

**Improving Traffic Safety Analysis
Capabilities for Local Communities in
the Kansas City Area**

Final Report

**For
Missouri Department of Transportation**

MRI Project No. 110541

September 2007

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Capabilities for Local Communities in
the Kansas City Area**

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**For
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600 NE Colbern Road
Lee's Summit, Missouri 64086**

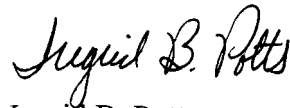
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Preface

This final report is submitted to the Missouri Department of Transportation (MoDOT) in accordance with the terms of the research contract MRI performed for MoDOT, entitled *Improving Traffic Safety Analysis Capabilities for Local Communities in the Kansas City Area*. This final report was jointly prepared by Ms. Ingrid B. Potts and Ms. Jessica M. Hutton, Midwest Research Institute (MRI); and Mr. Michael Briggs, Mid-America Regional Council.

MIDWEST RESEARCH INSTITUTE



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Contents

Preface.....	ii
Figures.....	iv
Tables.....	iv
Section 1. Introduction.....	1
1.1 Background.....	2
1.2 Purpose and Objectives.....	2
1.3 Research Overview and Report Organization	2
Section 2. Surveys.....	4
2.1 Survey Recipients	4
2.2 Response Rate.....	5
2.3 Crash Data	5
2.4 Safety Data Analysis.....	8
2.5 Summary.....	11
Section 3. Workshop.....	13
3.1 Safety Goals.....	13
3.2 Safety Teams	15
3.3 Data Access	16
3.4 Data Quality.....	16
3.5 Crash Data Uses and Analyses	18
3.6 Safety Project Funding	19
3.7 General Comments	19
Section 4. Conclusions and Recommendations	21
4.1 Conclusions.....	21
4.2 Recommendations.....	22

Appendix—Local Agency Safety Data Survey Questionnaire

Figures

Figure 1. Agenda for Workshop	14
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Tables

Table 1.	List of Survey Recipients.....	4
Table 2.	Response Rate for the Local Community Survey.....	5
Table 3.	Number of Cities That Maintain a Crash Database	6
Table 4.	Agencies/Persons to Whom Crash Data is Made Available.....	6
Table 5.	Number of Cities That Provide Training on Crash Data Collection	7
Table 6.	Number of Cities That Obtain Crash Data From Another Jurisdiction/Agency	8
Table 7.	Number of Cities That Analyze Crash Data	8
Table 8.	Number of Cities That Use Software to Analyze Crash Data	9

Section 1.

Introduction

Each year, 42,000 people lose their lives in traffic crashes in the United States, and in 2003 approximately 1,200 of those fatalities occurred on Missouri roads. In 2004, the Missouri Coalition for Roadway Safety, a partnership of over 100 organizations including the Missouri Department of Transportation (MoDOT) and the Mid-America Regional Council (MARC), set a goal of reducing the number of fatalities per year to fewer than 1,000 by 2008. This goal is part of the *Missouri Blueprint for Safer Roadways*, or Missouri's Strategic Highway Safety Plan (SHSP), which identifies key strategies for reaching the goal, as well as several vital elements to serve as a foundation to support the strategies. At the top of the list of vital elements is a robust data collection and analysis system.

Destination: Safe, Kansas City's regional highway safety coalition involving MARC, the Missouri and Kansas Departments of Transportation (DOTs), and the Missouri and Kansas Highway Patrols, developed the *Kansas City Regional Transportation Safety Blueprint*, modeled after Missouri's statewide *Blueprint*. The document serves as the regional SHSP and identifies six priority areas for safety funding and safety improvements in the Kansas City region. One of the priority areas is regional transportation safety data, and two strategies listed in this focus area are:

- Explore additional opportunities for local input about the use, accuracy, and timeliness of crash data
- Continue to use crash data to identify new improvement projects, including non-traditional, non-infrastructure strategies

These strategies are based on the principle that accurate and timely crash data is needed to effectively identify and address safety issues on all public roads. The availability of good safety data and the conduct of thorough safety analyses result in better allocation of safety funds to address existing safety problems and potentially prevent future crashes.

Substantial crash, traffic volume, and speed data are collected and analyzed at the state level, but since over a fourth of all fatal crashes occur on roadways off the state system, there is a strong need to equip local decision makers with accurate, timely data. Statewide crash data is typically maintained by state DOTs and state highway patrols, but the data is not necessarily utilized by local communities. Improved collaboration between state and local highway agencies in crash data sharing and crash data analyses would help local communities identify locations that need safety improvements and determine the types of improvements that are needed at those locations. The data could also be used more effectively to identify areas in need of targeted enforcement to reduce specific safety problems such as speeding and impaired driving.

1.1 Background

In early 2006, the Missouri Transportation Institute (MTI) issued a call for proposals to fund safety projects with special appropriations arranged by Senator Bond in recent transportation legislation. Midwest Research Institute (MRI), together with MARC, submitted a joint pre-proposal for a project to improve traffic safety analysis capabilities for local communities in the Kansas City Region. The objectives of the proposed project were to assess long- and short-term safety data and analysis needs at the local level, to identify tools to help meet those needs, to implement some of the tools in a pilot study in selected communities, and to prepare a report presenting the results of the pilot study and an implementation plan for other communities in the state. The project was ultimately not funded by MTI, but in early 2007, MoDOT safety funds became available through *Destination: Safe*. MRI and MARC jointly submitted an application for funding based on the proposal submitted to MTI, but more limited in scope. The project was funded and the scope of work focused on (1) an assessment of safety data and analysis needs of local communities through mail-back surveys and a safety needs workshop and (2) recommendations for improving data and analysis at the local level.

1.2 Purpose and Objectives

The purpose of the project was to identify ways to improve crash data availability and analysis capabilities for local communities in the Kansas City area. Because the project was funded by MoDOT, the project focused on local communities (counties, cities, and towns) on the Missouri side of the Kansas City area. The objectives of the study were to (1) conduct an assessment of safety data and analysis needs of local communities and (2) make recommendation for improving data and analysis at the local level.

The results of the study are intended specifically for use by transportation and safety officials at MARC, at MoDOT's Kansas City Area district, and at local communities in the Kansas City area. However, it is expected that the issues reported by local jurisdictions may be representative of what communities throughout the state are experiencing and the suggestions provided in this report may be applicable to communities outside the Kansas City region.

1.3 Research Overview and Report Organization

The research included both written surveys and a one-day workshop targeted at law enforcement officers and public works professionals in many of the local communities in the Kansas City region. Results from the surveys were used to develop an agenda and outline for discussion during the workshop. The workshop used a format of open discussion facilitated by the research team. The research team held a debriefing meeting following the workshop to compare notes, discuss the main themes brought out in the

surveys and workshop, and identify possible short and long-term solutions and tools for better safety data analysis at the local level.

This report summarizes the safety data and analysis needs identified through the surveys and workshop and presents suggestions for improved data collecting, sharing and analysis. Section 2 of the report presents the results of the survey. It includes a list of the local communities receiving the survey, the percentage of respondents, an overview of the responses to each question, and a discussion of the general findings from the survey. A copy of the survey can be found in the Appendix. Section 3 presents an overview of the workshop, including the discussion topics covered and key themes brought out in the discussion. Section 4 presents a summary of the data and analysis needs identified and recommends potential short-term and long-term tools, programs and policies that MoDOT, MARC, and the participants themselves could implement to improve data collection, storage and analysis at the local level.

Section 2. Surveys

This section presents a summary of the responses of local agencies to the survey questionnaire, which is presented in the Appendix. The questionnaire addresses crash data and safety analysis capabilities at the local level.

2.1 Survey Recipients

The survey questionnaire was mailed to 22 cities and counties in the greater Kansas City Area, as shown in Table 1. Communities were selected to include those with the greatest populations and to obtain geographic diversity. Nineteen communities were chosen from within the five Missouri counties in MARC's region, and three were chosen from counties that border MARC's region in order to include a more rural perspective. All of the communities fall within MoDOT's Kansas City area district.

Table 1. List of Survey Recipients

Survey recipient	County	Population
Belton	Cass	21,730
Blue Springs	Jackson	48,080
Cass County	--	95,781
Clinton*	Henry	9,511
Excelsior Springs	Clay	11,650
Gladstone	Clay	27,542
Grain Valley	Jackson	9,430
Grandview	Jackson	24,373
Harrisonville	Cass	9,804
Independence	Jackson	109,400
Jackson County	--	664,078
Kansas City	Jackson	447,306
Kearney	Clay	7,891
Lee's Summit	Jackson	81,913
Lexington*	Lafayette	4,613
Liberty	Clay	29,581
Parkville	Platte	5,107
Platte City	Platte	4,788
Platte County	--	83,061
Raytown	Jackson	28,577
Richmond	Ray	6,052
Warrensburg*	Johnson	17,965

* Community is not within MARC's region.

For each of the 22 communities, a survey was sent to both the public works department and the police department. Thus, a total of 44 survey questionnaires were mailed.

The questionnaires for departments of public works were generally sent to the director. The names and addresses of the public works directors and of key contacts at the police departments were obtained from the MARC and from city and county websites; in a few cases, phone calls were made to an agency to obtain the appropriate contact information.

2.2 Response Rate

Table 1 summarizes the number of surveys that were completed and returned. Out of the 44 surveys that were mailed, a total of 16 completed surveys were returned. Two of the completed surveys came from the same police department, so they were combined and treated as one completed survey. Thus, a total of 15 completed surveys from 11 cities and one county were analyzed. Two respondents indicated that they represented both the police department and the public works department; their responses were categorized based on the affiliation of the person who actually completed the survey. Of the 15 surveys, 14 were completed by cities (4 public works departments and 10 police departments), and one was completed by a county sheriff's department. The response rate was 18 percent for departments of public works, 50 percent for police departments, and 34 percent overall.

Table 2. Response Rate for the Local Community Survey

Agency type	Number of questionnaires mailed	Number of responses received	Response rate (%)
Public works departments	22	4	18
Police departments	22	11	50
Total	44	15	34

Respondents were asked how long they had been in their current position. Their responses ranged from 1 to 25 years, with an average of 8.6 years, indicating that, on average, respondents had substantial experience in their current position.

2.3 Crash Data

In Question 1, respondents were asked whether their city maintains a crash database for local roads. Their responses are summarized in Table 2. The majority of responding cities reported that they maintain their own crash database. A follow-up question asked which agency maintains the crash database, and all respondents who reported that their city maintains a database also reported that the police department maintains it. One city

indicated that both the police department and the public works department maintain a crash database.

Table 3. Number of Cities That Maintain a Crash Database

Maintain crash database?	Number of respondents		
	Public works	Police	Total
Yes	4	8	12
No	0	3	3
Total number of respondents	4	11	15

Questions 2 through 6 addressed the 12 agencies that indicated that their community maintains a crash database. These twelve agencies represent nine cities and one county.

In Question 2, respondents were asked whether their crash database is in electronic form, and all respondents indicated that they were. In addition to an electronic format, many respondents stated that they also maintain data in hard copy form including crash reports, spreadsheets, and collision diagrams.

In Question 3, respondents were asked to describe how the location of a crash is identified (i.e., what location reference system, if any, is used?). A number of reference systems were cited, including:

- Intersection or distance to nearest intersection (6)
- Address (2)
- GIS (2)
- Grid and intersection (1)

In Question 4, respondents were asked if their crash data was made available to anyone else. Their responses are summarized in Table 3. Several respondents indicated that crash data is made available upon request. One respondent said that their crash data is automatically sent to the Missouri highway patrol.

Table 4. Agencies/Persons to Whom Crash Data is Made Available

Crash data made available to:	Public works	Police	Total
State DOT and/or their safety division/office	3	7	10
Highway patrol	3	7	10
Police officers	3	8	11
Local coalitions	1	4	5
Citizens	2	7	9
Traffic engineering	4	8	12
Local public works department	3	6	9

In Question 5, respondents were asked to rate, on a scale of 1 to 10, how confident they are in the accuracy of the crash data for their city. Responses ranged from a rating of 7 to a rating of 10, with an average rating of 8.7, with similar ratings given by both public works and police departments. This indicated a higher level of confidence in the crash data than expected.

In Question 6, respondents were asked if training is provided on how to collect crash data. Table 4 summarizes the responses to this question. Some of the respondents provided additional information, such as:

- Officers are trained to use the Missouri state accident reporting system (STARS)
- During Academy training, officers are trained on how to diagram an accident scene
- Officers are trained on writing crash reports (users of the software learn “on the job”)
- Officers use the Missouri uniform accident report and manual. Ongoing training occurs with each change.
- There are documented guidelines and procedures on how to code the data from the police report and on how to locate the data based on the GIS street names

Table 5. Number of Cities That Provide Training on Crash Data Collection

Training provided?	Number of respondents		
	Public works	Police	Total
Yes	3	5	8
No	1	3	4
Total number of respondents	4	8	12

The responses in Table 4 suggest that respondents may have interpreted the question in varying ways. A greater percentage of public works respondents indicated that crash data collection training was provided than did the police respondents, yet one would expect most of the training to occur in police departments. Presumably, all police officers are given training on how to complete a crash report, and probably few public works officials receive this training since they do not respond to crashes. The additional comments provided by some of the respondents suggest that public works respondents may have interpreted the question to refer to database training and police respondents may have interpreted the question to refer to crash report coding and crash diagramming.

In Question 7, respondents were asked if their city collected crash data from other jurisdictions or agencies (i.e., from MoDOT, state highway patrol, another city, or another county). Table 5 summarizes the responses to this question. Four respondents indicated they obtain crash data from the Missouri state highway patrol; the county law enforcement respondent indicated they obtain crash data from other jurisdictions within their county.

Table 6. Number of Cities That Obtain Crash Data From Another Jurisdiction/Agency

Crash data obtained from other jurisdiction/agency?	Number of respondents		
	Public works	Police	Total
Yes	1	4	5
No	3	7	10
Total number of respondents	4	11	15

2.4 Safety Data Analysis

In Question 8, respondents were asked whether their city analyzes crash data. As shown in Table 6, all public works respondents indicated that crash data is analyzed, while only about half of the law enforcement agencies reported crash data analysis. When asked to identify which agency or agencies within their city conducts the safety analyses, respondents listed the following:

- Police (6)
- Public works, Engineering, or Transportation Planning (4)
- State patrol (3)
- MoDOT (1)
- Unknown (1)

Table 7. Number of Cities That Analyze Crash Data

Perform analysis of crash data?	Number of respondents		
	Public works	Police	Total
Yes	4	6	10
No	0	5	5
Total number of respondents	4	11	15

In general, the law enforcement agencies reported that the analysis is done by the police, and the public works departments reported that it is done by public works or by both public works and the police. This may indicate that agencies are unaware of analysis being done by other agencies within their jurisdiction.

In Question 9, respondents were asked whether their city currently has any software for crash data analysis. Their responses are summarized in Table 7. (Note: One of the respondents representing a police department did not answer this question.) From the results, it appears that the majority of cities do not analyze crash data with a software tool. The respondents that indicated they do use software to analyze crash data identified the following software tools:

- STARS—State Traffic Accident Report System
- LETS—Law Enforcement Traffic System
- ITI—Information Technologies, Inc. (provider of public safety software)
- CrimeStar—law enforcement investigation and records management system

Table 8. Number of Cities That Use Software to Analyze Crash Data

City has crash data analysis software?	Number of respondents		
	Public works	Police	Total
Yes	1	2	3
No	3	8	11
Total number of respondents	4	10	14

In Question 10, respondents were asked if they would consider analyzing crash data if it were more readily available. All but one of the respondents indicated they would.

In Question 11, respondents who indicated that their city currently analyzes crash data were asked to rank, on a scale of 1 to 10, how confident they are in their city’s ability to analyze crash data (10 = most confident). The responses from public works departments ranged from 9.5 to 10, with an average ranking of 9.9. Interestingly, the responses from police departments were much lower, ranging from 4 to 9, with an average ranking of 6.9.

In Question 12, respondents were asked if they would be interested in receiving help to analyze their crash data, if help were available. All of the respondents from police departments indicated they would be interested. The responses from public works departments were split 50/50 – two respondents indicated they would be interested and two respondents indicated they would not.

In Question 13, respondents were asked if they would be interested in an analysis tool (at no cost) to help with safety data analysis, if such a tool were available. All respondents indicated they would be interested.

In Question 14, respondents were asked what types of analyses they conduct. Responses included:

- Queries developed in report writing software
- Basic STARS information tabulations
- High-accident location, contributing factors; L.E.T. has analysis capability
- Microsoft Excel and Access, ArcGIS, Kofax (Note: no specific analysis identified)

In Question 15, respondents were asked to describe the types of analyses they would be interested in conducting. The majority of the responses came from respondents representing police departments. Responses included:

- Cause of crash (4)
- Contributing circumstances at high-accident location (4)
- Time of day (3)
- Day of week (3)
- Crash type
- Crash severity
- Crash location
- Information from STARS reports
- Lack of enforcement/engineering
- Roadway type
- Weather
- Vehicle type
- Vehicle speed

In Question 16, respondents were asked to list the contributing factors they would be interested in investigating. Responses included:

- All
- All listed in Missouri uniform accident report
- Speed
- Alcohol/dug use
- Type of traffic violation (Too many crashes are simply attributed to “inattention”)
- Signal and sign violations
- Failure to yield
- Improper turn or lane position
- Following too close
- Traffic control (e.g., signalized, unsignalized, clearance interval changes, modifications to signal timing)
- Roadway conditions
- Visibility/sight distance
- Driver age

- Human factors issues
- Engineering issues

In Question 17, respondents were asked what types of locations (e.g., roadway segments, intersections, etc) they would be interested in investigating. Nearly every respondent indicated either “all” or “roadway segments and intersections”; one respondent indicated “intersections” and one indicated “roadway segments”.

In Question 18, respondents were asked if they have regular programs for maintaining roadway inventory data and/or collecting traffic volume data. All of the respondents from police departments indicated that they do not have such a program. Of the four respondents from public works departments, three indicated they have a program for maintaining roadway inventory data (one of these said it was to check pavement condition only) and two indicated they have a program for collecting traffic volume data. One cited “no available personnel” as a reason for not being able to regularly collect traffic volume data.

Respondents were invited to provide any additional comments for observations. Responses included:

- We are satisfied with L.E.T.S. and its report capabilities.
- Software would need to generate STARS reports plus whatever else is needed.
- We currently submit STARS forms to the Missouri State Highway Patrol who, in turn, provides crash data. We formerly had our own software – MOTIS.
- We currently use the STARS system for crash data plus in-house data system.

2.5 Summary

The majority of respondents indicated that their city does maintain an electronic crash database, and that it is maintained by the police. One respondent from a public works department indicated that they maintain their own crash database, but this was in addition to the one maintained by the police department. The three cities that indicated that they did not maintain a crash database were communities with lower populations and that were geographically farther from the urban center than the other respondents.

Slightly over half of the respondents indicated that crashes are located by providing a distance from the nearest intersection, or a variation of that method. The Missouri Uniform Accident Report asks for the information in this manner. However, several respondents provided other means of crash location, such as GIS or address. A variety of responses were given when asked if training was provided for collecting crash data. This was likely due to the variety of interpretations of the question.

Most respondents indicated that they share their crash data with police officers, the traffic engineering or public works department, MoDOT, or the Highway Patrol. Many also indicated that crash information is shared with the public upon request. While the responding cities generally *share* crash information with others, very few reported that they *obtain* crash information from other agencies. The exception to this was the county law enforcement agency, which reported gathering crash data from all other agencies in their jurisdiction, and a few respondents who reported gathering information from the highway patrol. This would be expected since the highway patrol maintains all crash records state-wide, and provides crash statistic on their website.

All public works respondents indicated that crash data is analyzed, while only about half of the law enforcement agencies reported crash data analysis. In general, the law enforcement agencies reported that the analysis is done by the police, and the public works departments reported that it is done by public works or by both public works and the police.

All cities would consider analyzing crash data if the data were more readily available. Respondents from police departments would be interested in receiving help to analyze their crash data, if help were available. Respondents from public works departments were less interested in crash data analysis help. The majority of cities do not analyze crash data with a software tool, but all cities would be interested in an analysis tool if such a tool were available.

One of the most striking findings from this survey was the distinct division between public works and law enforcement when asked about their confidence in the crash analysis they perform. The responses from public works departments ranged from 9.5 to 10, with an average ranking of 9.9. The responses from police departments were much lower, ranging from 4 to 9, with an average ranking of 6.9.

Section 3. Workshop

This section presents a summary of a one-day workshop held at MRI on May 22, 2007, to document current safety data availability, current uses of available data, and safety analysis needs that are not being met in the Kansas City area.

The workshop was facilitated by MRI and MARC staff. Representatives from the same local communities to whom the survey questionnaire was distributed were invited to participate in the workshop. As with the survey questionnaire, the invitation was sent to representatives from both law enforcement and public works. MoDOT representatives were also invited to participate in the workshop.

A total of seven participants attended the workshop, including a police department employee responsible for entering crash reports and maintaining the crash records database, public works employees from four cities, and two representatives from MoDOT's traffic office in the Kansas City Area district. The participants represented a diverse group of communities, both in population and in size, and brought a broad base of responsibilities and experience to the discussions. All were involved in collecting, maintaining, or using safety data to make or support transportation safety funding allocation decisions.

Topics for discussion generally followed the questions asked in the survey, but included a few additional focus areas, such as safety teams and safety goals. The agenda for the workshop is presented in Figure 1. While the research team attempted to generate at least some discussion on each of the agenda topics, the atmosphere was informal and participants were encouraged to talk about the safety data and analysis topics on which they had the strongest feelings or greatest concern. This format allowed the research team to document the safety data issues and needs as perceived by the local communities themselves.

The discussion generated by the participants at the workshop is summarized and organized according to the following themes: safety goals, safety teams and goal setting, data access, crash data uses, data quality, safety project funding, and other comments. This organization represents the main themes on which workshop participants focused. Each theme is introduced with a list of the questions asked by the facilitators.

3.1 Safety Goals

Questions asked by the facilitators:

- Are you familiar with the *Missouri Blueprint for Safer Roadways*?

- Does your jurisdiction have specific safety goals? If so, what are they, and if not, why not?
- Does your jurisdiction actively work toward using the strategies outlined in the Blueprint and aiding in reaching the fatality reduction goal?

Safety Data and Analysis Needs Workshop Topics for Discussion	
1. Welcome and Introductions	Introduction of Facilitators and Participants Background of Study Objectives of Workshop
2. Roadway Safety	Stakeholders and Safety Teams Crash-Reduction Goals Priorities
3. Safety Data	Data Availability Data Collection Training Data Accuracy Uses for Safety Data
4. Data Analysis	Types of Analyses Training Software Tools Uses for Data Analyses
5. Wrap-up	Key Issues and Challenges Areas for Improvement

Figure 1. Agenda for Workshop

Responses provided by participants:

Local agencies are aware of the *Missouri Blueprint for Safer Roadways* from traffic safety meetings and workshops and from interacting with MoDOT employees; however no participants reported using it directly in their decision making. Some were familiar with the strategies included in the *Blueprint* and reported that their safety efforts may fall into the categories outlined in *Blueprint*, but that such coordination was not a specific goal.

None of the local agencies that participated in the workshop had developed specific safety goals for reduction of crashes or fatalities. In fact, participants were not able to identify any other specific measurable safety goals used by their agency. One participant mentioned that setting a specific goal could be a liability to the city because if it were not

met, the city could find itself in legal trouble. Other participants said funds were not available to support crash reduction safety goals.

3.2 Safety Teams

Questions asked by the facilitators:

- In your jurisdiction, who makes decisions related to roadway safety?
- How much coordination exists between agencies (e.g., between law enforcement and public works, between communities, between city and MoDOT)?
- What is the public's role in roadway safety decisions?

Responses provided by participants:

A public works official from a large city reported that bimonthly meetings were held with engineers and law enforcement officials during which roadway safety concerns were shared from both sides. Other communities reported a considerable amount of interaction between police officers and engineers, but stated that the interaction is entirely informal. One public works official reported participating in a police ride-along program, which allowed the traffic engineer to form a relationship with traffic officers. She indicated that these relationships facilitated informal dialogue between engineers and officers, including safety concerns.

The public, whether formally or informally, played a large role in the traffic safety projects that were undertaken in all jurisdictions represented. The traffic engineer from one community reported spending 30 to 40 percent of her time on customer concerns and the rest of her time on reviewing construction plans. No time was spent on system-wide safety programs or proactive solutions. She reported a backlog of three months to address customer concerns. Other participants indicated similar workload and responsibilities.

A workshop participant from a smaller community reported that a Citizens' Advisory Committee on Traffic Safety is consulted to decide which customer concerns can be addressed. Another community has a Public Safety Advisory Board that ratifies any code changes, such as raising speed limits, before it goes before the city council. This community is also trying a few proactive approaches to roadway safety, including attending neighborhood meetings to address citizens' concerns.

All participants agreed that some requests were "political" in nature and that those projects were given priority on improvements, changes, etc. These projects do not have to be justified with crash data, and they often take resources away from other more justifiable projects.

3.3 Data Access

Questions asked by the facilitators:

- What safety data is kept in your jurisdiction and in what format?
- Who has access to crash reports and other safety data (volumes, speed studies, etc.)?
- What data is available to transportation officials and law enforcement in your city?

Responses provided by participants:

The discussion on data access was very interesting and provided a few insights even to the participants themselves. For example, the participants from local communities indicated that they do not have the same crash record search and query abilities that are available to MoDOT personnel; the MoDOT representatives were not aware of this. The participants from local communities were not aware that the crash reports they send to the highway patrol in Jefferson City were re-entered electronically, and that this was the crash data used in MoDOT's Traffic Management System (TMS).

The one participant from a law enforcement agency reported that she enters all of the crash reports from her jurisdiction electronically using the LETS system. All variables from the crash report are included, other than the officer's narrative and the crash diagram. The LETS system allows her to query on almost any of the variables she has entered, which allows her jurisdiction to identify certain safety concerns beyond crash location. For example, in this jurisdiction, officers and traffic engineers can look up all crashes with a given contributing circumstance, all crashes that occurred on curves, or all crashes that occurred at a certain time of day. No other jurisdiction had the ability to run queries on many of these variables.

3.4 Data Quality

Questions asked by the facilitators:

- How are crashes located? How accurate is the location given?
- What training is provided on how to collect data? How to fill out a crash report? How to interpret a crash report?
- Is crash data available in a timely matter?
- Is there redundancy in recording and analyzing crash data between agencies?

Responses provided by participants:

All participants were concerned about the quality of data on crash reports. They believed that the people entering the data from the report into the electronic databases were probably doing a good job of coding the report, but that the report itself might have problems. They all favored refresher training for officers on how to properly code the report. Specific problems mentioned included:

- Cardinal direction of the route (since the overall direction of the route might be different than the road alignment at the crash location)
- Description of the crash location (they all preferred the old system which described the location as a given number of miles or feet in a cardinal direction from a known intersection, rather than as a given number of miles or feet before or after a known intersection)
- Incorrectly labeling crash type
- Inconsistencies in the report

Participants discussed how those entry fields on the report that police officers believe to be important are not necessarily the same fields that engineers need to make good safety decisions, and that if police officers were more aware of what engineers were looking for in the report, they might strive to be more accurate when reporting some of the variables (specifically crash type and contributing circumstances). Most participants believed the officers think the crash report is only used by insurance companies and do not realize that safety analysis is done with the data in the report.

A few participants noted the high number of walk-in reports that are taken at the local police station and described the data quality on those reports being very low, since the reporting officer can only go by the information provided by the person making the report. People make these walk-in reports because they are often required for insurance purposes. Furthermore, two drivers from the same crash may walk in a report at different times, and the duplicates are not detected. There is no check box on the crash report to indicate if it was a walk-in report, so these reports cannot be queried out of the system without reading the narrative.

One of the participants described how there is much duplication of effort in their city with respect to maintaining crash data. For example, in this city, police enter certain elements of the crash report into a database. Then, they provide a hard copy of the crash report to the public works department, which enters only the variables they are interested in into their own database. Both departments maintain hard copies on file, for at least a period of time. The public works department also scans the report into an electronic file. A hard copy of the crash report is then sent to the Missouri State Highway Patrol for its records. While this example illustrates substantial duplication of effort, the advantage to the system, as reported by the public works representative at the workshop, is that each agency can do its own quality control and that the information is available in a timely manner. In this particular city, engineers in the public works department review the

information on the crash report and can make changes in their database to correct officers' mistakes in the location and crash type reported. Since this quality check can only be done at the local level, the local communities worry that if they only used the data from the Highway Patrol's database, it would contain errors that would be difficult for them to detect. However, the mistakes that are corrected at the local level during data entry are not reflected in the statewide database, resulting in discrepancies between local and state crash data. Participants also noted that the Highway Patrol often has a three to six-month backlog in entering crash reports into their system, and that often they need information much faster than that to be able to respond to their city councils and citizens.

All participants mentioned the discrepancies and inconsistencies between local and state statistics for crashes and fatalities.

3.5 Crash Data Uses and Analyses

Questions asked by the facilitators:

- Who uses the crash data that is available?
- What is crash data used for in your jurisdiction?
- What kind of analysis is performed on crash data?
- Who performs the analysis and what training do they have?
- What software tools are used for data analysis?

Responses provided by participants:

Participants reported that crash data is used more often to justify a citizen request than to develop proactive approaches to safety. Some jurisdictions identify high-crash locations and try to make improvements at those locations. One large city reported a safety program similar to that used by MoDOT, which was the most advanced of all the programs reported. In this system, roadway segments and intersections are ranked based on a three-year crash history at a given location. Each location is assigned to an engineer who develops both short- and long-term solutions. Short-term solutions are those not requiring additional funding. Another community reported starting a similar program, but has not yet started taking crash severity or traffic volume into account in their rankings. They plan to incorporate that at some point in the future. Several participants reported that identifying high crash locations is important to applying for grant money for safety improvements.

One public works official reported that they run basic statistics on crash data, but did not provide specific examples. Participants were clearly aware of the random nature of crashes and familiar with the idea of regression to the mean. However, it did not appear that any of them have tools or expertise to take this into account when analyzing their crash data.

All agencies reported conducting before and after studies to evaluate the effectiveness of safety improvements. These are often performed in response to questions by the city council or other committees in their jurisdiction. Before and after studies seemed to consist of comparing crash numbers from before and after the improvement without using any statistical analysis to determine the statistical difference in crashes or the certainty of their results.

3.6 Safety Project Funding

Questions asked by the facilitators:

- What types of projects are safety grants used for?
- What are the requirements of these grants?
- What types of programs or tools would you like to be able to use safety grants for?

Responses provided by participants:

Participants reported that they would like to learn more about available safety money. The grants they are aware of are for specific purposes—for example, they might be able to apply for a grant for specific law enforcement activities or specific engineering activities. None were aware of any money that could be used for a safety program that included education, enforcement and improvements, but they thought this might be a good idea.

Many participants reported that identifying locations with specific safety problems is critical to receiving safety funding. In most jurisdictions, this amounts to ranking intersections or segments from highest crash location to lowest crash location over a given time period. While the participants seemed interested in software tools that could help them identify locations with a greatest potential for crash reduction, they noted that that level of analysis was not required for grant funding.

3.7 General Comments

- Participants would like to have any traffic volume data that MoDOT has available for city streets. A map format would be preferable.
- Participants thought that access to TMS would be helpful as long as all crashes on city streets were included. However, they wanted to keep their own databases and use TMS only to compare the data. One city was satisfied with their system, even though it involved duplication of efforts. Some participants were concerned about the lag time in getting data if they depended exclusively on TMS.

- A few participants said that through various meetings hosted by MARC, they had become more acquainted with traffic engineers in other jurisdictions and, therefore, it was easier to approach other areas to request some of their data if it was needed or helpful.
- All participants expressed a general concern for the current workload imposed on their staff, and that anything that required them to do additional work or provide additional information to MoDOT or MARC (in order to improve their own data management or data analysis capabilities) may not be worth it.

Section 4.

Conclusions and Recommendations

This section presents the conclusions of the research and recommendations for addressing safety data and analysis needs of local communities in the Kansas City area.

4.1 Conclusions

The conclusions of the research are as follows:

- The majority of respondents indicated that their city does maintain an electronic crash database, and that it is maintained by the police.
- Slightly over half of the respondents indicated that crashes are located by providing a distance from the nearest intersection, or a variation of that method. However, several respondents provided other means of crash location, such as GIS or address.
- Most respondents share their crash data with police officers, the traffic engineering or public works department, MoDOT, or the Highway Patrol. Many also indicated that crash information is shared with the public upon request.
- All public works respondents indicated that crash data is analyzed, while only about half of the law enforcement agencies reported crash data analysis.
- All responding cities would consider analyzing crash data if the data were more readily available. The majority of cities do not analyze crash data with a software tool, but all cities would be interested in an analysis tool if such a tool were available.
- Respondents from police departments would be interested in receiving help to analyze their crash data, if help were available. Respondents from public works departments were less interested in crash data analysis help.
- When asked to rank, on a scale of 1 to 10, how confident they are in their city's ability to analyze crash data (10 = most confident), the responses from public works departments ranged from 9.5 to 10, with an average ranking of 9.9. The responses from police departments were much lower, ranging from 4 to 9, with an average ranking of 6.9.
- Local agencies generally do not develop specific crash-reduction goals. This is due, in part, to (1) limited budgets available to address current day-to-day needs such as high-crash locations and citizen requests, and (2) concerns about liability.
- Traffic engineers and police officers generally interact with one another, either formally or informally, to discuss safety concerns.

- Citizen concerns, whether formally or informally, have an influence in the decisions a city makes about which traffic safety projects will be implemented. Those requests that are “political” in nature are often given priority.
- Local agencies are not very familiar with MoDOT’s Traffic Management System (TMS) database and analysis capabilities. They think that access to TMS would be helpful as long as all crashes on city streets are included. However, they want to keep their own databases and use TMS only to compare the data.
- Local agencies, particularly public works officials, feel that the quality of data on crash reports could be improved and that better communication should be established between traffic engineers and police officers about how crash data is used and which variables are of greatest interest.
- Local agencies may run basic statistics on crash data, but do not appear to have the software tools or statistical expertise to conduct sophisticated analyses such as accounting for regression to the mean in a before-after analysis.

4.2 Recommendations

The following recommendations have been developed based on these conclusions:

- ***Establish safety goals.*** Most local communities have not set local safety goals (i.e., target crash reduction or fatality reduction) even though they are familiar with the *Missouri Blueprint for Safer Roadways*. Local communities should consider getting involved with *Destination: Safe*, Kansas City’s regional highway safety coalition involving MARC, the Missouri and Kansas Departments of Transportation (DOTs), and the Missouri and Kansas Highway Patrols. This coalition has developed the *Kansas City Regional Transportation Safety Blueprint*, modeled after Missouri’s statewide *Blueprint*. One of the priority areas in the regional *Blueprint* is transportation safety data. Greater involvement with the coalition, and with the implementation of the regional *Blueprint*, may assist local communities in developing their own safety goals that are in line with regional and, potentially, statewide safety goals.
- ***Provide additional training for law enforcement officers.*** There is a perception among local traffic engineering staff that the officers coding the crash reports believe the report is used solely for insurance purposes and that they are unaware of the importance of certain elements of the report to traffic safety analysis and decision-making. While most officers reported receiving training on how to properly code the crash report, additional training that illustrates the importance of the crash report data to improve safety might increase the officer’s incentive to carefully and correctly code each section of the crash report. Also, the most frequently cited report coding error deals with the location of the crash. Additional training in coding crash locations could result in more reliable and valuable crash data at the local level and decrease the amount of staff time spent recoding or correcting errors on the crash report.

- ***Include traffic volume and severity information when ranking locations.*** Many local communities do not take traffic volumes into consideration when ranking candidate improvement locations. Thus, crash *frequency* rather than crash *rate* is used as a justification for requesting safety funds and prioritizing safety improvements. Also, crash severity is often disregarded when ranking candidate locations, so that locations with a high number of minor crashes have the potential to rank higher than those with fewer but much more severe crashes. Lack of consideration for traffic volumes and severity may lead to misdirected safety improvement efforts. Local agencies should consider developing a system that ranks locations by both “number of crashes” and “crash rates” and assigns a relative value to each crash based on severity when setting priorities for safety improvements.
- ***Use computer safety analysis tools.*** Many communities around the nation use computer analysis tools, such as commercially available collision diagram software and crash mapping software, to investigate the need for improvement of specific locations. Greater use of collision diagram and crash mapping software by communities in the Kansas City region appears desirable. In addition, MRI is currently developing a safety evaluation tool for MoDOT to use in evaluating the effectiveness of safety improvements. This stand-alone spreadsheet tool will account for such statistical issues as “regression to the mean,” yet still be user-friendly for local transportation engineers. Other such tools could be developed for investigating the need for or effectiveness of safety improvements at specific locations. MoDOT and MARC could assess the suitability of the available crash data in its current form for use as input to existing software tools and whether improvements to data formatting could make data more compatible with these tools. MoDOT and MARC may also consider offering local transportation engineers and law enforcement officers’ demonstrations of, training on, or licenses for these software tools. MoDOT and MARC could work with local agencies to determine the most helpful types of analysis tools and tailor the level of access to state databases and software tools to the analysis needs, level of expertise, and resources of the individual communities.
- ***Develop a statewide electronic crash report entry system to:***
 - ***Reduce duplication of effort.*** Currently, all crash reports in the State of Missouri are sent to the Missouri State Highway Patrol to be entered into a statewide database that is used to populate crash data for MoDOT’s TMS system. In many cases, local jurisdictions are entering the same data in their own databases before sending the hard copies on to the state. In some cities, separate databases are kept by the police department and the public works department. Creating one central database that all transportation safety data owners (local and state) can access for data input and retrieval will eliminate this duplication of effort and save staff time and resources at the state and local levels. Ideally, this system would allow local jurisdictions to append additional information beyond what is collected on the crash report if they so chose (for example, law enforcement could include citation history for

the driver involved in the crash, or public works could include AADT information for the road segment where the crash occurred). It would also provide basic sorting, filtering, and querying capabilities to improve the usefulness of the database for local jurisdictions that don't have access to advanced safety data management software.

- ***Increase reliability of data.*** Local public works and police departments cited as a reason for maintaining their own databases that often mistakes in crash reports can be identified and corrected by public works officials and law enforcement officers with local expertise. State level data is entered exactly as it appears on the crash reports, and mistakes and inconsistencies often go unrecognized and uncorrected. A centralized data entry system used by local officials will allow the crash database to be updated by local officials and for this more reliable data to be accessed by all state and local agencies.
- ***Make crash records available in a timelier manner.*** Local agencies are often expected to produce real-time crash statistics for a given location for citizens and politicians. They cannot wait to obtain data from the state, which is often not put into the system for several months after the crash has occurred. A centralized crash entry system could allow all local jurisdictions to input their own crash data and retrieve what they have input instantaneously. The state would use this database to populate its own data management system, TMS, and would have access to local records as soon as they were input by the local agencies.
- ***Improve communication between public works and law enforcement.*** Many communities reported informal discussions between traffic engineers and police officers to share information about roadway safety concerns. Informal discussions are important and helpful, but communities should consider increasing this line of communication through regular, and more formal, meetings between public works and law enforcement. Both agencies could set common roadway safety goals to work towards. Data analysts from the public works side can help inform officers of locations where enforcement efforts might be the most effective. Law enforcement efforts can inform engineers of certain driver behaviors that might indicate a problem not yet shown in the crash reports so that proactive solutions can be developed. Coordinating engineering and enforcement efforts can increase the effectiveness of both.
- ***Build on existing relationships between MoDOT traffic engineers and the local public works and law enforcement agencies.*** MoDOT engineers already have working relationships with engineers and law enforcement officers in the cities and counties to address development issues, safety concerns on state roads within city limits, and many other topics. These relationships can be further developed to provide avenues for the sharing of safety data on local roads. In some cases, MoDOT has access to safety information and analysis tools that local public works and law enforcement officers do not, any many times the local agencies are unaware of the capabilities at the state level. MoDOT engineers can use existing relationships to offer assistance in retrieving and

analyzing local safety data as staff time allows, and may also consider finding ways to provide local agencies with limited access to state databases. In the long term, a simplified and user-friendly version of TMS could be made available to local agencies. In the short term, MoDOT could consider providing a workstation in the district office available for use by area city and county public works staff that provided (1) crash data access; (2) other safety data access such as speed studies, traffic counts, and roadway characteristics; and (3) analysis tools, such as crash mapping software and collision diagramming software.

- ***Task the state Traffic Records Coordinating Committee (TRCC) to address local safety data needs.*** The TRCC has federal money to fund new programs and to devote to existing projects worthy of implementation. Although these funds represent only a small portion of those available for improvement of crash data access and analysis, the TRCC is responsible for coordinating data improvement projects and decisions funded by other means as well. Addressing the needs of local agencies and involving them in this committee would be a helpful step in shifting some of the TRCC's focus from state-level data and analysis needs to those at the local level.

Appendix

Local Agency Safety Data Survey Questionnaire

Missouri's Blueprint for Roadway Safety

"Improving Traffic Safety Analysis Capabilities for Local Communities in the Kansas City Area"

The following survey on crash data and safety analysis capabilities at the local level in the Kansas City area is being conducted by Midwest Research Institute (MRI) and the Mid-America Regional Council (MARC) in support of MoDOT and Missouri's Blueprint for Roadway Safety. MRI and MARC are investigating ways to help local agencies improve their capabilities to analyze crash data. Your responses to the following questions concerning your city's crash data and safety analysis capabilities would be greatly appreciated. If you are unable to complete the survey, or if you know of someone else in your department who would be more appropriate to complete the survey, please pass it along.

LOCAL AGENCY SAFETY DATA SURVEY QUESTIONNAIRE

(Please return by April 15, 2007)

CITY: _____

Public Works Department

Police Department

How long have you been in your current position? _____

CRASH DATA

1. Does your city maintain a crash database for local roads?..... Yes No

If YES, which agency maintains the crash database? _____

If NO, skip to Question 7.

2. Is your crash database in electronic form? Yes No

If YES, in what format is the output data displayed (e.g., report, spreadsheet, database)?

If NO, please describe how it is maintained (e.g., hard copy police reports):

3. How is the location of a crash identified (i.e., what location reference system, if any, is used)?

4. Is the crash data made available to any of the following?

- | | | |
|--|------------------------------|-----------------------------|
| State DOT and/or their safety division/office..... | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Highway patrol | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Police officers | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Local coalitions..... | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Citizens | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Traffic engineers..... | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Local public works department | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

Please elaborate as needed.

5. On a scale of 1 to 10, how confident are you in the accuracy of the crash data for your city? (1 = least confident; 10 = most confident)

6. Do you provide training on how to collect crash data? Yes No

If YES, please elaborate.

7. Does your city collect crash data from other jurisdictions/agencies (i.e., from a state DOT, state troopers, another city, or another county)? Yes No

If YES, from whom?

SAFETY DATA ANALYSIS

8. Does your city analyze crash data?..... Yes No

If YES, which agency conducts the safety analyses? _____

9. Does your city currently have any software for crash data analysis? Yes No

If so, what software do you have and what types of analyses do you conduct?

10. Would your agency consider analyzing crash data if it were more readily available?

..... Yes No

11. If your city currently analyzes crash data, how confident are you (on a scale of 1 to 10) in your city's *ability* to analyze crash data? (1 = least confident; 10 = most confident) _____

12. If help in analyzing your crash data were available, would you be interested?

..... Yes No

13. If there were an analysis tool available (at no cost) to help your agency with safety data analysis, would you be interested? Yes No

14. Does your city/agency currently have any software for crash data analysis. If so, what software do you have and what types of analyses do you conduct?

15. What types of analyses would you want to conduct?

16. What contributing factors would you be interested in investigating?

17. What types of locations (e.g., roadway segments, intersections, etc) would you be interested in investigating?

18. Does your agency have regular programs for maintaining roadway inventory data?

..... Yes No

For collecting traffic volume data (major road ADT, minor road ADT)?

..... Yes No

WORKSHOP

19. We are planning a one-day workshop in the Kansas City area to discuss current safety data availability, uses of available data, and safety analysis needs that are not being met. Would you, or someone from your agency, be interested in attending?..... Yes No

20. Do you have any other observations or comments?

21. May we have the name of a knowledgeable person in your agency that we may contact to clarify any aspect of your response or to obtain additional information?

Contact: _____

Title: _____

Agency: _____

Address: _____

Telephone #: _____

Fax #: _____

e-mail address: _____

Please return the completed survey by **April 15, 2007**, to:

Ingrid B. Potts, P.E.
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Kansas City, MO 64110