

# Local Road and Street Safety Improvement Program

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A project to encourage the establishment of a viable safety program at the local agency level, rather than to identify and correct site-specific problems, is described. Specific project objectives were (a) to develop and present a 1½-day short course that emphasized the benefits of a local road and street safety improvement program; and (b) to conduct on-site visits to assist local agencies in developing, implementing, and maintaining a local road and street safety program. The developmental tasks and specific contents of the short course are summarized and the accomplishments of the on-site visits are described. The contents of the overall program address low-volume, local road and street safety programming; specific safety improvement considerations; elements of a comprehensive local safety program; identification and implementation of feasible countermeasures; economic evaluation of alternative actions; and risk management techniques to reduce roadway tort liability.

A project that encouraged the development of a local road and street safety improvement program (1) for municipalities in Pennsylvania is described. The main focus of the project was to encourage the establishment of a viable safety process at the local agency level, rather than the sole identification and correction of site-specific problems. Specific project objectives were as follows:

- Develop and present a 1½-day short course that emphasized the benefits of a local road and streets safety improvement program; and
- Conduct on-site municipal visits to assist local agencies in developing, implementing, and maintaining a local road and street safety program.

The developmental tasks of the short course materials (notebooks and visual slide production), conduct of the 1½-day short course, and accomplishments of the on-site visits are summarized. The findings from the on-site interviews are described, and the evaluation responses of the short course and site visits are synthesized.

## PROJECT ACTIVITIES

### Background

In order to fully address the broad range of safety issues on low-volume, local roadways, the Pennsylvania Transportation

Institute (PTI) was selected to supplement the efforts of the Pennsylvania Department of Transportation's (PennDOT's) Center for Highway Safety. Although PennDOT continues to assist municipalities with information and guidance related to local road safety, PennDOT's safety design liaison engineers were not able to devote sufficient time to identifying and solving local highway safety problems. In order to supplement PennDOT's efforts, the project was divided into two phases. The first phase consisted of developing, producing, and conducting a 1½-day short course for representatives from local governments. The second phase involved on-site visits to interested local agencies.

The overall program also emphasized the benefits of practicing a strong risk management program to reduce roadway tort liability implications. The risk management considerations included the following:

- An explanation of municipal roadway liability per state legislation;
- An encouragement of public official support to promote risk management techniques;
- The need and benefits of data collection, data maintenance, and record keeping;
- An exposure to the legal procedures involved in filing, preparing, and defending a roadway-related lawsuit.

### Municipality Selection for Short Course

A joint meeting between representatives of PennDOT's Center for Highway Safety, Municipal Services, and Office of Research and Special Studies; Pennsylvania Transportation Institute; and the Pennsylvania Rural Technical Assistance Program (RTAP) was held early in the first phase to clarify project objectives and to select the participating municipalities. Before the meeting, PennDOT identified 150 rural and urban municipalities with high accident frequencies. Municipalities were selected during the meeting on the basis of the following criteria: accident frequency, population (15,000 to 25,000), a perceived need for this type of program, past interest in programs of this nature, an adjacent growing suburban area, a clearly defined organizational structure, probability of success for implementation, and geographical representation of the state. A goal of at least 30 interested agencies was established initially.

An invitation letter was mailed by PennDOT to the selected municipalities. The letter indicated that PennDOT would provide all accommodations and materials. Approximately 2 weeks after the letters were mailed, PTI began contacting the munic-

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ipalities by phone to determine which municipalities were interested in sending a representative to the course and, for each of these, the name of the representative. Approximately 1 month before the course, 25 municipalities had committed to attendance.

### Short Course Development

The "Local Road and Street Safety Improvement Program" short course was directed to the municipal level of road and street safety. The course was designed to familiarize local municipalities with road and street safety improvement programs. Topics of discussion included an overview of a safety improvement program, a municipality's safety responsibilities, the characteristics of a safe roadside, procedures for conducting engineering studies, identification of feasible improvement countermeasures, financing and implementation of identified improvements, risk management, and tort liability.

The goals of the course were to present the benefits of a road and street safety improvement program, help the municipality develop a program, establish priorities, and make efficient use of available funds. Related references and existing materials were reviewed for application to the short course notebook and lectures development. The materials included technical publications and reports, existing photographic slides, related accident information, and risk management reports and analyses. Related short course materials developed by other agencies or institutions were also selectively reviewed. The majority of the information contained in the course notebook was from the following four federal publications:

- *Local Highway Safety Studies—User's Guide*, U.S. Department of Transportation, FHWA, National Highway Institute, Washington, D.C., July 1986.
- *Local Highway Safety Improvement Program—User's Guide*, U.S. Department of Transportation, FHWA, National Highway Institute, Washington, D.C., July 1986.
- *Functional Requirements of Highway Safety Features*, U.S. Department of Transportation, FHWA, National Highway Institute, Washington, D.C., June 1984.
- *Guide to Safety Features for Local Roads and Streets*, U.S. Department of Transportation, FHWA, National Highway Institute, Washington, D.C. undated.

Two notebooks were developed: a Participant's Notebook and an Instructor's Notebook. The text of the Participant's Notebook was typed to cover only 75 percent of the horizontal page. The remaining 1½ in. of space on the right side of each page provided an area for the participants to make notes during the lectures. The text of the instructor's notebook was identical to that of the Participant's Notebook. The extra 1½-in. space along the right margin served two purposes: (a) the slide numbers that corresponded to the text were located in the extra space; and (b) the Instructor's Notebook maintained the same page numbers as the Participant's Notebook. These features enabled the instructors to readily refer the participants to a particular page in the notebook. Text material relating to a specific slide was highlighted in the Instructor's Notebook.

### Short Course Presentation

The 1½-day short course was presented on February 14 and 15, 1989. The course materials, lodging for the night of February 14, and meals were provided at no cost to the participants. Twenty-three municipalities sent representatives to the course. Thirty-two individuals attended the short course: 25 municipal representatives, 6 PennDOT personnel, and 1 FHWA representative.

At the conclusion of the short course, evaluation and interest forms were distributed to the participants. A discussion on the evaluation of the course is presented later. The Site Visit Interest Form asked the municipalities to indicate interest in a site visit. Nineteen municipalities indicated potential interest in the site visits.

### Site Visit Arrangements

The objective of the site visit was to assist each municipality with the development and implementation of its own local highway safety program. The site visits also made it possible for more local personnel to attend; these personnel could then apply the program content to their respective work areas. As an additional advantage of site visits, questions regarding the storage and use of accident and highway data would be more effectively answered when access to the data is available.

A few months after the short course, most of the municipalities that had indicated a potential interest in a site visit were contacted. Arrangements were made with nine municipalities. During the initial municipal contacts, information was sought on any unique problems identified by individual agencies. However, it was emphasized that the goal of the project was to encourage and assist in the development of a local highway safety program, and that isolated or individual corrective studies would not be conducted. Rather, general guidance in establishing procedures for identifying appropriate countermeasures at high-accident locations would be provided.

Two areas were typically discussed as potential items to be included on an agenda: presentation on selected chapters from the notebook and a review of the record-keeping system. The review of the municipality's record-keeping systems would include an examination of current procedures through discussions generated by a questionnaire, a discussion of potential changes and improvements, and a demonstration of available software that could assist in the management and storage of data records.

### Site Visit Administration

Two basic agendas were developed for the site visits: a 1-day agenda and a 2-day agenda. Each visit was conducted with one of these agendas or with minor variations from these agendas. The 1-day agenda was divided into two sessions. The first session, which typically lasted 3 to 4 hr, consisted of a review of the record-keeping systems for the municipality, discussion of potential changes and improvements in the record-keeping procedures, and demonstration of available software that could aid the municipality in its record keeping. The second portion of the visits was the lecture titled "Risk Management to Reduce Roadway Tort Liability."

The 2-day visits expanded the 1-day agenda to include lectures on other chapters from the Participant's Notebook. Chapter 2, "Road and Street Safety Improvements," and Chapter 3, "Local Road and Street Safety Improvement Programs," were typically the requested additional chapters.

An evaluation questionnaire was developed for use during each site visit. This questionnaire directed the record-keeping review. Results from the questionnaire are summarized in the following section.

The microcomputer software demonstration began with an overview of the software. The software presented to the municipalities included dBASE III, Lotus 1-2-3, HISAFE, and HISAM. [dBase and dBase III are registered trademarks of Ashton-Tate Corporation. Lotus and 1-2-3 are registered trademarks of Lotus Development Corporation. HISAFE and HISAM are public domain software for which the Center for Microcomputers in Transportation (McTrans) at the University of Florida serves as the distributor.]

Lotus 1-2-3 is a worksheet program that can be used for calculations (e.g., accident rates). dBASE III is a data manager program that is conducive to the storage and manipulation of data (e.g., sign inventories and roadway survey). Although both programs facilitate data management, dBASE III is better suited to data manipulation; Lotus 1-2-3 is preferable for computations. HISAFE (Highway Safety Evaluation Program) and HISAM (Highway Safety Analysis Monitoring) software and documentation are available from McTrans for \$45 and \$40, respectively (1989 prices). HISAFE is designed to evaluate the effectiveness of accident countermeasures, whereas HISAM is used to identify high-accident locations, analyze accident characteristics, and produce standard accident analysis reports.

Simple examples were developed for each type of software. A computer and printer were set up during each visit and used to demonstrate the software programs. Related questions were answered during the demonstrations. Sample printouts were also provided to interested municipalities.

Approximately half of the municipalities visited store accident data records on a structured mainframe computer. Most municipalities have limited flexibility to modify the program or merge other potential inventories (e.g., sign or pavement condition) with the accident data bases. Several agencies expressed interest in a program that could serve as a management tool as well as a data storage and retrieval mechanism. For example, agencies are interested in knowing how many signs are older than a specific number of years or when a particular route's pavement markings were last painted. The capability of merging accident data files with other data bases is of particular interest to municipalities. Several municipalities utilize computers, but are only beginning to touch on the capabilities of the computer as a management and record-keeping tool.

## QUESTIONNAIRE DEVELOPMENT AND RESULTS

### Questionnaire Development

A detailed questionnaire was developed to aid in directing the record-keeping review at each municipality and to gather

information about each local agency's data collection methods, traffic safety programs, and liability concerns. Development of the questionnaire was based on the Participant's Notebook; it also expanded on relevant topics and interests. The questionnaire was designed to have the research team learn specific details about each agency's current policies and procedures. It also served as a vehicle to engage the participants in discussions that typically resulted in group interactions. The topics covered in the questionnaire included the following:

- Background information on the municipality,
- Collection and maintenance of data,
- Identification of hazardous locations,
- Performance of engineering studies,
- Establishment of project priorities,
- Consideration of countermeasures,
- Sources of funding, and
- Consideration of liability.

During each site visit, the research team met with a pre-selected group of individuals representing the municipality. These individuals were chosen by the agency and typically included members responsible for record keeping. Also present were persons representing administrative personnel, the police department, the department of public works, and the highway department. In most cases, 8 to 10 individuals were in attendance and were met as a group, except at one municipality where one-on-one interviews were conducted. The structure of the meeting was flexible and somewhat formal; a question-and-answer or general discussion session was typical. The sessions had the additional benefit of providing an opportunity for separate municipal departments to interact with each other. In many cases, the questions sparked detailed conversation between municipal personnel regarding current policies and possible improvements.

### Background Information

The first section of the questionnaire was devoted to general information on each municipality, including size, number of accidents, population, operating budget, etc. Some of the questions were supplemented with information from PennDOT. Table 1 presents the general information on the visited municipalities. The average population of the nine agencies was approximately 24,000. Municipality population ranged from 9,200 to 40,000 residents. Geographic size ranged between 3.5 and 37.0 mi<sup>2</sup>, with the average size being 19 mi<sup>2</sup>. Total length of municipal roadway averaged 80 mi for the nine agencies. Annual operating budgets ranged from \$2 to \$14 million.

The municipalities visited had between one and three accidents per day, including both reportable and nonreportable. Most municipalities indicated that the majority of their accidents were intersection related. Several agencies stated that the more severe accidents, those involving fatalities, usually occurred in rural areas and were typically run-off-the-road accidents.

With one exception, all of the municipalities occasionally used the services of consulting traffic engineers. Most agencies

TABLE 1 GENERAL INFORMATION ON MUNICIPALITIES PARTICIPATING IN SITE VISITS

Municipality Miles <sup>a</sup> (mi)	State Highway Miles <sup>a</sup> (mi)	Size (mi)	Population	No. Employees		Operating Budget (\$ million)	No. of Reportable Accidents in 1988 <sup>b</sup>
				Total	Police Only		
143.46	47.33	28.0	40,000	100	50	7	563
74.35	51.97	37.0	28,000	140	55	10.5	784
81.68	31.76	13.4	24,000	112	36	13	424
62.44	19.51	16.7	21,000	67	34	4	382
45.02	12.06	3.5	20,000	127	29	8	277
95.03	29.34	9.0	35,000	196	80	14	648
120.47	92.76	27.5	20,000	60	25	5	384
30.41	21.46	25.0	9,200	25	10	2	73
73.32	24.87	13.0	23,000	120	35	8	490

<sup>a</sup>Data from PennDOT's Bureau of Accident Analysis (4-3-86 data).

<sup>b</sup>Data from PennDOT's Center for Highway Safety.

collected limited traffic data, such as spot speeds, using in-house resources, but consultants were usually retained to conduct comprehensive traffic studies.

### Collection and Maintenance of Data

This section dealt with current data collection and record-keeping procedures. Frequently, separate departments within many of the municipalities maintained different portions of the records. Responses by an individual representing one department stimulated questions from individuals in other departments. Many municipalities began discussing lines of communication and possible measures for improving current record-keeping procedures during the meeting.

#### Accident Data

At each municipality, the police department was responsible for accident data. Several agencies had a specific traffic safety group within the police department that was responsible for accident investigation.

Accident locations were generally referenced by direction and distance to the nearest intersection. Several agencies used a grid system to record accident locations. The grid number was used on the accident report or added when the information was coded into a computer. One agency located in an urban area used house numbers and street names as a reference.

Four of the nine agencies reported that they enter information from the accident reports into a computer data base. The remaining five agencies keep hard copies on file. Several agencies file reports on both reportable and nonreportable accidents. One agency does not complete an accident report

on nonreportable accidents. All municipalities send copies of reportable accident reports to PennDOT. Those agencies not currently maintaining accident records in a computer data base indicated they were in the process of, or close to, using a computer to maintain accident records. The computer data bases are typically structured mainframe programs used by a consortium of agencies within a geographical area. Individual municipalities using these facilities are unable to make significant program modifications or to merge other data inventories with the accident data bases.

Most agencies formally summarize accident data through a monthly or yearly report. In addition, several agencies use pin maps to flag high-accident locations. Municipal representatives indicated that they can informally identify high-accident locations because of their familiarity with the roadway system.

#### Traffic Data

The municipalities visited had average daily traffic (ADT) counts on at least a limited number of streets. Most municipalities conduct ADT counts on an "as needed" basis, but a few agencies had regularly scheduled ADT updating programs. ADT information was typically stored in hard copy files; one municipality utilized roadway maps.

#### Road And Street Data

Road and street information is processed on an informal basis at most municipalities. Because personnel are familiar with the system, certain information is not formally documented. The majority of the local agencies reported that they maintain at least limited sign inventories. Several municipalities retain

work orders and purchase records, whereas others have regular inspection programs. A few municipalities maintain a record of roadway marking locations and repaint all markings in their jurisdiction each year.

Most municipalities indicated that bridge inspections were carried out by PennDOT or a county agency. Pavement condition surveys at most municipalities are conducted on an informal basis. Many programs consist of walking pavements and recording work completed. One municipality contracts the services of a consultant to evaluate pavement conditions and recommend treatments. As mentioned earlier, most municipalities are familiar with roadway characteristics through routine maintenance responsibilities, and much of the information is processed informally.

### **Hazardous Locations Identification**

Typically, municipalities have opinions about the locations of hazardous areas because of familiarity with local roads. Municipalities also use accident records (total accident frequency and severity), citizen complaints, and field observations to assist in identifying hazardous locations. One municipality also considers accident rates on the basis of traffic volumes. Four municipalities regularly maintain a pin map. Two municipalities indicated that the police department observes traffic conflicts at high-accident locations or locations believed to be hazardous.

Citizen complaints are usually handled on an informal basis. Most municipalities document a complaint and forward it to the appropriate personnel for action. In most cases, the work performed or action taken is not formally documented.

### **Performance of Engineering Studies**

All municipalities conduct limited or preliminary engineering studies. The agencies visited collect preliminary data using some of the following sources: complaint files, maintenance records, enforcement records, construction plans, and traffic control inventories. Only one municipality occasionally uses collision diagrams in preliminary investigations.

Police departments are typically responsible for carrying out in-house engineering studies. Most municipalities perform traffic volume studies on an "as needed" basis. All municipalities surveyed conduct spot speed studies; some have conducted ball-bank studies. Several agencies indicated they have conducted sight distance investigations at locations with limited sight distance; others have conducted traffic conflict surveys on an informal basis by having members of the police department observe traffic operations.

### **Establishment of Project Priorities**

The municipalities rated budget considerations as a primary factor in the establishment of project priorities. The agencies also took into account departmental recommendations, severity of the pending problem, annual programs, public pressure, and political considerations. All municipalities indicated that informal benefit-cost considerations were based on the judgment of the individuals responsible for the final decisions.

### **Countermeasure Considerations**

A majority of the municipalities visited rely on informal methods to evaluate countermeasures. None of the agencies considers life cycle costs or performs an economic analysis on proposed alternatives. Most decisions appear to be driven by the availability of funds and the perceived severity of the problem.

### **Funding Sources**

Municipalities were questioned about their use of various available funding sources. Part of each municipality's budget consists of funds from the Liquid Fuels Tax and police fines and penalties. If the agency has bridges as part of its network, funds from bridge postings, bridge inspections, and the 1982 Bridge Bill are used. Few agencies use the Railroad Safety Program. Several municipalities are aggressively using public-private partnerships as a source of funds for roadway improvements.

### **Liability Considerations**

The incidence of accidents involving serious injuries or fatalities was the most frequently discussed concern among various liability issues. Proper documentation of an incident to provide courtroom defense was also frequently discussed. Several agencies expressed discontent with insurance companies independently deciding when to settle a case out of court.

Frequencies of traffic-related lawsuits ranged between one and five per year for the different municipalities. Six of the nine agencies currently have at least one traffic-related lawsuit pending against them. Several municipalities have a trained accident reconstructionist on the police staff. These individuals investigate accidents with a high probability for a lawsuit.

## **PROJECT EVALUATION**

### **Short Course Evaluation**

During the short course, two evaluation forms were distributed to the participants. Issues addressed ranged from the perceived usefulness of the various sections presented in the course, to whether course objectives were met. A summary of the results from each evaluation is provided in the following paragraphs.

The front side of Course Evaluation I gathered general information on the participants. The 25 persons attending the short course represented municipal public works departments (12), police departments and traffic safety units (6), township managers (2), township engineers (2), streets and parks department (1), a technical assistant (1), and an assistant road foreman (1).

The municipal duties of the participants varied from road construction and maintenance to administrative responsibilities. Participants were also questioned regarding the number of years of experience in their respective areas. Answers ranged

from 1 year to 29 years of experience. The following illustrates the distribution of years of experience among the participants:

<i>Number of Participants</i>	<i>Years of Service</i>
7	0–5
8	6–10
5	11–15
2	16–20
2	19–25
<u>1</u>	Over 25
25	

Of the 23 municipalities attending the short course, 7 stated that they currently have a specific road and street safety improvement program. Nineteen of the municipalities indicated that they were interested in a follow-up on-site visit to initiate or improve existing street safety improvement programs.

Side 2 of the Course Evaluation I form gathered information on the usefulness of the various sections presented in the short course. Participants were requested to answer this question after the presentation of each section's material. On a scale of 1 (not useful) to 5 (very useful), the results ranged from 4.2 to 4.8. The overall average rating for all presentations was 4.4 out of 5.0. The highest usefulness rating was given to Chapter 6, "Risk Management to Reduce Roadway Tort Liability." All nine municipalities participating in the site visits also requested that this chapter be presented to their agency's personnel.

The Course Evaluation II form dealt with the course content, materials, presentations, and intended objectives. The majority of the participants felt that the objectives of the course were met.

A one-page Site Visit Interest Form asking the representatives to indicate interest in an on-site visit was distributed at the conclusion of the presentations. The form also provided an opportunity for participants to make special comments or requests. Overall, the comments were very positive. Even participants who indicated they were doing essentially the right things found the presented materials supported current policies and procedures. Several participants commented on the usefulness of the information contained in the Participant's Notebook and inquired about purchasing additional copies. One participant recommended developing separate sections of the course, one dealing with rural concerns and another addressing urban concerns. One municipality commented: "Request PennDOT to fund additional regional forums. We would support these updated forums even if we would need to pay."

### Site Visits Evaluation

Seven of the nine visited municipalities provided evaluation letters. The letters were very positive regarding this program. Each municipality felt that the time spent was well worthwhile and that the information presented was very useful to them as they develop and maintain their safety improvement programs. Frequently, municipalities stated that the information was presented in a way that was easy to understand and follow.

Several municipalities indicated that the instructor's involvement with actual tort claims cases helped to emphasize the importance of a roadway safety program at the municipal level.

The visited municipalities recommended continuing the program and establishing additional programs related to traffic safety. A number of activities currently being implemented or under consideration by participating municipalities are the following:

- "The suggestions and ideas relative to the Township's current record keeping system are currently being reviewed for implementation. We are also exploring the possibility of computerizing the data."

- The afternoon session "also provided us with insight in how to utilize complaints, inquiries, or accident data to review potential problems or hazardous areas or conditions."

- ". . . it provided each township employee an awareness of the potential hazardous and perhaps libelous conditions that can exist—and the need for constant vigilance and action by the employee to identify and correct these conditions."

- "We have already cut away some brush obstructing some road signage and are ordering a ball-bank indicator to determine advisory speeds for curves on some of our rural collector roads. We have also ordered some cone reflectors and additional orange and white barricades for work zones as suggested."

- "The program, as presented, was an important first step in controlling liability risks through the education and training of our employees."

- "The most important aspects that were missing (in the municipality) included a comprehensive accident investigation and reporting document, and the need for a complaint response system that incorporates documentation of response and automatic follow-up. These two practices have already been implemented by the Public Works Department."

- ". . . (this program helped) to raise the conscientiousness level of our staff . . ."

- ". . . township is proceeding to acquire a computer road/street traffic identification and maintenance record system and hopes to have it in place by 1990 to use as a management tool for a road maintenance/safety program."

### SUMMARY OF FINDINGS

The Local Road and Street Safety Improvement Program short course presented on February 14 and 15, 1989, in State College, Pennsylvania, had 32 participants that represented 23 municipalities, PennDOT, and FHWA. Site visits were held at nine municipalities.

The significant findings and results of the overall project are as follows:

1. The participants rated the usefulness of the short course very highly.

2. The "Risk Management to Reduce Roadway Tort Liability" section received the highest most useful rating of the six sections included in the Participant's Notebook. This section was also requested by the nine municipalities participating in the site visits phase of the project.

3. Noteworthy recommendations from the participants include the following:

- The program should be split into two sections—one geared to *urban* areas and one to rural/developing areas since they have very different needs and concerns.
- This course seemed a bit rushed. Should probably be two full days. Would like to see follow-up courses on specific subjects.

4. The municipalities participating in the site visit program asked a broad range of technical and legal questions. In order to be responsive, PTI was very flexible in the agendas. It was this element of the site visit that was most meaningful to the local agencies. This is true because each local municipality has different needs, issues, and concerns.

5. Almost every local agency expressed a very strong need for more help with microcomputer data base development. Key areas identified include file management/structure; inventory of signs, signals, and markings; pavement condition; and evaluation software. During the site visits, PTI exposed each municipality to HISAM/HISAFE, dBASE III, and Lotus 1-2-3 using some elementary and very limited examples. However, much more needs to be done to effectively assist the local agencies in actual software development using practical and related examples.

#### FUTURE ACTIVITIES

Based on the reported interest and requested need for further assistance from the municipalities, PennDOT, via its Rural Transportation Assistance Program (RTAP), has hired a full-

time safety engineer to continue the site visits to provide the necessary support and guidance. PTI will present additional 1½-day short courses; the RTAP safety engineer will conduct the local site-specific training aspects of the overall program. Additionally, the RTAP safety engineer will develop and maintain an ongoing evaluation of the effectiveness of the program objectives.

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#### REFERENCE

1. J. M. Mason, Jr., K. Fitzpatrick, K. L. Slack, and W. P. Kilareski. *Municipal Safety Liaison—Local Road and Street Safety Improvement Program*. Final Report, PTI 9002, FHWA-PA-89-017 + SF-033. Pennsylvania Department of Transportation, Harrisburg, Aug. 1989.