FINAL REPORT

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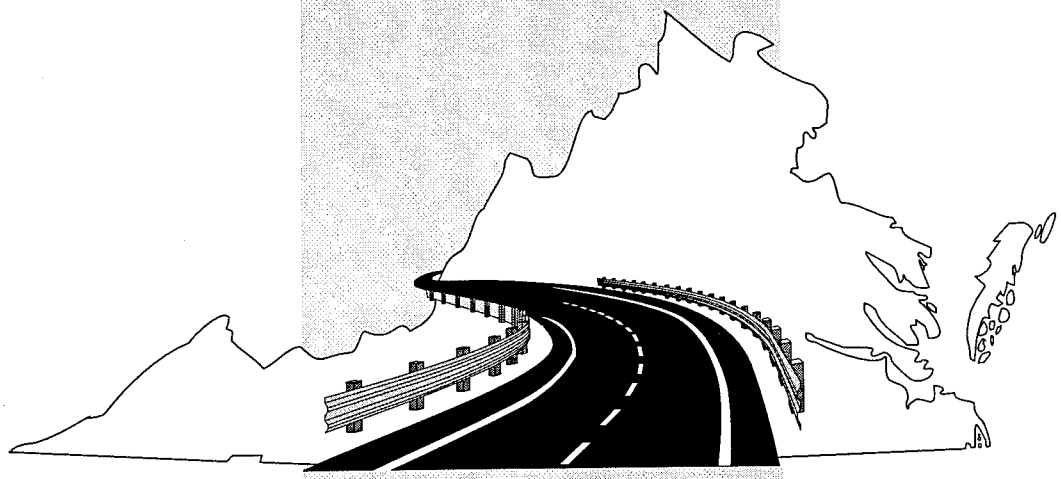
COMPARATIVE CASE STUDIES OF CORRIDOR SAFETY IMPROVEMENT EFFORTS



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16. Abstract

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Following Pennsylvania, numerous states, including Virginia and California, developed CSIPs. Further, in 1997, a series of fatal crashes on U.S. Route 28 in Virginia led to Virginia's governor directing Virginia's secretary of transportation to improve safety on the roadway, as had happened in Pennsylvania.

This study investigates these safety efforts to determine the factors associated with effectiveness. The researcher presents model guidelines for developing effective corridor safety programs.

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(The opinions, findings, and conclusions expressed in this report are those of the author and not necessarily those of the sponsoring agencies.)

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ABSTRACT

In 1988, following a series of fatal crashes on U.S. Route 322, Pennsylvania's governor directed Pennsylvania's secretary of transportation to develop immediate, short-term measures to improve safety on the roadway. In response, the Pennsylvania Department of Transportation (PennDOT) led a multidisciplinary team that developed a 14-point safety plan for the corridor. PennDOT immediately declared the initiative a success and implemented similar efforts statewide. The Federal Highway Administration heard about these programs, named Corridor Safety Improvement Programs (CSIPs), and encouraged other states to use them.

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INTRODUCTION

Background

In 1965, with the publication of *Unsafe at Any Speed*, Ralph Nader gained the attention of legislators, the media, and the public by showing that highway fatalities are not random events. He argued that the design of the Chevrolet Corvair was flawed and that the vehicle was responsible for numerous traffic crashes and fatalities. This book drew national attention to the issue of traffic safety (Miller 1993) and sparked a social movement. Following a series of public and congressional hearings, the U.S. Congress passed the National Traffic and Motor Vehicle Safety Act of 1966 and the Highway Safety Act of 1966. The former established specific standards to ensure that vehicles would be more crashworthy, and the latter required that each state implement a highway safety program by the end of 1968 to improve the safety of drivers and highways.

Before the passage of these acts, the U.S. Department of Commerce was the home of federal transportation-related activities (Miller 1993). Congress created the U.S. Department of Transportation in October 1966. Within the department, the Bureau of Public Roads administered highway-related issues and the newly formed Highway Safety Bureau established vehicle standards. Dr. William Haddon, a public health professional and epidemiologist, became the first administrator of the Highway Safety Bureau. Dr. Haddon is credited with developing an interdisciplinary approach to highway safety (Miller 1993).

The need for such an approach is exemplified by one of the most highly publicized traffic crashes in recent history. Early on Sunday, August 31, 1997, Diana, Princess of Wales, died as the result of crash in Paris, France. The princess' companion in the back seat and the driver of the Mercedes-Benz in which they were riding also died. The front seat passenger, although severely injured, survived. In the hours and days following the crash, the media reported to the international public many of the factors discovered about the circumstances of the crash.

Reportedly, paparazzi were pursuing the princess and the driver of the Mercedes was speeding while being pursued, perhaps traveling as fast as 190 km/h (120 mph) in a 50 km/h (30 mph) speed zone. Although the driver was not the princess' regular chauffeur, he had reportedly received special training in dealing with pursuit situations. Later reports indicated that the driver

had a blood alcohol concentration (BAC) of 0.175%, well in excess of the 0.05% BAC level of intoxication established in France. He was also, reportedly, using prescription drugs at the time.

The crash occurred in a tunnel that sloped downward and curved. The vehicle struck one of the support pillars head on, apparently after the driver lost control of the vehicle. The vehicle sustained extensive damage to its front, and the roof collapsed.

The Mercedes is a large car and noted as being one of the safest in the world. This vehicle had many safety devices, including a crash cage and driver and passenger air bags, which deployed in the crash. It also had safety belts and shoulder harnesses, although only the front seat passenger, the survivor, used them.

Although emergency personnel were called to the scene within 2 minutes of the crash, they took between 10 and 15 minutes to reach the scene. The driver and the princess' companion in the rear seat were dead at the scene, but the princess was reportedly alive. However, it took more than an hour to extract her from the vehicle. Almost 2 hours after the crash, she reached a hospital emergency room, not the closest one, where physicians worked on her for 2 hours before declaring her dead.

Although the media and the public looked for someone or something to blame for this tragedy, and although in 1999 the driver was deemed responsible for the crash, a number of factors contributed to this crash and its outcome. Had the paparazzi not pursued the princess, the driver might not have driven so fast. Had the driver not been drunk or under the influence of drugs, the crash might not have occurred. Had the driver not been speeding, the crash might not have occurred or the impact would not have been so severe. Had the tunnel not curved or had there been guardrail, a solid barrier instead of support pillars, or crash cushions around the support pillars, the impact would not have been so severe. Had the vehicle been smaller or had fewer safety devices, the front seat passenger might not have survived. Had the three unbelted occupants used their restraints, they might have survived. Had the emergency response personnel been able to get the princess to the hospital faster, or taken her to the nearest hospital, she might have survived.

This well-publicized crash exemplifies the complex nature of traffic crashes and, particularly, fatalities. Although it is tempting to look for a single cause of the tragedy, numerous factors contributed to it. Likewise, numerous factors could have prevented the crash or attenuated its consequences.

Development of Corridor Safety Improvement Programs

The 1990s saw numerous attempts to emphasize multidisciplinary cooperation among the various interests involved in highway safety (Federal Highway Administration [FHWA] 1997). One such effort is the Corridor Safety Improvement Program (CSIP). CSIPs are premised on the fact that crashes tend to occur along connected segments of highway, known as corridors. Some corridors have relatively high crash, fatality, and injury rates that spot highway improvements

may not alleviate. In these cases, multiple factors likely contribute to the problems. Thus, CSIPs seek to identify these problems and formulate countermeasures using a multidisciplinary approach involving engineering, enforcement, education, and emergency response personnel (Zogby, Bryer & Tenaglia 1991). This approach provides a broad perspective in which problems and potential corrective measures are less likely to be overlooked. In addition, individuals or groups that participate in a CSIP may develop a sense of ownership in the process, thereby having an increased interest in seeing that the problems of a corridor are corrected (Jernigan 1997).

CSIPs are the result of a concept developed in Pennsylvania in the late 1980s for a corridor of U.S. Route 322, a high-volume, high-speed, two- and four-lane highway. In response to a series of fatal crashes, Pennsylvania's governor ordered the Pennsylvania Department of Transportation (PennDOT) to develop short-term recommendations to improve safety on the corridor. To develop the plan, PennDOT assembled a multidisciplinary team, which included PennDOT's chief safety engineer, a traffic engineer, a maintenance engineer, and local elected and police officials. The team recommended a 14-point improvement program, which was fully implemented within 6 months. Because of the reported success of this effort, PennDOT analyzed crash data to identify other corridors with severe crash problems. This innovative approach was documented and is the model other states have used to develop CSIPs (Zogby, Bryer & Tenaglia 1991). In 1990, FHWA began emphasizing CSIPs as a wise use of limited highway safety improvement resources and the U.S. Department of Transportation identified corridor, pedestrian, and motor carrier safety programs as three major safety initiatives to be implemented nationwide (Zogby, Bryer & Tenaglia 1991).

In 1991, FHWA developed guidelines for developing a CSIP, which noted that rural and urban arterials have a high number and density of fatalities per mile (FHWA 1991). Many of these arterials are free-access facilities with operating speeds of 65 km/h (40 mph) or greater. The guidelines suggested that corridors with particularly high crash and severity rates be selected as candidates for a CSIP. Further, the guidelines outlined an implementation process based on the Pennsylvania model:

1. Designate a lead agency.

2. Determine what agencies need to be involved from the outset.

3. Determine conceptually what types of activities are needed to reduce crashes and save lives on the corridor from the highway, human factor, vehicle, and emergency medical services (EMS) perspectives.

4. Determine what existing agencies are doing, what resources are required, and what resources are available to implement the CSIP.

5. Conduct an initial corridor meeting.

6. Establish selection criteria and select a corridor.

7. Develop an action plan.

8. Establish a multidisciplinary safety team of 10 to 15 members to gain further insight into the problems and solutions to be implemented, obtain community support, and gain access to groups and individuals who can assist in implementation.

9. Revise the plan based on the team's input.

10. Present a final draft action plan at the second meeting of the team.

11. Schedule a media conference, and announce the plan.

12. Implement the initiatives.

13. Evaluate the effectiveness of the initiatives.

PURPOSE AND SCOPE

The purpose of this study was to determine whether CSIPs and related safety efforts could be effective in improving traffic safety along specific stretches of roadway, to isolate the factors that may contribute to the effectiveness or ineffectiveness of such programs, and to develop model guidelines for future programs.

To accomplish this purpose, case studies were developed for four corridor safety programs—the initial Pennsylvania initiative, a similar initiative for U.S. Route 28 in Virginia, a Virginia CSIP, and a California CSIP—to determine if any of the programs was effective in reducing traffic crashes, injuries, and fatalities. These programs were also examined to determine what factors were associated with effectiveness.

RESEARCH DESIGN

A comparative case study approach was used to study and understand the CSIPs. Blau and Meyer (1971) contrast the comparative and case study methods for examining organizations. The objective of comparative analysis is to study two or more organizations and try to explain their differences. In contrast, a case study looks into one organization in depth. The case study method does not require the researcher to develop detailed hypotheses in advance and provides a great deal of flexibility. However, the appropriateness of generalizing the conclusions is always suspect. By developing more than one case study, one can enjoy the advantages of the case study method and lessen its limitations by providing for at least some comparisons.

METHODOLOGY

Analytic Framework

To analyze the elements related to the implementation of four programs, a framework developed by Komarovsky (1975) was used. This framework follows a "natural history" approach and includes the following elements:

1. *Mandate (Goals).* What was the problem to be tackled?

2. *Selection of the Commission (Task Force).* Who were the leaders? What groups were involved? What groups were underrepresented?

3. *Organization of the Work.* How was the work divided? How much time was required for the work? What was the role of the leader?

4. *Aftermath.* What were the consequences of the work?

Data Collection

The researcher was an ex officio member of the task forces for Virginia's CSIP, which involved a rural and an urban pilot. The researcher's notes, the notes and official project files of the program coordinator, and the researcher's project files were used to delineate the development of Virginia's CSIP. Official files, news articles, and published reports describing the development of the Pennsylvania and Virginia Route 28 initiatives and the California CSIP were also used. In addition, the researcher conducted telephone interviews with a sample of participants from all cases (see Appendixes A through C).

Data Analysis

Crash data were used to determine the impact of these programs on traffic crashes, injuries, and fatalities. The researcher then sought to understand and explain the significant factors involved in the effectiveness or ineffectiveness of these cases.

OVERVIEW OF PROGRAMS

The Pennsylvania Initiative

On May 21, 1988, a woman was killed on U.S. Route 322 in Delaware County, Pennsylvania, when she swerved into oncoming traffic and collided head on with a large truck (Mayer 1988a). The same week saw a seven-car pileup on the same roadway. These crashes

occurred on a roadway that had been the site of the deaths of more than 50 people since 1970. Many of these fatalities had been concentrated in recent years. In 1986, there were 3, and in 1987, there were 6 (Lieber 1988). The corridor, known as the Conchester Highway, is a two- and four-lane high-speed roadway 12 km (7.5 mi) long that carries more than 20,000 vehicles per day. It stretches between I-95 and U.S. Route 1, both major north-south corridors. Large trucks make up about 25% of the traffic (Zogby, Bryer & Tenaglia 1991). Although the single-fatality crash on May 21 was probably one of several in Pennsylvania that weekend, it caught the attention of the public and the politicians. The roadway had already been the subject of recent calls to improve its safety, and some county officials had been quoted as calling the roadway a "killer highway" (Lieber 1988).

Five days after the crash, PennDOT officials held a public meeting attended by about 300 people (Mayer 1988a). Before the meeting, Pennsylvania's governor had ordered PennDOT to look for immediate, short-term recommendations to improve safety on the roadway (Mayer 1988a). PennDOT's deputy secretary of safety administration implemented a "corridor concept," which involved looking at the corridor as a whole, rather than for just spot improvements, and getting various disciplines together to look for the causes of and solutions to the crash problems. He formed a small multidisciplinary task force that included elected officials and state and local agency representatives in enforcement, engineering, and public information and education. He selected relatively high-level people from within the state and local bureaucracy—people with discretion over programs and spending.

The task force met one time in the field and developed recommendations to improve safety on the roadway. PennDOT and the other involved parties implemented the 14-point improvement program within 6 months at a cost of $650,000. The program included enhanced signing and pavement marking, reduced speed limits, increased local police enforcement, installation of a concrete median barrier, placement of anti-skid pavement surfaces, and establishment of an area for commercial vehicle inspections. On June 6, 1988, only 16 days after the crash, the governor toured the corridor and publicly announced the improvement program (Mayer 1988b).

PennDOT immediately declared the initiative a success. Although PennDOT never conducted an impact evaluation, they applied the multidisciplinary corridor safety approach statewide.

The Virginia CSIP

In 1992, Virginia became one of many states that initiated a CSIP after the reported success of the Pennsylvania program (Jernigan 1997). Unlike the Pennsylvania program, the Virginia CSIP was initiated from within the state bureaucracy.

The Virginia Department of Transportation (VDOT) and the Virginia Department of Motor Vehicles (DMV) agreed to co-sponsor two pilot CSIPs—one urban and one rural—to determine potential differences in the ability of the programs to be effective (Jernigan 1997).

VDOT allocated $500,000 and the DMV $10,000 for each corridor to establish the pilots. VDOT did not select the rural and urban areas to be targeted because they had the worst crash problems. Instead, they selected them because the DMV and VDOT personnel in these areas could be made available to run the program.

The urban corridor, U.S. Route 144, is a 9-km (5.5-mi) two-lane roadway near Richmond. It connects U.S. Route 1 at the south and U.S. Route 10 at the north. The northern end is more heavily traveled, and there is substantial subdivision development along the corridor. Except for its ends, the corridor is relatively straight (Jernigan 1997). According to VDOT's records, in the 3 years before the initiation of this program, there were two fatalities on the corridor. The corridor had not been the subject of much public interest. It is located on the outskirts of an urban county that has more exciting transportation problems than this relatively remote road (Jernigan 1997).

The rural corridor, U.S. Route 24, is a 30-km (19-mi) roadway near Roanoke. The western end is a four-lane divided highway, and the remainder is a two-lane roadway on rolling and winding mountainous terrain (Jernigan 1997). According to VDOT's records, there were six fatalities on the corridor in the 3 years before the initiation of this program. The corridor had been the subject of a great deal of citizen interest for many years (Jernigan 1997).

The task forces for the two corridors were relatively large, from 21 to 25 members. They took from 10 to 13 months and six or seven meetings to reach their engineering recommendations. Both task forces had attrition problems. By the final meeting, only 6 of 25 members of the rural task force who were not employed by VDOT or DMV participated, and only 1 of 21 members of the urban task force who was not employed by VDOT or DMV participated.

During the deliberations of the task forces, some small improvements were carried out using other funds. Immediately after the urban task force made its recommendation to widen the shoulder on part of the corridor, VDOT cancelled the program because of the lack of interest. However, VDOT's district traffic engineer used most of the funds to implement the task force's recommendation. The rural task force recommended improving two intersections. VDOT implemented the higher priority recommendation, but there was not enough money left to implement the second. As a result, the VDOT resident engineer combined the remainder of the funds with maintenance funds to widen the shoulder on part of the corridor. In addition, a number of enforcement programs were implemented on the rural corridor.

The California CSIP

In 1992, California also initiated a CSIP after the reported success of the Pennsylvania program (California Highway Patrol [CHP] 1994). Like the Virginia CSIP, the California CSIP was initiated from within the state bureaucracy by way of a $280,000 federal 402 grant. However, the California CSIP was not led by the state's DOT, Caltrans, but by the state's law enforcement agency, CHP (FHWA 1997).

The corridor, State Route 1 in Ventura County, is part of the Pacific Coast Highway. The corridor stretches for 34 km (21 mi), from the Los Angeles County line at its southern end into the City of Oxnard at the northern end. The corridor is a multilane divided highway that carries about 14,000 vehicles per day. The road winds along the coast of the Pacific Ocean, by recreational areas and military installations (CHP 1994).

The CHP program coordinator worked with staff from California's Office of Traffic Safety (OTS) and Caltrans to select the corridor and select the members of the task force. A multidisciplinary task force of 17 representatives of military, federal, state, and local agencies and the private sector was assembled. Similar to the Virginia CSIP, the task force was composed of mid-level personnel who generally did not have discretion over extensive budgets.

The task force met seven times over 17 months and made numerous and diverse recommendations for improvements along the corridor. Recommendations included enforcement, engineering, emergency response, and public information and education strategies. These recommendations included such things as selective enforcement, improvement of intersections and signing, installation of micro-cell emergency telephones, and development of multimedia educational materials. California's CSIP multidisciplinary team was energetic and active, and the improvement plan implemented far exceeded the objectives of the program. The team also secured $1.8 million in federal, state, and private funds beyond the initial $280,000 allocated for the project to implement their recommendations (FHWA 1997).

The Virginia Route 28 Program

In April 1997, a multiple-fatality crash occurred on U.S. Route 28 in Virginia. Within 6 weeks, two more multiple-fatality crashes occurred on the corridor (Emerson 1997). Virginia's governor called for action and through the state's secretary of transportation directed VDOT to act to make the corridor safer.

Virginia Route 28 is a winding two-lane road outside the Northern Virginia suburbs of Washington, D.C. The corridor is 33 km (20.5 mi) long and connects U.S. Route 29 at its southwestern end with Manassas at its northeastern end. Immediately before the series of fatal crashes, some sections of the corridor carried as many as 20,000 vehicles per day (Bradshaw 1997).

The governor's directive was to stage "an all-out effort to address the two-lane road's dangers" (Emerson 1997, p. 6). When the directive was passed to VDOT, the commissioner directed the VDOT district administrators involved and the administrator of VDOT's traffic engineering division to develop recommendations. Mid-level staff provided these high-level officials with ideas on how to make the corridor safer. However, the decisions were made by the high-level officials—those who had discretionary spending authority. The recommendations were announced at a media conference on the afternoon of the day the governor's directive was given. There was no task force, but the initial media conference and early recommendations required the cooperation of VDOT and state and local enforcement officials.

Many engineering improvements were made to the roadway over the next 9 months, including lowering the speed limit and installing raised pavement markers and guardrail. Enforcement officials also pledged to concentrate patrols on the corridor (Emerson 1997).

FINDINGS

Program Effectiveness

Pennsylvania Initiative

Between 1983 and 1988, the 5 years before the Pennsylvania initiative, there were 620 crashes on the corridor, an average of 124 per year (Mayer 1988a). Data provided by the Upper Chichester Police Department show that the number of crashes along the corridor decreased by more than 40% in the 3 years following the improvements and programs initiated.

Virginia CSIP

In the 3 years prior to 1994, when the improvements began to be implemented, there was an average of about 38 injury crashes and 67 injuries per year on the rural corridor and an average of about 27 injury crashes and about 40 injuries per year on the urban corridor.

Data provided by VDOT show that injury crashes decreased by more than 5% and injuries decreased by more than 10% on the rural corridor and injury crashes decreased by about 10% but injuries increased by about 5% on the urban corridor.

California CSIP

According to data provided by CHP, in the 3 years prior to the initiation of the improvements in 1993, there was an average of 200 injury crashes and 342 injuries per year on the corridor. Data provided by CHP show that injury crashes and injuries decreased by about 25%.

Virginia Route 28

According to data provided by VDOT, in the 3 years prior to the initiation of improvements in 1997, there was an average of 51 injury crashes and 70 injuries per year on the corridor. Data provided by VDOT show that there was more than a 60% reduction in injury crashes and injuries along the corridor. In addition, there were no fatal crashes in 1998, although there were also none in 1996, the year before this initiative.

Summary

There is evidence that three of the programs—the California CSIP and the Pennsylvania and Virginia Route 28 initiatives—were quite effective in enhancing safety on the corridors as evidenced by a reduction in crashes. Although there is evidence that the Virginia CSIP was effective, it did not result in as dramatic a reduction in crashes as the other three programs. Thus, the question for this study is not what led to a successful program, but rather what factors were shared by the more successful programs?

Similarities and Differences Among the Corridor Programs

Mandate

Both the Pennsylvania and Virginia Route 28 initiatives were begun because of a series of high-profile fatal crashes. The public and the media focused attention on the crashes and the dangerous nature of the roadway in question. The governors of both states directed high-level state officials to develop recommendations to improve the roadway.

The Virginia and California CSIPs also had similar beginnings. The mandates came from within the state bureaucracy and were to develop a program. However, the California CSIP was funded through a grant, which required a detailed listing of selection criteria and project objectives. Thus, the mandate for the California CSIP was the clearest and most detailed of the mandates for the projects analyzed in this study.

Selection of the Task Force

The Leaders

In the Pennsylvania and Virginia Route 28 programs, the leaders were relatively senior transportation officials. They had a great deal of experience in the department and had decision-making authority over a specialty or district area.

In contrast, in the Virginia and California CSIPs, the leaders were lower in the organization and new to the position, although each had considerable experience. In Virginia, the leader had spent her 26-year career primarily in engineering jobs and had no experience in dealing with task forces or the public. In California, the leader had a public relations background and had worked in task force environments in the private sector before joining CHP. She was hired into the position through a competitive job search.

Groups Involved

Relatively high-level officials in the department of transportation ran the Pennsylvania and Virginia Route 28 programs. These officials had authority and responsibility over a program area. Similarly, these programs involved high-level officials in state and local enforcement. The programs were generated, at least in part, by the media and citizens who expressed concern about crashes along the corridor. In both cases, political officials were involved from the start. However, neither program had EMS representatives.

In contrast, the Virginia and California CSIPs involved lower-level officials within the state bureaucracy. Further, the participants in the task force were selected primarily by the program coordinator rather than by high-level officials. The result was a task force operated more by technicians than by managers. In addition, the Virginia CSIP involved members of the state EMS program. Both CSIPs involved EMS representatives outside the state bureaucracy. In Virginia, the representatives were members of local volunteer fire departments, and in California, the representative was from a private ambulance association. The California CSIP also had several other representatives from private sector organizations. The Virginia CSIP, however, included members of the local board of supervisors on both task forces.

The size of the task forces also varied. There were 11 members for the Pennsylvania initiative, 10 for the Virginia Route 28 initiative, 17 for the California CSIP, 25 for Virginia's rural pilot CSIP, and 21 for Virginia's urban pilot CSIP.

Organization of the Work

Division of Labor

The state department of transportation led the Pennsylvania and Virginia Route 28 programs. Both efforts provided for a combination of engineering improvements and enhanced enforcement. Both also had substantial media exposure.

In Pennsylvania, where PennDOT administers both the engineering and federal 402 programs, PennDOT was in charge of putting together a financial package to fund the implementation of the recommendations.

In the Virginia Route 28 program, VDOT staff and management developed the original engineering improvement plan. However, in the weeks following the announced improvements, the VDOT district staff raised concerns about some of the announced improvements. The staff came up with an alternate proposal, which was ultimately approved. The local sheriff placed two patrol cars along the corridor during peak hours for a week to enforce the speed limit, which was lowered within a week of the latest multiple-fatality crash. DMV, which oversees the federal 402 program, funded a grant for dedicated enforcement along the corridor.

The Virginia CSIP was also led by the department of transportation. About 98% of the funds allotted for the program were earmarked for engineering improvements. Getting estimates for the cost of engineering improvements was slow. The task forces voted on which engineering improvements should be pursued with the allotted funds. Participation fell in both pilot programs. However, the drop in participation was greater in the urban pilot, which resulted in its cancellation prior to the implementation of the recommendations of the task force. However, the task force's recommendation to widen the shoulder on part of the roadway was implemented. The rural task force recommended improving two intersections, but only one was improved. The cost of implementing the second exceeded the amount of funds available, so the funds were used for a different engineering improvement along the corridor. The rural pilot also implemented enforcement efforts along the corridor.

The California CSIP, unlike the other programs, was led by the state enforcement agency, CHP, which received a grant to conduct the program from OTS. The CHP program coordinator worked with staff from OTS and Caltrans to select the corridor and the members of the task force. The California CSIP reported that there was initially resistance from Caltrans to participate in the program. However, a member of Caltrans middle management intervened and gave the go ahead for Caltrans to shift resources and cooperate with the program. There was also conflict between the state and local enforcement agencies. There was a question of how the enforcement monies should be split between the agencies. A formula was derived that split the funds according to the relative crash problem on the portion of the roadway under each agency's jurisdiction. The members of the task force generally made recommendations about what should be done along the corridor within their area of expertise. The grant funds were supplemented with a shifting of funds within Caltrans to make engineering improvements along the corridor. Private and federal funds were also secured to establish emergency response and public information and education efforts.

The Work of the Task Force

At the one meeting of the Pennsylvania and Virginia Route 28 initiatives, the decision makers were present. Each made recommendations concerning what his or her agency could and would do to improve safety on the corridor. Both initiatives also had extensive public information and education campaigns.

Much of the work of the task forces in the Virginia CSIP involved looking at crash data to determine where the problems were on the corridor and voting on which potential engineering improvements to recommend. The California task force spent little time analyzing data. Instead, the staff analyzed the data and the members of the task force made extensive and specific recommendations for engineering, education, enforcement, and emergency response programs and improvements. The California group also spent considerable effort lobbying for the implementation of its recommendations and finding ways to fund them. There was also an extensive public information and education campaign.

Time Required for the Work

The speed at which recommendations were reached is one of the stark contrasts between the Pennsylvania and Virginia Route 28 programs and the Virginia and California CSIPs. For the Pennsylvania effort, recommendations were reached in one meeting. The chief safety engineer, who oversaw the traffic engineering program and the federal 402 program, put the financial package together, and all short-term recommendations were implemented within 6 months. For the Virginia Route 28 program, engineering recommendations were provided by the VDOT staff literally while the district administrators and the administrator of the VDOT traffic engineering division were in route to a hastily called media conference. The short-term recommendations were implemented within 9 months. Although VDOT promised to place the reconstruction of a curve out for bid in October 1997, this was ultimately delayed for 2 more years. Within 1 week of the media conference, a 1-week enforcement plan was announced to cover the initial implementation of the lowered speed limit. Within a month, the police had applied for a grant to dedicate enforcement efforts along the corridor during peak hours.

The Virginia CSIP, on the other hand, had a number of delays. Nineteen months passed from the time of the mandate to the first meeting of the urban task force. An additional 4 months passed before the urban task force met. Further, deliberations of the urban task force took 13 months and those of the rural task force took 10 months. The recommendations of the task force were implemented within several years, with the exception of a recommendation by the rural task force that was not implemented because of a lack of funding.

The California CSIP also had a number of delays. Approximately 3 months passed from the preparation of the grant to its award. Another 4 months passed before the first meeting of the task force. During that time, a coordinator was hired, a corridor was selected, and crash data were examined in detail. The task force met seven times over 16 months, but some recommendations were not implemented for several years.

Role of the Leader

Despite the experience and rank of the leaders in the Pennsylvania and Virginia Route 28 efforts, it was clear that people higher in the organization expected them to succeed. Because of the governor's mandate and the high-profile nature of the problem, expectations were high and the work was closely monitored. These leaders were able to fund and implement decisions quickly. They also had the responsibility of enlisting cooperation among state and local agencies. Further, they were directly responsible for dealing with and appeasing public and media concerns about the corridor.

The coordinator of the Virginia CSIP saw her job as helping to move the task force forward and to encourage agencies other than VDOT to commit resources to improving the corridor.

The California coordinator saw her job as facilitating the task force, being a conduit of information, and administering the grant. The administration of the grant required such things as identifying a corridor, getting the task force together, developing an action plan, and monitoring the distribution of funds. The expectations of the position were clearly described in both the grant and the position description.

Aftermath

In each program studied, with the exception of the urban pilot in the Virginia CSIP, the people involved with the program declared it a success. This success was declared even before crash data could reveal whether the programs and improvements had an effect on safety. Data collected for this study indicate that the programs may have helped reduce crashes. Modest reductions were noted for both the rural and urban pilots of the Virginia CSIP, and more dramatic reductions were noted for the other three programs studied.

ANALYSIS

Factors Associated with Effectiveness

Analysis showed that five factors were associated with the most effective programs: (1) the magnitude of the crash problems on the roadway, (2) the role of the public, (3) the level and leadership qualities of the leaders, (4) the level and composition of the groups, and (5) the recommendations made.

Magnitude of the Problem

One of the outstanding differences between the Virginia CSIP and at least the Pennsylvania program and the California CSIP was the magnitude of the crash problem on the corridor, that is, the number of fatal or injury crashes. The corridor in the Virginia Route 28 program also had a more substantial crash problem than the corridor in either of the pilot Virginia CSIPs, though the difference was not so great as that between the pilot Virginia CSIPs and the California CSIP and the Pennsylvania program. Thus, the most effective programs were associated with corridors that had a higher crash problem than did the Virginia CSIP corridors.

For example, although the corridor for the California CSIP and the rural corridor for the Virginia CSIP were similar in length, the Virginia corridor averaged fewer than 70 injuries in crashes per year before the program was initiated and the California corridor averaged more than 340. Similarly, the corridor for the Virginia urban CSIP and the Pennsylvania initiative were similar in length. Yet the Virginia urban corridor had about 40 injuries in crashes per year compared with more than 120 on the Pennsylvania corridor.

Another similarity was the number of fatalities. The Pennsylvania and Virginia Route 28 programs were begun following a series of highly publicized fatal crashes. The California corridor also had a high number of fatalities—more than six per year. However, neither the rural nor the urban corridor in Virginia had a substantial number of fatalities—typically one or none each year.

Ironically, however, the Virginia Route 28 corridor did not have a history of fatal crashes. In 1996, the year before the series of multiple-fatality crashes, there were no fatalities on the corridor. In addition, there was typically one or no annual fatality. Yet this history did not matter much to the public. This corridor was *perceived* as having a fatal crash problem.

The Public

The role the public or external environment can play in developing a successful corridor safety initiative is clear. In the Pennsylvania and Virginia Route 28 initiatives, fatal crashes caught the public's and the media's attention. The resulting public outcry led the governor to direct the state department of transportation to correct the problem. Thus, public pressure was converted to political pressure as the governor was called in. The governor could use his status as the head of the executive branch to order the department of transportation into action. Thus, outside pressure can result in action from the bureaucracy.

Ironically, one of the goals of the Pennsylvania and Virginia Route 28 initiatives was to quiet the public outcry. However, the California CSIP, which was also quite effective, used the CSIP to build public support for improvements. The task force publicized the problems on the roadway and built up community support for improving the roadway. In fact, the Caltrans traffic safety branch chief said that the public pressure that had built helped him to resist challenges to targeting the corridor from within Caltrans.

In the case of the urban pilot of the Virginia CSIP, there was little or no public outcry for improving safety, and the task force did not build public support for improvements.

The Leader

The experience of the leader of each initiative was directly related to the reduction in injury crashes along the corridor. In the Pennsylvania and Virginia Route 28 initiatives, the leaders had much experience in their field and were in high-level positions. The groups came to agreement quickly and made their recommendations publicly. It is difficult to say, however, whether their success was due to their position, their leadership abilities, or both. Yet, the Virginia and California CSIPs can be contrasted to show the influence of leadership.

In the Virginia and California CSIPs, the coordinators were new to the job but experienced within their agency. However, the coordinator for the California CSIP had experience with task forces while working in the private sector and a public relations

background. The coordinator for the Virginia CSIP had much experience in engineering but had no experience in public relations or with task forces.

Thus, the programs with the experienced high-level leaders were associated with crash reductions. However, a lower level leader with experience also led a program associated with substantial crash reductions. Thus, although it may help to have a high-level leader for a program, it is not necessary to achieve reductions in crashes. Yet experience with the organization, and particularly with task forces, appears to be associated with effectiveness.

The Group

The level of the group participants was not necessarily associated with effectiveness. In the Pennsylvania and Virginia Route 28 programs, participants were of a relatively higher level. Yet both groups relied heavily on lower-level staff members for identifying problems and developing recommendations. Conversely, the California task force was composed mainly of lower-level staff members who had little discretion over spending. They relied on higher-level officials to give the go ahead to implement their recommendations. In the Virginia CSIP, after the program began, higher-level agency personnel were not notably involved. Thus, for a program to be most effective, it appears that both high- and mid-level agency personnel need to be involved, directly or indirectly, with formulating and approving recommendations.

An interested group also appears to be associated with effectiveness. In the Virginia CSIP, attendance at meetings was relatively low to begin with and declined further, particularly in the urban program. However, in the three most effective programs, interest and participation stayed high.

Perhaps one reason for the differing levels of interest and participation involved the diversity of the solutions being considered. In the Virginia CSIP, it was clear that the program would involve mainly engineering improvements. As such, few other than VDOT employees participated in the task forces to their end. In the three most effective programs, there was something for everyone involved in the effort. Thus, it seems that if an agency or area is involved in the effort, funding and recommendations need to be found for improvements in that area.

Another factor concerning the group is its size. Generally, smaller groups were associated with the more effective programs. In the Virginia CSIP, a group size of more than 20 was difficult for the leader to manage. Such large groups may have included people who had limited interest in the program. These factors may have contributed to the attrition in both pilots.

In contrast, the smaller groups, particularly of the Pennsylvania and Virginia Route 28 programs, were relatively easy to manage. They also reached their recommendations relatively quickly.

Recommendations

The recommendations of the urban pilot of the Virginia CSIP consisted of only a couple of engineering improvements. On the other hand, those of the California CSIP and the Pennsylvania and Virginia Route 28 initiatives consisted of a number of engineering improvements combined with enforcement and public information and education strategies. Thus, the programs that had more and multidisciplinary improvements and programs were more effective in improving safety.

It is not simply that the most effective programs did many things or had a lot of activity on the corridor. Instead, it was the diversity of the improvements and programs that likely helped reduce crashes along the corridor. These diverse efforts helped target the many factors that are involved in crashes. Targeting one or only a few of those factors has little chance of having a significant impact on the corridor overall.

For example, if driving under the influence of alcohol is a factor in 15% of the severe crashes on a corridor, then anti-DUI efforts can have a maximum impact of reducing crashes by 15% on the corridor if these efforts are 100% effective. Thus, addressing only DUI would leave the majority of the factors untouched. Similarly, if 5% of the crashes occur at a single intersection on the corridor, then the maximum reduction in crashes for the corridor that can be brought about by reconfiguring the intersection is 5%. Thus, implementing many diverse strategies throughout the corridor provides more opportunities for success than does targeting a few factors or locations.

DISCUSSION

CSIPs provide a different way of looking for and at highway safety problems than has traditionally been the case. In the past, it was common for highway engineers to look for locations, usually an intersection or a relatively short section of highway, that have a high incidence of crashes or a high crash rate. After identifying a high-crash location, the highway engineer would identify the common factors in the crashes and typically look for an engineering solution to reduce crashes at that location. These engineering solutions are commonly known as spot improvements. The corridor safety concept, however, allows highway engineers to look for a different type of problem and for different types of solutions. For instance, because of suburban development and commuting patterns in the United States, residential and commercial development is stretching into formerly rural areas. Development begins before the connecting roadways are widened and improved to handle the increasing traffic volume. Thus, urban areas are often surrounded by winding, narrow, country roads that may have served the purpose of bringing farm products to market but are inadequate to provide a safe route for commuter and commercial traffic.

Should an intersection or a curve on one of these roadways have a high concentration of crashes, it could be identified and improved through the traditional approach. However, the

problem on these routes is likely to be manifested throughout the route. The character of the roadway will likely be similar throughout the corridor. Thus, there may not be a single location where many vehicles crash, but there may be many locations with similar characteristics where vehicles crash. Taken together, considering the entire length of the corridor, these roads may have one of the worst crash problems in the state, even though no single location stands out. Hence, a corridor safety approach would allow for the identification of problems and potential improvement of safety on such roadways.

The cases studied in this study involved more than a highway engineer investigating a corridor. However, in one of the cases studied, Virginia Route 28, there is a glimpse of what might be considered the standard, bureaucratic way of investigating problems on a roadway. In January 1995, more than two years before the series of crashes that began the Virginia Route 28 initiative, the corridor had been identified for indefinite ongoing safety studies to address locations along the roadway with high crash rates. Although at least one curve had been identified as a high-crash location, nothing had been done to improve it. In fact, as of this writing, it has still not been improved. Even if this location were improved, crashes would be addressed at only that intersection and nowhere else on the 20-mile corridor. Thus, the standard approach is slow and limited in its ability to affect the problem.

Once there was the series of crashes and the governor's mandate, however, the bureaucracy did spring into action. Although the reconstruction and straightening of the high-crash curve have not taken place, a number of diverse engineering, enforcement, and public information and education efforts resulted in a substantial decrease in crashes along the corridor. Similarly, the diverse 14-point program put in place in Pennsylvania resulted in a 40% reduction in crashes. In both initiatives, recommendations were made and implemented quickly. Clearly, these initiatives were worth the effort—both had substantial safety benefits.

On the other hand, the CSIP was certainly less efficient than the Pennsylvania and Virginia Route 28 initiatives. The Virginia and California CSIPs took six or seven meetings over 10 to 17 months. Some recommendations, however, were implemented shortly after the start of the program. Both the Virginia and California CSIPs resulted in a decrease in crashes along the corridor. Yet, in the end, the task forces in Virginia did little more than vote on proposed engineering improvements. This could have been done more quickly by the engineers involved in the program. The California CSIP, which had more diverse recommendations, was apparently more effective. The diversity of the program, however, hinged on acquiring adequate funding to implement programs and improvements in the 4Es (enforcement, engineering, emergency response, and education). Had Caltrans not cooperated with this program and provided funding to implement recommendations, far less would have been done to improve safety on the corridor. Thus, it appears that the CSIP can be worthwhile in terms of bringing about reductions in crashes if a number of diverse recommendations are implemented. However, because CSIPs are run from lower in the bureaucracy than the Pennsylvania or Virginia Route 28 programs were, CSIPs will probably continue to take longer. Yet they are considerably faster and more effective than the standard, bureaucratic way of identifying crash problems on a corridor and implementing programs and improvements to improve safety.

CONCLUSIONS

- *It is possible to build effective multidisciplinary programs to address the safety issues on problem highway corridors.*

- *The transportation bureaucracy is a powerful force to be considered.* It has the inertia to slow attempts to change the ways of conducting the business of highway safety. Yet these case studies also showed that when the call comes from the elites in the government—namely, the governor—even the largest bureaucracy will react relatively quickly and effectively. Thus, political pressure can facilitate these business-not-as-usual attempts to improve safety.

- *Public opinion can be a powerful force to influence the bureaucracy.* In the cases that were the most effective, the members of the public used their influence to pressure the bureaucracy to do some things that the bureaucracy initially resisted.

- *Influence can be manifested in ways that are totally outside the established hierarchy.* People can get together through informal networks. Subordinates can influence their superiors, as was the case in the Virginia Route 28 initiative when the staff members changed a couple of recommendations that were made by those relatively high in the organization. The ability to influence policy in this case came from the technical expertise of the staff and their ability to convince the decision makers.

- *Task groups can be powerful tools in getting things done.* Ideas can be channeled into action. These groups and situations also encouraged thinking outside the box, and the three most effective programs did some innovative things along the corridors.

- *Power and influence are held in many places, both within and outside an organization.* Clearly, the hierarchy of the bureaucracy gives certain positions power over others. And that power is great. Yet there is a broader set of circumstances. The individuals lower in the hierarchy have power that can be tapped informally. There is also power in the technical expertise that is held by the incumbent in a position. There is power in the environment surrounding the bureaucracy and even in other parts of the bureaucracy. Finding and harnessing these sources of power and influence appears to be a key to moving the established bureaucracy forward and developing successful programs.

RECOMMENDATIONS FOR ENSURING EFFECTIVE CORRIDOR SAFETY EFFORTS

1. *Select a corridor with a substantial crash problem.* Although this seems to be a common-sense recommendation, it needs to be considered seriously. Certainly, spending time and money where there is no problem is a waste. Yet, it can happen. A substantial crash problem provides the opportunity for the programs and improvements to have an impact. Further, it

appears that a substantial crash problem can generate public support for improving safety on a roadway. This public support can be either tapped or generated to place pressure on the bureaucracy to act.

2. *Decide on the level of the task group.* These case studies show that task groups composed of either mid-level or high-level members can mount an effective corridor safety initiative. In fact, both the mid-level and higher-level members were used in the most effective programs to come up with and fund programs and improvements. The task groups composed of high-level members were notably faster in identifying problems and making and implementing recommendations. The decision makers were actively involved in the Pennsylvania and Virginia Route 28 initiatives. Yet these initiatives were a reaction to a public outcry over a series of fatal crashes. The governor gave the mandate, and the decision makers acted quickly. They used their high level in the bureaucracy to get lower-level employees to act quickly, and they had discretion over funds that could be used for improvements. Although the public outcry that started these initiatives cannot be scheduled, officials can be ready to react quickly when such situations arise.

2. *Identify the decision makers.* The decision makers are critical to the success of the program. It is they who can decide to move a program forward by acting on recommendations or block a program by refusing to fund them. The California CSIP can be replicated with mid-level employees. However, to be effective, the decision makers must support the program. Supporting such a program means that the recommendations will need to be initiated quickly and that they will come at a cost to agency resources, such as staff time and money.

3. *Limit the size of the task group.* The size of the group was correlated with effectiveness. In the Virginia CSIP, the task forces exceeded 20 members. The federal guidelines suggest that large meetings can become unruly, as was the case for the Virginia CSIP. Perhaps in these pilot programs, the goal of effectiveness was displaced by the goal of getting people together.

4. *Select an experienced leader.* Experience in an area and in dealing with task groups seems to be important. The experienced leader can get things moving more quickly. He or she can call upon that experience and provide the group and the task with the benefit of that experience.

5. *Use or generate public support.* Public support for improving a roadway can move the bureaucracy into action. Action is still relatively slow, but it is faster than what would have been expected otherwise. For instance, public support will not break down all bureaucratic barriers, such as the necessity for environmental studies, but it can move things forward and lead to the implementation of improvements and programs that can improve safety on the corridor. Public support can be particularly effective in moving forward measures that can be implemented immediately—those for which funding is available and are under the discretion of the decision makers involved. Thus, if there is public pressure for the bureaucracy to do something, there is some reaction that has a positive impact on the problem.

The California CSIP shows that public support can also be generated. Ironically, this strategy may not only be effective but may also have positive benefits for the agencies involved. In these cases, the public looked to the department of transportation to fix the roadway. It is the highway department, not the police, EMS, or educators, that is the focus of public attention. Other groups can help improve safety, but the highway department is the one blamed by the public for letting the roadway become dangerous. Yet once there is action to improve the roadway, all parties are credited with improving safety. Thus, it can be in the interest of an agency to find and correct problems. Not only would the roadway be safer, but also the public would have a better view of the agencies involved.

6. *Make diverse recommendations related to the problems.* In the urban pilot of the Virginia CSIP, the strategy was to implement a few engineering solutions at limited locations. In the rural pilot of the Virginia CSIP, the engineering improvements were supplemented with a number of enforcement strategies. Although these improvements appear to have had an impact, they were not as extensive as the efforts in the other 3 cases. In these other 3 cases, there were more and more diverse improvements implemented. The improvements in these other 3 cases covered at least the areas of engineering, enforcement, and education—3 of the 4Es. Thus, it appears that doing many diverse things related to the crash problems along the corridor has the chance for improving safety the most.

7. *Support and find funding for recommendations.* Ideally, adequate funding would be allotted before a program begins for the implementation of diverse recommendations involving the 4Es. One would expect the approved funding to help ensure that the diverse recommendations could be implemented. However, in each of the most effective programs, recommendations were made first and the funding for the recommendations came later. Even the California CSIP, which was begun with about $280,000, acquired the greatest amount of funding from sources other than the initial grant.

   Finding funding requires reaching the decision makers for the various disciplines. This is unlikely to be done through the bureaucracy because the various players do not directly control each other. They are not a part of the same hierarchy. Thus, informal networks are important to this program. Yet the informal network must influence the decision makers if the program is to be effective.

8. *Evaluate effectiveness.* The final guideline is to evaluate the effectiveness of the program as measured by crash reductions. The primary goal of these programs *should* be to improve safety. They may also have other goals, such as getting people together or making the public feel better about the bureaucracy. However, it is possible to displace the primary goal of the program with these other goals. In fact, each of the programs studied was declared a success *before* crash data were available to determine the ultimate impact of the program. Knowing that the program will be evaluated for effectiveness may keep the various players focused on the primary goal.

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APPENDIX A

COORDINATOR QUESTIONNAIRE

Person Interviewed_____
Phone Number_____
Position Title_____
Organization_____
Corridor_____
Date of Interview_____
Time Started_____Time Finished_____

COORDINATOR SURVEY

I. INTRODUCTION

Hello, I'm Jack Jernigan and I'm a researcher with the Virginia Transportation Research Council, which is sponsored jointly by the University of Virginia and the Virginia Department of Transportation. I'm calling you because a few years ago, you were the coordinator of a corridor safety improvement program on_____(corridor). I'm conducting a study of this type of program for my study through the University of Virginia and I'm very interested in your perceptions of this program.

I'd like to ask you some questions to get some background on that corridor safety improvement program. Basically, I'm trying to get an idea of what went into the program, how long it took, who participated in it, and what solutions were recommended and implemented.

This background interview should take about fifteen minutes. Is now a convenient time to talk with you? (If not, can we schedule a time for me to call you back?)

Before we begin, do you have any questions about this study that you'd like to ask me?

II. BACKGROUND

1. Why was this particular corridor chosen?
   —How was it chosen?
   —Was this a known problem corridor or did the program discover the problem?
2. How was the working group selected?
   —What criteria were used for selection?
3. Who were the official leaders?
   —How were they selected?
4. Were there any other working groups for this program (e.g., high-level officials, staff)?
   —Who participated in those groups?
   —How were the participants selected?
   —What was the function or role of these other groups?

5. Why do you think you were chosen to be the coordinator?
   —Experience?

III. WHAT HAPPENED?

6. Did you have a model or strategy that you wanted to follow from the start?
   —If so, did it change? How?
7. Were representatives added after the start of the program?
   —If so, who were they?
   —Why were they added?
8. Was the public involved? How?
9. How many months did the working group's deliberations take?
10. How many meetings were there?
11. How much money was initially available?
   —Where did the money initially come from?
   —How much money was actually spent?
   —Were there other sources of money?
12. What were the recommended solutions?
   —Which have been implemented?
   —Which have not been implemented? Why?
   —Which took longer than expected to implement? Why?

IV. FOLLOW-UP

13. Was an evaluation conducted?
   —What were the results?
14. Are there before/after crash data available? Can I have a copy?
15. Are there files, minutes, or notes on the program? Can I have a copy?
16. Is the group continuing to meet?
17. Do you have a list of who was on the working group? Would you fax it to me?
   —Name
   —Affiliation
   —Phone number

V. WRAP-UP

That ends the questions I have for you. Is there anything you'd like to ask me?

Thank you very much for your help in gathering this background information. I have another set of questions that I would like to ask you and some of the members of the working group at a later time. That survey should take about 30 minutes to complete. Would you like to schedule a time for me to call you back?

Thanks again for your assistance.

APPENDIX B

PARTICIPANT QUESTIONNAIRE

Person Interviewed_____
Phone Number_____
Position Title_____
Organization_____
Corridor_____
Date of Interview_____
Time Started_____Time Finished_____

PARTICIPANT SURVEY

I. INTRODUCTION

Hello, I'm Jack Jernigan and I'm a researcher with the Virginia Transportation Research Council, which is sponsored jointly by the University of Virginia and the Virginia Department of Transportation. I'm calling you because a few years ago, you participated in a corridor safety improvement program on_____ (corridor). I'm conducting a study of this type of program for my study through the University of Virginia, and I'm very interested in your perceptions of this program.

I'd like to ask you some questions related to three things. How did the program start? What happened during the course of the program? And what was accomplished? There are no right or wrong answers to these questions. I am looking to get your honest opinions only.

This interview should take about thirty minutes. Is now a convenient time to talk with you? (If not, can we schedule a time for me to call you back?)

Before we begin, do you have any questions about this study that you'd like to ask me?

II. INTRODUCTORY QUESTION

1. First, would you tell me a little bit about the job you had when this program started?
   —In what year did you begin working in_____ (your field)?
   —What was your position in your organization at the start of this project?
   —In what year did you start in that position?
   —Why do you think you were chosen to participate in this program?

III. HOW DID THE PROGRAM START?

I'd like to shift our focus to the corridor safety improvement program and ask you about the start of the program.

2. What was the problem to be tackled by this program?

3. When this program was started, what did you personally hope to accomplish?
   —When the program started, what were the official goals of the group?
   —Did those goals change during the process?
4. Why do you think this program was started?
   —Whose idea was it to start the program?

IV. WHAT HAPPENED DURING THE COURSE OF THE PROGRAM?

I'd like you to think back now to the various meetings and things that went on during the course of this program.

I understand that _____*(agencies, groups, and individuals) were involved in the program.*

5. Who would you say had the most influence in the process?
   —How so?
   —Anyone else?
6. Were there some stakeholders (government agencies, private groups, or individuals) who should have been included in the process but were not? Who were they?
7. What went on at the working group's meetings?
   —How were problems on the corridor identified? What were they?
   —How were potential solutions identified? What were they?
   —How were recommended solutions ranked and selected? What were they?
   —Do you remember any decisions where there were any distinct winners or losers?
   —What other tactics or information should have been used?
   —What did the coordinator do?
   —What did the leaders do?
8. Was there conflict or differing viewpoints concerning some issues?
   —About what?
   —Among whom?
   —Frequent or infrequent?
9. Were there some representatives who did not participate or whose participation fell off?
   —Who were they?
   —Why?
10. What were your responsibilities in the process?
    —Did other people have different responsibilities?
    —Who and how so?

V. WHAT WAS ACCOMPLISHED?

11. What do you think was accomplished?
    —Was this a successful program?
    —How so? Why or why not?
    —If yes, what were the keys to success?
12. What were the key obstacles to overcome?

—Were they overcome?
—How?

13. Would you advise another state to try a corridor safety improvement program? Why or why not?
—Is there anything that should have been done differently?
14. Is there anything else that you think I should know about this program?
15. Can you think of anyone else I should contact about this program?

VI. BACKGROUND INFORMATION

16. Sex: Male_____ Female_____

VII. WRAP-UP

Now that I've asked you a lot of questions, do you have any questions or comments for me?

Thank you very much for taking the time to answer these questions. I appreciate your help.

APPENDIX C

LIST OF PERSONS INTERVIEWED

Pennsylvania

Thomas Bryer, Director, Bureau of Highway Safety and Traffic Engineering, Pennsylvania Department of Transportation
William Robinson, Chief of Police, Upper Chichester Police Department
James Tenaglia, Highway Safety Engineer, Pennsylvania Department of Transportation
Jack Zogby, Deputy Secretary for Safety Administration, Pennsylvania Department of Transportation

Virginia CSIP

Ellen Ambler, Senior Transportation Engineer, Virginia Department of Transportation
Laura Bullock, Public Relations Coordinator, Virginia Department of Transportation
Andy Farmer, Public Relations Coordinator, Virginia Department of Transportation
Steve Goodwin, Transportation Safety Program Supervisor, Department of Motor Vehicles
Tom Jennings, Transportation Management Engineer, Federal Highway Administration
Jeffrey Kessler, Resident Engineer, Virginia Department of Transportation
Cheryl Lynn, Senior Research Scientist, Virginia Transportation Research Council
Robert Morris, Transportation Safety Program Supervisor, Department of Motor Vehicles
Harry Reed, President, Chamblissburg Ruritan Club
Herman Wilkins, Supervisor, Alcoholic Beverage Control Board

California CSIP

Donald Follett, Captain, Commander of the Office of Special Projects, California Highway Patrol
Alice Huffaker, Associate Transportation Planner, California Highway Patrol
Larry Loudon, District Traffic Bureau Chief, California Department of Transportation
Chris Stephens, Director of Planning and Highway Programming, Ventura County Transportation Commission

Virginia Route 28

Jeffrey Hores, District Traffic Engineer, Virginia Department of Transportation
Robert Moore, Resident Engineer, Virginia Department of Transportation