

EVALUATION OF 1983 SELECTIVE SPEED
ENFORCEMENT PROJECTS IN VIRGINIA

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ABSTRACT

This report describes and evaluates Virginia's 1983 selective speed enforcement projects. These projects are one of the various types of highway safety programs classified as selective traffic enforcement projects (STEPs) partially funded by the federal government under the Highway Safety Act. The state allocates federal monies among competing state and local police agencies to fund their efforts to reduce identified crash problems. Virginia allocated \$456,296 of its federal allocation for highway safety activities to selective speed enforcement in fiscal year 1983. Of this, \$293,576 went to the Department of State Police and \$162,720 to 12 city and county law enforcement departments.

As a condition of the state grant, the federal government requires that the effectiveness of the programs be evaluated. This report is the second in a series of such evaluations prepared in compliance with the federal requirements. It follows much of the analytic framework established in the evaluation report for the 1982 projects. Since the evaluation of the 1982 projects was not completed until 1985, the findings, conclusions, and recommendations of that report were not available to the people who planned and conducted the 1983 projects. Thus, several of those findings, conclusions, and recommendations are repeated here because project selection and implementation procedures were unchanged.

This report describes each of the local projects, including problem identification, project goals, proposed enforcement activity, and results achieved. Each project director set activity and crash reduction goals. The evaluations of the projects compare the goals with results in terms of the number of traffic crashes. Project effectiveness is also examined by analyzing data for speed-related crashes, in which the police identified speed as a factor contributing to the occurrence or the severity of the crash. While most projects aimed at reducing the number of total crashes, the methodology adopted in this report focused on changes in the number of serious crashes -- those crashes resulting in a death or personal injury -- because these crashes are more closely related to speed-related crashes than total crashes are.

Many localities had too few serious crashes and speed-related crashes for the computation of statistical values with which to make comparative analyses. Consequently, a more general approach is used to compare crash data from the selective enforcement community against hypothetical comparison communities derived from statewide data. Baseline data were gathered from the crash reports filed with the state police, and covered the three-year period from 1980-1981. The analysis revealed that while few projects met their goals in terms of reducing the number of total crashes, several did appear to affect the identified speed-related crash problems.

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FINDINGS

For the convenience of the reader, Exhibit 1 presents the summary of results for the 12 community based and 1 statewide selective speed enforcement projects. The reader is directed to the sections on the projects funded in 1983 for detailed descriptions, analyses, findings, and conclusions.

1. Of the 13 projects evaluated, only 9 stated their project goals in terms suited to impact evaluations. Of these 9, only 3 met or exceeded their goals of reducing total and serious crashes.
2. Based on the objective evaluation measures defined in the body of the report, 3 counties and 1 city conducting selective speed enforcement projects in 1983 experienced aggravated speed-related crash problems in the 1980-1983 baseline years.
3. Some evidence of project effectiveness, in terms of reducing the local speed-related crash problem, was found in 5 projects.
4. None of the communities conducting STEPs thoroughly documented a local speed-related crash problem in their grant applications. Few grant applications described the proposed projects in terms of sites, days, or hours of activity.
5. The selective enforcement program conducted by the Department of State Police was extremely difficult to evaluate. The absence of site specific crash data in the baseline period and activity and crash data during the project period mitigated against an adequate effectiveness evaluation for the project with the greatest expenditure of funds.

EXHIBIT 1

A Summary of Findings By Projects

	Did Community Meet Project Goals? =====	Was There Evidence of Effectiveness? =====	Did Objective Measures Indicate a Speed-Related Crash Problem? =====	Number of Previous Programs =====
COUNTIES				
Charles City	N	Y	Y	2
Chesterfield	N	Y	N	2
Goochland	Y	Y	N	0
New Kent	N	N	Y	0
Prince George	N	N	N	3
Roanoke	NS	N	N	4
Surry	N	Y	Y	2
Sussex	N	N	N	1
CITIES				
Chesapeake	Y	Y	N	0
Petersburg	Y	N	Y	1
Richmond	NS	NS	NS	0
Virginia Beach	NS	N	N	1
STATE				
State Police	NS	N	NS	4
	====	====	====	
	3	5	4	

NS = Not Stated

CONCLUSIONS

1. The 1983 selective speed enforcement projects produced no noticeable reductions in the number of total, fatal, or personal injury crashes. This conclusion is the same as that made in the evaluation report of the 1982 projects regarding the impact of speed enforcement projects on crashes.
2. Of the thirteen 1983 selective enforcement projects, several had some success in reducing the number of speed-related crashes in the community.
3. As concluded in the evaluation report for the 1982 projects, it appears that localities may have selected locations for increased enforcement by intuition or according to no pre-determined plan at all.
4. There was no correlation between the number of previous selective speed enforcement projects a community had conducted and the effectiveness of the 1983 projects.
5. No correlation was found between the presence of an above-average speed-related crash problem and project effectiveness.
6. Project effectiveness was not determined by the amount of the selective enforcement grant nor by the grant amount per vehicle registered in the community.

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RECOMMENDATIONS

1. As stated in the evaluation report for the 1982 projects, the grant application process should be amended to require documentation of a speed-related crash problem. The documentation should include accident and citation data for prior years, and should be specific as to location, day, and hour of enforcement activities. Adequate documentation is vital to the selection of projects to be funded, to the proper design of effective projects, and to the accurate evaluation of results.
2. Law enforcement agencies receiving selective enforcement grants should be assisted in the design and implementation of their local projects. Community projects should be planned and implemented according to the speed-related crash problem identified through analysis of citation and crash data. Projects should attempt to concentrate enforcement activity on specific sites, days, and hours according to a predetermined plan. This recommendation is consistent with that made in the evaluation report for the 1982 projects.
3. Also in agreement with prior recommendations, enforcement agencies receiving selective enforcement grant money should be required to record and report accurate activity, citation, and crash data during the project period. Without adequate local data gathered at the enforcement sites, the required evaluation must be prepared using statewide data sources.
4. Consideration should be given to requiring that jurisdictions receiving selective enforcement grants utilize available micro-computer software which process citation and crash data and produce standardized reports. Alternatively, jurisdictions should be encouraged, through a subsidy, to make use of this computer software. Such systems are being developed by the Virginia Highway and Transportation Research Council.
5. While the State Police should not be directed as to how its projects are to be designed and implemented, the Superintendent should encourage each division commander to conduct projects in his region in a manner that facilitates an effectiveness evaluation. These projects should be limited to certain roads, hours, days, or other criteria whereby effects would be reflected in crash data.

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INTRODUCTION

The Highway Safety Act of 1966 (1) authorizes the Secretary of Transportation to allocate federal funds to states for highway safety projects. (2) Among the uses to which these funds may be applied are "traffic control ... [and] surveillance of traffic for detection of high or potentially high accident locations... ." (3) Federal funds can thus be used in selective traffic enforcement programs because they involve identifying high accident locations and focusing police patrols on these locations. The statute requires that the U.S. Secretary of Transportation establish performance criteria for selective traffic enforcement programs (STEPs), and these criteria require the states to evaluate the effectiveness of the projects in reducing accidents. (4) This report presents the results of evaluations of thirteen selective speed enforcement projects conducted in Virginia during 1983.

As provided under the Highway Safety Act, and within federal guidelines, each state decides how it will use federal funds to address local traffic safety problems. In Virginia, the Transportation Safety Administration of the Department of Motor Vehicles (TSA/DMV) is the agency empowered to distribute highway safety funds. (5) The federal statute requires that at least 40% of the state's allocation of federal funds be passed on to local jurisdictions to conduct highway safety projects. (6) In addition, the federal regulations for selective enforcement projects require that the jurisdiction conducting the project identify a particular safety problem and implement appropriate measures to reduce that problem. (7)

This report is the second in a series evaluating Virginia's federally funded STEP projects in accordance with federal requirements. (8) While this report can be read alone, it incorporates much of the analytic framework of the previous effort and is written in the context of the earlier findings, conclusions, and recommendations. Although similar, the two reports are significantly different. It is important to note that the report evaluating the 1982 projects was published in 1985. Since that report was unavailable when the 1983 projects were selected, designed, and implemented, adopting the same approach in evaluating the 1983 projects would be both duplicative and somewhat unfair in expecting the recommendations to have been implemented when the 1983 projects were funded. Thus, the purposes of the two reports differ. The 1982 evaluation focused on the relationship of project procedures — selection, planning, and implementation — to project effectiveness, with the purpose of finding defects in the procedures. In contrast, this report examines effectiveness in a more abstract way, with the purpose of determining whether the 1983 STEP projects were effective at all in addressing local speed-related crash problems.

THE SPEEDING PROBLEM IN VIRGINIA

The purpose of this report is to evaluate the results of selective speed enforcement projects in Virginia, not to analyze speeding as a causative factor in auto accidents nor to examine the relationships between speeding and personal injuries or highway deaths. According to the methodology used in this report, however, it is necessary to distinguish those communities with aggravated speed-related crash problems from those with moderate or minor speed-related crash problems. This is not to say that communities with lesser speed-related crash problems did not suffer the effects of speeding.

Based on state police traffic crash data, between 1978 and 1983 there were 4,514 crashes in Virginia which resulted in one or more fatalities. Of these, police issued speeding citations in 1,850 crashes. These data indicate that speeding was identified by the reporting officer in 41% of all fatal crashes in this period. Speed was identified in 20% (40,724 of 202,482) of the personal injury crashes occurring over the same five years. These data do not prove that speeding causes serious crashes. They do, however, support the common sense conclusion that crashes involving a speeding vehicle will be severe. These raw numbers and simple percentages also indicate the extent of the speed-related crash problem throughout the state.

Some characteristics of this problem can also be described. First, experience would suggest that speeding is more of a problem in rural

areas than in urban ones. The slower road speeds, more congestion, and greater traffic control in the city than on the open road obviously restrain auto speed. This is supported by the crash data. Speeding citations are issued to drivers in twice as many serious accidents (those resulting in a fatality or personal injury) in rural areas than in urban areas. Between 1978 and 1982, 27.0% of the serious crashes were speed-related in rural communities, whereas they accounted for 12.8% in urban communities.

Second, crashes in which speeding is identified as a causative factor are more serious than non-speed-related crashes. While 44.6% of all speed-related crashes involve a fatality or personal injury, only 31.9% of the non-speed-related crashes do. Finally, trends in statewide crash data indicate the situation is improving in terms of the number and percentage of speed-related crashes. In 1978, the statewide percentage of fatal crashes that were speed-related was 42.9%, and by 1983 this figure had fallen to 37.0%.

SELECTIVE ENFORCEMENT PROGRAMS IN GENERAL

The goal of selective enforcement programs is to address identified accident problems through countermeasures designed to fit these problems. "Selective enforcement" is an effort by police officers to enforce traffic laws relating to identified accident problems. Normally, this effort is complementary to the routine patrol activities conducted by the local police force. Effective selective enforcement projects may be conceptually divided into four phases: (1) identifying and selecting locations with accident problems, (2) developing a comprehensive plan to address the problems and setting performance goals, (3) implementing the plan and recording data on plan activity and results, and (4) evaluating performance and results.

Selective enforcement programs work on a deterrence theory: by raising public awareness about the risks of apprehension and receiving a ticket, the program influences drivers to become less inclined to violate traffic laws. The two primary activities used in these programs are public information campaigns and stringent enforcement of traffic laws. Generally, enforcement is emphasized over information. Selective traffic enforcement programs may be applied to a number of traffic safety problems, including speeding and driving under the influence of alcohol. In this report, STEP and selective enforcement will refer only to those projects addressing speed-related safety problems, unless otherwise noted.

A successful STEP should cause a decline in the number and severity of crashes. In theory, communities should be awarded grants based on an existing speed-related crash problem. Prior to specialized enforcement activity, the number and severity of crashes for the STEP community should exceed that of the average or control community. In the early phases of the program, the number and severity of crashes should decrease more quickly for the STEP community than for the control community. Later, as drivers become acclimated to intensified enforcement, improvements in highway safety should reach a point of diminishing returns and speed limit violations and the number of crashes should level off at a point closer to those of the control community. At this point, lesser enforcement activity should be needed to maintain the gains.

PURPOSE

In 1983, thirteen Virginia enforcement agencies received funds under the federal highway safety program, including those of eight counties, four independent cities, and the state police. These communities, and the 1983 grant amounts are listed in Table 1. Relevant demographics appear in Appendix A.

The federal regulations regarding highway safety programs require that each project be evaluated. A state is required to perform an in-depth evaluation of only one module of the state's overall highway safety plan during each year. (9) The regulations express a preference for evaluating effectiveness in terms of the number of impacts. Accordingly, this report evaluates the effects of increased enforcement of speed laws on the number of speed-related and total accidents. The results of each local project are evaluated and compared to its stated goals. For a variety of reasons, a sophisticated statistical analysis for each local STEP was beyond the scope of this report. Instead, project effectiveness was examined through rather simplistic techniques.

It should be noted that this report discusses only selective enforcement of speed laws. The effectiveness of federally funded 1983 alcohol countermeasures will be described in a separate report.

TABLE 1

STEP COMMUNITIES AND GRANTS

Community =====	1982 Grant =====	1983 Grant =====	1983 Increase =====	1983 Grant Funds per Registered Vehicle + =====
COUNTIES				
CHARLES CITY	7,000	5,000	-28.6%	\$0.95
CHESTERFIELD	53,000	20,000	-62.3%	0.17
GOOCHLAND	0	10,000	NA	0.99
NEW KENT	0	7,000	NA	0.94
PRINCE GEORGE	15,000	6,000	-60.0%	0.44
ROANOKE	22,555	11,000	-51.2%	0.17
SURRY	6,000	8,500	41.7%	1.77
SUSSEX	18,500 *	8,000	-56.8%	0.99
others	92,300	NA		
CITIES				
CHESAPEAKE	0	18,720	NA	\$0.23
PETERSBURG	26,508	20,000	-24.6%	0.81
RICHMOND	0	15,000	NA	0.11
VIRGINIA BEACH	24,000 *	33,500	39.6%	0.17
others	61,007	NA		
STATE				
STATE POLICE	266,675	293,576	10.1%	\$0.07
TOTALS				
COUNTIES	214,355	75,500	-64.8%	
CITIES	111,515	87,220	-21.8%	
STATE	266,675	293,576	10.1%	
	=====	=====		
TOTAL	592,545	456,296	-23.0%	\$0.12

+ based on 1982 registration figures

* included grant for equipment purchase

METHODOLOGY

Each of the twelve county and city selective speed enforcement projects was evaluated according to a standardized approach. The evaluation of each project, presented below, is divided into four parts:

- 1) Problem Statement
- 2) Proposed Activities and Project Goals
- 3) Project Results
- 4) Conclusion

The following sections of this report describe the purpose and analytical approach for each part in detail.

A different methodology was adopted for the evaluation of the selective speed enforcement projects conducted by the State Police, because these differed greatly in scope and nature from those conducted by the localities. A description of the methodology used for the State Police projects is part of the evaluation section for these statewide projects.

Problem Statement

This part of the evaluation contains both subjective and objective descriptions of the local speed-related crash problem. The subjective descriptions were provided by many communities in their applications for project funds, and are supplemented by information drawn from a number of sources, including the 1982 evaluation report. Unfortunately, detailed descriptions were not required by the state, and any description provided by the localities for this report would suffer from being after the fact. Because of this lack of information, various objective criteria were used to examine the nature and magnitude of the local speed-related crash problem. These criteria, their definitions, and their use in this report are described in Appendix B.

The community's percentage of speed-related crashes, measured by the number of speeding citations issued in crashes, was used as the primary indicator of a speed-related crash problem. Speeding citations issued in crashes were used in place of crashes involving speeding, as data on community speeding crashes alone were unavailable. Raw numbers of citations were compared to total crashes to produce a ratio of citations to crashes. This ratio is referred to and treated as the percentage of crashes that were speed-related. This is not entirely accurate, since multiple speeding citations could be issued in a single accident. However, the difference between the two is not great, and the usage simplifies terminology and avoids jargon.

Three secondary indicators of a speed-related crash problem were used: the percentage of crashes that were serious, the ratio of serious crashes to community population (referred to as the serious-crash rate), and the ratio of serious crashes that were speed-related to community population (referred to as the speeding-crash rate). Appendix C presents these rates for each community. Serious crashes, those resulting in personal injury or death, were used in these indices for two reasons. First, reporting of property damage crashes is required by law only if the estimated damage exceeds a statutory dollar limit. The dollar limit was raised in 1982. Second, aggravated injury and death are symptomatic of excessive speed crashes. Data for preparing this analysis were taken from centralized Department of State Police crash tapes.

Crashes were divided into four categories or classes: (1) all crashes or total crashes, (2) serious crashes, (3) speed-related crashes, and (4) non-speed-related crashes. Of these classes, only class 3 and class 4 are mutually exclusive. Thus, speed-related crash percentages are computed for both the class of all crashes and the smaller class of serious crashes. Likewise, crash severity percentages are computed for both the class of all crashes and the class of speed-related crashes.

Two assumptions were made regarding the definition of a speed-related crash problem. First, in recognition that virtually all communities share the problem of recurring personal injuries and property damage caused by speeding, in this report a speed-related crash problem is assumed to be "aggravated" only if the community experiences more speed-related crashes than do other similar communities. These other communities provide a roughly defined control group against which the problems of the individual communities were measured. For lack of more precise control communities, statewide crash data were manipulated to produce three comparison groups: rural counties, urban areas, and suburban counties. Data for and the analysis of these comparison "communities" are included in Appendix D. The number of speed-related crashes in a STEP community was compared against the appropriate group to determine whether an aggravated speed-related crash problem existed.

A second important assumption, related to the one above, is that the effectiveness of deterrence in STEPs is inversely related to the magnitude of the speed-related crash problem; that is, as fewer drivers speed, it is progressively harder to influence the driving behavior of the remaining violators. This assumption proceeds from the common experience that some drivers will speed regardless of the hazards, whether from accidents or from strict law enforcement. Under this assumption, selective enforcement is more successful in addressing egregious problems than moderate ones. From this, in turn, two conclusions follow. First, communities should be selected for STEP funding ac-

ording to the extent of the local problem, and second, greater reductions in speed-related crashes are expected from STEP where the speed-related crash problem is aggravated than where it is moderate.

In addition to subjective and objective problem descriptions, crashes were analyzed by county route number to determine whether local speeding problems were concentrated on certain roads. This served to identify situations where the speed-related crash problem would have appeared to be particularly suited to enforcement countermeasures, if activity were restricted to these high accident roads. This analysis could not be prepared for the four STEP cities, as the data base used did not specify street locations of city crashes. Finally, trends in crash data and the results of previous STEP were reviewed to reveal other aspects of the speed-related crash problem.

Proposed Activities and Project Goals

The second part of the individual community evaluations describes the proposed activities for each project and the project goals. The information for this section was also provided by several communities in their grant applications. Since the source of this information, TSA/DMV grant applications, was not detailed, the treatment here is cursory.

It is important to note that both the proposed activities and project goals were prepared in 1982 for the 1983 grants. Thus, the implementation of the projects may have varied significantly from the original proposals. No attempt was made to reconstruct how the various projects were conducted, because the projects had been completed, the grant money had been expended, and a considerable amount of time had elapsed between completion of the projects and the writing of this report.

Project Results

In the third part of each evaluation, the results of each community project is compared against the stated project goals. Because of differences among communities, their speed-related crash problems, and the designs of their selective enforcement projects, it is appropriate that each community set its own project goals and activities. Two universal goals of the projects were to increase enforcement activity and to reduce speed-related crashes. However, enforcement activity was not analyzed in this report because of the difficulty in obtaining reliable and consistent data from each community.

Project results were measured by comparing the number of speed-related crashes during calendar year 1983 with the number of crashes in 1982, and comparing 1983 crashes with a three-year average number of crashes. Although the grant periods ran from October 1, 1982, to September 30, 1983, calendar year data were used since the cost of converting the data was prohibitive. As above, citations issued in crashes were used as a surrogate for speed-related crashes themselves. The secondary indicators used in problem identification were used to supplement the data on speed-related crashes and provide additional support for conclusions. The experience of the identified high accident roads was also reviewed to determine whether resources were applied to areas with the greatest problems.

In assessing project results, it was necessary to determine whether any change was due to selective enforcement activities or some other factor. A three-step analysis was used to distill project effects from overall changes, as follows:

- 1) The change in speed-related serious crashes was assessed during the study period.
- 2) The change in serious speed-related crashes was compared to changes unrelated to speed during the same period. In interpreting project results, changes in serious speed-related crashes were discounted for changes in serious non-speed-related crashes.
- 3) The change in speed-related serious crashes in the participating communities was compared against that of a control community. Control communities were the same as those used in the problem identification: rural Virginia for the rural STEP counties, urban Virginia for the cities, and statewide Virginia for suburban counties. As above, project results were discounted for changes in the control community.

The one-year and three-year changes represent a simplified comparison of accident experience "before and after" selective enforcement, and the use of control communities represents a simplified comparison of accident experience "with and without" selective enforcement. The source of data for these analyses was, as above, the crash statistics compiled by the state police from accident reports. Baseline data were gathered from 1980 to 1982.

Several limitations of the analyses in this report should be noted. First, they are admittedly crude. Baseline data are limited to three years and the reliance on averages in the individual evaluations disregards important trends in the results. Also, the small data sets

for individual communities may create misleading numerical results. Second, the effects of other selective enforcement projects, such as alcohol-related selective enforcement projects and previous speed-related selective enforcement projects, are not integrated into the analyses. The more important of these is the effect of previous speed-related projects. Since selective enforcement is based on public awareness, projects conducted over several years should have greater long-term effect than shorter projects, but a lesser incremental effect in later years. Where possible, data will be interpreted with the previous selective enforcement grant history in mind. Finally, data for all analyses in this report were drawn from the 1980 to 1983 Department of State Police crash tapes, and no attempt was made to examine the activities conducted by each community in implementing its project. Local community data on activity and results were not used for a number of reasons, including reliability of the information, ease of access, and comparability of measurements.

INDIVIDUAL PROGRAM EVALUATIONS

The following sections of this report contain the evaluations of the selective enforcement projects of the Department of State Police and the twelve communities which received federal grant money. In addition to the narrative, baseline data and a numerical analysis are presented for each community. Crash data for the four routes with the highest annual number of serious crashes are presented for the STEP counties. Also, for the convenience of the reader, two bar charts are used to graphically present crash data and project results. The first displays the total number of serious crashes by year, divided into speed-related and non-speed-related categories. The second graph presents project results, comparing community goals against results and against the experience of the appropriate control community. Although many communities stated their goals in terms of reductions in total crashes, only serious crashes are represented in these graphs, as it is believed that these are more meaningful.

One community, Richmond, is not included in the individual evaluations. As the state's capital and third most populous city, Richmond experienced an aggravated speed-related crash problem before the grant year. Between 1980 and 1983, the cumulative number of crashes in Richmond was the highest of any city in the state; the cumulative number of speed-related crashes was the second highest. In two of the three baseline years, the city's speed-related crash percentages were noticeably above the urban average.

Although the speed-related crash problem in Richmond was citywide, the Richmond Bureau of Police designed and implemented a selective enforcement project restricted to one street -- West Broad Street. Apparently, West Broad Street had become a "cruising strip" for Richmond's teenagers and young adults, which resulted in a concentration of crashes on weekend nights. The bureau received \$15,000 to conduct its project on this street. Because of the nature of the city's STEP, it was thought that the analyses used in this report would be ineffective and inappropriate.

Charles City County

Problem Statement

A small rural county, Charles City County ranked 88th in population among 95 Virginia counties, according to a study by the Tayloe Murphy Institute. (10) However, Charles City County had a problem with speed-related crashes disproportionate to its size. During the 1980-1982 baseline years, an average of 25.8% of all crashes in the county were speed-related (see Table 2). The percentage of crashes that were speed-related was higher, averaging 33.3%, over the three years. Using rural Virginia data as a comparison group, these county percentages materially exceeded those of similar counties. The percentage of rural Virginia crashes that were speed-related was 21.3% for all crashes and 26.3% for serious crashes (see Appendix D).

The presence of a speeding problem was also indicated by the severity of crashes in the county. Although the number of crashes in Charles City County fell between 1980 and 1982, the percentage of serious crashes increased significantly. In 1980, 41.2% of all crashes resulted in a death or personal injury; in 1981 this figure was 48.2%, and in 1982 it was 47.3%. Over this same period, the percentage of rural crashes that were serious rose from 37.6 % to 38.9%.

The data also reveal a disturbing trend in the number of speed-related crashes. Total crashes in Charles City County fell 16.0% between 1980 and 1981, from 131 to 110, but there was no change in total crashes between 1981 and 1982. Serious crashes varied little over the baseline period, starting at 54 in 1980, with 53 in 1981, and 52 in 1982 (see Exhibit 2). Between 1980 and 1981 the number of speed-related crashes that were serious fell from 20 to 15, a 25.0% reduction. However, the number rose again to 18, close to its 1980 level. These trends are also reflected in the percentages of all crashes that were speed-related.

Charles City County identified five roads where the crash problem was focused; these were Routes 5, 155, 602, 615, and 618. Three of these roads ranked among the four roads reporting the highest number of serious crashes (see Table 3), and showed a high concentration of serious crashes. Each year between 1980 and 1982, the four roads with the most serious accidents together accounted for more than 70% of the county's total. While crash concentration generally indicates a good opportunity for selective enforcement, here the number of crashes throughout the county may have been too small to be effectively targeted.

Secondary measures generally supported the evidence of a speeding problem. Charles City County averaged the second highest speed-crash rate of all 1983 STEP counties (see Appendix C), with 2.6 serious speed-related crashes per thousand residents. Additionally, the county's serious-crash rate exceeded the rural rate in each of the baseline years.

The 1983 federal grant was the third the county had received to conduct its STEP. In 1982 the county used a \$7,000 grant to pay overtime to officers working selective speed enforcement. Enforcement was to be limited to the five problem roads identified by the Sheriff's Department. The 1982 program did not succeed in reducing crashes in any category. In particular, speed-related crashes increased to 1980 levels despite the infusion of federal grant money.

Proposed Activities and Project Goals

Charles City received \$5,000 in grant funds in 1983 for overtime pay of officers involved in selective enforcement. A description of the project activities planned to address the speeding problem was not included as part of their grant application.

The county set the following goals for the 1983 project:

- o To reduce total crashes by 10%
- o To reduce fatal crashes by 10%
- o To reduce injury crashes by 10%

Project Results

The county's program did achieve one of its three goals, that of reducing fatal crashes. Only one fatal crash was reported for 1983, a reduction of 66.7% from the 3 reported fatal crashes in 1982. Realistically, the data reveal a STEP that was less than successful. First, the numerical change in fatal accidents was so small that it can be considered a random event. Second, the county failed to meet its other two goals of reducing the total number of crashes and the number of injury crashes. Total reported accidents fell 2.7% (110 to 107) and injury accidents increased 4.1% (49 to 51).

While changes in overall crash statistics did not indicate a successful program, it is interesting to note that a favorable change occurred in speed-related crashes. The number of speed-related crashes dropped from 33 in 1982 to 24 in 1983, a reduction of 22.2%. At the same time, the number of non-speed-related crashes increased from 77 to

83, an increase of 11.8%. The reduction in the number and percentage of speed-related crashes may have been attributable to selective enforcement; on the other hand, the data are insufficient to establish this relationship. For instance, the number of speed-related crashes in 1983 was little different from that reported in 1981 without selective enforcement.

Serious crash data for the county's high accident roads showed a decline in 1983 (see Table 3). Between 1980 and 1982, the four worst routes accounted for over 70% of all accidents in the county. In 1983, this figure had dropped to 55.8% as the number of serious crashes on these roads reached its four-year low. These results tend to support a finding of limited success for the STEP.

A comparison of the county's crash experience with that of rural Virginia also puts project results in a favorable light. Every relevant crash category registered an increase for rural Virginia, while they declined or held steady in Charles City County. Most notably, serious speed-related crashes rose by 5.6% in rural Virginia, compared to the 22.2% reduction in Charles City County.

Conclusions

Charles City did not meet its stated goals of reducing total crashes and serious crashes. The results of this data analysis does, nevertheless, provide some evidence that the 1983 program affected the county's speed-related crash problem. The project's effectiveness is best reflected by the contrast of reductions in the county's serious speed-related crashes versus increases in both its non-speed-related crashes and the rural speed-related crashes (see Exhibit 3). However, when all of the data are considered the results of the county's activities are inconclusive, and the changes noted may have been wholly unrelated to the selective enforcement project.

TABLE 2

SELECTIVE ENFORCEMENT CRASH DATA
CHARLES CITY COUNTY

BASELINE DATA	1980	1981	1982	1980-1982 AVERAGE	1983
=====	====	====	====	=====	====
Number of Crashes	131	110	110	117.0	107
Fatal	3	5	3	3.7	1
Injury	51	48	49	49.3	51
Serious (Fatal + Injury)	54	53	52	53.0	52
Number of Crashes That Are Speed-Related *	36	22	33	30.3	24
Fatal	2	2	2	2.0	1
Injury	18	13	16	15.7	13
Serious (Fatal+Injury)	20	15	18	17.7	14
Number of Crashes That Are Non-Speed-Related	95	88	77	86.7	83
Fatal	1	3	1	1.7	0
Injury	33	35	33	33.7	38
Serious (Fatal+Injury)	34	38	34	35.3	38
SPEED-RELATED PERCENTAGES					
=====					
Crashes That Are Speed-Related					
All Crashes	27.5%	20.0%	30.0%	25.8%	22.4%
Serious Crashes	37.0%	28.3%	34.6%	33.3%	26.9%
SERIOUS CRASH PERCENTAGES					
=====					
Crashes That Are Serious					
All Crashes	41.2%	48.2%	47.3%	45.3%	48.6%
Speed-Related	55.6%	68.2%	54.5%	58.2%	58.3%
REDUCTIONS IN CRASH CATEGORIES					
=====					
Reduction in Total Crashes					
From previous year	NA	16.0%	0.0%	8.0%	2.7%
From 1980-1982 average					8.5%
Reduction in Serious Crashes					
From previous year	NA	1.9%	1.9%	1.9%	0.0%
From 1980-1982 average					1.9%
Reduction in Speed-Related Crashes That Are Serious					
From previous year	NA	25.0%	-20.0%	2.5%	22.2%
From 1980-1982 average					20.8%
Reduction in Non-Speed-Related Crashes That Are Serious					
From previous year	NA	-11.8%	10.5%	-0.6%	-11.8%
From 1980-1982 average					-7.5%

* Speed-Related Crashes based on speeding CITATIONS in crashes (see p. 6 of report).

TABLE 3

HIGH ACCIDENT ROADWAY CRASH DATA
CHARLES CITY COUNTY

	1980 ====	1981 ====	1982 ====	1983 ====
1st Road				
Route Number	5	5	5	5
Serious Crashes	30	23	21	18
Share of Total Serious Crashes in Community	55.6%	43.4%	40.4%	34.6%
2nd Road				
Route Number	155	155	618	609
Serious Crashes	5	5	8	4
Share of Total Serious Crashes in Community	9.3%	9.4%	15.4%	7.7%
3rd Road				
Route Number	618	618	155	155
Serious Crashes	3	7	6	4
Share of Total Serious Crashes in Community	5.6%	13.2%	11.5%	7.7%
4th Road				
Route Number	607	607	602	602
Serious Crashes	3	3	2	3
Share of Total Serious Crashes in Community	5.6%	5.7%	3.8%	5.8%
TOTAL				
Serious Crashes	41	38	37	29
Share of Total Serious Crashes in Community	75.9%	71.7%	71.2%	55.8%

EXHIBIT 2

SPEED INVOLVEMENT - SERIOUS CRASHES
CHARLES CITY COUNTY

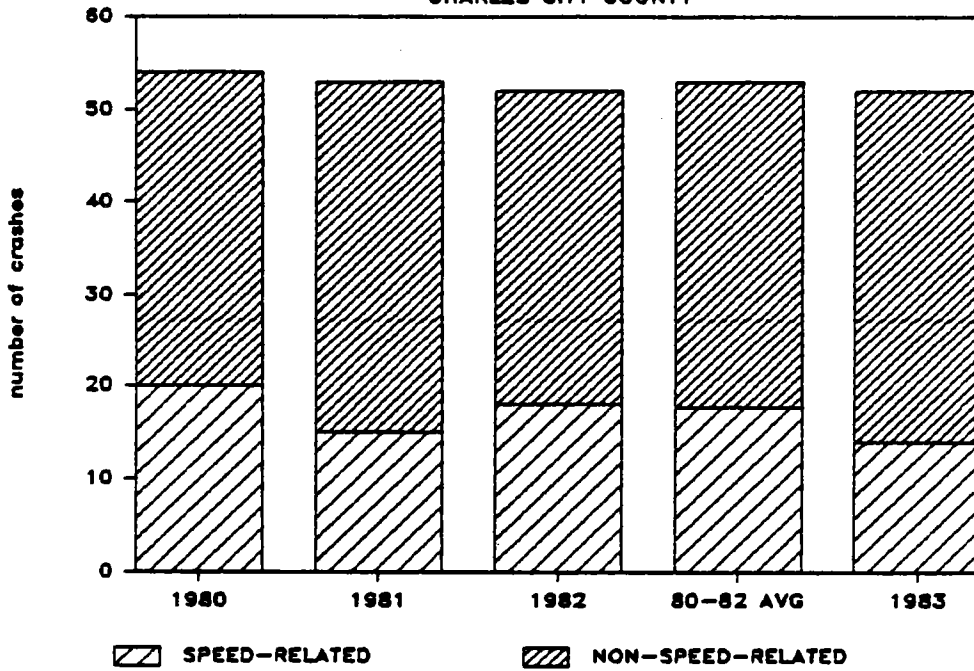
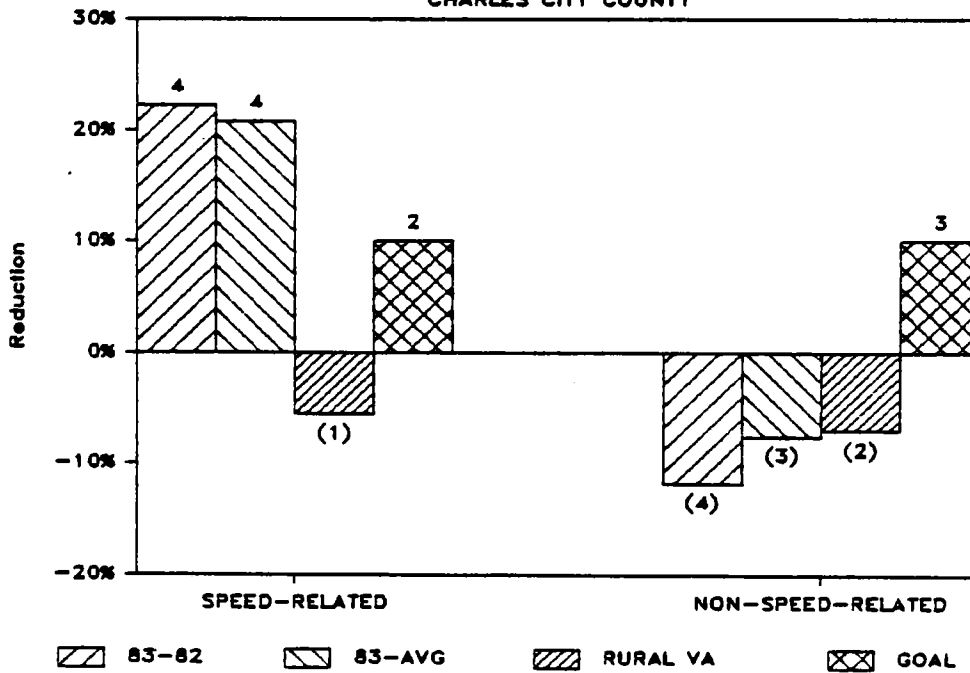


EXHIBIT 3

REDUCTION IN SERIOUS SPEED CRASHES
CHARLES CITY COUNTY



Chesterfield County

Problem Statement

Chesterfield County is the fourth largest Virginia county in population. Bordering the state capital, it has a high percentage of suburban residents and the highest population density of the eight 1983 STEP counties. For the purposes of this report, it was classified as a suburban county, and statewide data were used for comparison purposes in analyzing project results.

During the baseline years, Chesterfield County had a higher average percentage of severe crashes than that experienced statewide. In 1980 and 1981, 36.7% and 37.4% of all county crashes resulted in a death or injury, as compared to 34.7% and 35.3% statewide (see Table 4). In 1982, while total crashes in the county increased a moderate 3.3%, serious crashes rose 16%. This indicated an escalating trend in crash severity, in that 42.0% of all crashes in Chesterfield County were serious versus 36.7% across the state.

Based on crash statistics, however, the county's speeding problem was well below statewide averages. In 1980, 14.0% of all crashes in Chesterfield County were speed-related; this was five points lower than the corresponding statewide percentage. Over the following two years, the gap between the two figures broadened slightly. Based on the definitions used in this report, Chesterfield County suffered from a crash severity problem, but not a speed-related crash problem per se.

County data on both speed-related crashes and serious crashes followed the general trends in statewide data. Over the 1980-1982 baseline period, serious crashes rose 11.5% in Chesterfield County and 2.2% statewide. Speed-related crashes in Chesterfield County fell 10.1% during these years, with the largest share of the reductions occurring between 1980 and 1981; speed-related crashes across the state fell 7.5% in the same period. The county's serious speed-related crashes were less consistent, falling 11.4% between 1980 and 1981 and rising 15.0% between 1981 and 1982, for less than a 2.0% net change.

The county identified nine high accident roads which accounted for 65% of all reported accidents, according to local records. The data and analysis for four of these roadways, Routes 1, 60, 10, and 360, are presented in Table 5. These four appear in the same rank order in the consecutive years, and together they accounted for more than one-third of all serious crashes throughout the county.

Proposed Activities and Project Goals

The Chesterfield County Police Department requested \$47,000 in grant funds for the salaries of two officers to be assigned to the special patrol full-time. The county received a \$20,000 grant. The program was originally designed to identify locations with high frequencies of accidents and to apply enforcement countermeasures at those locations. This program was a continuation of an existing effort integrating selective speed and alcohol enforcement, and was supported by a computer system designed to pinpoint problem locations through local crash and citation data.

The goal of the 1983 project set by the county in its grant application was to reduce fatal and injury crashes on the identified problem roads by 10%.

Project Results

While data on the crash experience on each of the nine identified roads were not available, all indications were that Chesterfield did not meet its goal of reducing fatal and injury accidents by 10%. Throughout the county, serious accidents increased 4.7%, from 1,122 in 1982 to 1,175 in 1983. Additionally, the number of total crashes increased 6.3%, from 2,669 in 1982 to 2,837 in 1983, a four-year high (see Table 4 and Exhibit 4). Crash data were available on four of the targeted roads. The data in Table 5 demonstrate that these four routes followed the increasing trend throughout the county and that selective enforcement was not effective in reducing the total number of serious crashes on these problem roads. The four listed routes had 4% more crashes in the grant period than in the year prior to the project.

Despite increases in the number of total and serious crashes, close analysis of the data suggests that the program may have had an effect on the county's speed-related crash problem. During the grant period, speed-related serious crashes decreased 4.7% while non-speed-related crashes increased 6.4%. These changes occurred against a background of an increase in speed-related serious crashes across the state (up 5.6% in 1983). The reduction in speed-related crashes against an overall increasing trend may have been attributable to selective enforcement efforts; however, the data are not sufficient to firmly establish such a conclusion. Unfortunately, the data base used in the analysis of high accident roads did not provide information correlating both speed-related crashes and route number. Therefore, it was not possible to examine the effectiveness of the selective enforcement project in terms of the number of speed-related crashes occurring on the problem roads.

Conclusion

Chesterfield County experienced an increase of 6.3% in total crashes in 1983, and an increase of 4.7% in serious crashes. Based on these figures, Chesterfield's selective enforcement program fell short of its goals. Speed-related serious crashes, however, decreased by almost 5% during 1983, while non-speed-related crashes in the county increased, as did both non-speed-related and speed-related crashes statewide (see Exhibit 5). These findings suggest that the selective enforcement program in the county may have had limited success in addressing the county's speeding problem.

TABLE 4

SELECTIVE ENFORCEMENT CRASH DATA
CHESTERFIELD COUNTY

BASELINE DATA =====	1980 ====	1981 ====	1982 ====	1980-1982 AVERAGE =====	1983 ====
Number of Crashes	2,741	2,583	2,669	2,664.3	2,837
Fatal	26	20	18	21.3	21
Injury	980	947	1,104	1,010.3	1,154
Serious (Fatal + Injury)	1,006	967	1,122	1,031.7	1,175
 Number of Crashes That Are Speed-Related *	 384	 342	 345	 357.0	 321
Fatal	9	2	6	5.7	4
Injury	157	145	163	155.0	157
Serious (Fatal+Injury)	166	147	169	160.7	161
 Number of Crashes That Are Non-Speed-Related	 2,357	 2,241	 2,324	 2,307.3	 2,516
Fatal	17	18	12	15.7	17
Injury	823	802	941	855.3	997
Serious (Fatal+Injury)	840	820	953	871.0	1,014
 SPEED-RELATED PERCENTAGES =====					
Crashes That Are Speed-Related					
All Crashes	14.0%	13.2%	12.9%	13.4%	11.3%
Serious Crashes	16.5%	15.2%	15.1%	15.6%	13.7%
 SERIOUS CRASH PERCENTAGES =====					
Crashes That Are Serious					
All Crashes	36.7%	37.4%	42.0%	38.7%	41.4%
Speed-Related	43.2%	43.0%	49.0%	45.0%	50.2%
 REDUCTIONS IN CRASH CATEGORIES =====					
Reduction in Total Crashes					
From previous year	NA	5.8%	-3.3%	1.2%	-6.3%
From 1980-1982 average					-6.5%
 Reduction in Serious Crashes					
From previous year	NA	3.9%	-16.0%	-6.1%	-4.7%
From 1980-1982 average					-13.9%
 Reduction in Speed-Related Crashes That Are Serious					
From previous year	NA	11.4%	-15.0%	-1.8%	4.7%
From 1980-1982 average					-0.2%
 Reduction in Non-Speed-Related Crashes That Are Serious					
From previous year	NA	2.4%	-16.2%	-6.9%	-6.4%
From 1980-1982 average					-16.4%

* Speed-Related Crashes based on speeding CITATIONS in crashes (see p. 6 of report).

TABLE 5

HIGH ACCIDENT ROADWAY CRASH DATA
CHESTERFIELD COUNTY

	1980 =====	1981 =====	1982 =====	1983 =====
1st Road				
Route Number	1	1	1	1
Serious Crashes	131	112	130	135
Share of Total Serious Crashes in Community	13.0%	11.6%	11.6%	11.5%
2nd Road				
Route Number	60	60	60	60
Serious Crashes	101	84	101	125
Share of Total Serious Crashes in Community	10.0%	8.7%	9.0%	10.6%
3rd Road				
Route Number	10	10	10	10
Serious Crashes	83	75	77	103
Share of Total Serious Crashes in Community	8.3%	7.8%	6.9%	8.8%
4th Road				
Route Number	360	360	360	360
Serious Crashes	52	52	73	92
Share of Total Serious Crashes in Community	5.2%	5.4%	6.5%	7.8%
TOTAL				
Serious Crashes	367	323	381	455
Share of Total Serious Crashes in Community	36.5%	33.4%	34.0%	38.7%

EXHIBIT 4

SPEED INVOLVEMENT – SERIOUS CRASHES
CHESTERFIELD COUNTY

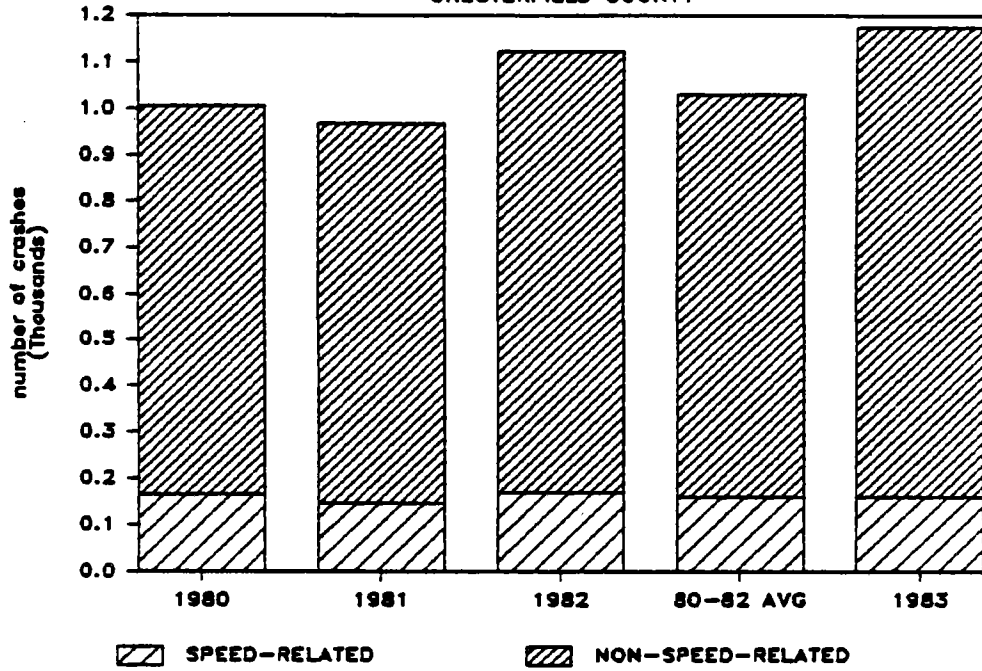
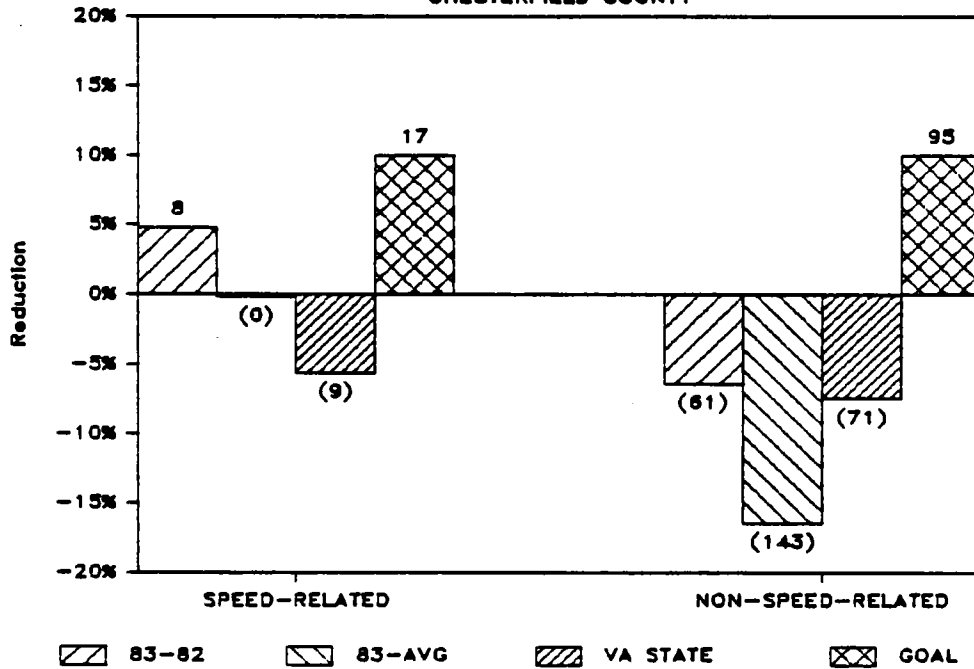


EXHIBIT 5

REDUCTION IN SERIOUS SPEED CRASHES
CHESTERFIELD COUNTY



Goochland County

Problem Statement

Goochland County described its speeding problem as a high incidence of weekend crashes occurring disproportionately on three roads. In its DMV/TSA grant application, the Goochland County Sheriff's Department cited statistics showing that more than half of the crashes in the county occurred on Fridays and Saturdays, and that most of these crashes were located on Routes 6, 250, and 522. This problem was accentuated by a manpower shortage, which resulted in only two officers being on duty during peak accident times to respond to all types of calls for assistance on a countywide basis.

Crash data available to the evaluation team confirm the characteristics of the problem identified by Goochland County. Table 6 demonstrates the concentration of serious crashes on the identified problem roads. Routes 6, 250, and 522 appear in the same rank order in each of the baseline years and together represented from 42% to 46% of all serious crashes. The focusing of intensified enforcement on these roads was an appropriate selective enforcement activity given this concentration, and should have provided an opportunity to demonstrate crash reductions.

Although the crash data did present characteristics of a local speed-related crash problem, they did not indicate a problem more severe than those of other rural communities. Between 1980 and 1982, a greater proportion of all crashes in rural Virginia counties were speed-related than those in Goochland County. In 1980 and 1981, speed-related crashes represented 20.1% and 22.5%, respectively, of all crashes in Goochland County. In the same two years, speed-related crashes were 21.4% and 21.5% of all crashes in rural Virginia (see Table 7). In 1982, the number of speed-related crashes reported in Goochland County dropped significantly and speeding citations were issued in only 15.3% of all crashes. This put Goochland well below the 1982 rural speed-related crash percentage of 21.1%.

The crash data did indicate that more crashes in Goochland County were serious than were those in the average rural county. From 1980 to 1982, an average of 41.7% of all crashes were serious, while the figure for rural Virginia was 38.0%. Interestingly, the crash data did not indicate a greater severity for speed-related crashes. In 1980 and 1981, speed-related crashes in Goochland County comprised 44.7% and 45.6% of all serious crashes, compared to 46.2% and 46.7% in the average rural county. In 1982, the situation was different, and 60.5% of all speed-related crashes in Goochland County were serious, while the figure was 47.8% in rural counties. However, the 1982 county percentage should

not be given too much weight, since it was not due to more serious crashes in the county, but to a decline of 33.3% in total speed-related serious crashes. Another secondary indicator, the speed-crash rate, also pointed away from a speeding problem above those of other rural counties. Goochland County averaged 2.0 serious speed-related crashes per thousand inhabitants, while the corresponding rural average was 1.9 crashes.

In the final analysis, the overall county crash data indicated an above average severity problem, but not an aggravated speed-related crash problem. Under the assumptions of this report, significant reductions in speed-related crashes in the county would not have been predicted. Additionally, the 1983 program was introduced following a year when total crashes and speed-related crashes had declined. This may have been an indication that speed-related crashes were following a declining trend prior to the introduction of the selective speed enforcement countermeasures.

Proposed Activities and Project Results

Goochland County received \$10,000 in grant funds to operate its first STEP. It proposed to allocate this money to pay officers on an overtime basis to work the selective enforcement project. The project was designed to place one or more additional officers on duty during weekend nights to patrol Routes 6, 250, and 522 exclusively.

The stated goals of the project were:

- o To reduce speed-related crashes by 30% over a three-year period
- o To reduce fatalities by 12%
- o To reduce injuries by 15%

Project Results

The STEP in Goochland County achieved two of its three stated goals. There were 23 fewer crashes in the county during the study year, which represented a 9.2% reduction in total crashes, or approximately one-third of its three-year goal. Only 2 of the reported 226 crashes were fatal, the lowest number of fatal crashes in the county in four years. The goal of reducing injury crashes was not met; 99 crashes resulted in bodily injury, 1 more than in the previous year.

The results of the program are more impressive when measured in terms of speed-related serious crashes. There were 23 of these crashes in 1982, and this declined to 14 in 1983, a 39.1% reduction. While

speed-related serious crashes fell to their lowest total in four years, non-speed-related serious crashes increased 6.1%, reaching a three-year high (see Table 6 and Exhibit 6). Two additional signs of effectiveness of the selective enforcement project were that total speed-related crashes and total serious crashes fell from their 1982 and three-year baseline average levels, and the speed-crash rate was almost halved.

Program effectiveness on the roads targeted for selective enforcement was analyzed (see Table 7). The frequency of serious crashes declined on two of the three routes. The number of serious crashes on these roads dropped from 44 in 1982 to 38 in 1983, changing their share of the county's serious crashes from 41.9% to 37.7%. This decline is in line with the general trend observed over the baseline period. Unfortunately, crash data did not allow analysis of speed-related crashes on the three selected roads, and it was not possible to determine whether the reduction in speed-related crashes was directly related to enforcement activity.

A comparison of county data with rural data also reflected favorably for the program. For the rural counties, the numbers of crashes of all types of measured categories (total, serious, speed-related, and non-speed-related) were higher in 1983 than in 1982. For Goochland County, only one category of crashes -- non-speed-related serious crashes -- was higher, while most others were lower. Most noticeably, serious crashes increased 6.7% in rural Virginia, and serious speed-related crashes increased 5.6%, but these categories of crashes fell 3.8% and 39.1% in Goochland County.

Conclusion

According to the effectiveness measures used in this report, the first Goochland County STEP was successful. The program met two of its three stated goals. Speed-related crashes fell significantly, and the changes observed were against the movement in the county data on non-speed-related crashes. These decreases also went against the increases in the comparison community data (see Exhibit 7). However, the extent of the program's effect must be discounted somewhat because of a pre-existing declining trend in the number of speed-related crashes. It should be noted also that these reductions would not have been predicted based on the assumptions in this report and the analysis of crash data over the baseline.

TABLE 6
SELECTIVE ENFORCEMENT CRASH DATA
GOOCHLAND COUNTY

BASELINE DATA	1980	1981	1982	1980-1982 AVERAGE	1983
=====	====	====	====	=====	====
Number of Crashes	234	253	249	245.3	226
Fatal	8	10	7	8.3	2
Injury	101	83	98	94.0	99
Serious (Fatal + Injury)	109	93	105	102.3	101
Number of Crashes That Are Speed-Related *	47	57	38	47.3	32
Fatal	4	5	3	4.0	0
Injury	17	21	20	19.3	14
Serious (Fatal+Injury)	21	26	23	23.3	14
Number of Crashes That Are Non-Speed-Related	187	196	211	198.0	194
Fatal	4	5	4	4.3	2
Injury	84	62	78	74.7	85
Serious (Fatal+Injury)	88	67	82	79.0	87
SPEED-RELATED PERCENTAGES					
=====					
Crashes That Are Speed-Related					
All Crashes	20.1%	22.5%	15.3%	19.3%	14.2%
Serious Crashes	19.3%	28.0%	21.9%	23.0%	13.9%
SERIOUS CRASH PERCENTAGES					
=====					
Crashes That Are Serious					
All Crashes	46.6%	36.8%	42.2%	41.7%	44.7%
Speed-Related	44.7%	45.6%	60.5%	49.3%	43.8%
REDUCTIONS IN CRASH CATEGORIES					
=====					
Reduction in Total Crashes					
From previous year	NA	-8.1%	1.6%	-3.3%	9.2%
From 1980-1982 average					7.9%
Reduction in Serious Crashes					
From previous year	NA	14.7%	-12.9%	0.9%	3.8%
From 1980-1982 average					1.3%
Reduction in Speed-Related Crashes That Are Serious					
From previous year	NA	-23.8%	11.5%	-6.1%	39.1%
From 1980-1982 average					40.0%
Reduction in Non-Speed-Related Crashes That Are Serious					
From previous year	NA	23.9%	-22.4%	0.7%	-6.1%
From 1980-1982 average					-10.1%

* Speed-Related Crashes based on speeding CITATIONS in crashes (see p. 6 of report).

TABLE 7

HIGH ACCIDENT ROADWAY CRASH DATA
GOOCHLAND COUNTY

	1980 =====	1981 =====	1982 =====	1983 =====
1st Road				
Route Number	6	6	6	6
Serious Crashes	22	20	18	20
Share of Total Serious Crashes in Community	20.2%	21.5%	17.1%	19.8%
2nd Road				
Route Number	250	250	250	250
Serious Crashes	19	20	18	15
Share of Total Serious Crashes in Community	17.4%	21.5%	17.1%	14.9%
3rd Road				
Route Number	522	522	522	623
Serious Crashes	9	3	8	7
Share of Total Serious Crashes in Community	8.3%	3.2%	7.6%	6.9%
4th Road				
Route Number	621	621	621	522
Serious Crashes	3	3	9	3
Share of Total Serious Crashes in Community	2.8%	3.2%	8.6%	3.0%
TOTAL				
Serious Crashes	53	46	53	45
Share of Total Serious Crashes in Community	48.6%	49.5%	50.5%	44.6%

EXHIBIT 6

SPEED INVOLVEMENT – SERIOUS CRASHES
GOOCHLAND COUNTY

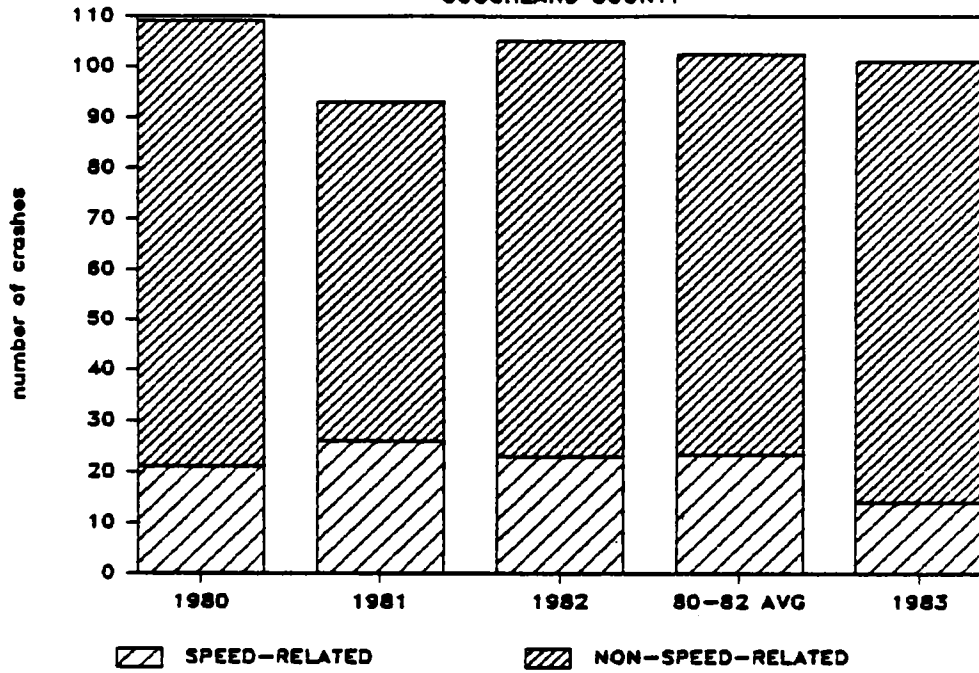
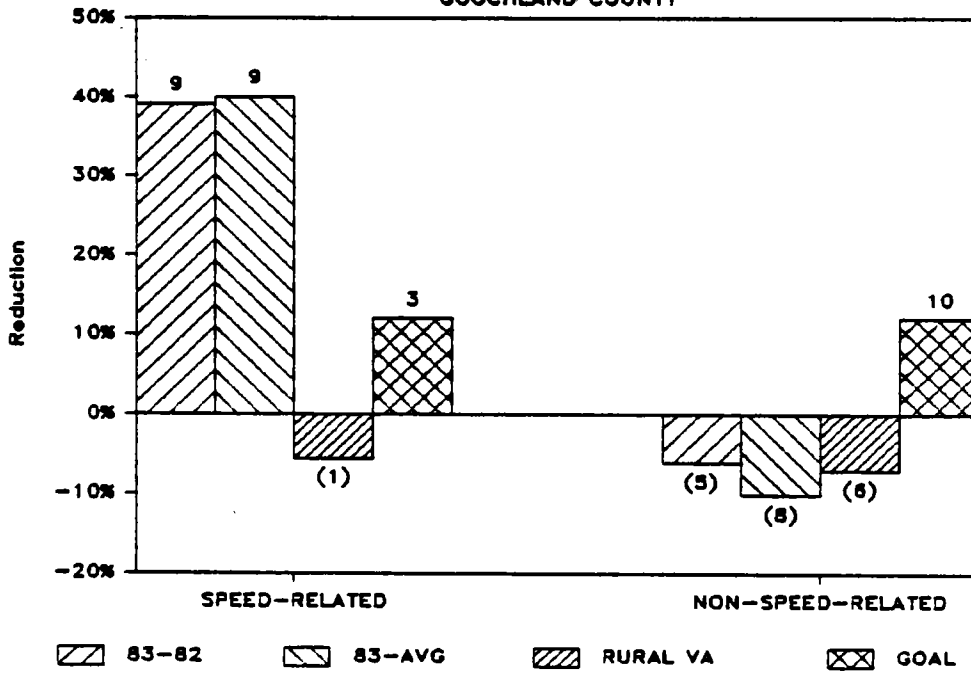


EXHIBIT 7

REDUCTION IN SERIOUS SPEED CRASHES
GOOCHLAND COUNTY



New Kent County

Problem Statement

New Kent County is one of the fastest growing counties in Virginia. This growth is reflected in a 6.9% increase in population from 1980 to 1983, the eighth highest of any Virginia county. (10) Most newer county residents commute across the county to Richmond and to other urban areas. The Sheriff's Department views this commuter traffic as a major factor contributing to the county's speeding and accident problems. They state that 36% of all accidents reported occur during commuting hours.

The crash data for New Kent County reflect its speed-related crash problem (see Table 8). Between 1980 and 1982, an average of 30.9% of all serious crashes were speed-related, compared to a rural average of 26.3%. It should be noted, however, that the number and percentage of speed-related crashes in the county were falling at a rate greater than that in rural Virginia as a whole, thus reflecting some improvement in the speed-related crash problem prior to the advent of the federally funded selective speed enforcement program (see Exhibit 8).

The rates of serious crashes for both New Kent County and for all of rural Virginia were nearly the same. Serious crashes accounted for 37.3% of all the county's crashes over the 1980-1982 baseline years and 38.0% of all rural crashes. Similarly, for speed-related crashes, 46.7% of those in the county were serious, while 46.9% of those in all rural areas were serious. The use of three-year averages disguises important trends in data, however. The percentage of speed-related crashes that were serious climbed steadily throughout rural Virginia, but dropped sharply in New Kent County. This decline was from 55.6% in 1980 to 36.2% in 1982.

The data presented in Table 9 reveal that more than half of all serious accidents occurred on four state roads. These four roads, in order of accident frequency, were Routes 60, 249, 30, and 33. The data also indicated an improving trend in the accident rate on these four roads. In 1980 they accounted for 59.8% of all accidents in the county, but by 1982 this figure had fallen to 51.3%.

From these analyses, it appears that prior to the initiation of the 1983 STEP there was a speed-related crash problem in New Kent County, and that the problem was somewhat more serious than that in all of rural Virginia. The problem was concentrated on a few roads, and with more than 200 total crashes and 58 speed-related crashes reported in 1982, an effective selective enforcement program should have been able to produce an impact on the problem.

Proposed Activities and Project Goals

New Kent received \$7,000 in grant funds to implement its first STEP. Patrols were proposed to be focused on Routes 30, 33, 249, 612, 611, 640, and 60 during commuter hours. Grant money was to be used to assign a deputy exclusively to selective speed enforcement activities during the targeted hours.

In its grant application, the New Kent County Sheriff's Department stated its goals to be:

- o To reduce fatalities 17%
- o To reduce the overall accident rate by between 7% and 10%

Project Results

New Kent County's first year of selective enforcement was not successful in reducing the numbers of total and fatal crashes. Total crashes rose 6.4% in 1983 over those in 1982 and 10.0% over the 1980-1982 average. In addition, while the number of speed-related crashes fell from 58 in 1982 to 52 in 1983, all other categories of crashes indicated a greater speed-related crash problem during the year of selective enforcement. The number of serious crashes was at the highest level in four years and the number of speed-related serious crashes was at the highest level in three years. The one-year increase in serious crashes was 32.5% and the one-year increase in speed-related serious crashes was 23.8%. The percentage of crashes that were serious increased from 34.2% to 42.6%, the largest one-year change over the 1980-1983 period.

As seen by the data in Table 9, there were 53 serious accidents in 1983 on the four roads that had the most serious crashes. In both 1981 and 1982 there were 41 serious accidents on the same four roads. Because the number of serious crashes throughout the county increased significantly, these roads accounted for about the same percentage of the county's serious crashes in 1983 as they had in previous years.

While the above data indicated an increase in the speed-related crash problem, two measures used in this report to determine project effectiveness pointed in the opposite direction. First, the percentage of speed-related crashes decreased from 24.8% to 20.9% of all crashes, and from 26.3% to 24.5% of serious crashes. Second, the 26 speed-related serious crashes in 1983 were minimally less than the three-year average of 26.3, but significantly more than the 21 speed-related serious crashes in 1982 (see Exhibit 9).

Conclusions

The 1983 STEP did not meet the goals set by the New Kent County Sheriff's Department. Additionally, some indicators of a successful program suggested that the speed-related crash problem worsened during the county's first year of STEP enforcement. Most notably, the number and percentage of serious crashes increased significantly. Finally, the number of speed-related serious crashes provided no evidence that the project was effective. The number of speed-related serious crashes in 1983 represented a significant increase over 1982 figures, but a minimal decrease from 1980-1982 average figures (see Exhibit 9).

TABLE 8

SELECTIVE ENFORCEMENT CRASH DATA
NEW KENT COUNTY

BASELINE DATA	1980	1981	1982	1980-1982 AVERAGE	1983
=====	====	====	====	=====	====
Number of Crashes	234	211	234	226.3	249
Fatal	7	3	2	4.0	4
Injury	90	73	78	80.3	102
Serious (Fatal + Injury)	97	76	80	84.3	106
Number of Crashes That Are Speed-Related *	63	48	58	56.3	52
Fatal	5	2	2	3.0	2
Injury	30	21	19	23.3	24
Serious (Fatal+Injury)	35	23	21	26.3	26
Number of Crashes That Are Non-Speed-Related	171	163	176	170.0	197
Fatal	2	1	0	1.0	2
Injury	60	52	59	57.0	78
Serious (Fatal+Injury)	62	53	59	58.0	80
SPEED-RELATED PERCENTAGES					
=====					
Crashes That Are Speed-Related					
All Crashes	26.9%	22.7%	24.8%	24.8%	20.9%
Serious Crashes	36.1%	30.3%	26.3%	30.9%	24.5%
SERIOUS CRASH PERCENTAGES					
=====					
Crashes That Are Serious					
All Crashes	41.5%	36.0%	34.2%	37.3%	42.6%
Speed-Related	55.6%	47.9%	36.2%	46.7%	50.0%
REDUCTIONS IN CRASH CATEGORIES					
=====					
Reduction in Total Crashes					
From previous year	NA	9.8%	-10.9%	-0.5%	-6.4%
From 1980-1982 average					-10.0%
Reduction in Serious Crashes					
From previous year	NA	21.6%	-5.3%	8.2%	-32.5%
From 1980-1982 average					-25.7%
Reduction in Speed-Related Crashes That Are Serious					
From previous year	NA	34.3%	8.7%	21.5%	-23.8%
From 1980-1982 average					1.3%
Reduction in Non-Speed-Related Crashes That Are Serious					
From previous year	NA	14.5%	-11.3%	1.6%	-35.6%
From 1980-1982 average					-37.9%

* Speed-Related Crashes based on speeding CITATIONS in crashes (see p. 6 of report).

TABLE 9

HIGH ACCIDENT ROADWAY CRASH DATA
NEW KENT COUNTY

	1980 =====	1981 =====	1982 =====	1983 =====
1st Road				
Route Number	60	60	60	60
Serious Crashes	28	20	21	23
Share of Total Serious Crashes in Community	28.9%	26.3%	26.3%	21.7%
2nd Road				
Route Number	249	249	249	249
Serious Crashes	18	14	12	14
Share of Total Serious Crashes in Community	18.6%	18.4%	15.0%	13.2%
3rd Road				
Route Number	30	30	30	30
Serious Crashes	8	3	3	11
Share of Total Serious Crashes in Community	8.2%	3.9%	3.8%	10.4%
4th Road				
Route Number	33	33	33	33
Serious Crashes	4	4	5	5
Share of Total Serious Crashes in Community	4.1%	5.3%	6.3%	4.7%
TOTAL				
Serious Crashes	58	41	41	53
Share of Total Serious Crashes in Community	59.8%	53.9%	51.3%	50.0%

EXHIBIT 8

SPEED INVOLVEMENT – SERIOUS CRASHES
NEW KENT COUNTY

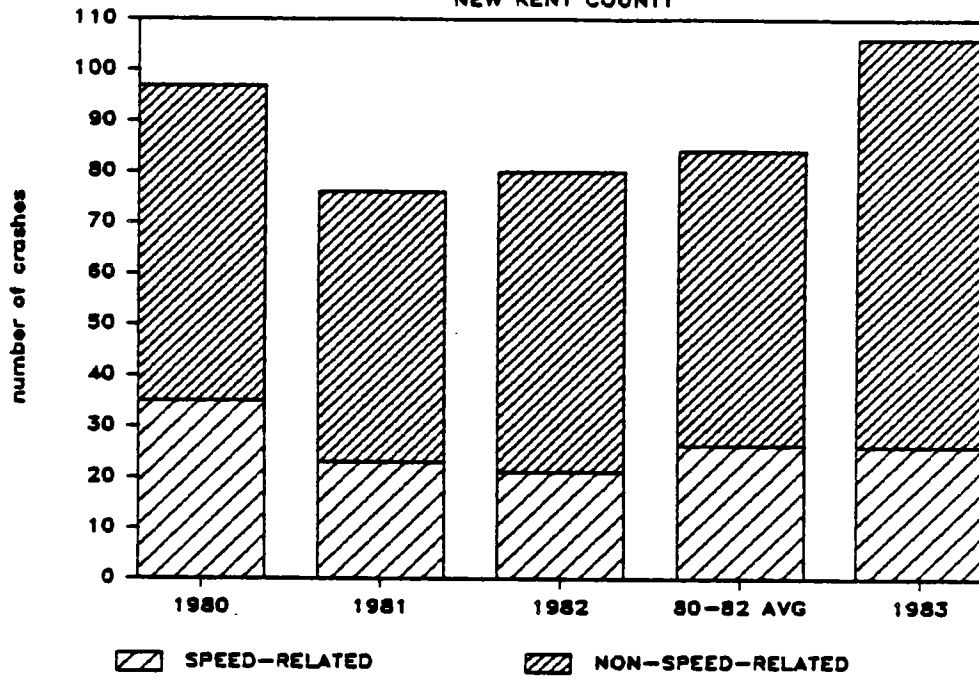
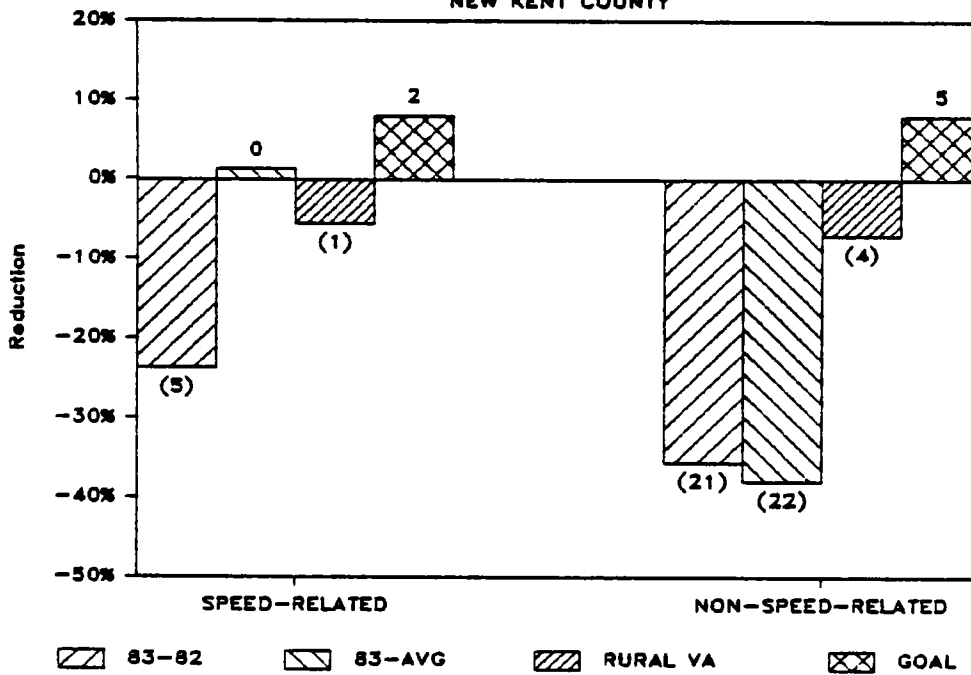


EXHIBIT 9

REDUCTION IN SERIOUS SPEED CRASHES
NEW KENT COUNTY



Prince George County

Problem Statement

Prince George County initiated its first selective speed enforcement program in 1980, and it continued STEP activity over the next three years. The County Sheriff's Department believed these programs were successful in reducing the number of total and speed-related crashes during this period. Crash data over this period provide some support to this view, with particularly noticeable reductions in two crash categories occurring in 1982. Serious crashes fell 15.0%, from 173 in 1981 to 147 in 1982, and serious speed-related crashes declined 51.4%, from 45 in 1981 to 28 in 1982.

The effectiveness of these projects, however, should be considered in light of three features in the 1980-1982 crash data (see Table 10). First, the number of total crashes was gradually declining, from 367 in 1980 to 324 by 1982. Second, while there were fewer total crashes in 1981 than in 1980, the number of serious crashes in 1981 was much higher than the number in both 1980 and 1982. There were 173 serious crashes reported in 1981, compared to 152 in 1980 and 147 in 1982 (see Exhibit 10). Third, the reduction percentages for serious speed-related crashes were subject to large variations based on relatively small changes in the underlying data. A difference of 11 more serious speed-related crashes in 1981 than in 1980 equated to a 45.8% increase in these crashes. Eighteen fewer of these crashes in 1982 than in 1981 produced a 51.4% decrease. Taken together, these observations suggest that while the crash data indicate highway safety advances over the 1980-1982 period, the simplistic percentage analyses used may overstate the extent of these improvements in any one year.

The most prominent crash problem revealed by the data was the severity of crashes. Serious accidents occurred more frequently in Prince George County than in the average rural Virginia county. Between 1980 and 1982, an average of 64.4% of all speed-related crashes in Prince George were serious, compared to 46.9% for rural Virginia. Within the set of all crashes, 46.0% were serious in Prince George County while only 38.0% were serious in rural Virginia. Although these averages were somewhat exaggerated by the high number of serious crashes in Prince George County in 1981, the county's percentage of serious crashes exceeded that of rural Virginia in each of the baseline years. Prince George County had the highest average crash severity percentages of any of the eight 1983 STEP counties.

In contrast to this overall higher crash severity, the crash statistics did not demonstrate a speed-related crash problem in Prince George. Between 1980 and 1982, the percentage of crashes that were

speed-related never exceeded 14% in Prince George County, while it never fell below 21% for the composite of rural counties. Over these three years, speeding citations were issued in an average of 15.9% of all serious crashes in Prince George County, while drivers were cited in 26.3% of all serious crashes throughout rural Virginia. Additionally, the number and percentage of the county's speed-related crashes were dramatically lower in 1982 than in the previous two years, while those of the comparison community were relatively unchanged.

An analysis of the high accident roads within the county showed that more than 40% of all serious accidents in Prince George occurred on Routes 156, 460, and 10 (see Table 11). This concentration of crashes should provide a favorable environment for use of selective enforcement techniques. As noted above, however, the Sheriff's Department had been operating federally funded STEPs for the three previous years. Over time, local drivers may have become acclimated to intensified enforcement, undermining the deterrence effect. Additionally, the assumptions underlying the analyses of this report hypothesize that demonstration of improvement in highway safety would have been difficult given a speed-related crash problem below that of the average Virginia county.

Proposed Activities and Project Goals

Prince George received \$6,000 for continuation of its selective enforcement program. This represented 60% less than the \$15,000 requested by the county in its 1983 grant application and the \$15,000 appropriated in 1981. Project funds were to provide overtime pay for deputies to carry out the program.

A detailed description of the proposed program was not contained in the grant application, and therefore is not included in this report.

The county stated its 1983 STEP goals as:

- o To reduce the four year average number of crashes by 30% (from 448 to 300).
- o To reduce the four year average fatality rate by 40% (from 12.4% to 7%).

Project Results

Since the project goals were stated in terms of a long-range average, it is difficult to gauge project results at the end of any one year of activity. Regardless of how the goals were stated, however, 1983 data did not demonstrate crash reductions from 1982 levels. The number

of crashes in each relevant category was higher in the grant year than in the previous year and generally followed the changes in the number of crashes throughout rural Virginia. The 6.1% increase in serious crashes reported in Prince George County approximated the 6.7% rise in serious crashes for all of rural Virginia. The rate of change in total crashes differed slightly between the two areas, with a 4.0% increase in the county and a 2.1% increase in rural Virginia. The only material divergence between the changes in county data and rural data appeared in the category of speed-related crashes. The number of serious speed-related crashes rose 5.6% in the average rural Virginia county, but increased 17.6% in Prince George County. This percentage increase also outstripped the 4.6% increase in serious non-speed-related crashes within Prince George County.

While the number of county crashes reported in 1983 exceeded that in 1982, the 1983 figures are actually lower than the 1980-1982 baseline average figures. Compared to the three-year baseline averages, total 1983 crash data show 1.5% fewer total crashes, 0.8% fewer serious crashes, and 21.1% fewer serious speed-related crashes. These percentage reductions were greater than or equal to the corresponding rural figures.

The disparity between the greater number of crashes in 1983 when compared to those in 1982 and the fewer number of crashes in 1983 when compared to the three-year baseline average are difficult to account for. It was especially perplexing because the greatest difference was between the percentages for serious speed-related crashes. Starting from 1982 data, this percentage indicates that the 1983 project was ineffective. Starting from the 1980-1982 baseline average, the percentage indicates the opposite. The interpretation of this disparity offered here is that the number of crashes in each category was generally declining over that of the baseline years. The 1983 crash data are consistent with this general trend if the peaks and valleys in data over previous years are smoothed out.

An analysis of crash data for high accident roads did not reveal any evidence of the 1983 selective speed enforcement project having an effect on the speed-related crash problem. The number and percentage of serious crashes on the three identified routes were not materially different from those of the previous year (see Table 11).

Conclusions

Selective enforcement in Prince George County during 1983 did not reduce the number or severity of accidents. The number of crashes in each category increased in 1983 from the 1982 levels. Thus, the county did not meet its stated goals. Despite these increases over the previous year, the number of crashes in 1983 was less than the baseline averages and may have been in line with a long term declining trend. Taking all the data together, there was no evidence that the 1983 project was effective in addressing the speed-related crash problem (see Exhibit 11).

The results of this program should be viewed in the context of previous activity and of reduced funding. After three years of selective enforcement, significant gains would not ordinarily be anticipated. Also, an increase in crashes following a 60% reduction in federal funds suggests that highway safety advances achieved in previous years may have been lost in 1983 because of a reduced level of activity.

TABLE 10

SELECTIVE ENFORCEMENT CRASH DATA
PRINCE GEORGE COUNTY

BASELINE DATA =====	1980 ====	1981 ====	1982 ====	1980-1982 AVERAGE =====	1983 ====
Number of Crashes	367	335	324	342.0	337
Fatal	6	2	3	3.7	6
Injury	146	171	144	153.7	150
Serious (Fatal + Injury)	152	173	147	157.3	156
 Number of Crashes That Are Speed-Related *	 45	 45	 28	 39.3	 36
Fatal	1	0	1	0.7	3
Injury	23	35	16	24.7	17
Serious (Fatal+Injury)	24	35	17	25.3	20
 Number of Crashes That Are Non-Speed-Related	 322	 290	 296	 302.7	 301
Fatal	5	2	2	3.0	3
Injury	123	136	128	129.0	133
Serious (Fatal+Injury)	128	138	130	132.0	136
 SPEED-RELATED PERCENTAGES =====					
Crashes That Are Speed-Related					
All Crashes	12.3%	13.4%	8.6%	11.4%	10.7%
Serious Crashes	15.8%	20.2%	11.6%	15.9%	12.8%
 SERIOUS CRASH PERCENTAGES =====					
Crashes That Are Serious					
All Crashes	41.4%	51.6%	45.4%	46.0%	46.3%
Speed-Related	53.3%	77.8%	60.7%	64.4%	55.6%
 REDUCTIONS IN CRASH CATEGORIES =====					
Reduction in Total Crashes					
From previous year	NA	8.7%	3.3%	6.0%	-4.0%
From 1980-1982 average					1.5%
 Reduction in Serious Crashes					
From previous year	NA	-13.8%	15.0%	0.6%	-6.1%
From 1980-1982 average					0.8%
 Reduction in Speed-Related Crashes That Are Serious					
From previous year	NA	-45.8%	51.4%	2.8%	-17.6%
From 1980-1982 average					21.1%
 Reduction in Non-Speed-Related Crashes That Are Serious					
From previous year	NA	-7.8%	5.8%	-1.0%	-4.6%
From 1980-1982 average					-3.0%

* Speed-Related Crashes based on speeding CITATIONS in crashes (see p. 6 of report).

TABLE 11

HIGH ACCIDENT ROADWAY CRASH DATA
PRINCE GEORGE COUNTY

	1980 =====	1981 =====	1982 =====	1983 =====
1st Road				
Route Number	156	156	10	156
Serious Crashes	21	33	22	25
Share of Total Serious Crashes in Community	13.8%	19.1%	15.0%	16.0%
2nd Road				
Route Number	460	10	156	10
Serious Crashes	20	20	23	19
Share of Total Serious Crashes in Community	13.2%	11.6%	15.6%	12.2%
3rd Road				
Route Number	10	460	460	460
Serious Crashes	20	25	15	16
Share of Total Serious Crashes in Community	13.2%	14.5%	10.2%	10.3%
4th Road				
Route Number	301	106	36	630
Serious Crashes	14	14	8	12
Share of Total Serious Crashes in Community	9.2%	8.1%	5.4%	7.7%
TOTAL				
Serious Crashes	75	92	68	72
Share of Total Serious Crashes in Community	49.3%	53.2%	46.3%	46.2%

EXHIBIT 10

SPEED INVOLVEMENT – SERIOUS CRASHES

PRINCE GEORGE COUNTY

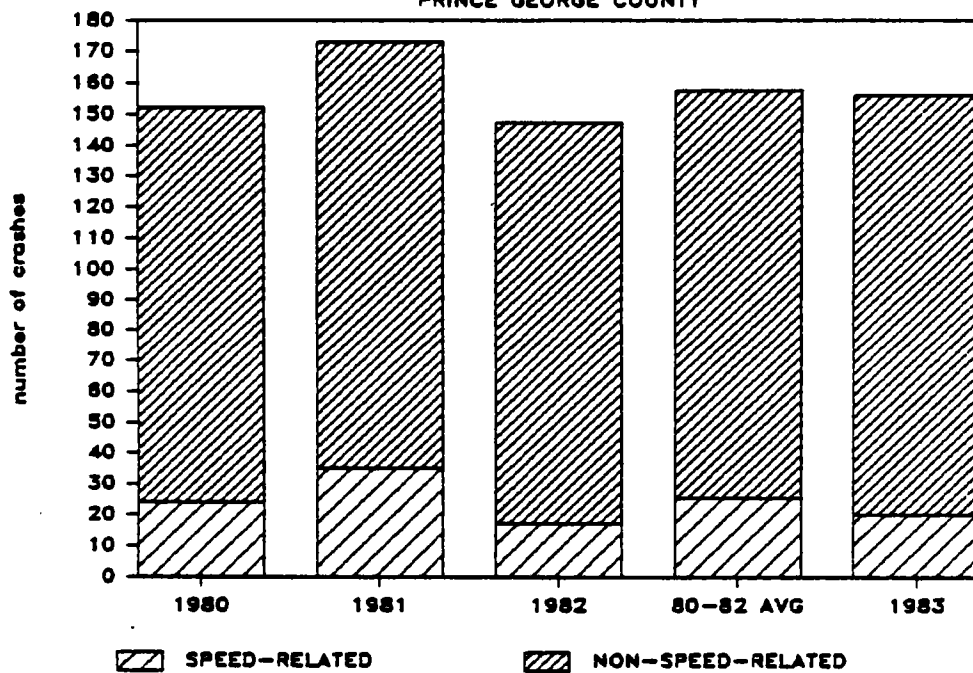
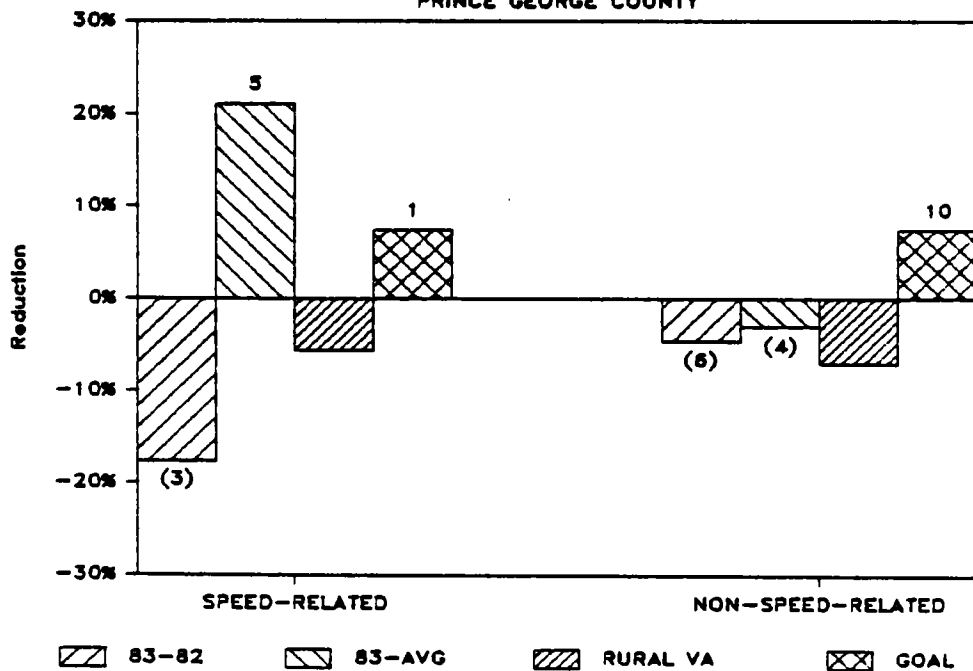


EXHIBIT 11

REDUCTION IN SERIOUS SPEED CRASHES

PRINCE GEORGE COUNTY





Roanoke County

Problem Statement

Roanoke County initiated its first selective enforcement project in 1979 and continued to operate federally funded projects through the 1983 grant year. Baseline data indicate that these programs may have contributed to reducing speed-related crashes. Total accidents in Roanoke County declined in two of the three baseline years, resulting in a net reduction of 4.2% from 1979 totals. Statewide, total accidents fell by 12.7% during this same period. Thus, previous selective enforcement projects were no more effective in reducing the total number of crashes in Roanoke County than other factors were in reducing crashes across the state. In contrast, these projects may have had an effect on the speed-related crash problem. The number of speed-related crashes fell more than three times faster in Roanoke County than it did statewide.

The frequency of speed-related crashes in Roanoke County was slightly greater than the state average during 1980 and 1981. During these two years, speed was cited as a contributing factor in 26.5% and 25.4% of the county's fatal and injury crashes, while speed contributed to 24.3% and 23.6% of all those in the state (see Table 12). In 1982, the county percentage fell sharply to 20.5%, two percentage points below the state average of 22.6%.

There was no established trend in the number of crashes in the county over the 1980 - 1982 period. Total crashes rose 7.4% between 1980 and 1981, but fell 7.7% the following year. Serious crashes rose 11.8% between 1980 and 1981, and fell 10.6% in 1982 (see Exhibit 12). The number of speed-related crashes was stable between the first and second years, but dropped significantly between the second and third years, from 218 in 1981 to 166 in 1982.

The slightly higher crash severity percentages for Roanoke County indicated a moderate severity problem. Fatal and injury accidents accounted for an average of 37.8% of all crashes, slightly above the state average of 35.6%. Also, an average of 47.9% of all speed-related crashes in Roanoke County were serious, while 44.7% of all state speed-related crashes were serious. No clear trend in the number or percentage of these crashes was noticeable for the county over the baseline years.

The data in Table 13 reveal a concentration of serious crashes on four roads. Routes 419, 221, 11, and 220 appear in each year with relatively consistent rank orderings. Together they accounted for 34% to 40% of all serious crashes in Roanoke County during the baseline years. Also of interest is that the combined number of serious crashes

occurring on these four roads increased each year, rising from 135 in 1980 to 152 in 1982. It appears from these data that either traffic on these four routes was resistant to the selective enforcement techniques used by the county, or that the County Sheriff's Department did not focus its efforts on the problem roads.

After four years of selective enforcement projects, the speeding problem in Roanoke County was of the same proportions as that of the state as a whole. Theoretically, the greatest impact from the STEP should have taken place in the early phases of the program, as the public became aware of the increased enforcement. The crash problem remaining after four years of activity should have been more resistant to selective enforcement countermeasures, and small reductions, if any, should have resulted from the 1983 program.

Proposed Activities and Project Results

The Roanoke County Sheriff's Department requested \$23,348 in federal grant funds to conduct its 1983 program. This money was to pay half the salary of an officer assigned exclusively to selective enforcement duties; the balance was to come from state and local resources. Proposed duties for this officer included conducting traffic surveys to determine high accident locations and making crash investigations. The county received \$11,000 in grant funds, less than half of its 1982 grant and its 1983 request.

The grant application contained no quantifiable objectives or goals for use in evaluating the 1983 project.

Project Results

Since no objective goals were available, it was not possible to compare project results against the goals set by the Sheriff's Department. The numbers of total crashes and serious crashes declined slightly from their previous levels, with changes of 2.6% and 1.6%, respectively. There were 3 more serious speed-related crashes in 1983 than in 1982, which represented a 3.8% increase. Generally, the reductions achieved in 1982 were maintained during the grant period, but no further improvements were made. While the 1983 project did not reduce the number of crashes, project results appear more favorable when viewed against a background of an increasing number and severity of crashes throughout the state. In 1983, the number of crashes statewide rose by 1.1%, serious crashes rose 7.0%, and serious speed-related crashes rose 5.6%.

Two interesting observations can be made on the crash data. First, Roanoke County was one of only two STEP counties in which the number of non-speed-related crashes was less in 1983 than in 1982. The second notable feature was that the county's 1983 crash data compare more favorably against the three-year baseline average figures than against the one-year 1982 figures. The numbers of total crashes and serious crashes in 1983 were 5.5% and 5.3% less than the three-year average figures, as compared to being 2.6% and 1.6% less than the 1982 numbers. Also, while serious speed-related crashes in 1983 were up 3.8% over 1982, they were 15.3% less than the three-year average (see Exhibit 13). This relationship indicates that overall the speed-related crash problem was less in 1983 than in 1980 and 1981, and that the 3.8% increase in serious speed-related crashes should not be overemphasized.

Table 13 data indicate that the crash picture for four high accident roads in Roanoke County remained about the same after the 1983 STEP as it had been previously. The increased number of serious crashes on these roads in 1983 continued the previous three years' growth in their relative share of the serious crashes occurring throughout the county. In 1983, there were 155 serious crashes (or 41.3% of all serious crashes in the county) on these roads. In 1982, there were 152 (39.9%) such crashes, and in 1981, 146 (34.3%).

Conclusions

Generally, there were no meaningful changes in the frequency or severity of crashes after the 1983 program year. Substantial gains after four years of STEP activity would not ordinarily be expected. Evidence that the 1983 project had a limited impact on the county's crash problems can be found in that the number of speed-related crashes and serious crashes did not increase above their 1982 levels, against a background of increasing crashes statewide and reduced program funding.

TABLE 12

SELECTIVE ENFORCEMENT CRASH DATA
ROANOKE COUNTY

BASELINE DATA	1980	1981	1982	1980-1982 AVERAGE	1983
=====	====	====	====	=====	====
Number of Crashes	1,025	1,101	1,016	1,047.3	990
Fatal	5	15	6	8.7	10
Injury	376	411	375	387.3	365
Serious (Fatal + Injury)	381	426	381	396.0	375
Number of Crashes That Are Speed-Related *	215	218	166	199.7	159
Fatal	2	5	2	3.0	7
Injury	99	103	76	92.7	74
Serious (Fatal+Injury)	101	108	78	95.7	81
Number of Crashes That Are Non-Speed-Related	810	883	850	847.7	831
Fatal	3	10	4	5.7	3
Injury	277	308	299	294.7	291
Serious (Fatal+Injury)	280	318	303	300.3	294
SPEED-RELATED PERCENTAGES					
=====					
Crashes That Are Speed-Related					
All Crashes	21.0%	19.8%	16.3%	19.0%	16.1%
Serious Crashes	26.5%	25.4%	20.5%	24.1%	21.6%
SERIOUS CRASH PERCENTAGES					
=====					
Crashes That Are Serious					
All Crashes	37.2%	38.7%	37.5%	37.8%	37.9%
Speed-Related	47.0%	49.5%	47.0%	47.9%	50.9%
REDUCTIONS IN CRASH CATEGORIES					
=====					
Reduction in Total Crashes					
From previous year	NA	-7.4%	7.7%	0.2%	2.6%
From 1980-1982 average					5.5%
Reduction in Serious Crashes					
From previous year	NA	-11.8%	10.6%	-0.6%	1.6%
From 1980-1982 average					5.3%
Reduction in Speed-Related Crashes That Are Serious					
From previous year	NA	-6.9%	27.8%	10.4%	-3.8%
From 1980-1982 average					15.3%
Reduction in Non-Speed-Related Crashes That Are Serious					
From previous year	NA	-13.6%	4.7%	-4.4%	3.0%
From 1980-1982 average					2.1%

* Speed-Related Crashes based on speeding CITATIONS in crashes (see p. 6 of report).

TABLE 13

HIGH ACCIDENT ROADWAY CRASH DATA
ROANOKE COUNTY

	1980 =====	1981 =====	1982 =====	1983 =====
1st Road				
Route Number	221	419	419	419
Serious Crashes	43	52	56	48
Share of Total Serious Crashes in Community	11.3%	12.2%	14.7%	12.8%
2nd Road				
Route Number	419	221	221	11
Serious Crashes	38	44	37	41
Share of Total Serious Crashes in Community	10.0%	10.3%	9.7%	10.9%
3rd Road				
Route Number	11	11	11	221
Serious Crashes	35	31	32	35
Share of Total Serious Crashes in Community	9.2%	7.3%	8.4%	9.3%
4th Road				
Route Number	220	220	220	220
Serious Crashes	19	19	27	31
Share of Total Serious Crashes in Community	5.0%	4.5%	7.1%	8.3%
TOTAL				
Serious Crashes	135	146	152	155
Share of Total Serious Crashes in Community	35.4%	34.3%	39.9%	41.3%

EXHIBIT 12

SPEED INVOLVEMENT — SERIOUS CRASHES
ROANOKE COUNTY

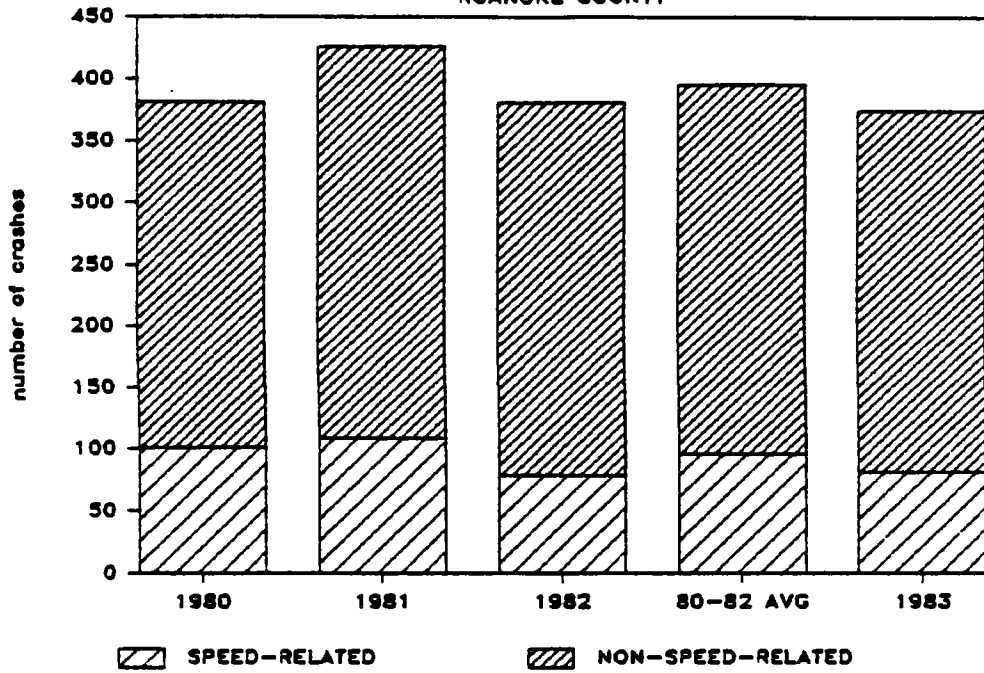
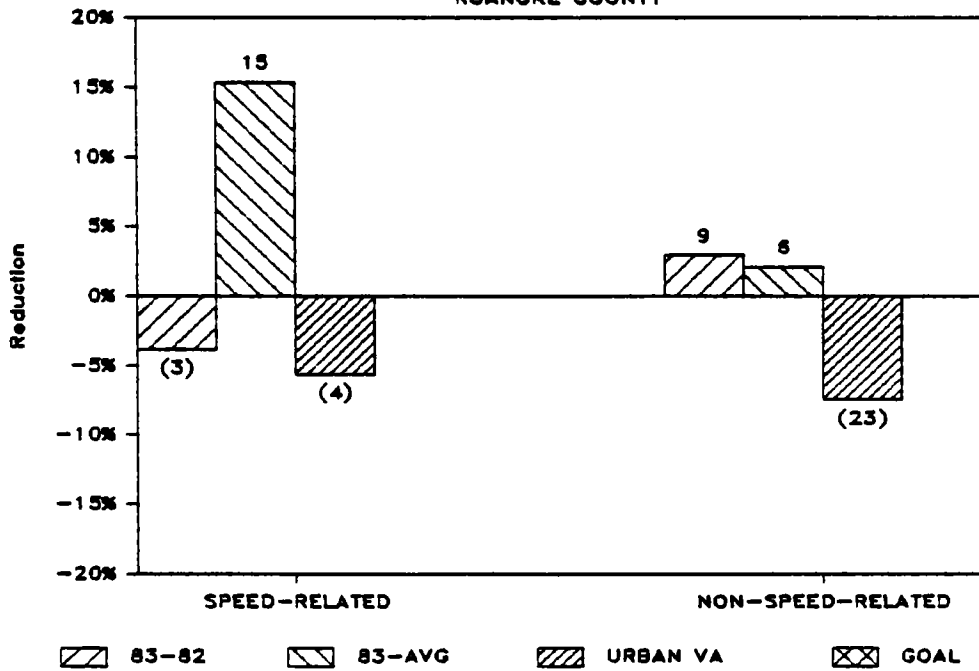


EXHIBIT 13

REDUCTION IN SERIOUS SPEED CRASHES
ROANOKE COUNTY



Surry County

Problem Statement

The Surry County Sheriff's Department defined the county's speed-related crash problem as resulting from two factors: (1) most of the highways in the county were signed for a 55 mph speed limit, and (2) there was a shortage of patrol officers. Local officials perceived the problem to be so serious that they started a selective enforcement program in July 1981 using unpaid, voluntary overtime by deputies. These initial efforts were continued and expanded in 1982 and 1983 through the use of highway safety grants.

There are sufficient data to indicate that a moderate speed-related crash problem existed in the county. In 1980 and 1981, a period prior to the receipt of federal funds, the county experienced a frequency of speed-related serious crashes slightly higher than the rural average in the state. Speed-related crashes accounted for 21.4% of the state's rural crashes during 1980 and 21.5% during 1981. The corresponding percentages for Surry County were 22.1% and 23.8% (see Table 14).

The incidence of serious crashes in the county also exceeded that of rural Virginia. Over the three baseline years, an average of 38.8% of all crashes in rural Virginia were serious. At 50.4%, the average for Surry County exceeded the rural average by nearly 33%. Also, more speed-related crashes in the county were serious, averaging 61.0% of all crashes, while the rural average was 47.8%. The rate of serious crashes remained above rural averages throughout the baseline period, despite efforts by the county that resulted in reductions in the number of crashes during each year of the period.

After conducting its first federally funded STEP in 1982, the county experienced significant reductions in each of the relevant crash categories. Total crashes, serious crashes, and speed-related serious crashes fell 23.1%, 8.5%, and 35.3%, respectively, from their 1981 totals (see Exhibit 14). Reductions in these crash types in all rural areas were minimal in comparison. As a result, speed-related crash percentages were significantly lower in Surry County than in other rural areas. The alleviation of the speed-related crash problem in 1982 was due to the selective enforcement countermeasures used by the Sheriff's Department.

Secondary indicators used in this report confirmed the above observations. The serious-crash rate for the county was the highest of those of the eight 1983 STEP counties in each of the baseline years, averaging 10 serious crashes per 1,000 inhabitants. Also, at 3.1 serious speed-related crashes per 1,000 inhabitants, the county's speed-

crash rate was the second highest among the STEP counties in 1980; by 1982, this figure had fallen to 1.8 crashes per 1,000 inhabitants, equal to the rural average.

The analysis of crashes by roadway is presented in Table 15. The data in the table did not demonstrate crash concentration on any highway segment. During the 1980-1982 period, six routes appear as problem roadways and the ranking among the six changed each year. The four routes appearing more than once are Routes 10, 31, 650, and 617. Route 10 had the greatest number of serious crashes in each year. In 1980 and 1981, this road accounted for about one-third of all serious crashes in the county. After one year of selective enforcement, the number of serious accidents reported on Route 10 dropped by 40% (from 25 to 15), but its relative share of all serious accidents in the county remained the same. Other than Route 10, no roads could be identified as being high accident roads.

After impressive results following the first year of federally funded operation, the county STEP should not have been expected to achieve equivalent reductions in the number of accidents in subsequent years. This is not to say that an effective program would not have improved highway safety beyond the advances made in the previous year, but simply that STEP activity and crash reductions are not linearly related.

Proposed Activities and Project Goals

Surry County received \$8,500 in federal funds to conduct its 1983 selective enforcement project. This represented more than a 40% increase in federal funding above the 1982 level. The County Sheriff's Department proposed to pay for 850 hours of overtime activity in carrying out its selective speed enforcement project. Details regarding geographic areas, time of day, and day of week to be patrolled were not available from the grant application submitted by the county.

In its grant application, the county set the following goals for its STEP:

- o To achieve a 15% reduction in total crashes, from the 1983 projection of 135 total crashes to 115 total crashes.
- o To achieve a yearly reduction of 15% in total crashes for four successive years, for a cumulative diminution of 60%.

Project Results

All categories of crashes declined during the 1983 grant period from the 1982 levels. Total crashes fell by 4.0%, serious crashes by 3.7%, and speed-related serious crashes by 9.1%. The county achieved its first goal of holding total crashes below 115, although they declined by only 4%. Whether the project met the second goal of a 15% yearly reduction is not as clear. If 1981 was to be the base year, the 1983 total of 96 is not far from the cumulative two-year reduction goal of 30%; however, if 1982 was intended to be the base year, the 1983 total is well behind the intermediate project goal.

Too much emphasis should not be placed on the percentages of reductions, however, since the numerical differences in these crash categories were very small. There were 4 fewer total crashes, 2 fewer serious crashes, and 1 fewer serious speed-related crash. Nevertheless, the numbers of crashes in 1983 were significantly less than the 1980-1982 average numbers (see Table 14 and Exhibits 14 and 15). The two years of fewer crashes after countermeasures were introduced in 1982 compared to the number of crashes before 1982 suggest that the STEPs were effective in addressing the local crash problem.

The reductions in the numbers of Surry County crashes contrasted with increases in the numbers of crashes across rural Virginia. In contrast to the one-year reductions for Surry County, total rural crashes increased by 2.8%, serious crashes by 7.2%, and speed-related serious crashes by 2.0%. The county's speed-crash rate was down for the third consecutive year, but the rural rate was slightly higher than in 1982.

Surry County was one of only two STEP counties which reported fewer non-speed-related crashes in 1983 than in 1982 (see Exhibit 15). These crashes dropped 2.3%, from 83 in 1982 to 76 in 1983. The number of serious non-speed-related crashes remained virtually unchanged, with 43 such crashes in 1982 and 42 in 1983.

There was also a decrease in the number of serious crashes in Surry County during the period analyzed. From 1980 through 1983, the number of serious crashes declined each year, with marked improvement in 1982, the first year of federally funded selective enforcement activity. The county's serious-crash rate followed this downward movement each year. There was no noticeable change in the occurrence of serious accidents on high accident roads (see Table 15).

Conclusions

Subsequent to 1982, there was a tangible reduction in the number of speed-related crashes in Surry County. While most of this improvement occurred in 1982, it was sustained in 1983. The combined 1982 and 1983 STEPs in the county appear to have been successful in addressing the crash problem identified by county officials. Results from the 1983 project indicate, however, that its four-year goal of reducing total crashes by 60% from 1981 levels may have been overly optimistic.

TABLE 14

SELECTIVE ENFORCEMENT CRASH DATA
SURRY COUNTY

BASELINE DATA	1980	1981	1982	1980-1982 AVERAGE	1983
=====	====	====	====	=====	====
Number of Crashes	131	130	100	120.3	96
Fatal	5	3	1	3.0	2
Injury	64	56	53	57.7	50
Serious (Fatal + Injury)	69	59	54	60.7	52
Number of Crashes That Are Speed-Related *	29	31	17	25.7	20
Fatal	3	1	1	1.7	1
Injury	16	16	10	14.0	9
Serious (Fatal+Injury)	19	17	11	15.7	10
Number of Crashes That Are Non-Speed-Related	102	99	83	94.7	76
Fatal	2	2	0	1.3	1
Injury	48	40	43	43.7	41
Serious (Fatal+Injury)	50	42	43	45.0	42
SPEED-RELATED PERCENTAGES					
=====					
Crashes That Are Speed-Related					
All Crashes	22.1%	23.8%	17.0%	21.0%	20.8%
Serious Crashes	27.5%	28.8%	20.4%	25.6%	19.2%
SERIOUS CRASH PERCENTAGES					
=====					
Crashes That Are Serious					
All Crashes	52.7%	45.4%	54.0%	50.4%	54.2%
Speed-Related	65.5%	54.8%	64.7%	61.0%	50.0%
REDUCTIONS IN CRASH CATEGORIES					
=====					
Reduction in Total Crashes					
From previous year	NA	0.8%	23.1%	11.9%	4.0%
From 1980-1982 average					20.2%
Reduction in Serious Crashes					
From previous year	NA	14.5%	8.5%	11.5%	3.7%
From 1980-1982 average					14.3%
Reduction in Speed-Related Crashes That Are Serious					
From previous year	NA	10.5%	35.3%	22.9%	9.1%
From 1980-1982 average					36.2%
Reduction in Non-Speed-Related Crashes That Are Serious					
From previous year	NA	16.0%	-2.4%	6.8%	2.3%
From 1980-1982 average					6.7%

* Speed-Related Crashes based on speeding CITATIONS in crashes (see p. 6 of report).

TABLE 15

HIGH ACCIDENT ROADWAY CRASH DATA
SURRY COUNTY

	1980 ====	1981 ====	1982 ====	1983 ====
1st Road				
Route Number	10	10	10	10
Serious Crashes	22	25	15	15
Share of Total Serious Crashes in Community	31.9%	42.4%	27.8%	28.8%
2nd Road				
Route Number	31	650	31	31
Serious Crashes	10	4	7	9
Share of Total Serious Crashes in Community	14.5%	6.8%	13.0%	17.3%
3rd Road				
Route Number	626	626	617	617
Serious Crashes	6	3	6	5
Share of Total Serious Crashes in Community	8.7%	5.1%	11.1%	9.6%
4th Road				
Route Number	40	617	650	650
Serious Crashes	3	3	4	3
Share of Total Serious Crashes in Community	4.3%	5.1%	7.4%	5.8%
TOTAL				
Serious Crashes	41	35	32	32
Share of Total Serious Crashes in Community	59.4%	59.3%	59.3%	61.5%

EXHIBIT 14

SPEED INVOLVEMENT - SERIOUS CRASHES

SURRY COUNTY

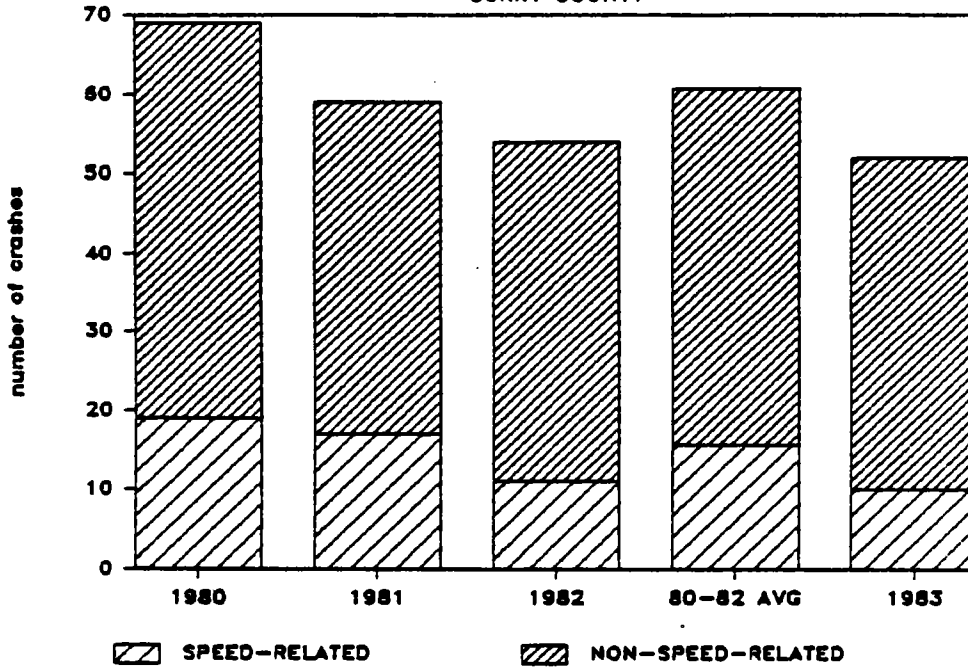
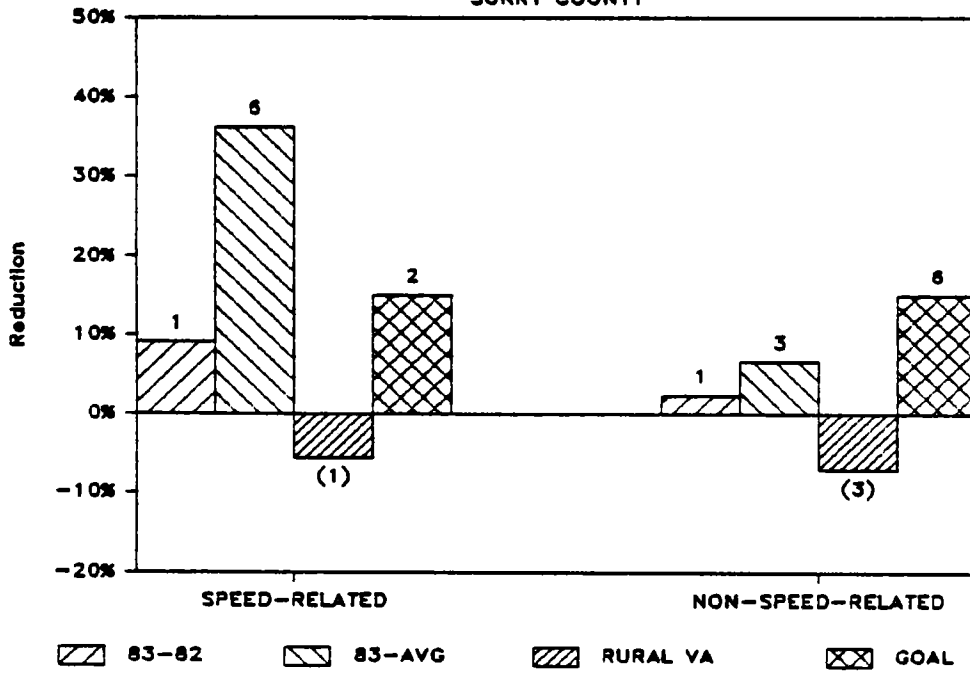


EXHIBIT 15

REDUCTION IN SERIOUS SPEED CRASHES

SURRY COUNTY



Sussex County

Problem Statement

The Sussex County Sheriff's Department identified the cause of the local speed-related crash problem to be the result of heavy truck traffic travelling to and from the state's southern border and heavy vacation traffic travelling through the county to Williamsburg and the Virginia sea shore. The department began to devote more time to speed patrol in 1979, after identifying an increase in the number and severity of crashes between 1977 and 1979. Local officials continued their intensified enforcement of speed limit laws through 1981 without use of federal funds to pay for this activity.

According to data in the Sussex County grant application, there was a dramatic reduction in the number of total crashes in the county after the Sheriff's Department intensified its enforcement, from 266 in 1979 to 218 in 1980. Speed-related crashes and serious crashes also declined, though not to same extent. The number of serious crashes declined from 102 in 1980 to 88 in 1981; speed-related crashes fell from 48 in 1980 to 17 in 1981. In 1982, the county applied for and received federal grant money to conduct a STEP. Despite heightened enforcement activity, the number of crashes rose 17.7% in 1982, to a total of 193. The county attributed this change to greater traffic flow following the completion of Interstate 95 through the county in 1981. Over the three years prior to the grant year, the data had exhibited a rapidly decreasing number of crashes, reaching a low point in 1981, followed by an strong upturn in 1982.

The crash data for the period prior to the grant did not indicate the presence of a speed-related crash problem in Sussex County that was more severe than that in the average Virginia rural community. The percentage of serious crashes in Sussex County that were speed-related was 27.5% in 1980, 19.3% in 1981, and 25.0% in 1982 (see Table 16). These figures were nearly the same as the rural figures of 26.3%, 26.7%, and 25.8% (see Appendix E). The average percentages from these three years were 23.9% for Sussex County and 26.3% for rural Virginia. Thus, the speed-related crash percentages for Sussex County were either lower than or only marginally above the rural average for all three years.

The 1982 data did reveal a crash severity problem. In Sussex County, 43.5% of all crashes were serious, and 52.5% of all speed-related crashes were serious; rural figures for 1982 were 38.9% for all crashes and 47.8% for speed-related crashes. The speed-related serious crash difference was greater in 1981: the county percentage was 68.0% and the rural figure was 46.7%. As noted above, this peak in serious crashes coincided with a dip in the total number of crashes in 1981.

The severity of crashes was also indicated by the county's share of the state wide number of serious crashes. Sussex County accounted for nearly 0.4% of all serious crashes in the state, while it had less than 0.2% of the state's population. A third indication of a crash severity problem was found in the serious crash rate for Sussex County. Between 1980 and 1982, it was materially higher than the rural rate.

The analysis of high accident roads showed that most serious crashes occurred on four roads: Routes 301, 460, 40, and 35 (see Table 17). These four roads appear each year in the analysis and are relatively consistent in their rank orders throughout. Together, they accounted for more than three-fourths of all serious accidents in the county during 1980. Their share fell to 62.5% in 1981 and 47.6% in 1982. Over this period, the number of serious crashes on these roads fell almost in half, from 77 in 1980 to 40 in 1982. This pattern implies that the local deputies may have concentrated their efforts on these problem roads with reasonable success. After almost half of the serious crashes on these roads were eliminated, they still accounted for roughly half of all serious crashes in the county.

As discussed above, the Sussex County Sheriff's Department had been operating selective enforcement programs prior to federal funding. During this period the county experienced significant reductions in the numbers of crashes in all categories. In 1982, \$18,500 were allocated to the county for its STEP. In spite of the increase in funding, total crashes and speed-related crashes increased considerably. If the prior years of selective enforcement had effectively influenced driver behavior, the 1983 program could not have been expected to reduce crashes to the same extent that had occurred previously. Thus, it may be appropriate to view the 1983 project as a continuation of a program which had been operating for several years, rather than as the second year of a new program.

Proposed Activities and Project Goals

The county received \$8,000 in federal grant money for its 1983 STEP. It intended to use this money to provide overtime pay for deputies working selective enforcement patrols. Data gathered from previous programs were to be used to select locations and times, with special emphasis being given to holiday weekends. Officers were also to serve in a public information campaign about the county's STEP efforts.

In their 1983 grant application, the county identified the following goals:

- o To reduce total accidents by 18%
- o To reduce injury accidents by 9%
- o To reduce fatal accidents by 20%

Project Results

Sussex County met one of its three stated goals; the 3 fatal accidents reported in 1983 represent a 40% reduction from the 5 accidents in 1982. Unfortunately, little significance can be placed on these results given the small number of such crashes occurring in both years. Results in other categories are not as positive. Total accidents were up sharply between 1982 and 1983, from 193 to 239, for an increase of 23.8%. Serious crashes increased 50% from 84 in 1982 to 126 in 1983 (see Table 16 and Exhibit 16). Speed-related crashes rose by more than 25%, from 40 to 51, and serious speed-related crashes rose at twice this rate, from 21 to 32.

Comparing the changes in Sussex County with those across rural Virginia shows that, like Sussex County, most rural counties experienced increases in all crash categories. The important difference between the two sets of data is that the number of crashes in the county grew 7 to 10 times faster than in most other rural areas (see Exhibit 17).

The only good news among the data was that the share of serious crashes on the identified problem roads fell for the third consecutive year to a four-year low of 33.3%. This drop was not the result of fewer crashes on these roads, but of more crashes elsewhere. However, with 42 serious crashes, the number was only marginally higher than the previous year's share.

Conclusions

Available crash data did not indicate the presence of a speed-related crash problem in Sussex County during the baseline years. This may have been attributable to efforts by the County Sheriff's Department to enforce speed limit laws for several years prior to the 1983 federally funded project. Crashes reached a low point in 1981, and started to climb in 1982, the first year of federal funding for the county's selective enforcement efforts. Despite a long history of selective enforcement in Sussex County and apparent early successes, crashes in all categories climbed steeply in 1983. There was no indication that the latest local STEP was effective in curbing the county's speed-related crash problem beyond the degree already achieved by locally funded projects.

TABLE 16
SELECTIVE ENFORCEMENT CRASH DATA
SUSSEX COUNTY

BASELINE DATA	1980	1981	1982	1980-1982 AVERAGE	1983
=====	====	====	====	=====	====
Number of Crashes	218	164	193	191.7	239
Fatal	4	8	5	5.7	3
Injury	98	80	79	85.7	123
Serious (Fatal + Injury)	102	88	84	91.3	126
Number of Crashes That Are Speed-Related *	48	25	40	37.7	51
Fatal	2	1	2	1.7	1
Injury	26	16	19	20.3	31
Serious (Fatal+Injury)	28	17	21	22.0	32
Number of Crashes That Are Non-Speed-Related	170	139	153	154.0	188
Fatal	2	7	3	4.0	2
Injury	72	64	60	65.3	92
Serious (Fatal+Injury)	74	71	63	69.3	94
SPEED-RELATED PERCENTAGES					
=====					
Crashes That Are Speed-Related					
All Crashes	22.0%	15.2%	20.7%	19.3%	21.3%
Serious Crashes	27.5%	19.3%	25.0%	23.9%	25.4%
SERIOUS CRASH PERCENTAGES					
=====					
Crashes That Are Serious					
All Crashes	46.8%	53.7%	43.5%	47.7%	52.7%
Speed-Related	58.3%	68.0%	52.5%	58.4%	62.7%
REDUCTIONS IN CRASH CATEGORIES					
=====					
Reduction in Total Crashes					
From previous year	NA	24.8%	-17.7%	3.5%	-23.8%
From 1980-1982 average					-24.7%
Reduction in Serious Crashes					
From previous year	NA	13.7%	4.5%	9.1%	-50.0%
From 1980-1982 average					-38.0%
Reduction in Speed-Related Crashes That Are Serious					
From previous year	NA	39.3%	-23.5%	7.9%	-52.4%
From 1980-1982 average					-45.5%
Reduction in Non-Speed-Related Crashes That Are Serious					
From previous year	NA	4.1%	11.3%	7.7%	-49.2%
From 1980-1982 average					-35.6%

* Speed-Related Crashes based on speeding CITATIONS in crashes (see p. 6 of report).

TABLE 17

HIGH ACCIDENT ROADWAY CRASH DATA
SUSSEX COUNTY

	1980 =====	1981 =====	1982 =====	1983 =====
1st Road				
Route Number	301	301	460	40
Serious Crashes	50	20	12	12
Share of Total Serious Crashes in Community	49.0%	22.7%	14.3%	9.5%
2nd Road				
Route Number	460	40	301	460
Serious Crashes	13	17	10	13
Share of Total Serious Crashes in Community	12.7%	19.3%	11.9%	10.3%
3rd Road				
Route Number	40	460	40	301
Serious Crashes	7	11	9	11
Share of Total Serious Crashes in Community	6.9%	12.5%	10.7%	8.7%
4th Road				
Route Number	35	35	35	35
Serious Crashes	7	7	8	6
Share of Total Serious Crashes in Community	6.9%	8.0%	9.5%	4.8%
TOTAL				
Serious Crashes	77	55	39	42
Share of Total Serious Crashes in Community	75.5%	62.5%	46.4%	33.3%

EXHIBIT 16

SPEED INVOLVEMENT - SERIOUS CRASHES
SUSSEX COUNTY

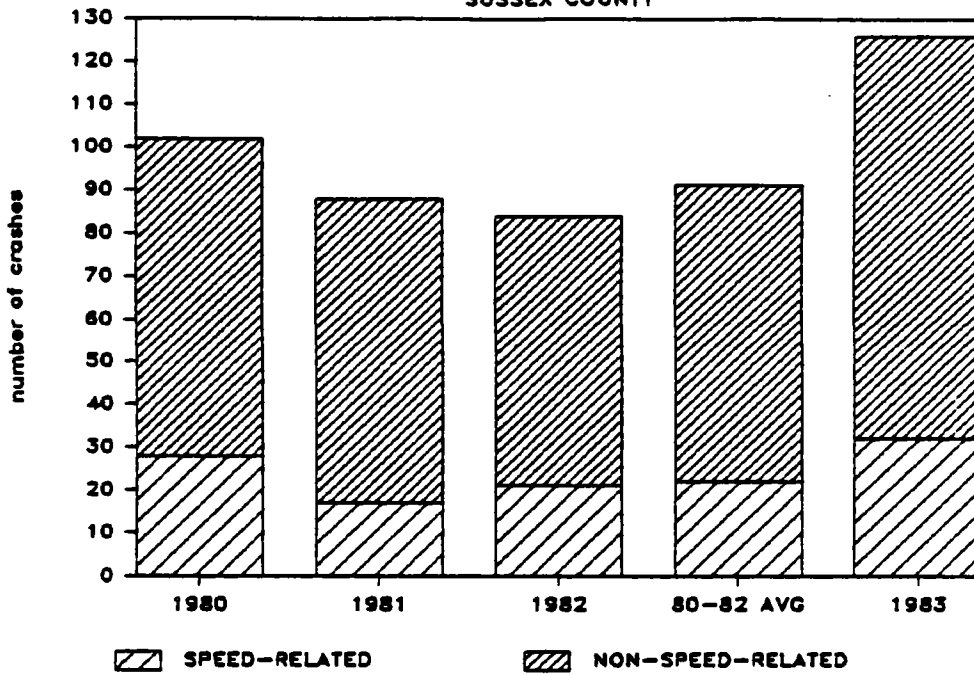
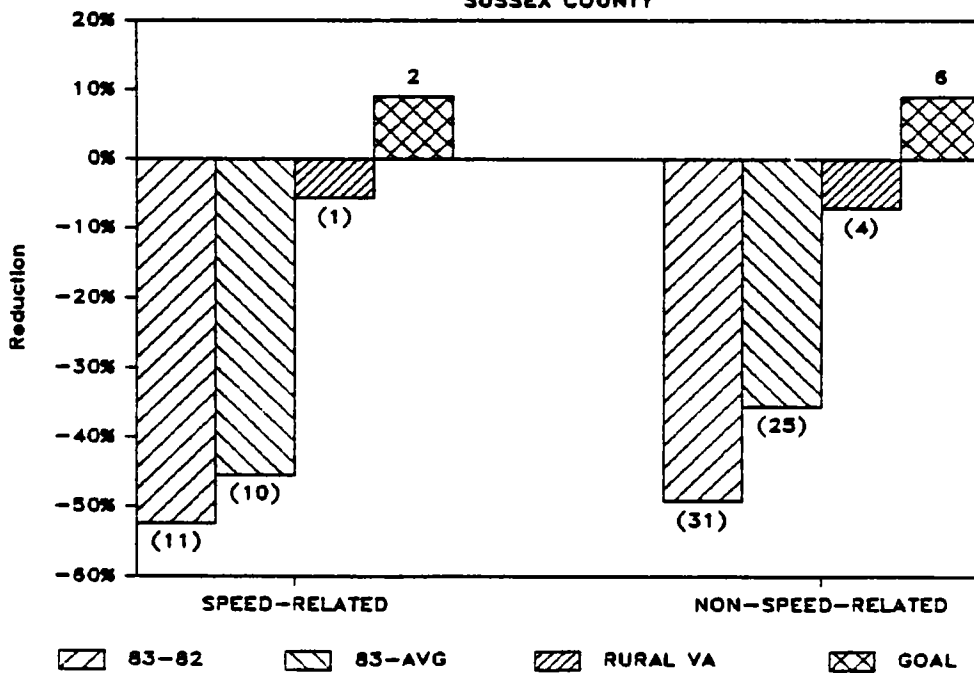


EXHIBIT 17

REDUCTION IN SERIOUS SPEED CRASHES
SUSSEX COUNTY



City of Chesapeake

Problem Statement

The city of Chesapeake had a disproportionate number of serious crashes between 1980 and 1982, when compared to other urban communities. First, the percentage of serious crashes was noticeably higher in Chesapeake than in the average urban Virginia community. Between 1980 and 1982, 40.6% to 41.5% of all speed-related crashes in Virginia cities resulted in a personal injury or fatality. In Chesapeake, 47.3% to 51.9% of all speed-related crashes were serious. A second indication of the severity problem was a high motor vehicle death rate registered in Chesapeake; throughout the baseline years, the death rate for Chesapeake exceeded that of all other Virginia cities with populations of 50,000 or more. A third sign of a severity problem was a continuous increase in the number of serious crashes. Serious crashes rose from 889 in 1980 to 908 in 1981, a 2.1% increase, then rose to 950 in 1982, a 4.6% increase (see Table 18 and Exhibit 18). Urban areas throughout the state also experienced increases in these years, but not to as great an extent as did Chesapeake.

In contrast to the city's discernible crash severity problem, available data did not reveal a speed-related crash problem above that of the urban mean. In the 1980 - 1982 baseline years, 21.3%, 19.2%, and 18.3% of all serious urban crashes were speed-related. The same measures for Chesapeake were 17.0%, 18.4%, and 16.8%, averaging two percentage points lower than the urban figures each year. Additionally, there was no pattern in the data suggesting that the speed-related crash problem was growing worse. The 7.5% increase in speed-related crashes in 1981 was erased by a 10.2% reduction in 1982. Similarly, serious speed-related crashes rose 10.6% in 1981 and fell 4.2% in 1982. These changes followed urban percentages in direction of change, but were lesser in extent.

Prior to its 1983 project, Chesapeake had not conducted a federally funded STEP. One would expect that the existing local speed-related crash problem would respond to selective enforcement countermeasures in its first year, as some drivers who routinely exceeded the speed limit would be deterred by intensified enforcement. Given the magnitude of the local problem, however, significant reductions would not be expected.

Proposed Activities and Project Goals

In its DMV/TSA application for grant funds, Chesapeake proposed a comprehensive STEP, including the purchase of radar units, training of

officers in the use of radar, a public information campaign, and intensified enforcement activity. The project was also designed to integrate selective enforcement of speed-related laws with other enforcement activities, including the detection and citation of alcohol-impaired drivers. Of the \$37,870 requested, Chesapeake received only the amount allocated to officers' salaries for enforcement activity, or \$18,720.

In its 1983 grant application, the county stated that the goal of the 1983 project was to achieve a 10% reduction in serious crashes resulting from speeding, driving while intoxicated, failure to yield right-of-way, and following too closely.

Project Results

Unfortunately, it was not possible to measure the project results against the project goals because data on each of the four types of violations were not available. When city data were analyzed by crash categories used in this report, the results were mixed in direction and extent. Total crashes fell 4.4%, from 2,466 in 1982 to 2,357 in 1983, serious crashes rose from 950 in 1982 to 977, a 2.8% increase, and speed-related crashes continued to decline from their 1981 peak of 343 to the 259 reported during the first year of STEP operation in Chesapeake. This last reduction was also reflected in an 18.1% decline in serious speed-related crashes.

For each crash category, the percentage change in the number of crashes was more favorable for Chesapeake than for the average city in Virginia. The percentage of urban serious crashes increased 7.5%, 4 points more than the corresponding percentage for Chesapeake. Total urban crashes fell by 0.1%, about 4 percentage points less than in Chesapeake. The most significant difference was in the percentage of serious speed-related crashes; urban crashes were up 8.9%, while crashes in Chesapeake were down 18.1%, a net difference of 27 points.

While the favorable differences in the serious and total crash categories can be attributed to a variety of factors, differences in speed-related crashes appear to be due to the city's STEP. As noted above, changes in the number of speed-related crashes in the city followed those across urban Virginia during the baseline years. In 1983, however, both the direction and extent of the changes diverged sharply, reflecting the presence of stepped-up enforcement in Chesapeake. Additional evidence of effectiveness was found in the comparison of a declining number of speed-related serious crashes in 1983 and an increasing number of non-speed-related crashes (see Exhibit 19).

The data also suggest that the crash severity problem was not closely associated with the speed-related crash problem. The speed-related crash problem responded to STEP countermeasures, with the number of crashes falling to the lowest point in four years. Serious crashes, on the other hand, reached their four-year high during the first year of STEP operation. In this connection, as was noted above, the STEP can be predicted to have little effect in addressing the city's crash severity problem.

Conclusions

The first year of STEP operation in Chesapeake exceeded the city's goal of reducing speed-related crashes by 10%. It was not possible to determine whether its goals in reducing other categories of crashes were also reached.

TABLE 18
SELECTIVE ENFORCEMENT CRASH DATA
CHESAPEAKE

BASELINE DATA =====	1980 ====	1981 ====	1982 ====	1980-1982 AVERAGE =====	1983 ====
Number of Crashes	2,390	2,365	2,466	2,407.0	2,357
Fatal	14	17	17	16.0	13
Injury	875	891	933	899.7	964
Serious (Fatal + Injury)	889	908	950	915.7	977
 Number of Crashes That Are Speed-Related *	 319	 343	 308	 323.3	 259
Fatal	5	2	4	3.7	5
Injury	146	165	156	155.7	126
Serious (Fatal+Injury)	151	167	160	159.3	131
 Number of Crashes That Are Non-Speed-Related	 2,071	 2,022	 2,158	 2,083.7	 2,098
Fatal	9	15	13	12.3	8
Injury	729	726	777	744.0	838
Serious (Fatal+Injury)	738	741	790	756.3	846
 SPEED-RELATED PERCENTAGES =====					
Crashes That Are Speed-Related					
All Crashes	13.3%	14.5%	12.5%	13.4%	11.0%
Serious Crashes	17.0%	18.4%	16.8%	17.4%	13.4%
 SERIOUS CRASH PERCENTAGES =====					
Crashes That Are Serious					
All Crashes	37.2%	38.4%	38.5%	38.0%	41.5%
Speed-Related	47.3%	48.7%	51.9%	49.3%	50.6%
 REDUCTIONS IN CRASH CATEGORIES =====					
Reduction in Total Crashes					
From previous year	NA	1.0%	-4.3%	-1.6%	4.4%
From 1980-1982 average					2.1%
 Reduction in Serious Crashes					
From previous year	NA	-2.1%	-4.6%	-3.4%	-2.8%
From 1980-1982 average					-6.7%
 Reduction in Speed-Related Crashes That Are Serious					
From previous year	NA	-10.6%	4.2%	-3.2%	18.1%
From 1980-1982 average					17.8%
 Reduction in Non-Speed-Related Crashes That Are Serious					
From previous year	NA	-0.4%	-6.6%	-3.5%	-7.1%
From 1980-1982 average					-11.9%

* Speed-Related Crashes based on speeding CITATIONS in crashes (see p. 6 of report).

EXHIBIT 18

SPEED INVOLVEMENT - SERIOUS CRASHES

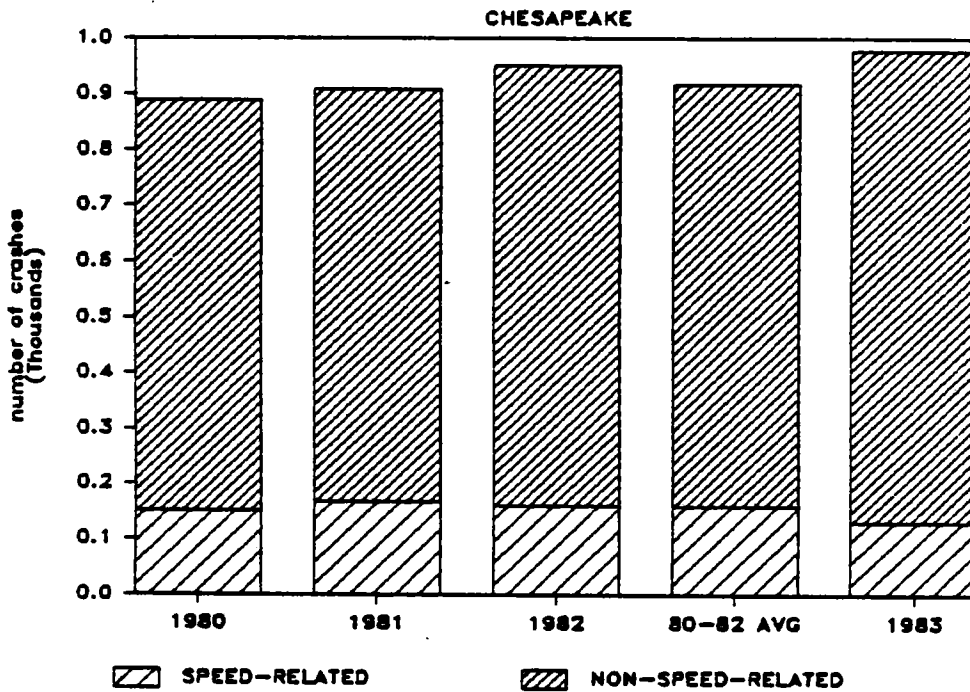
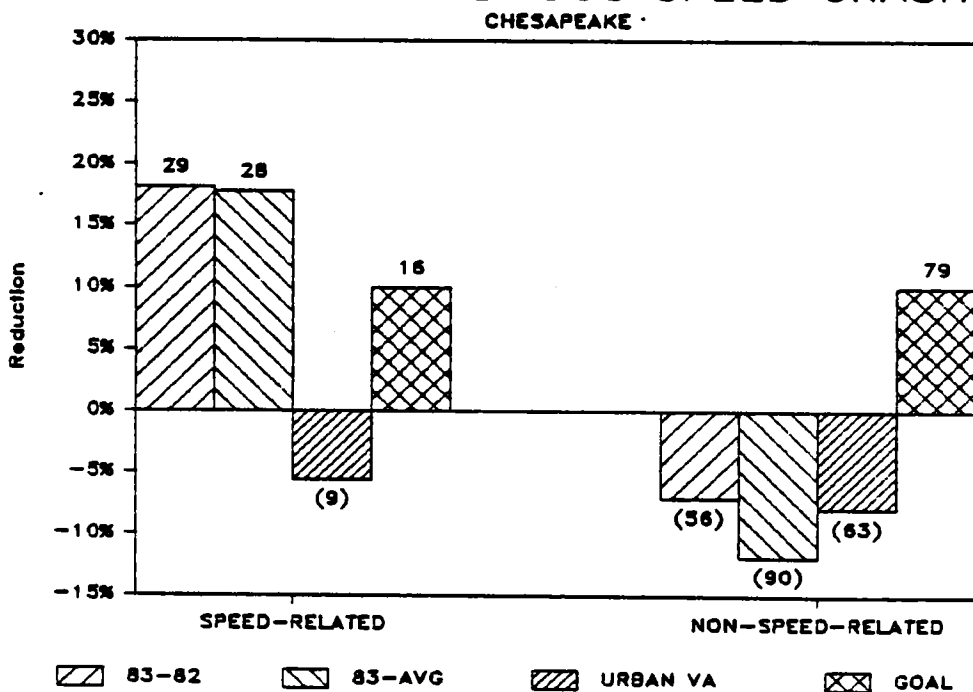


EXHIBIT 19

REDUCTION IN SERIOUS SPEED CRASHES



City of Petersburg

Problem Statement

From 1980 to 1982, the frequency of speed-related crashes was higher in the city of Petersburg than in any of the other Virginia cities conducting STEPs. During these years, drivers were cited for speeding in 22.4% to 24.9% of all serious crashes occurring within the city (see Table 19). In other urban areas, drivers were cited in 18.3% to 21.3% of all serious crashes. These figures averaged to 23.3% for Petersburg and 19.6% for urban Virginia, ranking Petersburg fourth worst among Virginia's 16 largest cities.

In addition to a speed-related crash problem, Petersburg also demonstrated a crash severity problem. From 1980 through 1982, an average of 35.0% of Petersburg's crashes involved a fatality or injury. The urban average was slightly lower, at 32.6%. The Petersburg average placed it sixth among Virginia's 16 largest cities in crash severity. Also symbolic of the crash severity problem were the high 1980-1982 motor vehicle death rates calculated for the city. Of Virginia's 16 largest cities, Petersburg ranked second in death rate in each of these years. An interesting contrast to this overall crash severity problem was that the city's speed-related crash ratio was about the same as the urban average; 41.7% for Petersburg and 41.2% for urban Virginia.

An analysis of the crash data did not reveal any trends in the city's crashes different from the general trends in other urban areas. The total number of crashes in the city declined over the three baseline years, as did the number of crashes in the average urban area. The number of serious crashes in the city increased slightly, following the direction of change for urban areas but with a smaller percentage increase (see Exhibit 20).

The Petersburg Police Department invested considerable time and effort in identifying the city's highway safety problems. Based on the data it collected, the speed-related crash problem was determined to be concentrated on four city streets: Washington, Sycamore, Wythe, and Crater. These four streets accounted for over a third of all serious crashes within the city over the three years prior to the grant year.

In 1982, the city began the first year of a planned two-year STEP with a grant of \$26,508. Enforcement was focused on the four problem streets and was integrated with an alcohol enforcement project. As reported by the police department, the 1982 project yielded virtually no change in the numbers of crashes on these roads (see Table 20).

Proposed Activities and Project Goals

The Petersburg Police Department proposed to continue its 1982 selective enforcement project on the four identified high accident streets. The department requested funds to pay the salaries and benefits for two full-time officers assigned to the project; the salaries of two additional full-time officers and part of the salary of a sergeant assigned to oversee the unit were to be funded by local resources. Of its \$39,892 request, the department received \$20,000 to operate its project.

The goal of this project, as stated in the 1983 grant application, was to reduce total crashes on the four identified high accident streets by 5%.

Project Results

The data base used for evaluating the effectiveness of the county STEPs could not be used to measure city project results because the street location of a crash could not be identified. The use of city-wide crash data would have been inappropriate, because any effect of crash reductions on specific streets only would be diffused. If all the crash reduction goals for these streets were achieved, the reduction in the number of crashes on a citywide basis would equate to less than a 2% change. In evaluating this project, data provided by the Petersburg Police Department was used instead of state police data. Table 20 presents crash data for the targeted streets as well as citywide crash data.

Based on raw percentages, the 1983 STEP exceeded its goal of reducing the number of accidents on the four identified high accident streets. Total crashes fell 18.1% on these streets. However, during this same period, the number of citywide crashes fell by 16.1%. Additionally, the contribution of the four high accident roads to the city's total number of crashes changed very little from previous levels. Thus, it was not possible to identify the STEP as the source of the reductions in crashes on these streets.

Reductions in crash severity did point to some effectiveness of the 1983 STEP. There were 6.0% fewer serious crashes on the problem streets in 1983, while the citywide data showed no change. Also, in contrast to the reductions on these roads, the average Virginia city reported 7.5% more serious crashes on its roads between 1982 and 1983. These comparisons must be viewed skeptically, however, given the inconsistencies in the local crash data. One such inconsistency was the dramatic jump in citywide serious crashes between 1981 and 1982 that was not reflected in

the state police crash data. Petersburg data reflected 345 serious crashes in 1980 and 500 in 1981, while state police crash data showed 375 such crashes in 1980 and 385 in 1981 (see Tables 19 and 20). In addition, contrary to the reduction in the number of serious crashes on the targeted streets, the percentage of crashes on these streets that were serious reached a four-year high, 31.2%, up significantly from 27.2% in the previous year.

Unfortunately, local crash data did not specify speed involvement. Information on the speed-related crashes on the identified roads may have demonstrated project effectiveness not evident in the other data available for evaluation.

Conclusions

The city of Petersburg clearly experienced an aggravated speed-related crash problem over the three baseline years. The police department correctly identified the major problem streets contributing to this problem and focused its selective enforcement efforts on them during both its 1982 and 1983 projects. Despite intensified enforcement, there was no evidence that project activity was a major factor in reducing the number of crashes. There was some evidence that the two years of STEP activity reduced the severity of crashes on these streets.

TABLE 19
SELECTIVE ENFORCEMENT CRASH DATA
PETERSBURG

BASELINE DATA =====	1980	1981	1982	1980-1982 AVERAGE	1983
=====	=====	=====	=====	=====	=====
Number of Crashes	1,122	1,105	1,025	1,084.0	963
Fatal	5	7	6	6.0	6
Injury	373	368	379	373.3	389
Serious (Fatal + Injury)	378	375	385	379.3	395
 Number of Crashes That Are Speed-Related *	 219	 209	 207	 211.7	 174
Fatal	2	4	3	3.0	3
Injury	92	80	84	85.3	93
Serious (Fatal+Injury)	94	84	87	88.3	96
 Number of Crashes That Are Non-Speed-Related	 903	 896	 818	 872.3	 789
Fatal	3	3	3	3.0	3
Injury	281	288	295	288.0	296
Serious (Fatal+Injury)	284	291	298	291.0	299
 SPEED-RELATED PERCENTAGES =====					
Crashes That Are Speed-Related					
All Crashes	19.5%	18.9%	20.2%	19.5%	18.1%
Serious Crashes	24.9%	22.4%	22.6%	23.3%	24.3%
 SERIOUS CRASH PERCENTAGES =====					
Crashes That Are Serious					
All Crashes	33.7%	33.9%	37.6%	35.0%	41.0%
Speed-Related	42.9%	40.2%	42.0%	41.7%	55.2%
 REDUCTIONS IN CRASH CATEGORIES =====					
Reduction in Total Crashes					
From previous year	NA	1.5%	7.2%	4.4%	6.0%
From 1980-1982 average					11.2%
 Reduction in Serious Crashes					
From previous year	NA	0.8%	-2.7%	-0.9%	-2.6%
From 1980-1982 average					-4.1%
 Reduction in Speed-Related Crashes That Are Serious					
From previous year	NA	10.6%	-3.6%	3.5%	-10.3%
From 1980-1982 average					-8.7%
 Reduction in Non-Speed-Related Crashes That Are Serious					
From previous year	NA	-2.5%	-2.4%	-2.4%	-0.3%
From 1980-1982 average					-2.7%

* Speed-Related Crashes based on speeding CITATIONS in crashes (see p. 6 of report).

TABLE 20

CITYWIDE CRASHES AND CRASHES ON TARGETED STREETS IN PETERSBURG

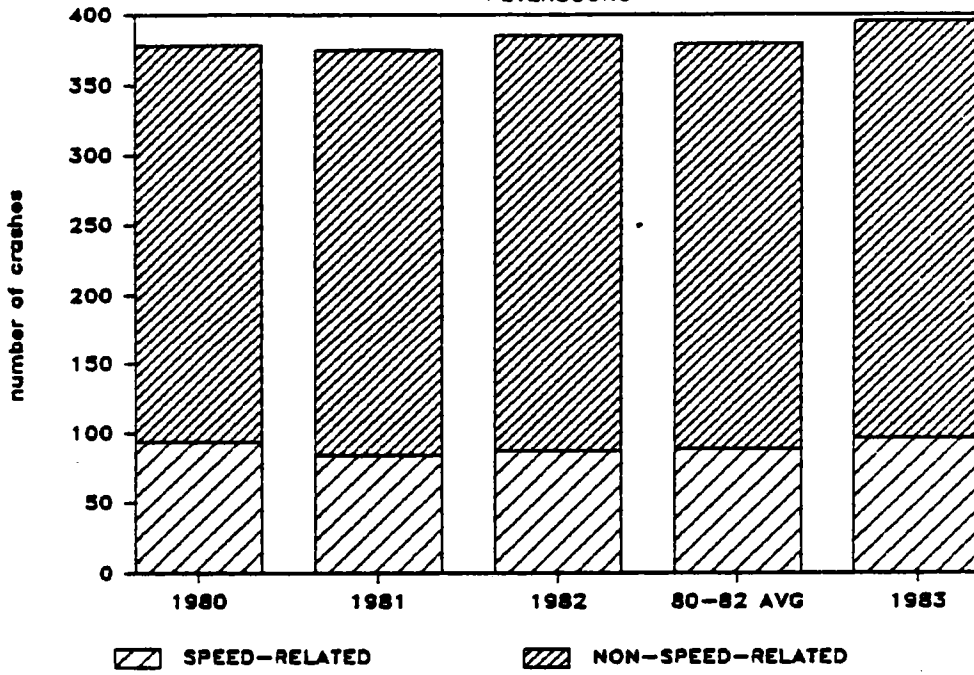
BASELINE DATA =====	1980	1981	1980-1982		1983
			1982	AVERAGE	
=====	=====	=====	=====	=====	=====
TARGETED STREETS					
Number of Crashes	616	620	618	618.0	506
Fatal	1	4	2	2.3	1
Injury	158	165	166	163.0	157
Serious (Fatal+Injury)	159	169	168	165.3	158
CITYWIDE					
Number of Crashes	1,818	1,804	1,662	1,761.3	1,394
Fatal	6	7	5	6.0	7
Injury	355	338	495	396.0	492
Serious (Fatal+Injury)	361	345	500	402.0	499
PERCENTAGE OF TOTAL CITY CRASHES ON TARGETED STREETS =====					
Total Number of Crashes	33.9%	34.4%	37.2%	35.1%	36.3%
Serious Crashes	44.0%	49.0%	33.6%	41.1%	31.7%
REDUCTIONS IN CRASH CATEGORIES =====					
Reduction in Total Crashes From previous year					
TARGETED STREETS	NA	-0.6%	0.3%	-0.2%	18.1%
CITYWIDE	NA	0.8%	7.9%	4.3%	16.1%
Reduction in Serious Crashes From previous year					
TARGETED STREETS	NA	-6.3%	0.6%	-2.8%	6.0%
CITYWIDE	NA	4.4%	-44.9%	-20.2%	0.2%

NOTE: Data for targeted streets from Petersburg Police Department.

EXHIBIT 20

SPEED INVOLVEMENT – SERIOUS CRASHES

PETERSBURG



Virginia Beach

Problem Statement

Since the 1980 census, Virginia Beach has become the state's most populous city. According to a study by the Tayloe Murphy Institute, Virginia Beach outstripped all other Virginia cities in population growth between 1980 and 1983. (10) Its 12.7% population increase over these years moved it ahead of the former leader, Norfolk. Virginia Beach is also one of Virginia's largest cities in area. Its 310 square miles exceed the area of six of the Virginia counties with STEPs in 1983. Virginia Beach ranks as a major city in the magnitude of its highway safety problems as well. Between 1980 and 1982, there were 18,092 crashes in Virginia Beach (see Table 21), the third highest number of any Virginia community. Three-year totals of 6,202 serious crashes and 2,493 speed-related crashes placed Virginia Beach third in these categories as well. The three-year total of 91 fatalities was the second highest in the state, and its average death rate of 11.2 was fifth among the 16 largest cities.

In its grant application, the Virginia Beach Police Department stated that the city had a high number of speed-related accidents. There were 779 speed-related crashes in 1980, 800 in 1981, and 914 in 1982. Speed was a contributing factor to at least 42% of all fatal crashes in the city. Six highways with particularly serious crash problems were identified, which together accounted for 15.6% of all the city's crashes. Because Virginia Beach is a popular vacation area, summer traffic swells the number of drivers in the city. Additionally, a large percentage of the summer visitors are high school and college students. The combination of these factors -- a growing population, vacation travel, and youthful drivers -- exacerbates the local crash problems.

Available crash data did not confirm the existence of a severe speed-related crash problem prior to 1982. In 1980 and 1981, 13.5% and 13.0% of all crashes were speed-related. These figures were below the urban percentages of 16.4% and 15.1%. The speed-related crash percentages for Virginia Beach and for the average Virginia city converged in 1982, at 15.0% and 14.8%, respectively. The percentage of serious crashes that were speed-related followed a similar pattern. The city figures were 17.9% in the first baseline year, 17.5% in the second year, and 20.2% in the third year. The urban averages during these three years were 21.3%, 19.2%, and 18.3%.

It is important to note the jump in the number of speed-related crashes in Virginia Beach between 1981 and 1982. While the numbers of total crashes and serious crashes increased only slightly, speed-related

crashes ballooned 14.3%, from 800 in 1981 to 914 in 1982. Serious speed-related crashes accounted for a large portion of this growth, rising from 356 in 1981 to 437 in 1982, a 22.8% increase. Prior to this expansion, the speed-related crash problem was below that of the rest of urban Virginia. The increases in 1982 indicated that the city's speed-related crash problem was becoming more severe than that in the average Virginia city.

Baseline data show a close association between the crash severity percentage in Virginia Beach and that for all of urban Virginia. These data support the observation that the speed-related crash problem in Virginia Beach approached that of most other Virginia cities. These serious crash percentages were 34.9% for Virginia Beach and 31.2% for urban Virginia in 1980, 33.0% and 32.6% in 1981, and 35.0% for both in 1982. The percentage of speed-related serious crashes, however, was considerably higher in Virginia Beach than in other urban areas. An average of 46.2% of all these crashes were serious in Virginia Beach, while the urban average was 41.2%. Also, the city's death rate was above the mean, but its serious-crash rate, 7.6 serious crashes per 1,000 inhabitants, was below the mean of other Virginia cities. In general, these data support the conclusion that the speed-related crash problem in Virginia Beach was generally not an aggravated one. Speed-related crashes in the city were more severe than in most urban areas.

An examination of the trends in the baseline data showed that the speeding problem was growing worse in Virginia Beach, while it appeared to be declining in other urban areas. The number of total crashes fell slightly in urban Virginia as a whole and increased in Virginia Beach at a rate approximately equal to its rate of population increase. The number of serious crashes increased at the same average rate for the city and other urban areas. Serious speed-related crashes in Virginia Beach rose at an average of 10.8%, while those in urban areas declined at an average rate of 4.3%.

The city received its first federal STEP grant in 1982 as part of a comprehensive effort to reduce speed-related crashes. The project was originally designed to include the purchase of radar equipment, to conduct a public information campaign, and to increase enforcement activity. Federal grant money was used only to purchase radar equipment; the city was not given funds to provide manpower to operate the equipment. All enforcement activity was paid from state and local resources. Consequently, the 1983 project is treated as a first-year project in this report. It should be noted, however, that in 1982 the city experienced a sharp increase in speed-related crashes despite the additional radar units and a 20% increase in the number of citations for speed limit violations.

Proposed Activities and Project Goals

Virginia Beach proposed to assign five officers exclusively to selective enforcement patrols, using motorcycles and hand-held radar units. The city requested \$67,000 in federal funds to pay the salaries of three officers. The salaries of the other two full-time officers, all necessary equipment, and training were to be funded from state and local resources. Half of the grant requested, \$33,500, was appropriated. The effect of funding below the proposed budget on the implementation of the project is not known.

In its 1983 grant application, the Virginia Beach Police Department stated several goals by which their project was to be evaluated. None, however, were stated in terms suited for an impact evaluation.

Project Results

As the project goals were unsuited for an impact evaluation, it was not possible to compare goals against results. However the goals may have been stated, the project did not succeed in reducing the number of citywide crashes in any category. Total crashes increased 4.1%, and serious crashes rose 7.4% over their 1982 levels. Separating serious crashes by speed involvement, speed-related crashes were up 2.3%, while non-speed-related crashes rose 8.6% (see Exhibit 22). By comparison, the total number of urban crashes held relatively constant, and serious crashes increased 7.5%. In the subset of serious crashes, speed-related crashes increased 5.7% and non-speed-related crashes 7.9%. This comparison suggests that after one year of selective enforcement activity, the speed-related crash problem in Virginia Beach had changed little in relation to those of other urban areas. Speeding crashes rose at a lesser rate than in other urban areas and at a lesser rate than the city's average rate of population growth. Total crashes increased at about the same rate as did the population, and serious crashes rose at approximately the same rate as in the average Virginia city.

The most notable feature in the data was the relatively small increase of 2.3% in the number of serious speed-related crashes between 1982 and 1983, following the 22.8% jump in these crashes in 1982 (see Table 21). The 1983 increase in these crashes also compared favorably against the 8.6% increase in serious non-speed-related crashes (see Exhibit 21). These data, taken together with the comparison of city crash experience versus that of other urban areas, provide evidence of the 1983 STEP having had some effect on the occurrence of speed-related crashes (see Exhibit 22).

Conclusions

Virginia Beach did not appear to have an aggravated speed-related crash problem prior to 1982. In 1982, the city experienced a significant jump in speed-related crashes, an indication of an emerging crash problem. The 1983 STEP, the first city project funded with federal money, did not reduce total crashes, speeding crashes, or serious crashes. However, the number of crashes in each category rose less rapidly than in the average city in Virginia. In addition, there was only an insignificant increase in serious speed-related crashes. These data indicate that the project may have had some effect on the city's speed-related crash problem.

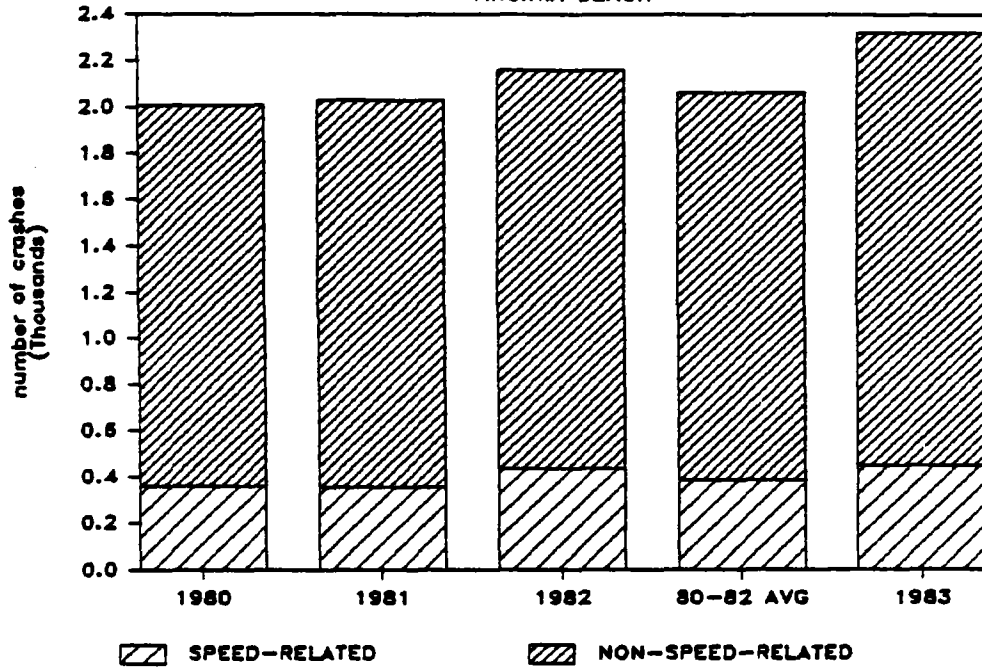
TABLE 21
SELECTIVE ENFORCEMENT CRASH DATA
VIRGINIA BEACH

BASELINE DATA =====	1980 ====	1981 ====	1982 ====	1980-1982 AVERAGE =====	1983 =====
Number of Crashes	5,764	6,152	6,176	6,030.7	6,429
Fatal	31	32	28	30.3	34
Injury	1,978	1,999	2,134	2,037.0	2,287
Serious (Fatal + Injury)	2,009	2,031	2,162	2,067.3	2,321
 Number of Crashes That Are Speed-Related *	 779	 800	 914	 831.0	 949
Fatal	13	14	11	12.7	12
Injury	347	342	426	371.7	435
Serious (Fatal+Injury)	360	356	437	384.3	447
 Number of Crashes That Are Non-Speed-Related	 4,985	 5,352	 5,262	 5,199.7	 5,480
Fatal	18	18	17	17.7	22
Injury	1,631	1,657	1,708	1,665.3	1,852
Serious (Fatal+Injury)	1,649	1,675	1,725	1,683.0	1,874
 SPEED-RELATED PERCENTAGES =====					
Crashes That Are Speed-Related					
All Crashes	13.5%	13.0%	14.8%	13.8%	14.8%
Serious Crashes	17.9%	17.5%	20.2%	18.6%	19.3%
 SERIOUS CRASH PERCENTAGES =====					
Crashes That Are Serious					
All Crashes	34.9%	33.0%	35.0%	34.3%	36.1%
Speed-Related	46.2%	44.5%	47.8%	46.2%	47.1%
 REDUCTIONS IN CRASH CATEGORIES =====					
Reduction in Total Crashes					
From previous year	NA	-6.7%	-0.4%	-3.6%	-4.1%
From 1980-1982 average					-6.6%
 Reduction in Serious Crashes					
From previous year	NA	-1.1%	-6.5%	-3.8%	-7.4%
From 1980-1982 average					-12.3%
 Reduction in Speed-Related Crashes That Are Serious					
From previous year	NA	1.1%	-22.8%	-10.8%	-2.3%
From 1980-1982 average					-16.3%
 Reduction in Non-Speed-Related Crashes That Are Serious					
From previous year	NA	-1.6%	-3.0%	-2.3%	-8.6%
From 1980-1982 average					-11.3%

* Speed-Related Crashes based on speeding CITATIONS in crashes (see p. 6 of report).

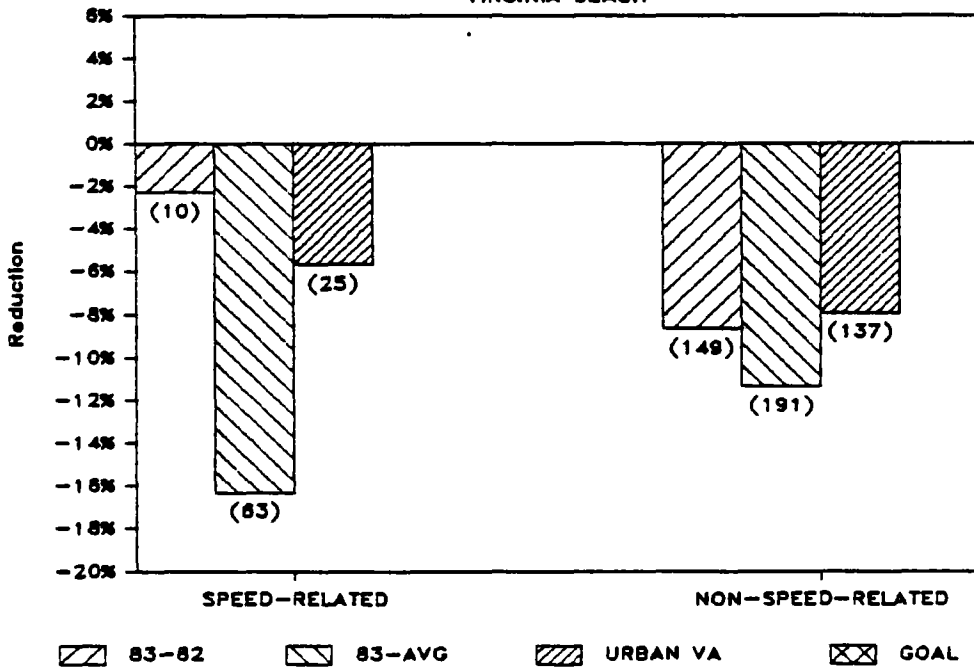
SPEED INVOLVEMENT – SERIOUS CRASHES

VIRGINIA BEACH



REDUCTION IN SERIOUS SPEED CRASHES

VIRGINIA BEACH



Department of State Police

The Department of State Police conducts highway safety activities throughout the state. It has the primary responsibility for patrolling the seven interstate highways which cross Virginia. Its officers also patrol the major state highways concurrently with local enforcement authorities. Among the duties of the state police is the responsibility of enforcing the national 55 mph speed limit on interstate and primary highways.

The State Police have been conducting federally funded STEPs since 1979. Over this period, there has been a significant change in the number of highway crashes, injuries, and fatalities. Between 1979 and 1983, the numbers of crashes and traffic fatalities fell to a ten year low. Traffic injuries did not decline to this extent, but neither did they increase. It is difficult to determine whether these improvements in highway safety were related to State Police STEPs. If it is assumed that these projects were successful, their effect would be spread throughout the state because of the nature of the patrol activity, and any benefits would be very hard to detect from the statewide crash data. The multiplicity of factors affecting the number and severity of highway accidents can easily mask the impact of one such project. For example, the State Police set the goals of its 1982 projects to be a 2% reduction in both total crashes and injury crashes across the state. However, for the 1973-1981 period, the number of total crashes statewide changed by an average of 6.6% (increase or decrease). The change in injury crashes averaged 5.2%. Thus, even if the 1982 program had completely met its goals, the effect would have been hard to distinguish from that of other factors.

Because of the nature and scope of these projects, it was necessary to adopt a methodology different from the approach used to evaluate the county and city STEPs discussed in previous sections of this report. First, the creation of a comparison community from statewide data was rejected as inappropriate. The project activity was not restricted to clearly identifiable times of day, sites, or days of week. Accompanying this lack of project data was the lack of pre-project data showing the existence of a speed-related crash problem. Thus, there were no crash data for a comparison of "treatment" areas with "non-treatment" areas, nor for a comparison of pre- and post-project periods. To isolate the impact of the State Police projects, crash data for state highways were divided into two categories: those for highways patrolled primarily by state troopers (interstate highways and primary state highways), and those for roads patrolled mainly by local law enforcement officers (secondary state highways).

A second difference in methodology was that no determination was made regarding whether an aggravated speed-related crash problem existed prior to the initiation of selective enforcement activity. Such a determination is relevant on a local level, but not on a statewide level. Comparing the extent of the local problem with other communities in the state assisted the evaluation team in determining whether the selections of city and county projects were made according to need and predicting whether these projects would be effective. These inquiries lose meaning in the statewide context, since the number of speed-related crashes occurring throughout the state cannot be compared to those in the counties.

A third difference in methodology was that a primary indicator of effectiveness used in the above section, the percentage of crashes that were speed-related, was unavailable for the evaluation of the State Police projects. The crash data provided by the State Police did not cross-reference speed involvement and highway system. Thus, it was not possible to compare the percentages of crashes that were speed-related for secondary highways against percentages for primary and interstate highways. Speed involvement was examined through the percentage of rural crashes that were speed-related, since most state trooper activity is limited to highways outside incorporated areas.

Finally, because enforcement was scattered over the state for several years, the baseline period was extended from the three years used above to ten years. The data for the extended period were examined for any signs of improvement since the introduction of federally funded STEP activity in 1979, rather than focusing on one-year changes in crash data as was done in evaluating the city and county STEPs.

The evaluation was based on the following objective measures:

- o the statewide motor vehicle death rate compared to the national motor vehicle death rate,
- o the percentage of rural crashes that were speed-related,
- o the number of serious crashes by roadway system,
- o the annual change in serious crashes by roadway system, and
- o a severity rate, defined as the number of serious crashes divided by the estimated vehicle miles of travel, by roadway system.

These measures are presented numerically in Table 22 and graphically in Exhibits 23 through 27.

Proposed Activities

The Department of State Police received \$293,576 in grant funds to operate its 1983 project. This represented 58% of the total selective speed enforcement funds received by the state. Funds were to be used to provide overtime pay to state troopers and sergeants volunteering for the project. This method was chosen to allow the department to concentrate its activity on days, times, and locations of heaviest traffic flow.

The federally funded selective enforcement program was only one component of the State Police's comprehensive traffic safety program. The department also conducted other selective enforcement projects, including one directed towards drunken drivers and a truck and bus program aimed at detecting violations by large vehicles. Additionally, funding for the State Police STEP came from both federal and state sources.

Each of the department's seven regional divisions planned and implemented selective speed enforcement projects within a specific geographical area. The State Police defined one project as selective enforcement activity conducted on one day on one highway or in one general area. Thus, activity on the same highway for two consecutive days was considered two projects. Project sites were selected on the basis of the professional opinion of the sergeant who worked an area and were submitted to headquarters in Richmond for approval. However, each division had complete discretion to change the assignments at any time. Similar projects had been conducted in previous years, beginning in 1979.

Project Results

The analyses of effectiveness measures used in this report did not show a pattern of reductions in the number or severity of crashes that could clearly be attributed to the STEPs. Only one indicator, the percentage of rural crashes that were speed-related, directly measured speed involvement. This indicator failed to reflect a reduction after State Police STEPs were initiated. An examination of the 1974-1983 crash figures revealed three distinct trends. First, gradual declines in the numbers of these crashes from 1974 through 1977 (26.8% to 25.1% for serious crashes), a sharp increase in 1978, followed by a decline through 1981 (28.7% to 26.6%), and a rising trend from 1982 to 1983 (see Table 22 and Exhibit 23). The STEPs were initiated during the second period and continued in operation through the third. While STEP activity may have contributed to the decline in the percentage of speed-related crashes in the 1978-1981 period, a declining trend prior to STEP

activity and an increasing trend in 1982 and 1983 (after three years of activity) argue against making such a correlation between STEP activity and the 1978-1981 decline.

An examination of the number of serious crashes by road system showed little difference between roads patrolled primarily by state police and those patrolled primarily by local enforcement officers. The numbers of serious crashes on secondary highways and those on primary and interstate highways followed similar patterns (see Exhibit 24). Both showed significant increases from 1974 through 1978, followed first by slight decreases, and then by gradual increases. The only significant divergence in the annual changes occurred between 1979 and 1980, when there were 2.7% fewer serious crashes on primary and interstate highways, but 7.1% more on secondary highways (see Exhibit 25). This divergence occurred one year after initiation of the federally funded STEPs in the state. Both prior and subsequent to this change, the numbers of crashes on the two systems moved uniformly. The annual percentage change in serious crashes on the two systems averaged 2.3 percentage points difference.

When the number of serious crashes was adjusted by the amount of annual traffic on the two systems, no signs of effectiveness were found. The severity rate — the number of serious crashes per MVMT (million miles of vehicle travel) — dropped during the year federally funded STEPs began, from 67 in 1978 to 63 in 1979. However, the severity rate for secondary highways reflected similar reductions, from 157 to 142. In general, both systems showed an increasing rate of serious crashes from 1974 to 1978, followed by a drop in 1979, and mixed movement thereafter (see Exhibit 26).

These data indicate that the only difference between the rate of serious crashes occurring on highways patrolled by the state police and the rate for those on other highways was in the 1979-1980 period. This coincides with the introduction of federally funded STEP activity, and may be evidence of overall project effectiveness within the state. If STEP activity did produce this effect, however, it should have affected the number of crashes in later years also.

Finally, the effects of state police STEP activity is not evident in the state's motor vehicle death rate when compared to the national rate. Data for the 1974-1983 period are presented in Table 22 and Exhibit 27. State and national death rates follow the same long-term declining pattern, with a significant variation for the three years from 1978 to 1980. In those years, while the national death rates rose, the state figures fell. Again, this may have been attributable to an intensified highway patrol presence in Virginia, but the association is not sufficiently clear to assert a definite correlation, especially since

the divergence in state and national rates began one year prior to the initiation of federally funded STEPs in Virginia.

Conclusions

The State Police conducted a series of individual projects in 1983. These projects were highly selective in that they generally lasted only one day at a location. There were no limitations on the days of week, hours of day, or the locations of road segments that could be selected for STEP activity. Thus, it was difficult to assess the impact of these projects on either statewide or locality specific crashes. In the absence of site specific data gathered over a long term, several objective measures were used to examine project effectiveness. The first measure, the percentage of crashes that were speed-related, did not reflect state police STEP activity. The other two measures, serious crashes by road system and the state death rate, produced ambiguous results. Even with the most liberal interpretation, however, the effect of the projects on the number of statewide crashes was minimal.

TABLE 22

CRASH DATA FOR EVALUATION OF THE 1983 STATE POLICE SELECTIVE ENFORCEMENT PROJECTS

YEAR	RURAL CRASHES THAT ARE SPEED-RELATED		SEVERITY RATE *		NUMBER OF SERIOUS CRASHES		ANNUAL CHANGE IN SERIOUS CRASHES		DEATH RATES	
	TOTAL	SERIOUS	PRIMARY & INTERSTATE	SECONDARY	PRIMARY & INTERSTATE	SECONDARY	PRIMARY & INTERSTATE	SECONDARY	VA.	U.S.
1974	19.48%	26.78%	64	153	11,254	7,331	NA	NA	3.1	3.6
1975	17.58%	26.32%	63	151	11,585	7,603	-2.9%	-3.7%	3.0	3.5
1976	18.97%	25.68%	64	149	12,660	7,850	-9.3%	-3.2%	2.8	3.4
1977	18.47%	25.10%	65	158	13,627	8,735	-7.6%	-11.3%	3.0	3.3
1978	23.07%	28.66%	67	157	14,724	9,153	-8.1%	-4.8%	2.7	3.4
1979	23.07%	28.24%	63	142	14,054	8,767	4.6%	4.2%	2.7	3.5
1980	21.29%	26.08%	63	149	13,670	9,389	2.7%	-7.1%	2.8	3.5
1981	20.56%	25.43%	64	149	14,279	9,606	-4.5%	-2.3%	2.8	3.3
1982	21.98%	26.60%	62	141	14,206	9,402	0.5%	2.1%	2.2	3.0
1983	22.80%	27.71%	62	143	15,058	10,039	-6.0%	-6.8%	2.2	2.7

Source: State Police Crash Facts and Department of Highways & Transportation Summary of Accident Data for years 1974-1983.

* Severity Rate is the number of fatal and injury crashes divided by the estimate of vehicle miles of travel, in millions.

EXHIBIT 23

SPEED-RELATED CRASH %
FOR RURAL VIRGINIA

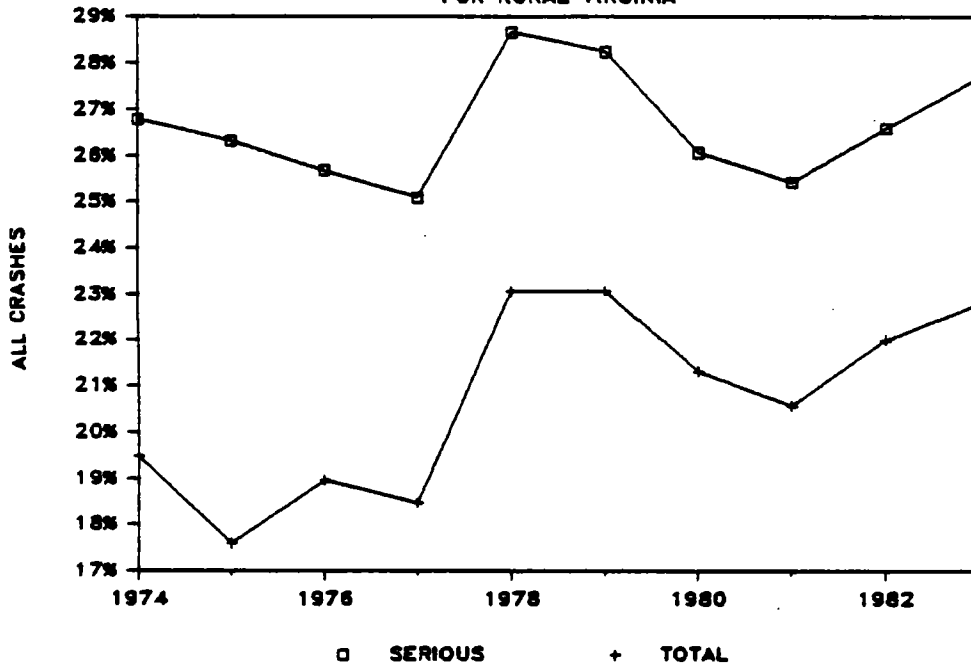


EXHIBIT 24

NUMBER OF SERIOUS CRASHES
BY ROAD SYSTEM

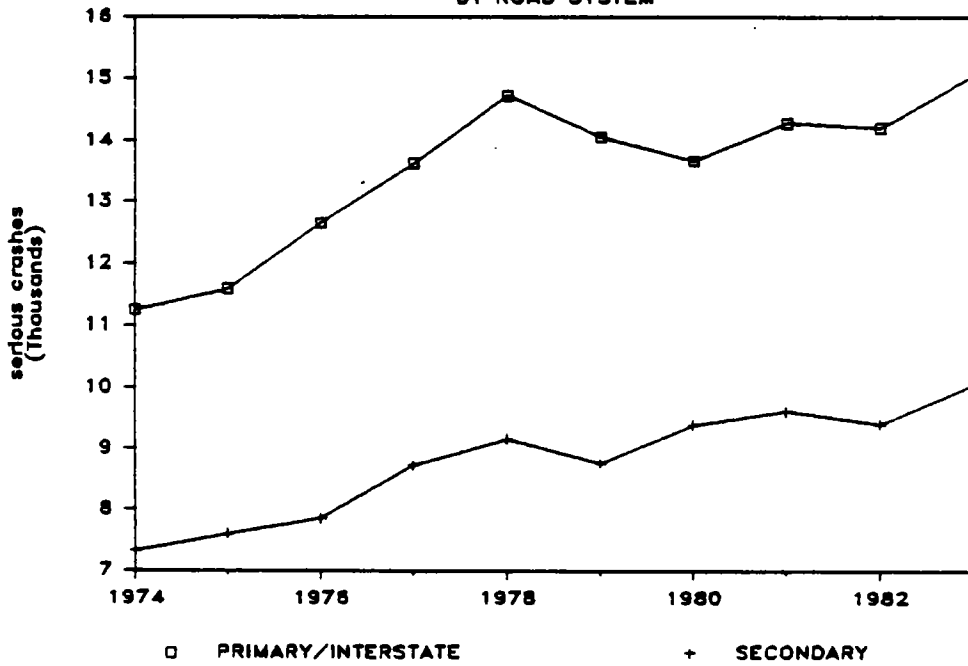


EXHIBIT 25

REDUCTIONS IN SERIOUS CRASHES
BY ROAD SYSTEM

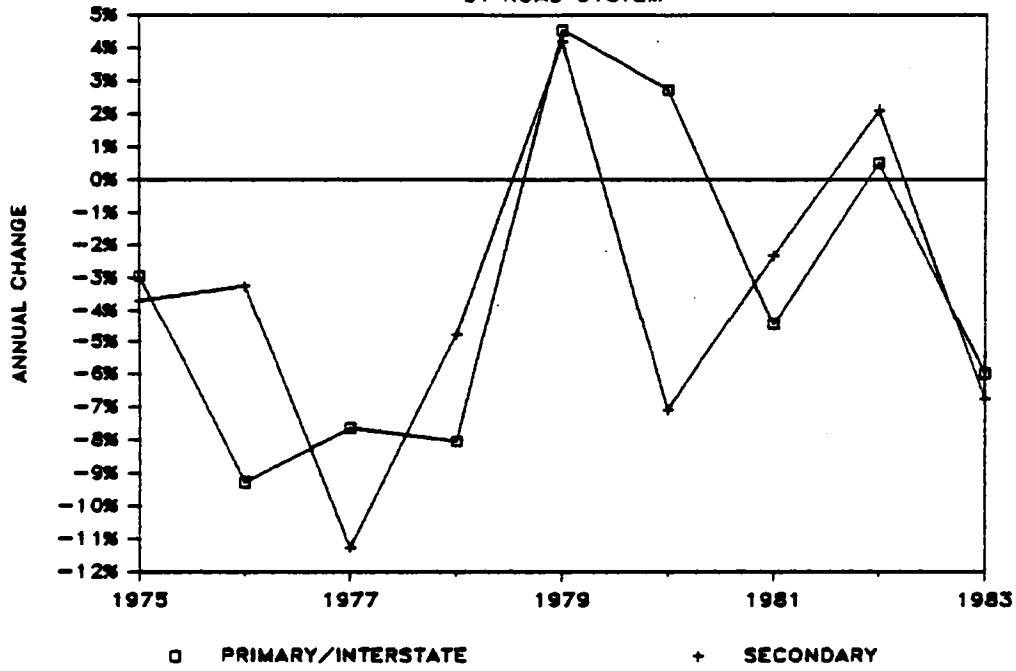


EXHIBIT 26

SEVERITY RATE
BY ROAD SYSTEM

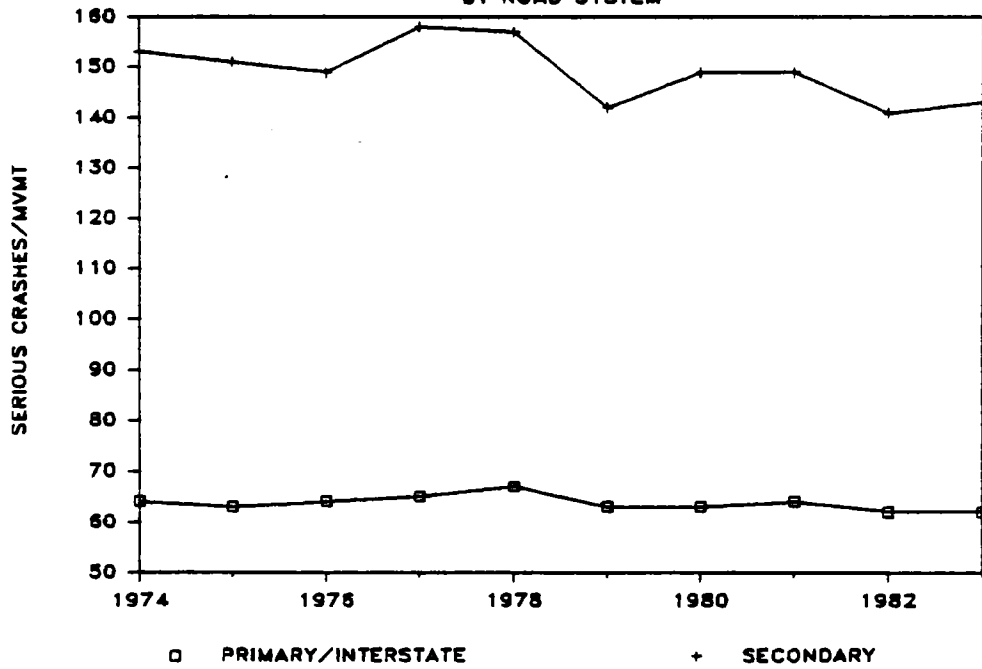
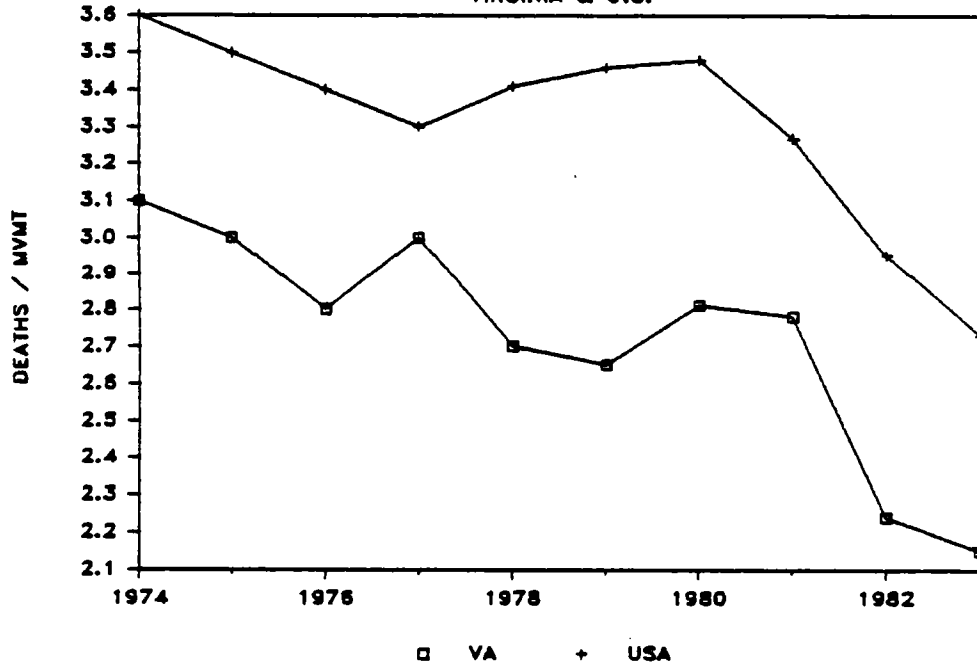


EXHIBIT 27

DEATH RATES

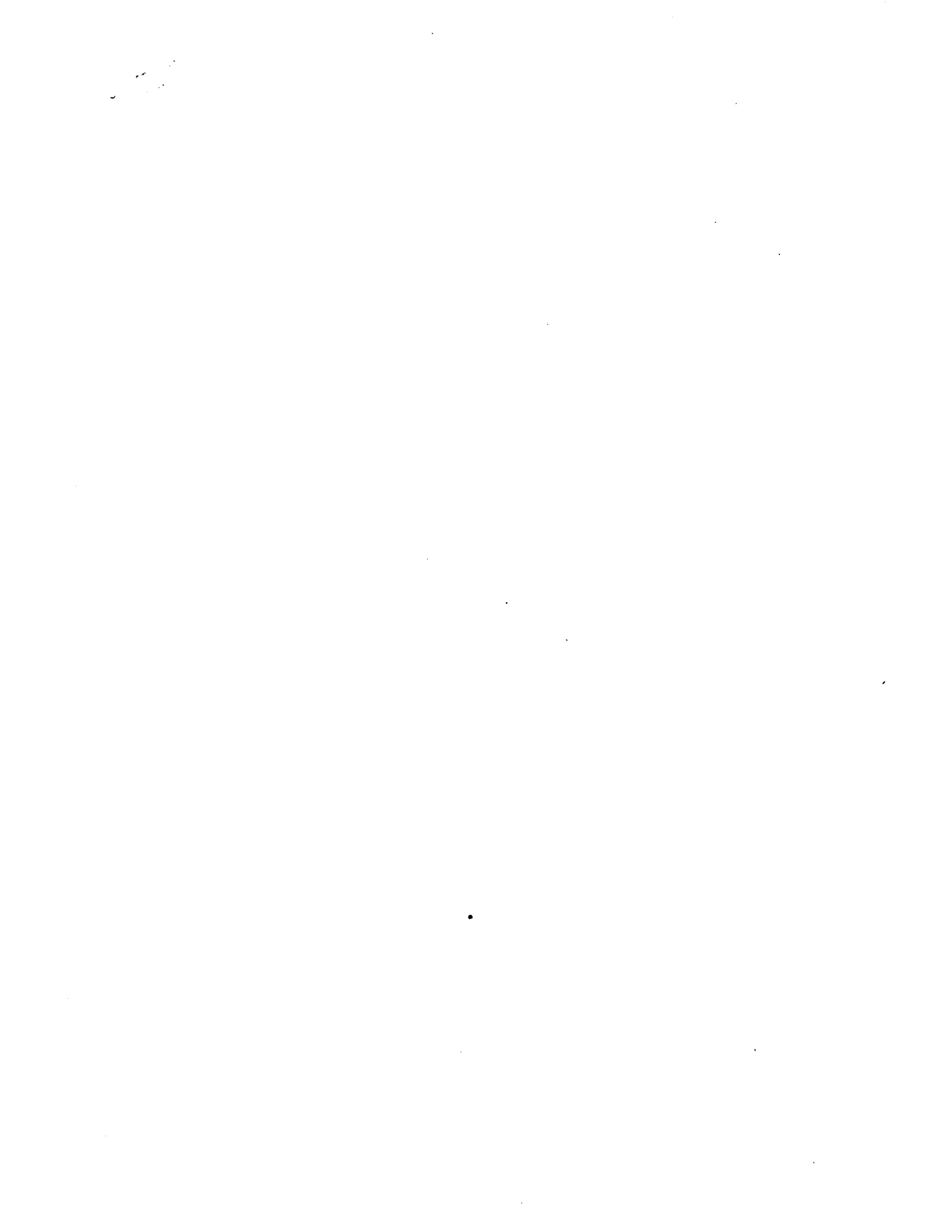
VIRGINIA & U.S.



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2. 23 U.S.C. §402(a) (1982).
3. Id.
4. 23 C.F.R. §1204.4, Highway Safety Program No. 9, I.A.4. (1983).
5. Va. Code Ann. §133.1-395 (Supp. 1983).
6. 23 U.S.C. §402(b)(1)(C) (1982).
7. 23 C.F.R. §1204.4 (1983).
8. Charles B. Stoke, Alden L. Atkins, and Alan K. Caudell, Evaluation of 1982 Selective Speed Enforcement Projects in Virginia, Virginia Highway & Transportation Research Council, Charlottesville, VA., 1985.
9. 23 C.F.R. §1204.4, Chapter IV (1983).
10. Julia H. Martin and David W. Sheatsley, Estimates of the Population of Virginia Counties and Cities, The Tayloe Murphy Institute, 1985.

APPENDICES



APPENDIX A

DEMOGRAPHIC INFORMATION ON STEP COMMUNITIES

Community	1982 Population	Taylor/Murphy Rank in Population	Vehicles Registered 1982	Area in Square Miles	Population Density	Interstate & Primary		Secondary Road Mileage	Total Road Mileage
						Road Mileage	Road Mileage		
[95 TOTAL COUNTIES]									
CHARLES CITY	6,700	88	5,238	204	33	35	143	178	
CHESTERFIELD	152,400	4	118,831	446	341	119	977	1,096	
GOOCHLAND	12,100	66	10,118	295	41	103	272	375	
NEW KENT	9,200	80	7,455	221	42	82	189	271	
PRINCE GEORGE	25,700	37	13,582	281	91	87	258	345	
ROANOKE	73,800	6	63,968	243	304	85	484	569	
SURRY	6,100	90	4,801	299	20	49	248	297	
SUSSEX	10,500	75	8,094	492	21	105	453	558	
[41 TOTAL CITIES]									
CHESAPEAKE	119,800	6	82,345	367	326	23	654	677	
PETERSBURG	40,200	14	24,748	23	1,741	0	173	173	
RICHMOND	218,600	3	137,798	63	3,495	39	779	818	
VIRGINIA BEACH	283,000	1	191,715	311	911	23	988	1,011	
STATE									
RURAL VIRGINIA	3,416,700					8,191	42,733	50,924	
URBAN VIRGINIA	2,068,500					1,790	8,315	10,105	
STATE TOTAL	5,485,200		3,940,060	40,767	135	9,981	51,048	61,029	

NOTE: Data for this appendix were derived as follows:

- 1) Population data extracted from Estimates of the Population of Va. Counties and Cities, The Tayloe Murphy Institute (10).
- 2) Road mileage data extracted from Mileage Tables, Virginia Dept. of Highways & Transportation, 1982.

APPENDIX B

DEFINITION OF OBJECTIVE MEASURES

Measure =====	Definition =====	Use ===
Speed-Related Crash % a) All Crashes	Speeding Citations issued in crashes divided by Total Crashes	primary indicator of speeding problem
a) Serious Crashes	Speeding Citations issued in Serious Crashes, divided by Total Serious Crashes	primary indicator of speeding problem
Serious Crash % a) All Crashes	Serious Crashes divided by Total Crashes	secondary indicator of speeding problem
a) Speed-Related Crashes	Speeding Citations issued in Serious Crashes, divided by Total Speeding Citations issued in Crashes	secondary indicator of speeding problem
Serious-Crash Rate	Serious Crashes divided by number of residents, in thousands	secondary indicator of speeding problem
Speed-Crash Rate	Serious Speed-Related Crashes divided by number of residents, in thousands	secondary indicator of speeding problem
High Accident Road Analysis: Percentage of Community Total Serious Crashes	Serious Crashes on Identified Roads divided by Total Local Serious Crashes	crash concentration; suitability of STEP countermeasures
Reductions in Crash Categories Speed crashes Serious crashes Total crashes	For each category: (Prior year total less current total), divided by prior year total	effectiveness of STEPs



APPENDIX C
CRASH RATES

TABLE C-1
SERIOUS CRASHES per 1,000 POPULATION

Community =====	1980 =====	1981 =====	1982 =====	1980-82 average =====	1983 =====
COUNTIES					
CHARLES CITY	8.1	7.9	7.8	7.9	7.9
CHESTERFIELD	7.1	6.5	7.4	7.0	7.6
GOOCHLAND	9.3	7.8	8.7	8.6	8.3
NEW KENT	11.0	8.4	8.7	9.4	11.3
PRINCE GEORGE	5.9	6.5	5.7	6.0	6.0
ROANOKE	5.2	5.8	5.2	5.4	5.1
SURRY	11.4	9.7	8.9	10.0	8.5
SUSSEX	9.4	8.2	8.0	8.5	12.2
CITIES					
CHESAPEAKE	7.8	7.8	7.9	7.8	8.0
PETERSBURG	9.2	9.3	9.6	9.4	9.8
RICHMOND	11.8	11.9	11.2	11.6	12.8
Va BEACH	7.7	7.4	7.6	7.6	7.9
COMPARISON COMMUNITIES					
STATE TOTAL	7.6	7.7	7.5	7.6	8.0
RURAL Va	7.2	7.2	6.9	7.1	7.3
URBAN Va	8.1	8.4	8.5	8.4	9.0

TABLE C-2
SPEED-RELATED SERIOUS CRASHES per 1,000 POPULATION

COUNTIES					
CHARLES CITY	3.0	2.2	2.7	2.6	2.1
CHESTERFIELD	1.2	1.0	1.1	1.1	1.0
GOOCHLAND	1.8	2.2	1.9	2.0	1.1
NEW KENT	4.0	2.6	2.3	2.9	2.8
PRINCE GEORGE	0.9	1.3	0.7	1.0	0.8
ROANOKE	1.4	1.5	1.1	1.3	1.1
SURRY	3.1	2.8	1.8	2.6	1.6
SUSSEX	2.6	1.6	2.0	2.1	3.1
CITIES					
CHESAPEAKE	1.3	1.4	1.3	1.4	1.1
PETERSBURG	2.3	2.1	2.2	2.2	2.4
RICHMOND	2.1	2.3	1.9	2.1	2.4
Va BEACH	1.4	1.3	1.5	1.4	1.5
COMPARISON COMMUNITIES					
STATE TOTAL	1.8	1.8	1.7	1.8	1.8
RURAL Va	1.9	1.9	1.8	1.9	1.9
URBAN Va	1.7	1.6	1.6	1.6	1.6

APPENDIX D
CRASH DATA FOR COMPARISON COMMUNITIES

TABLE D-1
STATE OF VIRGINIA

BASELINE DATA	1980	1981	1982	1980-1982 AVERAGE	1983
=====	====	====	====	=====	====
Number of Crashes	116,382	117,981	112,474	115,612.3	113,672
Fatal	938	908	782	876.0	802
Injury	39,454	40,778	40,480	40,237.3	43,359
Serious (Fatal + Injury)	40,392	41,686	41,262	41,113.3	44,161
 Number of Crashes That Are Speed-Related *	 22,237	 21,969	 20,576	 21,594.0	 20,682
Fatal	386	408	334	376.0	321
Injury	9,411	9,420	9,010	9,280.3	9,548
Serious (Fatal+Injury)	9,797	9,828	9,344	9,656.3	9,869
 Number of Crashes That Are Non-Speed-Related	 94,145	 96,012	 91,898	 94,018.3	 92,990
Fatal	552	500	448	500.0	481
Injury	30,043	31,358	31,470	30,957.0	33,811
Serious (Fatal+Injury)	30,595	31,858	31,918	31,457.0	34,292
 SPEED-RELATED PERCENTAGES					
=====					
Crashes That Are Speed-Related					
All Crashes	19.1%	18.6%	18.3%	18.7%	18.2%
Serious Crashes	24.3%	23.6%	22.6%	23.5%	22.3%
 SERIOUS CRASH PERCENTAGES					
=====					
Crashes That Are Serious					
All Crashes	34.7%	35.3%	36.7%	35.6%	38.8%
Speed-Related	44.1%	44.7%	45.4%	44.7%	47.7%
 REDUCTIONS IN CRASH CATEGORIES					
=====					
Reduction in Total Crashes					
From previous year	NA	-1.4%	4.7%	1.6%	-1.1%
From 1980-1982 average					1.7%
 Reduction in Serious Crashes					
From previous year	NA	-3.2%	1.0%	-1.1%	-7.0%
From 1980-1982 average					-7.4%
 Reduction in Speed-Related Crashes That Are Serious					
From previous year	NA	-0.3%	4.9%	2.3%	-5.6%
From 1980-1982 average					-2.2%
 Reduction in Non-Speed-Related Crashes That Are Serious					
From previous year	NA	-4.1%	-0.2%	-2.2%	-7.4%
From 1980-1982 average					-9.0%

* Speed-Related Crashes based on speeding CITATIONS in crashes (see p. 6 of report).

TABLE D-2
RURAL VIRGINIA

BASELINE DATA	1980	1981	1982	1980-1982 AVERAGE	1983
=====	====	====	====	=====	====
Number of Crashes	63,572	64,791	60,870	63,077.7	62,128
Fatal	737	713	579	676.3	597
Injury	23,159	23,636	23,129	23,308.0	24,692
Serious (Fatal + Injury)	23,896	24,349	23,708	23,984.3	25,289
Number of Crashes That Are Speed-Related *	13,590	13,923	12,826	13,446.3	12,926
Fatal	302	326	261	296.3	253
Injury	5,980	6,172	5,864	6,005.3	6,215
Serious (Fatal+Injury)	6,282	6,498	6,125	6,301.7	6,468
Number of Crashes That Are Non-Speed-Related	49,982	50,868	48,044	49,631.3	49,202
Fatal	435	387	318	380.0	344
Injury	17,179	17,464	17,265	17,302.7	18,477
Serious (Fatal+Injury)	17,614	17,851	17,583	17,682.7	18,821
SPEED-RELATED PERCENTAGES					
=====					
Crashes That Are Speed-Related					
All Crashes	21.4%	21.5%	21.1%	21.3%	20.8%
Serious Crashes	26.3%	26.7%	25.8%	26.3%	25.6%
SERIOUS CRASH PERCENTAGES					
=====					
Crashes That Are Serious					
All Crashes	37.6%	37.6%	38.9%	38.0%	40.7%
Speed-Related	46.2%	46.7%	47.8%	46.9%	50.0%
REDUCTIONS IN CRASH CATEGORIES					
=====					
Reduction in Total Crashes					
From previous year	NA	-1.9%	6.1%	2.1%	-2.1%
From 1980-1982 average					1.5%
Reduction in Serious Crashes					
From previous year	NA	-1.9%	2.6%	0.4%	-6.7%
From 1980-1982 average					-5.4%
Reduction in Speed-Related Crashes That Are Serious					
From previous year	NA	-3.4%	5.7%	1.2%	-5.6%
From 1980-1982 average					-2.6%
Reduction in Non-Speed-Related Crashes That Are Serious					
From previous year	NA	-1.3%	1.5%	0.1%	-7.0%
From 1980-1982 average					-6.4%

* Speed-Related Crashes based on speeding CITATIONS in crashes (see p. 6 of report).

TABLE D-3
URBAN TOTAL

BASELINE DATA	1980	1981	1982	1980-1982 AVERAGE	1983
=====	====	====	====	=====	====
Number of Crashes	52,810	53,190	51,604	52,534.7	51,544
Fatal	201	195	203	199.7	205
Injury	16,295	17,142	17,351	16,929.3	18,667
Serious (Fatal + Injury)	16,496	17,337	17,554	17,129.0	18,872
Number of Crashes That Are Speed-Related *	8,647	8,046	7,750	8,147.7	7,756
Fatal	84	82	73	79.7	68
Injury	3,431	3,248	3,146	3,275.0	3,333
Serious (Fatal+Injury)	3,515	3,330	3,219	3,354.7	3,401
Number of Crashes That Are Non-Speed-Related	44,163	45,144	43,854	44,387.0	43,788
Fatal	117	113	130	120.0	137
Injury	12,864	13,894	14,205	13,654.3	15,334
Serious (Fatal+Injury)	12,981	14,007	14,335	13,774.3	15,471
SPEED-RELATED PERCENTAGES					
=====					
Crashes That Are Speed-Related					
All Crashes	16.4%	15.1%	15.0%	15.5%	15.0%
Serious Crashes	21.3%	19.2%	18.3%	19.6%	18.0%
SERIOUS CRASH PERCENTAGES					
=====					
Crashes That Are Serious					
All Crashes	31.2%	32.6%	34.0%	32.6%	36.6%
Speed-Related	40.6%	41.4%	41.5%	41.2%	43.8%
REDUCTIONS IN CRASH CATEGORIES					
=====					
Reduction in Total Crashes					
From previous year	NA	-0.7%	3.0%	1.1%	0.1%
From 1980-1982 average					1.9%
Reduction in Serious Crashes					
From previous year	NA	-5.1%	-1.3%	-3.2%	-7.5%
From 1980-1982 average					-10.2%
Reduction in Speed-Related Crashes That Are Serious					
From previous year	NA	5.3%	3.3%	4.3%	-5.7%
From 1980-1982 average					-1.4%
Reduction in Non-Speed-Related Crashes That Are Serious					
From previous year	NA	-7.9%	-2.3%	-5.1%	-7.9%
From 1980-1982 average					-12.3%

* Speed-Related Crashes based on speeding CITATIONS in crashes (see p. 6 of report).

