrams
- Response vehicle management
- Merging taper
- One lane two-way traffic taper
- Operations on the shoulder
- Incident in center of intersection
- Right lane closure on far side of the intersection.

Figure 5 displays the cover page of the “Guidelines for Emergency Traffic Control” handbook.
CHAPTER THREE

THE PILOT CORRIDORS, PARTICIPATING FIRE DEPARTMENTS, AND OTHER STAKEHOLDERS

With limited funding available for the purchase of equipment, decisions had to be made on who would receive the kits and where they would be utilized. Representatives of the KYTC and the FHWA identified the area where they saw the greatest need for the equipment and then the Kentucky Fire Commission identified the fire departments that would need to participate in the pilot project. Other responding agencies in those areas of greatest need were identified as stakeholders and asked to participate in evaluation of the pilot project as well. The sections below provide further information on the pilot corridors, the participating fire departments, and other stakeholders.

3.1 Pilot Corridors

Each of the pilot corridors was identified using a specific set of criteria. The criteria included: the volume of traffic on the interstate; the accident rate; and the availability of a good incident management team that could assist with stakeholder identification and evaluation.

The first corridor identified for the pilot project was I-65 from the Tennessee line through Bullitt County. Shortly after the kits were purchased, it was realized that there was enough equipment to expand the pilot project to other areas. The segments immediately added included I-64 in Franklin and Shelby Counties and I-75 in Laurel and Rockcastle Counties. After the six-month review it was determined that there were still unused kits, and it was decided to add additional corridors to the pilot project. Corridors added included Carter County on I-64 and sections of I-24 in Livingston, McCracken, Lyon, and Trigg counties. By the end of the evaluation, the corridors included in the pilot project were:

• I-65: Bullitt County to the Tennessee line
• I-75: Rockcastle and Laurel Counties
• I-64: Franklin, Shelby and Carter Counties
• I-24: Livingston, McCracken, Lyon and Trigg Counties

3.2 Participating Fire Departments

The Kentucky Fire Commission took the pilot corridors and identified the appropriate fire departments who would respond to an incident on the interstate. In total, there were 33 departments identified to participate in the pilot project. The fire chief of each department was contacted by the Kentucky Fire Commission and asked if they would participate in the pilot study. As a participant, they would receive one kit and four hours of training on ETC, but they also had to commit to assisting with the evaluation. All 33 departments agreed to participate in
the pilot project. The table below lists the participating fire departments (by interstate and county).

Table 1: Participating Fire Departments by Interstate and County

<table>
<thead>
<tr>
<th>Pilot Corridor</th>
<th>County</th>
<th>Participating Fire Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-65</td>
<td>Hardin</td>
<td>Elizabethtown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Radcliff</td>
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<tr>
<td></td>
<td></td>
<td>Central Hardin</td>
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<td></td>
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<td>Glendale</td>
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<td>Sonora</td>
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<td>Upton</td>
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<td></td>
<td>Hart</td>
<td>Bonnieville</td>
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<td></td>
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<td>Munfordville</td>
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<tr>
<td></td>
<td></td>
<td>Horse Cave</td>
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<td></td>
<td>Barren</td>
<td>Cave City</td>
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<td>Park City</td>
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<tr>
<td></td>
<td>Warren</td>
<td>Alvaton</td>
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<td></td>
<td></td>
<td>Smiths Grove</td>
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<tr>
<td></td>
<td>Simpson</td>
<td>Franklin-Simpson</td>
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<td></td>
<td></td>
<td>Zoneton</td>
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<td></td>
<td></td>
<td>Shepherdsville</td>
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<td></td>
<td></td>
<td>Southeast Bullitt</td>
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<tr>
<td></td>
<td></td>
<td>Lebanon Junction</td>
</tr>
<tr>
<td>I-64</td>
<td>Shelby</td>
<td>Simpsonville</td>
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<td></td>
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<td>Shelby County</td>
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<td>Shelbyville City</td>
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<td></td>
<td></td>
<td>East 60</td>
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<tr>
<td></td>
<td>Franklin</td>
<td>Franklin County</td>
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<tr>
<td></td>
<td>Carter</td>
<td>Olive Hill</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grayson</td>
</tr>
<tr>
<td>I-75</td>
<td>Rockcastle</td>
<td>Mount Vernon</td>
</tr>
<tr>
<td></td>
<td>Laurel</td>
<td>Laurel County</td>
</tr>
<tr>
<td></td>
<td></td>
<td>London</td>
</tr>
<tr>
<td></td>
<td></td>
<td>West Knox</td>
</tr>
<tr>
<td>I-24</td>
<td>McCracken</td>
<td>Reidland Farley</td>
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<tr>
<td></td>
<td>Livingston</td>
<td>Grand Lakes</td>
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<tr>
<td></td>
<td>Lyon</td>
<td>Kuttawa</td>
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<td></td>
<td>Trigg</td>
<td>Montgomery</td>
</tr>
</tbody>
</table>

The following map details the location of both the pilot corridors and the participating departments in the state of Kentucky.
3.3 Other Stakeholders

Additional stakeholders were identified to participate in the pilot project evaluation by participating on the Study Advisory Committee (which steered the project) or by participating in the evaluation surveys. Some agencies played a more significant role than others. The following is a list of agencies that made a significant contribution to the pilot project and evaluation and a description of the roles that each agency played.

3.3.1 The Kentucky Fire Commission

State Fire Rescue Training is a division with the Kentucky Fire Commission, and part of the Kentucky Community and Technical College System. They were responsible for a number of items, primarily: 1) providing training to each of the participating fire departments and 2) distributing equipment to the fire departments. They also played a vital role in data collection activities. Beyond the pilot project, the State Fire/Rescue Training program continues to teach the curriculum to fire departments and other responders with interest in ETC.

3.3.2 Kentucky Transportation Cabinet

Kentucky Transportation Cabinet representatives included the incident management coordinators, SAFE patrol operators and others from the central and district offices. They served multiple roles for the pilot project and evaluation. Some of their major contributions included: funding for the equipment, training (train the trainer only), and evaluation; identification of other key responding agencies and a point of contact who could participate in the evaluation surveys; and direct feedback on the pilot project in the form of evaluation surveys or pictures from the incident scene. Beyond the pilot project, KYTC is hosting (or will begin hosting) an incident
management team in all highway district offices to promote the safe and efficient clearance of incidents.

3.3.3 Kentucky State Police

The Kentucky State Police, including the Division of Commercial Vehicle Enforcement, were very supportive of the pilot project. Captains in the various regions participating in this pilot project ensured that troopers were aware of the pilot project and participated in the evaluation surveys.

3.3.4 Other Responding Agencies

“Other responding agencies” refer to all first responders at the scene of the incidents where the ETC equipment was deployed. As part of the pilot program it was imperative to explain the equipment that the fire departments had, and the incidents where it would be used, in order to foster an environment of understanding and utility with regard to the use of the ETC kits. The other responding agencies contacted (beyond those mentioned above), included emergency medical services (EMS), Kentucky Emergency Management, local law enforcement, health departments and towing companies. If a member of one of these emergency response teams found themselves on scene of an incident where the ETC kit was deployed, they were asked to complete an online survey regarding:

1. Near Misses / Struck by Vehicle (before evaluation period and after each use of equipment on the corridor)
2. Visibility of Responders (after each use of equipment on the corridor)
3. Improved Notification to Motorists (after each use of equipment on the corridor)
4. Time Spent on Scene of Incident (after each use of equipment on the corridor)
5. Usage of ETC equipment (after each use of equipment on the corridor)
CHAPTER FOUR

FINDINGS OF THE PILOT STUDY

Data collection occurred in several forms, including: equipment use log sheets; online surveys; interviews with fire departments and other agencies as needed; and analysis of Kentucky’s CRASH database. The sections below summarize the tools that were utilized and the information that was collected through this process.

4.1 Equipment Use Log Sheets

Log sheets were administered to each fire department at the beginning of the study. The log sheet was used to collect information regarding the number of times the ETC equipment was deployed by each fire department. The fire departments entered information regarding the date and time of the incident, location and type of incident, and the equipment that was utilized. This information was then submitted to KTC at the end of each month. The log sheet could be submitted either by email as an excel file, or by fax as a paper copy. A copy of the logsheet is available in Appendix A. Firefighters are required by law to wear high visibility vests at all incidents, except when fighting fire. Therefore, the use of vests did not have to be recorded. Figure 6 outlines the total number of times the equipment was used by each of the fire departments that submitted information.

![Total Equipment Use by Fire Department](image_url)
Figure 6 shows huge disparities between the numbers of times fire departments have utilized their equipment. In comparing departments, it is seen that Franklin County used their equipment more than 130 times, while smaller departments did not record using the equipment very often. Reasons for this disparity emerged during the study period and are discussed in Chapter 5.

Figure 7: Overall Equipment Use by Equipment Type

Figure 7 outlines the number of times that the equipment was used during the yearlong pilot study. Cones were utilized most often, followed by the advanced warning signs and then the flagger paddles. These findings result from data generated through the online surveys outlined in section 4.2.

Figure 8: Increasing Trend of Equipment Use over Study Period
Figure 8 depicts the increasing trend in equipment use which occurred over the course of the pilot project. The number of times the equipment was utilized, the number of fire departments responding and the average number of times the equipment was deployed per responding department is on the y-axis, while the month of the year is on the x-axis. The blue line shows the number of times the equipment was used during the study period. The red line shows the number of fire departments filing their monthly log sheets. The green line shows an average number of times the equipment was used by each reporting fire department in a given month. Equipment use was variable throughout the study period, but there was an overall increasing trend. The lowest equipment use was in March with the equipment being deployed a total of 25 times. November was the peak month regarding equipment use, with the equipment being deployed 90 times in total. November also coincides with the peak average use of equipment by department, with the average number of deployments for each reporting department being 6.6. It should be noted that a few departments were added as the pilot progressed so there were more opportunities to utilize the equipment. The number of fire departments that reported using the equipment in December drops in comparison to the preceding months. This is most likely due to the holiday period and the fact that the study was coming to a close.

4.2 Online Surveys

Four online surveys were created and distributed to stakeholders to determine if the ETC equipment was being sufficiently and properly used and to better understand the benefits of its use. Three of the surveys were designed for the exclusive use of the fire departments while one was designed for other responders at the scene where the equipment was used.

4.2.1 Deployment Survey

The first survey pertained to the deployment of the ETC equipment and was distributed electronically after the fire departments received their equipment and training. The purpose of the survey was to obtain basic information regarding the reception of the equipment and training and to understand early issues or concerns. Each fire department was asked to complete this survey within the first month of receiving their equipment. Twenty-eight of the participating departments completed this survey. The survey contained twelve questions and can be found in Appendix B. An initial question was to ascertain if departments could find space on their apparatus to carry traffic control equipment. While departments did find space on their apparatus for traffic control equipment, eighteen departments stated that they had issues finding space for the equipment.
Departments addressed the space issue in a variety of ways, including:

- storing equipment on top of the truck,
- removing equipment,
- reorganizing the apparatus,
- breaking the ETC kit up to store on a variety of apparatus, and
- storing on a separate vehicle such as a pick-up that gets called out to the incident site if the officer in charge deems it necessary.

Figure 10 illustrates the variety of apparatus employed by fire departments to carry the traffic control equipment.
As can be seen in Figure 10, at the time of completing the online survey, one department had not yet found space for the ETC equipment on any of their vehicles.

Each fire department was also required to provide information for both the month they received the equipment and the month that they received their training. The intent was for all the fire departments to have their equipment and training prior to the start of the evaluation period on January 1, 2010. This did not occur however due to availability of trainers, difficulty scheduling some classes, and because some departments were added to the pilot project after January 1, 2010. So while some departments participated in the pilot study for a full year, many did not.

![Figure 11: Month When Equipment Was Received](image1)

Figure 11 shows the months beginning in October 2009 and ending in September 2010, when fire departments received equipment. Six fire departments entered the pilot program after the start date of January 1, 2010. Figure 12 outlines the training dates, beginning August 2009 and running through September 2010.

![Figure 12: Month When Training Was Received](image2)
Each department was asked if they had any problems with the placement or removal of the equipment from the interstate. Note that this question came shortly after they had received equipment and training so use of the equipment at that point was limited. The overwhelming response was that there was no problem placing or removing the equipment on the interstate. The reasons cited for difficulty in placement or removal dealt with the lack of sufficient manpower and the center divider wall restricting access. The following two charts (Figure 13 and 14) depict the results of those questions.

![Figure 13: Problems with Placement of ETC Equipment on the Interstate](image)

![Figure 14: Problems with Removal of ETC Equipment on the Interstate](image)

Fire departments were given the opportunity to provide additional comments at the end of the survey. Those comments included:

- “This department is having a hard time trying to put equipment on apparatus.”
• “We have only used the equipment once, but did notice a difference in the speed and apparent awareness of traffic.”

• “The ETC Equipment is kept on a utility vehicle which has to be requested by the first arriving apparatus or officer.”

• “The only problem I see with the equipment is being able to store it. Other than that, I think the equipment is exceptional.”

• “Great concept but our fire dept. does not have enough personnel to place equipment at incidents when needed. We cannot set aside our emergency operations to set out signs. We have to rely on mutual-aid or wait until emergency operations are over to deploy equipment.”

• “The folding sign stands are very difficult to place on a fire truck. We have a sign we bought that 2-3 years ago that folds up much smaller and has telescoping legs and fits in a space about 1/2 the size, 1/2 the weight, and the sign is already attached. This is a big issue for the fire service - we don't have pickup truck beds to carry the signs in and don't have a lot of time to mess with signs.”

• “We are looking forward to using these safety signs to protect our firefighters.”

• “Scene site management with signs may be beneficial if you were on scene at the time of incident. However the response time to scene and amount of traffic on the Interstate creates unsafe conditions while trying to protect the scene and any patients.”

• “We hope to use the traffic cones whenever we have the chance because they make the emergency scene safer.”

• “This equipment is paramount when dealing with traffic; I now feel our department is better prepared when dealing with issues on our interstates and rural highways we protect. Thanks to everyone that made this possible.”

• “Would love to see additional equipment such as cones and arrow or message boards etc.”

4.2.2 Use of ETC on the Pilot Corridor Survey

The Use of Emergency Traffic Control Equipment on the Pilot Corridor survey is the second online survey completed by fire departments. This survey was completed each time the fire department deployed the ETC kit on the segment of interstate for which they are responsible. This survey was comprised of 22 questions and is located in Appendix C. Questions asked ranged from basic questions pertaining to the particular incident, such as date, time and location,
to equipment deployed, assistance received and the perceived benefits of the ETC, or any related issues.

A total of 198 “Use of ETC Equipment on Pilot Corridor” online surveys were collected from the participating departments. Figure 15 is a chart displaying the 24 contributing fire departments and the number of surveys they completed. It is worth noting that a number of departments do not regularly run on the interstate, but have actively utilized their ETC equipment on other roadways, and in a variety of circumstances. There are a number of departments that felt like they did not have the personnel to utilize the equipment. Fire departments that did not report any use on the pilot corridors included: Reidland-Farley; Kuttawa; Smiths Grove; Radcliff; Sonora; Bonnieville; Park City; Munfordville and London.

![Number of Responses](image)

**Figure 15: Number of Responses on the Pilot Corridor**

The data collected encompassed a variety of incidents and occurred on the following interstates displayed in Figure 16 and Figure 17. Incidents included in the other category are comprised of motorist assists, brush fires and medical assists.
Figure 16: Type of Incident

Most reported uses of the equipment came from I-65 with a very small number coming from I-24. This finding was anticipated. The I-65 corridor (as seen on Map 1 in Section 2) stretches from Bullitt County south to the Tennessee line in Simpson County. The sections of pilot corridor on the other interstates (I-64, I-75 and I-24) are much shorter. This is also depicted in Map 1. Fire departments in Carter County on I-64 and all the departments along I-24 joined the study in October 2010, ten months after the beginning of the study period.

Figure 17: Number of Incidents by Interstate

The incidents where the ETC equipment was utilized on the interstate pilot corridors include numerous scenarios, ranging from crashes to fires and from property damage only to fatalities. Fire departments appear to have used the kits on nearly an equal number of injury and non-injury incidents. Using the equipment on an incident involving a fatality occurs much less frequently.
This is due to the fact that there are a much smaller number of incidents involving fatalities. Figure 18 and 19 display the number of incidents that involved either an injury or fatality.

![Bar chart showing the number of incidents involving an injury.]

**Figure 18: Number of Incidents Involving an Injury**

![Bar chart showing the number of incidents involving a fatality.]

**Figure 19: Number of Incidents Involving a Fatality**

A question was posed to determine if responders had problems with the placement of the traffic control equipment on a particular incident. The data indicated there were very few problems with placement of traffic control equipment. However, the fire departments completing this online survey account for departments that have already successfully deployed the equipment. The problems that were identified included an instance where another agency providing traffic control reached the incident scene before the fire department and an instance where traffic was
backed up inhibiting the placement of the signs. Figure 20 shows the overwhelming response was there were no issues arising from the placement of the traffic control equipment.

![Figure 20: Problems with Placement](image)

Fire departments were asked if there were any close calls or injuries to responders within the incident scene. The results are depicted in Figure 21. There were very few close calls reported and no injury to responders. Of the close calls that were reported, most seem to be associated with an inattentive or distracted driver and did not relate directly to the placement or removal of equipment. There were a couple of instances where the fire departments were not sure if there were any close calls or not, and in this instance, “unknown” was selected as the response.

![Figure 21: Close Calls or Injuries within the Incident Scene](image)

It was important to learn if the placement of traffic control equipment significantly increased the time fire department personnel spent on scene. As indicated in Figure 22, the data indicated that in the majority of incidents, the placement of equipment did not increase time on scene for
emergency responders. The instances where the time spent on scene increased were due to limited personnel to retrieve equipment after the incident.

![Graph: Did the Placement of ETC Equipment Significantly Increase the Time Personnel Spent on Scene?](image)

**Figure 22: Time Spent on Scene**

Fire departments were encouraged to request additional traffic control if they were going to be on the scene for an hour or more. Figure 23 displays the incidents where traffic control assistance was requested.

![Graph: Did Your Agency Request Assistance with Traffic Control?](image)

**Figure 23: Requesting Traffic Control Assistance**

Of those incidents where assistance was requested and received, Figure 24 depicts the agency that provided assistance. The other category referred to in Figure 24 was comprised of SAFE Patrol and various fire departments. The fire departments were also asked if there were any problems or issues with the assistance they received. Four issues were noted by the responders, and three of those were related to a lack of communication with the SAFE Patrol Operator and/or
the SAFE Patrol Operator being located too close to the incident to warn approaching motorists of the traffic queue. The other issue occurred when only one arrow truck was provided for a traffic diversion.

![Figure 24: Traffic Control Assistance Received](image)

Each of the fire departments was asked a series of questions pertaining to the incident scene and their opinion of the usefulness of the ETC equipment. Figure 25 shows the response regarding whether the traffic control equipment created a safer working environment for responders. Seventy-three percent of all respondents felt that safety was either improved or greatly improved, while 27 percent were unsure of the impact or thought there was no effect.
Figure 25: Safer Working Environment for Responders

Figure 26 outlines the responses to whether the usage of the traffic control equipment improved the visibility of responders. Seventy-five percent of respondents felt that visibility was either improved or greatly improved, while 25 percent was unsure of the effect or saw no effect.

Figure 27 illustrates the extent to which the traffic control equipment provided better notification to approaching motorists. Fifty-eight percent of respondents felt that notification was improved or greatly improved, while 42 percent were unsure of the effect or saw no effect.
4.2.3 Follow-up Survey

KTC collected information from all agencies responding to these incidents, not just the fire departments participating in the pilot project. The follow-up survey is found in Appendix D. This survey allowed for input from EMS, law enforcement and other responders involved in the incidents. This tool accounted for the third online survey. A total of 84 online follow-up to all responders surveys were completed.

Figure 28 outlines the different agencies on scene at each of these incidents that subsequently completed the online survey. It should be noted that local law enforcement did not complete a single survey but was responsible for traffic control assistance at more than one third of all pilot corridor incidents.
Figure 28: Agency Type Responding to Online Survey

Figure 29 displays the variety of traffic control resources that were utilized on scene. This list is not limited to the ETC kits administered to fire departments as other agencies were on scene and utilizing their own equipment.

Figure 29: Traffic Control Resources Utilized on Scene
First responders to the emergency scene were asked if they thought the traffic control equipment helped to improve safety at the scene of the incident. Figure 30 shows these results. Data indicates that more than 80 percent of responders believe the use of traffic control equipment has improved safety at incidents. Thirteen percent were unsure of the impact on safety, and three percent felt that it reduced safety. Some concerns with safety dealt with exposure to traffic from deploying signs with limited manpower.

![Safety on Scene](image)

**Figure 30: Safety on Scene**

Responders were also questioned about the extent to which the visibility of first responders at the scene of the incident was improved through the use of the ETC kit. More than 80 percent of responses indicated that visibility was improved or greatly improved as a result of using the equipment. Eighteen percent were unsure of the effect, and one percent felt that it reduced visibility. These results are depicted in Figure 31.

![Improvements in Visibility](image)

**Figure 31: Improvements in Visibility**
Figure 32 outlines the opinions of the first responders when asked about the improvement in notification to motorists achieved through the use of the ETC kit. Eighty-five percent of all responders felt that there was improved or greatly improved notification; 14 percent felt that there was no effect or they were unsure of the impact, and one percent felt that the notification was reduced.

![Improvement in Notification to Motorists](image)

**Figure 32: Improvement in Notification to Motorists**

As depicted in Figure 33, there is an extremely mixed response as to whether the ETC equipment actually increased or decreased the length of time spent on scene.

![Time Spent on Scene](image)

**Figure 33: Time Spent on Scene**
Figure 34 indicates instances where a responding agency indicated there was a problem with the traffic control. Overwhelmingly they found there were no issues. The issues that were noted included that traffic was backed up past the signage, the traffic taper was too short, or there was an inattentive flagger.

![Figure 34: Problems with Traffic Control](image)

4.2.4 Exit Survey

The Exit Survey was administered to all fire departments in March of 2011, after the pilot program was completed. The Exit survey was 10 questions long, and designed to gather information about the overall feelings and opinions of the fire departments with regards to both the equipment and training received, and any changes that they would recommend. The Exit Survey is found in Appendix E. Twenty-three of the fire departments completed this final online survey.

The first set of questions were designed to determine if the kits were sufficient to meet the needs of the fire departments, and if there was anything that they would change or recommend changing in the future. As depicted in Figure 35, more than 90 percent responded that the kits were sufficient, but two departments responded that the amount of equipment provided was insufficient to meet their needs. The comment was that the kit was a great help but was only about “30 percent of what we actually need to setup proper control”. This particular department felt that they needed twice as many signs to set up an adequate incident scene on two-lane divided highways. They also felt that they needed additional lane-change signs, and that eighteen traffic cones were a good start but no-where near the actual number of cones needed in their department. Figure 36 shows what the fire departments would actually change in the kits. Most involved the addition of more cones or signs, but some requested additional signs for lane usage and diversion. It was also suggested that the bags for the signs be color-coded so the type of sign could be identified with removal and setup.
Each fire department was then asked a question about which piece of equipment they found to be the most beneficial. Nine departments found the advanced warning signs to be the most beneficial, eight fire departments found the vests most beneficial, five stated the cones were most beneficial, and one stated the flagger paddles. This is depicted in Figure 37.
Following on from this question each fire department was then asked about the biggest issue they faced when using the equipment. This question was answered by 19 of the 23 fire departments. Some departments noted more than one issue. Their answers are depicted in Figure 38. One fire department noted that they did not have any issues. A lack of man-power for the deployment of equipment was noted by eight departments, and appears to have been the most significant issue faced by all departments. Limited or no storage space on their apparatus was noted by five departments; most departments have rectified the storage issue. Developing standard operating guidelines or creating the habit of using the equipment was another issue noted by three of the departments. Time, the second largest issue (noted by six departments), ranged from having enough time while on scene to deploy the equipment, to the length of time that there was personnel on scene before equipment could be deployed or the time it actually took to deploy the equipment. This issue overlaps with the manpower issue.
As shown in Figure 39, when asked if the training provided as part of the pilot project was sufficient, the answer was overwhelmingly yes. However, two fire departments did make recommendations of how to adapt the training for future uses. One department felt that the training should be more in depth and provide hands-on experience in setting up an incident scene. Another department recommended setting up yearly training, or an in-house refresher training course. When asked about what should be changed about the training, 13 fire departments answered this question, with 10 answering nothing. One fire department suggested that the training materials should include more video or web-based content. Two recommended that the training should only be provided by instructors with firsthand experience in deploying the equipment on an interstate. Another department recommended spending more time in the training session emphasizing the importance of using the equipment to improve scene safety.

Figures 40 and 41 show the results for when fire departments were asked if they will continue to use the equipment and if they will purchase additional equipment. When asked if they would continue to use the equipment beyond the pilot project, all 23 fire departments answered yes. Eleven fire departments stated that they plan to purchase additional ETC equipment in the future. Two stated that they would not purchase additional equipment, and ten stated that they were unsure if their department would be purchasing additional equipment.
As depicted in Figure 42, 12 fire departments have changed policies and procedures as a result of being involved with the pilot program. The changes instituted included: 1) updating or instituting standard operating guidelines; 2) utilizing equipment on all roadways; 3) deploying advanced warning signs; 4) emphasizing rapid control of the scene; 5) deploying equipment on the third-in truck. Some fire departments are still looking for ways to safely deploy their equipment.
The end of the survey gave fire departments the opportunity to make additional comments. Following are some of the comments provided:

- “Excellent program. We hope you can get additional funding to continue the project.”

- “Very good project and very well managed project. Our department is interested in future projects if conducted. Thanks for the opportunity to participate.”

- “Good program. Really good to see the Transportation Cabinet and KCTCS Fire Rescue training doing this cooperatively. (We), wish we had more cooperation between government agencies to share their resources and knowledge with us. Thanks for including us in this program and for the equipment. It will continue to be used!”

- “This proved to be a very good project and the use of the signs and cones have proved (to be) very useful. With this equipment we were able to enhance and strengthen our procedures for highway & roadway safety. We are utilizing the kits on all roadways now. We have been utilizing the paddles more often here lately on our incidents.”

- “(We would) like to thank all those who were involved in this project and chose our department to participate. We thank you very much for the equipment and the training to properly set the equipment up. We feel it has made it safer for emergency workers on roadway incidents.”

- “I think it is beneficial to give all fire departments in the state this equipment if they don't already have it. I don't know that it is worthwhile to give six signs to every fire
department in the state. I think the financial cost may outweigh the use that the signs will get. It would be best to get more feedback and opinion on this issue.”

- “The staff and the information that will be gleaned from this study shows that there was a blatant problem without the equipment or training. Hopefully, this will awaken the idea of safety in individuals around the interstate highway system and all roads. The program has made individuals realize that safety starts with the individual first and that the responsibility is their own. The staff and training materials were always made available when questions arose about the aspects of the program. Sarah, the program manager was very helpful and cordial whenever I had questions. I hope that this program continues in its shifting of the paradigm that public safety personnel are impervious to serious injury or death and safety is everyone's concern. If this program saves one life, then this program will have paid for itself. Thank you for your time and take care.”

- “We have had several comments from other emergency services about the signs and cones being set up on a scene. They are happy to see them. We have noticed traffic responding favorably to them also. It is our job to maintain safety on a scene. These devices give us a great means to let oncoming traffic know "something’s happening" and "here's what we expect of you". With lights flashing, traffic stopping abruptly and drivers not being prepared for something out of the ordinary, we desperately need something to say "hey, pay attention". This equipment is absolutely a great "hey" for us to use. Thanks to everyone involved for asking us to be involved in this program.”

4.3 Interviews

In April of 2010, KTC visited each of the then participating fire departments to conduct individual meetings. Up to that point, staff at KTC was having difficulty collecting all the necessary information to conduct the study. There appeared to be a lot of misunderstanding on behalf of the fire departments as to what was expected, or what was needed in order to carry out the pilot project. There was also some misunderstanding surrounding when they could or could not use the equipment, and when to report the equipment use. Individual fire departments had differing experiences with trying to utilize the ETC kits. The following is a list of the major points that were raised at the fire department meetings:

4.3.1 Vests

Every fire department stated that they used vests on every run, except when fighting fire. Most departments (about 65 percent of those interviewed) have five-point breakaway vests, and use the vests issued in the kit as back-up. It should be noted that the vests provided do meet federal safety requirements, and are compliant. A lot of departments keep vests on their turn-out gear, and only remove them if fighting a fire. A number of departments use both vests and cones at every incident. One department has a policy to use cones and vests at every injury incident within the city.
4.3.2 Storage of Equipment

A majority of departments (about 75 percent) have a system in place whereby the paddles, cones and vests are located on their first out truck, while the second out vehicle is responsible for deploying the signs. Several departments stated that they are in the process of going through a cultural turn or change within the department (it was a matter of getting used to the fact that the signs were there) and are working on getting out of the habit of cancelling the second out vehicle in order to deploy the signs.

4.3.3 Rural Roads Versus Interstate

Several departments also state that they see even more benefit for the signs on the rural roads in their area. A couple of the reasons for this being the case: 1) They don’t get many calls to the interstate; 2) There are no barriers on county roads impeding deployment/collection of signs; 3) Traffic is less likely to be backed up when they reach the scene, and therefore notifying motorists becomes a bigger safety issue; 4) County roads are more likely to have hills, and bad bends that make notification to motorists even more important; and 5) On-going construction (in some areas) on the interstate means that the traffic is already at a complete standstill, and the work-zone can negate the need or severely impede the deployment of signs. However, it should also be noted that a large number of departments use the signs on the interstate as well as rural roadways.

4.3.4 Manpower

Man-power is a serious issue for most volunteer departments, especially during the day-time hours when most volunteers are at other jobs. Fifty percent of all the departments either have mutual aid agreements in place or are working on implementing agreements, whereby the responding department calls a neighboring department to set out signs upstream of the incident. This is helping tackle the man-power issue.

4.3.5 Cable Barriers and Turnarounds

Fifteen percent of departments have issues with the cable barrier, and an additional 40 percent of departments have issues with a lack of turnarounds on the interstate.

4.3.6 Additional Traffic Control Mechanisms

Two departments have installed directional arrows on top of their trucks to aid in notifying and directing traffic at the scene.

4.3.7 Deployment of Equipment

Another issue that was raised pertained to how to safely deploy the signs on the roadway. The Zoneton Fire district has had an “Accident Ahead” sign for about two years before this program began. The signs are kept on all of their apparatus, and the second or third companies are used to
deploy the signs from about a 3/4 to a mile before the accident. The fire company will block off the lane that it needs to start shutting down with the truck as they deploy the sign. They deploy the sign in front of the truck and use it as a buffer. Then that truck continues to the scene and they then will call out the service vehicle with all other equipment.

Storage remains an issue for a couple of departments. One suggestion that was made to help tackle this problem was to add a carry-out/storage hitch to the back of the responding unit which can easily be taken on and off. These hitches range in price from about $100-$1,000. Other departments have found space for the signs on top of the truck, or behind the cab seats.

4.4 CRASH Data Analysis

One aspect of the evaluation was to determine if there was any difference in the “road closure” times as a result of the use of the additional equipment. In order to evaluate this question, an analysis was conducted using data collected by the Alvaton fire department. This fire department was selected due to the extent of their use of the equipment and the related documentation. The roadway section studied was on I-65 between milepoints 13 and 28. The road closure time was estimated using the collision time and the time the roadway was opened. Data were compared for 2006 (before their use of any of this type of equipment) and 2010 (following implementation of the equipment use). In 2006 there were 175 crashes with 71 (41 percent) having a “roadway opened” time. If there was no “roadway opened” time the assumption was there was no road closure. In 2010 there were 130 crashes with 42 (32 percent) having a “roadway opened” time. Table 2 displays some averages for those two years.

<table>
<thead>
<tr>
<th>Year</th>
<th>All Crashes</th>
<th>Truck Crashes</th>
<th>Injury Crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>63</td>
<td>89</td>
<td>65</td>
</tr>
<tr>
<td>2010</td>
<td>54</td>
<td>62</td>
<td>63</td>
</tr>
</tbody>
</table>

The reported “road closure” times did decrease for 2010 compared to 2006. While the sample is small, the argument can be made that training about the importance of clearing the road as quickly as possible (using proper equipment) had an effect. The effect was greatest for crashes involving trucks which had higher closure times. The difference was less for injury crashes where care of the injured controlled the closure time.

There were two crashes in this roadway section in 2006 involving a hazmat vehicle with an average clearance time of 164 minutes compared to one crash involving a hazmat vehicle in 2010 with a clearance time of 20 minutes. This sample is too small to show any meaningful results.
The location, date, and time of the crashes in this section were reviewed to determine if there were any secondary crashes. The crash report was reviewed when two crashes occurred on the same date at a close location (according to the milepoints). Some crashes which occurred at almost the same date, time, and location were related to hydroplaning or snow so they were not a secondary crash. There was one crash in 2006 and one crash in 2010 which would be classified as secondary. The 2006 crash was a rear end collision and noted “stop and go” traffic resulting from another crash. The narrative of the 2010 crash noted that the driver was slowing for another crash and lost control of his vehicle.

A review of five years of crash data (from 2006 through 2010) was conducted to determine the number of crashes involving a pedestrian working in the road. Using this logic, the data showed a total of 186 crashes on all roads with 12 on an interstate. There were eight crashes in these five years on an interstate which involved an emergency worker (fire department, police, or tow truck operator) at the scene of a previous incident.
CHAPTER FIVE

RECOMMENDATIONS AND CONCLUSIONS

The overwhelming response from fire departments was that they were encouraged to see government agencies (Kentucky Transportation Cabinet and the Kentucky Fire Commission) working together, and they hoped to be able to participate in further studies that helped make their working environment safer.

As a result of this pilot project, the following recommendations are made with regard to training and equipment:

1. **All fire departments should be trained in ETC and roadway scene safety.**

   Findings from this pilot project indicate that the training in ETC is very beneficial to all fire department personnel, regardless of the individual's level within the organizational structure. It is imperative that this training be rolled out to first responders across the state. It is critical that all first responders have knowledge of the dangers inherent to emergency work scenes. This training helps personnel to capitalize upon the variety of mechanisms and practices that can alleviate these dangers. Ultimately, these practices contribute to the goal of increasing safety.

2. **Other responding agencies (beyond fire departments) should be trained in the basics of ETC and roadway scene safety.**

   Fire departments are often the first responding agency at the scene of an emergency incident. However, they are not usually the only responders. In order to capitalize on the merits of the ETC training, it is essential that this training be provided to other responding agencies including but not limited to Emergency Medical Services, towing companies, and SAFE Patrol (among others).

3. **A refresher course highlighting key points from the Emergency Traffic Control for Responders training course should be provided to all fire departments participating in the pilot project.**

   In order to make certain that the guidance and recommendations provided in the Emergency Traffic Control for Responders training course are fully utilized, the training must be made available on a regular basis. Many of the concepts that are discussed in training do not become evident to the trainees until they are implemented in real world situations. Providing regular training allows the participants to build upon applicable knowledge areas as they are applied in real world situations. Finally, continuous training is required due to the frequent turnover within fire departments.
4. **The current training course should be enhanced to provide a better learning experience and more valuable resources to participants.**

Additions and enhancements to the curriculum could include:

- Hands-on exercises
- Utilizing trainers with hands-on experience with traffic control
- Incorporating more video or web-based materials
- Addressing storage issues by providing a list of recommended storage solutions
- Incorporating standard operating guidelines for fire departments to adopt
- Make available “Guidelines for ETC” handbook for each vehicle with equipment
- Provide examples of mutual aid agreements

5. **Within the training sessions, more time should be spent emphasizing the importance of using the equipment.**

In many instances, equipment has been handed to users, with the assumption that it would be adopted in daily practice. Fire department personnel have indicated it takes a significant shift in their mentality to put their personal safety first. By the very nature of their job, firefighters often put the safety of others first, with regard for their own lives. However, the usage of this equipment is beneficial to responders as well as the general public as it reduces the potential for secondary incidents. Emphasizing the importance of the safety of first responders, and the ways in which this equipment can assist, should be give more attention in the classroom.

6. **Encourage mutual aid between fire departments; especially volunteer departments who may not be adequately staffed to deploy the equipment.**

Often it is the case in rural areas of Kentucky that volunteer fire departments are the first to respond to an incident. The nature of volunteer fire departments is that they can never predict how many personnel will respond to a particular incident. For example, many volunteer fire departments may have only four firefighters to respond to an incident. This does not allow them the opportunity to allocate personnel to establish a safe working environment through the use of the ETC equipment. In situations such as this, it is critical that fire departments have an established communication protocol to assist each other in the establishment of a safe work area.

7. **All fire departments should obtain a minimal amount of ETC equipment to improve safety at the scene of an incident.**
Based on the findings of this study, it is strongly suspected that the use of the ETC equipment reduces secondary accidents and increases the safety and visibility of emergency response teams. Therefore, given the relatively low cost of implementation, a sufficient amount of equipment should be provided to all agencies that will utilize the equipment. Further, enough kits should be provided such that each agency has enough equipment on hand to adequately respond, even at peak volume, to a variety of situations.

8. KYTC and FHWA should consider continuing to provide grant opportunities to fire departments for ETC equipment.

Most fire departments are struggling to meet the budgetary demands required for core personnel and essential equipment. Even though the ETC equipment has been proven in the field to be effective, it is not viewed as essential equipment by most fire departments. Therefore, in order to ensure the continued benefits of the program in critical areas, KYTC and FHWA should consider providing grant opportunities so that use of the equipment can be extended to other fire departments.

9. If space allows, the equipment kits should be supplemented with:
   a. Diversion signs and lane change signs
   b. Additional cones

Based on responses from frequent users of base ETC kits, it was recommended that diversion signs, lane change signs, and additional cones be provided as part of the kit. However, the addition of this equipment requires added storage space to be allocated for the units on emergency response vehicles. The current equipment is sufficient, but could be supplemented with these additional items as space allows.

10. Public safety five-point break-away vests should replace the three-point breakaway vests that were provided in the original kits.

Due to the increased safety associated with the design of the five-point breakaway vests all future kits should be equipped with these type of vests. In the original kits, the three point vests were included (as per minimum standards described in the MUTCD). In addition, the National Fire Protection Association recommends use of the five-point breakaway vests for firefighters.

11. Mark storage bags accordingly to make the signs more easily identifiable in emergency situations.

At the current time the ETC kit has three different types of signs. These signs include the: “Emergency Scene Ahead”; “Be Prepared to Stop”; and flagger (symbol). Differing combinations of these signs are used depending on the response scenario. Presently, these signs are stored in a manner such that they are indistinguishable
without actually removing the sign from its bag. By providing a mechanism to more readily identify the signs the overall efficiencies of the ETC kit deployment will be improved. This could be done in a number of ways including using color coded bags or tagging the bags appropriately.
# APPENDIX A: LOG SHEET

## Log Sheet: Use of Traffic Control Equipment Kits

<table>
<thead>
<tr>
<th>Date</th>
<th>Time of Response (24:00)</th>
<th>Roadway # / Name</th>
<th>Approximate Milepost or Intersection</th>
<th>Other</th>
<th>If Other, please describe</th>
<th>Type of Incident</th>
<th>Equipment Utilized</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/2/2009</td>
<td>17:15</td>
<td>I-65</td>
<td>47</td>
<td>X</td>
<td></td>
<td></td>
<td>Vests</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Flagger</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Paddles</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Traffic Cones</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Signs</td>
</tr>
</tbody>
</table>

**Total number of runs**: 

**Total number of runs on Interstate**: 

---

1. If I-65, I-64, or I-75 Complete Additional Information
2. Other Examples: structural fire, hazardous spill, etc.
3. This is the total number of runs made during the month. Please include runs not listed on the logsheet
4. This is the total number of runs made on either I-65, I-64, or I-74. Please include runs not listed on the logsheet
APPENDIX B: DEPLOYMENT SURVEY

1. Name:

2. Fire Department:

3. When did you receive your Emergency Traffic Control Equipment Kit?  
   MM DD YYYY  
   Date Received

4. When did you receive the training for your Emergency Traffic Control Equipment?  
   MM DD YYYY  
   Training Date

5. What type of truck is the equipment kept on?

6. Was there a problem finding space on this vehicle for storage of the Emergency  
   Traffic Control equipment?  
   Yes  
   No  
   If yes, how was the problem fixed:

7. Who makes the decision at the incident scene on whether the equipment will be  
   utilized?

8. Has the Emergency Traffic Control equipment been utilized yet?  
   Yes  
   No  
   If Yes, approximately how many times:

9. If you have not yet used your equipment, why have you not done so? (Please choose  
   all that apply)  
   No incident that required it  
   Did not have time  
  Forgot/ not used to deploying equipment  
   Operator uncomfortable with its use  
   Equipment already deployed by other agency, such as KSP  
   Other (please specify)

10. Have there been any problems with placement of Emergency Traffic Control  
    equipment on the interstate?  
    Yes  
    No  
    If yes, please provide specific information:
11. Have there been any problems with removal of Emergency Traffic Control equipment on the interstate?
   Yes
   No
   If yes, please provide specific information:

12. Other Comments:
APPENDIX C: ONLINE SURVEY

1. Name:

2. Fire Department:

3. Type of Incident:
   - Vehicle Crash
   - Vehicle Fire
   - Spill
   - Other
   - If Other, please specify:

4. Date of Incident (MM/DD/YYYY):

5. Time of Response (24:00):

6. Roadway:
   - I-24
   - I-64
   - I-65
   - I-75

7. Approx. Milepost:

8. Did the incident involve an injury?
   - Yes
   - No
   - Unknown

9. Did the incident involve a fatality?
   - Yes
   - No
   - Unknown

10. Were there any problems with the placement of the traffic control equipment?
    - Yes
    - No
    - If yes, please explain:

11. Which advanced warning signs were used and how many?
    - Emergency Scene Ahead
      - 0
      - 1
      - 2
    - Be Prepared to Stop
      - 0
      - 1
      - 2
    - Flagger
      - 0
      - 1
      - 2
12. Did the placement of the ETC equipment significantly increase the time personnel spent on scene?
   Yes
   No
   Unsure
   If yes, please describe:

13. Did your agency request assistance with traffic control?
   Yes
   No

14. Which agency or agencies assisted with traffic control? (Please mark all that apply.)
   Kentucky Transportation Cabinet
   Kentucky State Police
   Local Law Enforcement
   Other
   If other, please specify:

15. At what point in the incident was traffic control assistance received?
   Less than 1 hour
   1 to 2 hours
   2 to 3 hours
   3 to 4 hours
   More than 4 hours
   Please explain:

16. Were there any problems with the assistance received with traffic control?
   Yes
   No
   If yes, please describe:

17. Were there any close calls or injuries to responders from motorists within the incident scene?
   Yes
   No
   Unknown
   If yes, please describe:

18. Please indicate the extent to which the traffic control equipment provided a safe working environment for responders:
   Greatly reduced safety on scene
   Reduced safety on scene
   No effect or Unknown
   Improved safety on scene
   Greatly improved safety on scene
19. Please indicate the extent to which the traffic control equipment improved the visibility of responders:
    Greatly reduced visibility of responders
    Reduced visibility of responders
    No effect or Unknown
    Improved visibility of responders
    Greatly improved visibility of responders

20. Please indicate the extent to which the traffic control equipment provided better notification to approaching motorists:
    Greatly reduced notification to approaching motorists
    Reduced notification to approaching motorists
    No effect or Unknown
    Improved notification to approaching motorists
    Greatly improved notification to approaching motorists

21. Please note any other comments here:
APPENDIX D: FOLLOW-UP TO FIRST RESPONDERS SURVEY

1. Name:

2. Agency Name:

3. Agency Type:
   Fire
   EMS
   State Law Enforcement
   Local Law Enforcement
   Towing Company
   Emergency Management
   Transportation
   Other
   If other, please specify:

4. What type of traffic control resources were utilized at the scene of the incident? (Please mark all that apply.)
   Advanced Warning Signs (fluorescent pink or orange)
   Electronic Message Boards
   Emergency Vehicle with Lights Flashing
   Flagger (Designated Person to Stop/Slow Traffic)
   Flares
   Flashing Arrow Board
   Shadow Vehicle (large vehicle used to protect the scene)
   Stop/Slow Paddle
   Traffic Cones
   If other, please specify:

5. To the best of your knowledge, was emergency traffic control equipment utilized properly?
   Yes
   No
   If No, please explain:

6. What problems with traffic control did you notice? (Please mark all that apply.)
   Inattentive flagger
   Signs not visible (knocked over or not perpendicular to roadway)
   Traffic backed up past signage (no warning for approaching motorists)
   Signs in poor location (not providing adequate notice of incident)
   Traffic taper too short
   Responders not utilizing reflective vests
   None
   Please provide additional detail:
7. Please use the following scale to note the impact of traffic control equipment on providing a safe working environment for responders?
   Greatly reduced safety on scene
   Reduced safety on scene
   No effect or Unknown
   Improved safety on scene
   Greatly improved safety on scene

8. Please use the following scale to note the impact of traffic control equipment on improving visibility of responders?
   Greatly reduced visibility of responders
   Reduced visibility of responders
   No effect or Unknown
   Improved visibility of responders
   Greatly improved visibility of responders
   Visibility

9. Which resources were most helpful in creating a safer working environment? (Please mark all that apply.)
   Advanced Warning Signs (fluorescent pink or orange)
   Electronic Message Boards
   Emergency Vehicle with Lights Flashing
   Flagger (Designated Person to Stop/Slow Traffic)
   Flares
   Flashing Arrow Board
   Shadow Vehicle (large vehicle used to protect the scene)
   Stop/Slow Paddle
   Traffic Cones
   None
   Other
   If other, please specify:

10. Please use the following scale to note the impact of traffic control equipment on providing better notification to approaching motorists:
    Greatly reduced notification to approaching motorists
    Reduced notification to approaching motorists
    No effect or Unknown
    Improved notification to approaching motorists
    Greatly improved notification to approaching motorists

11. Which resources were most helpful in providing better notification to motorists? (Please mark all that apply.)
    Advanced Warning Signs (fluorescent pink or orange)
    Electronic Message Boards
Emergency Vehicle with Lights Flashing
Flagger (Designated Person to Stop/Slow Traffic)
Flares
Flashing Arrow Board
Shadow Vehicle (large vehicle used to protect the scene)
Stop/Slow Paddle
Traffic Cones
None
Other
If other, please specify:

12. **Please use the following scale to note the impact of traffic control equipment on the time responders spent on scene?**
   - Greatly reduced time spent on scene
   - Reduced time spent on scene
   - No effect or Unknown
   - Increased time spent on scene
   - Greatly increased time spent on scene
APPENDIX E: EXIT SURVEY

1. Did you find the ETC kit that was provided sufficient to meet your needs?
   Yes
   No
   If No, Why?

2. Please describe what you would change about the equipment provided in the kits, if anything:

3. Which piece of ETC Equipment did you find the most beneficial?
   Vests
   Advanced Warning Signs
   Flagger Paddles
   Cones

4. What was your biggest issue when utilizing the ETC equipment?

5. Did you find the ETC training provided as part of this pilot to be sufficient?
   Yes
   No
   If No, why?

6. What would you change about the training if anything?
   Yes
   No
   If No, why?

7. Will you continue to utilize the ETC equipment beyond the pilot project?
   Yes
   No
   If No, why?

8. Does your department plan to purchase additional traffic control equipment?
   Yes
   No
   If No, why?

9. Has your fire department changed any policies and procedures as a result of participating in this pilot project?
   Yes
   No
   Not sure

10. Additional comments: