# TRAFFIC AND SAFETY MANAGEMENT NEEDS IN VIRGINIA

by

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## ABSTRACT

A survey questionnaire was developed to identify traffic operations and safety management needs in Virginia. Form A of the questionnaire was mailed to 79 traffic engineering practitioners throughout Virginia and Form B was mailed to 78 law enforcement officials throughout Virginia and 10 area safety coordinators employed by the Virginia Department of Transportation Safety. Form B was identical to Form A except for the deletion of specific items pertaining to traffic engineering practitioners.

There were 72 respondents to Form A of the questionnaire and 71 respondents to Form B, for a combined return rate of 85% of the questionnaires mailed. It was found that the majority of the respondents perceived their role in traffic engineering and highway safety activities as being an administrative one, and the respondents to Form A indicated that a little over half of the communities they represented employed no full-time traffic engineers. A large majority of the respondents indicated either a great need or some need for training of their employees having traffic engineering responsibilities. Besides a lack of qualified traffic engineering personnel, other needs indicated by the survey included increased funding, evaluation of traffic control devices and pavement markings, skid resistance studies, evaluation of signalized intersections, and identification of hazardous locations. It is recommended that consideration be given to providing traffic engineering services on a rotating basis for small communities and that training programs be developed to increase traffic engineering expertise.

## SUMMARY OF FINDINGS

1. The majority of the respondents perceived their role in traffic engineering and highway safety activities as being an administrative one.

2. A little over half of the respondents to Form A indicated that their communities employed no full-time traffic engineers.

3. The majority of the respondents to Form A indicated a great need or some need for training of their employees having traffic engineering responsibilities.

4. Over half of the communities responding to Form A maintained an inventory of traffic control devices (i.e., signs, signals, and pavement markings); however, this percentage is not very high.

5. Over half of the respondents to Form A evaluated the effectiveness of traffic and safety improvements at least occasionally.

6. A little over half of all respondents indicated that they used §402 safety funds available through the Virginia Department of Transportation Safety.

7. Skid resistance studies, including a determination of the need for treatments to improve skid resistance and the identification of substandard or non-skid resistant pavements, were often indicated as never being performed.

8. Over half of all the respondents indicated that they had a program to identify hazardous locations with almost 70% of the respondents to Form A indicating they had such a program.

9. Less than half of all respondents indicated having a method for establishing priorities for safety projects.

10. Most of the communities who responded to Form A indicated that they had a copy of the Manual on Uniform Traffic Control Devices (MUTCD), and of these respondents a large percentage said that they routinely used the MUTCD when installing signals, signs, pavement markings, etc.

11. The majority of the respondents were not familiar with Highway Safety Program Standard 13, Traffic Engineering Services.

12. Among the traffic operations and highway safety needs specifically listed in the questionnaire, these ranked highest in priority by all respondents: identification of hazardous

locations, accident analysis, studies relating accidents to specific design features of the roadway, pedestrian safety studies, evaluation of existing traffic control devices and pavement markings, development of methods for identifying substandard or deficient roadway lighting, and highway capacity analysis.

13. For all respondents, among the needs ranked highest from a list of traffic engineering problems were funding and budget, lack of personnel, and need for training of personnel.

14. Some of the general problem areas mentioned most frequently in responses to the discussion questions included evaluation of traffic control devices, lack of qualified traffic engineering personnel, need for additional funds, evaluation of signalized intersections, and the identification of hazardous locations.

15. Increased funding, additional personnel, and training for personnel were rated most important among respondents' rankings of measures to improve traffic operations and safety.

An evaluation of the responses on the survey questionnaires returned by traffic engineering practitioners and law enforcement officials throughout Virginia led to the following conclusions.

1. There is a need for additional qualified traffic engineering personnel as evidenced by the lack of full-time traffic engineers employed throughout Virginia and the respondents' ranking of such a need among the highest priorities.

   It is recommended that consideration be given to (a) the development of a method for providing statewide traffic engineering assistance on a consulting, rotating, or as needed basis since many Virginia communities are too small to support a full-time traffic engineer, and (b) the development of training programs (workshops, seminars, etc.) in traffic engineering principles for persons having traffic engineering responsibilities and for policy makers as a forum for upgrading education and for exchange of information. It is recommended that these objectives be met by the formation of a committee composed of members from the Virginia Department of Highways and Transportation, the Virginia Department of Transportation Safety, and the Virginia Section of the Institute of Transportation Engineers (VASITE). The committee's responsibilities, which must be met through coordination among the agencies represented and individual communities, are seen as including (a) the distribution of informational and instructional materials such as primers, guides, current training manuals, and recommendations related to traffic operations and safety; (b) providing information on relevant seminars, including those sponsored by the Virginia Department of Transportation Safety and Virginia Commonwealth University, (c) providing the communities with information on Highway Safety Program Standard 13; and (d) informing them of the availability of §402 safety funds through the Virginia Department of Transportation Safety.

2. While some communities are involved at least to some extent in traffic operations and highway safety activities such as maintaining an inventory of traffic control devices and evaluating the effectiveness of traffic and safety improvements, there remains a need for improvement in these areas.

   The goals of the committee should be to increase the number of communities who (a) maintain an inventory of traffic control devices, (b) perform analyses to evaluate

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the effectiveness of traffic and safety improvements, (c) have programs to identify hazardous locations, and (d) have methods for establishing priorities for safety projects.

3. Among traffic operations and highway safety needs, ranked high in priority were (a) the identification of hazardous locations, (b) accident analyses, (c) studies relating accidents to specific design features of the roadway, (d) pedestrian safety studies, (e) the evaluation of existing traffic control devices and pavement markings, (f) intersection studies, (g) the development of methods for identifying substandard or deficient roadway lighting, and (h) highway capacity analyses.

It is recommended that consideration be given to evaluating and prioritizing the needs listed above, particularly on a community rather than a statewide basis.

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## INTRODUCTION

The initiation of and participation in traffic safety programs have been rapidly increasing in recent years. Included has been a growing involvement of several national organizations in promoting such programs (Pignataro, 1973). Attempts have been made ". . . to alleviate the results of accidents, reduce the occurrence of accidents, improve the quality of roads, tighten the qualifications for drivers' licenses, and other considerations" (Pignataro 1973, p. 426). Programs for providing engineering assistance to areas where it is not readily available are increasingly seen as beneficial to traffic safety. For example, Texas has recently initiated a program providing traffic engineering assistance to areas of the state on a regular basis. A task force of area traffic engineers (ATEs) has been designated to work in multijurisdictional areas on a regular basis to assist local officials and coordinate with state highway engineers as needed (Todd 1978, p. 9).

Recently an innovative approach to traffic and safety management was demonstrated in a ". . . comprehensive traffic engineering project conducted in Oakland County, Michigan" (Traffic Improvement Association of Oakland County 1977). The basic elements in this project included: "(1) a survey of the status of traffic engineering . . ., (2) prioritization of identified needs and development of a master plan, (3) implementation of countermeasures, and (4) a traffic engineering 'awareness' program designed to impact upon the public and traffic authorities alike" (TIA 1977). The Michigan traffic and safety management project addressed specific issues such as proper training of traffic engineering personnel, identification of high accident locations, and establishment of speed limits.

The identification and prioritization of traffic and safety management needs represent a relatively new approach to traffic safety. The project described in this report was a preliminary phase to the development of a comprehensive traffic and safety management program in Virginia, with the direction of the program being determined by findings from this initial stage of evaluation. Several general topics for study have been suggested by sources such as the Institute of Transportation Engineers (ITE) and the Transportation

Research Board (TRB) (ITE Technical Council Committee 2-13 1978; TRB Special Report 158 1975). These have included general problem areas such as methods for making decisions concerning traffic operations, traffic law enforcement, operation and maintenance of traffic control devices, operational effects of geometrics, effectiveness of operational measures, road user characteristics, motorist information systems, and motorist services. Topics such as these were used in the design of the questionnaires sent to traffic engineering professionals and law enforcement officials throughout Virginia to determine traffic and safety management needs.

## PURPOSE AND SCOPE

The purpose of this project was to identify traffic engineering and safety management problems and needs in Virginia. Later, these needs will be prioritized and the results will be used to develop a comprehensive traffic and safety management program in Virginia.

## METHOD

Survey questionnaires were mailed to a total of 167 traffic engineering professionals and law enforcement officials throughout Virginia.

A 10-page questionnaire (Form A) and accompanying cover letter were sent to 79 traffic engineers, including 4 traffic and safety engineers employed by the Virginia Department of Highways and Transportation in Richmond (see Appendix A). The 75 local traffic engineers included those persons having traffic engineering responsibilities in cities or towns with populations over 3,500. Since the Department of Highways and Transportation has jurisdiction over cities and towns with populations under 3,500, questionnaires were also sent to the Department's district traffic engineers having responsibility for these jurisdictions.

Form A consisted of 30 questions and covered such items as personnel information (number of traffic engineers employed, education/experience requirements, training, seminars attended, involvement in professional organizations, etc.), distribution of traffic engineering responsibilities and duties, sources of revenues used, analyses performed to evaluate improvements, identification of hazardous locations, and prioritization of listed and perceived traffic engineering and safety needs.

Form B of the questionnaire and an accompanying cover letter (see Appendix B) were mailed to 78 law enforcement officials throughout Virginia and 10 area safety coordinators employed by the Virginia Department of Transportation Safety. Form B consisted of 17 questions and was identical to Form A except for the deletion of specific items pertaining more to traffic engineering than to law enforcement.

Approximately two weeks after the deadline for the questionnaires to be returned, follow-up letters (see Appendix C) and questionnaires were sent to those who had not yet responded.

## QUESTIONNAIRE SURVEY RESULTS

Seventy-two traffic engineers responded to Form A of the questionnaire and 71 law enforcement officials responded to Form B. These represent 85% of the total number of questionnaires mailed. The distribution of respondents is shown in Table 1.

### TABLE 1

### NUMBER AND PERCENTAGE OF RESPONDENTS BY CATEGORY OF QUESTIONNAIRE

| Type of Respondent | Questionnaire Form | Number Mailed | Number Returned | Percent Returned |
|---|---|---|---|---|
| Traffic Engineer | A | 75 | 68 | 90.7 |
| Department of Highways and Transportation Traffic and Safety Engineer | A | 4 | 4 | 100.0 |
| Law Enforcement Official | B | 78 | 62 | 78.2 |
| Department of Transportation Safety Area Safety Coordinator | B | 10 | 9 | 90.0 |
| Total | | 167 | 143 | 85.0 |

Since the initial purpose of this project was to identify traffic and safety management needs in Virginia, the survey results were analyzed with three questions in mind. First, what are the identifying characteristics of the persons with major traffic engineering responsibilities in Virginia? What is the emphasis on traffic safety by local officials? For example, what are their job

classifications? How do they perceive their role in traffic operations and highway safety activities? Do education/experience requirements exist for their positions? And, do they keep up with the state of the art in their fields, for example, by attending seminars and being involved in professional organizations? Questions such as these are addressed in the "Characteristics of Respondents" section of the report.

The second question concerns the responsibilities of these traffic professionals in the area of traffic operations and safety. What are Virginia's traffic practitioners doing to improve traffic operations and safety? Are inventories of traffic control devices being maintained? Are hazardous locations being identified, and, if so, how? Is the effectiveness of highway safety improvements being evaluated? How are traffic engineering and highway safety problems being evaluated? The analysis of the questionnaire survey relevant to questions such as these appears in the "Traffic Operations and Highway Safety Activities" section of the report.

The third question has to do with what traffic practitioners in Virginia think needs to be done to improve traffic operations and highway safety in Virginia. What would they like to see changed or improved in their jurisdictions? Specific questions were included in the survey questionnaire in addition to more general discussion questions that provided the respondents an opportunity to elaborate on specific needs in their jurisdictions. The responses are discussed in the "Traffic Operations and Highway Safety Needs" section of the report.

## Characteristics of Respondents

Several questions were directed at identifying characteristics of the respondents. These questions pertained to such items as job classifications, the education/experience requirements, training opportunities, and the respondents' perception of their role in traffic engineering and highway safety activities.

### Occupation of Respondents

The occupation of respondents to Form A varied among the categories listed in Table 2.

TABLE 2

OCCUPATIONS OF RESPONDENTS TO FORM A

| Occupation | Number | Percentage |
|---|---|---|
| District traffic engineer | 9 | 12.5 |
| State traffic and safety engineer | 4 | 5.6 |
| City or town traffic engineer | 21 | 29.2 |
| City or town manager | 17 | 23.6 |
| Planning officer | 1 | 1.4 |
| Town engineer | 4 | 5.6 |
| Director of public works | 9 | 12.5 |
| Administrative assistant, administrator | 7 | 9.7 |

As seen in Table 2, city or town traffic engineers and city or town managers made up the largest groups of respondents to Form A, 29.2% and 23.6%, respectively. The job classifications were rather varied, and most of these persons with major traffic engineering responsibilities were not traffic engineers.

## Respondents' Perception of Their Role

A question was also directed at identifying how the respondents perceived their role in traffic engineering and highway safety activities. The distribution of responses is shown in Table 3. It should be noted that whereas in some instances respondents checked more than one category, only the first category indicated was tabulated.

As seen in Table 3, the majority of the respondents to Form A (68%) perceived their role to be an administrative one, with only 20.8% perceiving their role as being one involving engineering activities. The results were similar for the respondents to Form B, with "administrative" being the category checked most frequently. It is interesting, then, that the majority of those persons with major traffic engineering responsibilities did not perceive their role as being one involving engineering/operational activities.

TABLE 3

RESPONDENTS' PERCEPTION OF THEIR ROLE IN TRAFFIC ENGINEERING AND HIGHWAY SAFETY ACTIVITIES

| Category of Role | Respondents to Form A | | Respondents to Form B | |
|---|---|---|---|---|
| | Number | Percent | Number | Percent |
| Administrative | 49 | 68.1 | 27 | 38.0 |
| Research oriented | 1 | 1.4 | 1 | 1.4 |
| Engineering/operational | 15 | 20.8 | 1 | 1.4 |
| Technical assistance | 2 | 2.8 | 3 | 4.2 |
| Enforcement | N/A | N/A | 16 | 22.5 |
| Other | 2 | 2.8 | 13 | 18.3 |
| Blank | 3 | 4.2 | 10 | 14.1 |

## Employees Having Traffic Engineering Responsibilities

As seen in Table 4, more full-time traffic technicians were employed than full-time traffic engineers. In fact, a little over half (51.4%) of the communities who responded to Form A indicated that they employed no full-time traffic engineers and over three-quarters of them (76.4%) indicated that they employed no part-time traffic engineers.

TABLE 4

EMPLOYEES HAVING TRAFFIC ENGINEERING RESPONSIBILITIES (FORM A)

| Category of Position | Number of Employees | | | | | | |
|---|---|---|---|---|---|---|---|
| | None | 1-10 | 11-20 | 21-30 | >30 | Blank | N/A |
| Full-time traffic engineers | 37 (51.4%) | 31 (43.1%) | 2 (2.8%) | | | 2 (2.8%) | |
| Part-time traffic engineers | 55 (76.4%) | 55 (15.3%) | 1 (1.4%) | | | 4 (5.6%) | 1 (1.4%) |
| Full-time traffic technicians | 28 (38.9%) | 35 (48.6%) | | 1 (1.4%) | 3 (4.2%) | 5 (6.9%) | |
| Part-time traffic technicians | 53 (73.6%) | 11 (15.3%) | | | | 7 (9.7%) | 1 (1.4%) |

## Training

Table 5 presents the distribution of responses to training questions by respondents to Form A and Form B. For respondents to Form A, although slightly more communities indicated they provided in-house training for employees having traffic engineering responsibilities than not, less than half provided such training. Even fewer of these respondents indicated that they themselves had conducted any training in traffic engineering for their staff. More of these respondents than not (almost 70%) indicated familiarity with traffic engineering seminars conducted by the Department of Transportation Safety and Virginia Commonwealth University. As might be expected, since most of the respondents to Form B were law enforcement officials with few traffic engineering responsibilities, few of them indicated that in-house training in traffic engineering was being provided, and even fewer (less than 3%) indicated that they themselves had conducted any such training. Also, fewer of the respondents to Form B than of those to Form A were familiar with any traffic engineering seminars conducted by the Department of Transportation Safety and Virginia Commonwealth University.

In addition to questions directly concerning the availability of training, respondents were questioned on the number of traffic engineering or highway safety seminars they had attended in the past three years. As might be expected, respondents to Form A indicated having attended seminars more often than did respondents to Form B. The number of seminars attended by respondents to Form A varied; however, the majority of them (36.1%) had attended from 1 to 5 seminars. As seen in Table 6, 25% of the respondents to Form A and almost 34% of the respondents to Form B indicated that they had attended no traffic engineering or highway safety seminars during the past three years.

TABLE 5

TRAINING QUESTIONS

| | Form A | | | | Form B | | | |
|---|---|---|---|---|---|---|---|---|
| | Yes | No | N/A | Blank | Yes | No | N/A | Blank |
| a. Is in-house training in traffic engineering provided for your employees having traffic engineering responsibilities? | 35 (48.6%) | 32 (44.4%) | 3 (4.2%) | 2 (2.8%) | 6 ( 8.5%) | 38 (53.5%) | 14 (19.7%) | 13 (18.3%) |
| b. Have you conducted any training in traffic engineering for your employees having traffic engineering responsibilities? | 30 (41.7%) | 37 (51.4%) | 3 (4.2%) | 2 (2.8%) | 2 (2.8%) | 42 (59.2%) | 13 (18.3%) | 14 (19.7%) |
| c. Are you familiar with any traffic engineering seminars conducted by the Department of Transportation Safety and Virginia Commonwealth University? | 50 (69.4%) | 20 (27.8%) | 0 (0.0%) | 2 (2.8%) | 24 (33.8%) | 28 (39.4%) | 5 (7.0%) | 14 (19.7%) |

TABLE 6

NUMBER OF TRAFFIC ENGINEERING OR HIGHWAY SAFETY SEMINARS ATTENDED IN THE PAST THREE YEARS

| No. of Seminars | Respondents to Form A | | Respondents to Form B | |
|---|---|---|---|---|
| | Number | Percent | Number | Percent |
| None | 18 | 25.0 | 24 | 33.8 |
| 1-5 | 26 | 36.1 | 9 | 12.7 |
| 6-10 | 8 | 11.1 | 1 | 1.4 |
| More than 10 | 3 | 4.2 | 0 | 0.0 |
| Number not specified | 8 | 11.1 | 8 | 11.3 |
| N/A | 0 | 0.0 | 5 | 7.0 |
| Blank | 9 | 12.5 | 24 | 33.8 |

## Personnel and Training Needs

Table 7 presents respondents' ratings of personnel and training needs. This question was included in Form A, but excluded from Form B since it seemed more pertinent to traffic engineering than to law enforcement. As seen in Table 7, a large majority (84.7%) of the respondents indicated a great need or some need for training in traffic engineering for employees having traffic engineering responsibilities. A large number of the respondents indicated a great need or some need for training (seminars, workshops, etc.) in traffic engineering for policy makers (legislators, city council, manager, county executive, etc.), and a great or some need was indicated for education/experience requirements for traffic engineering personnel. A little over half of the respondents indicated a great need or some need for an assessment of traffic engineering manpower needs and for additional traffic engineering manpower.

TABLE 7

HOW WOULD YOU DESCRIBE THE NEED FOR THE FOLLOWING?

| | | Great Need | Some Need | Little Need | No Need | Not Applicable | Blank |
|---|---|---|---|---|---|---|---|
| (a) | Education/experience requirements for traffic engineering personnel | 13 (18.1%) | 31 (43.1%) | 6 ( 8.3%) | 3 ( 4.2%) | 12 (16.7%) | 7 ( 9.7%) |
| (b) | Training in traffic engineering for employees having traffic engineering responsibilities | 28 (38.9%) | 33 (45.8%) | 4 ( 5.6%) | 1 ( 1.4%) | 4 ( 5.6%) | 2 ( 2.8%) |
| (c) | Training (seminars, workshops, etc.) in traffic engineering for policy makers (legislators, city council, manager, county executive, etc.) | 20 (27.8%) | 30 (41.7%) | 9 (12.5%) | 3 ( 4.2%) | 7 ( 9.7%) | 3 ( 4.2%) |
| (d) | Written job descriptions for traffic engineering positions | 6 ( 8.3%) | 16 (22.2%) | 20 (27.8%) | 12 (16.7%) | 12 (16.7%) | 6 ( 8.3%) |
| (e) | Formal assignment of traffic engineering positions | 6 ( 8.3%) | 14 (19.4%) | 20 (27.8%) | 11 (15.3%) | 13 (18.1%) | 8 (11.1%) |
| (f) | An assessment of traffic engineering manpower needs | 15 (20.8%) | 25 (34.7%) | 14 (19.4%) | 4 ( 5.6%) | 6 ( 8.3%) | 8 (11.1%) |
| (g) | Additional traffic engineering manpower | 18 (25.0%) | 23 (31.9%) | 16 (22.2%) | 3 ( 4.2%) | 7 ( 9.7%) | 5 ( 6.9%) |

## Summary of Characteristics

In summary, then, the people having major traffic engineering responsibilities in Virginia can be typified as follows. First, their job classification is usually city or town traffic engineer or city or town manager, and in a substantial percentage of cases they are directors of public works. As seen by the distribution of job classifications, most of them are not traffic engineers. This is substantiated by responses to another question in the survey which showed that most of the respondents perceived their role in traffic engineering and highway safety activities to be an administrative one rather than one involving engineering activities. In fact, a little over half of the communities who responded to Form A indicated that they employed no full-time traffic engineers and over 75% indicated that they employed no part-time traffic engineers. Although some respondents indicated that in-house training was being provided for employees having traffic engineering responsibilities, this number was not very high, and such training was identified as a great need by respondents later in the questionnaire. While some familiarity with traffic engineering seminars conducted by the Department of Transportation Safety and Virginia Commonwealth University was indicated, overall attendance at professional seminars such as these had been rather low.

## Traffic Operations and Highway Safety Activities

In addition to the questions relating to the characteristics of traffic practitioners in Virginia, there were questions addressed to what these traffic professionals were doing in the area of traffic operations and safety.

## Inventory of Traffic Control Devices

As seen in Table 8, over half of the communities responding to Form A maintained an inventory of traffic control devices (i.e., signs, signals, and pavement markings), and an additional few maintained an inventory of at least some traffic control devices. These percentages were considerably lower for respondents to Form B, which might be expected since Form A respondents were more likely to be responsible for traffic operations.

TABLE 8

DO YOU MAINTAIN AN INVENTORY OF TRAFFIC CONTROL DEVICES, i.e., SIGNS, SIGNALS, AND PAVEMENT MARKINGS?

| Response | Respondents to Form A | | Respondents to Form B | |
|---|---|---|---|---|
| | Number | Percent | Number | Percent |
| Yes | 49 | 68.1 | 12 | 16.9 |
| No | 17 | 23.6 | 43 | 60.6 |
| At least one of the above | 3 | 4.2 | 4 | 5.6 |
| Blank | 3 | 4.2 | 12 | 16.9 |

## Evaluation of the Effectiveness of Improvements

Form A included a question on the frequency of analyses performed to evaluate the effectiveness of traffic and safety improvements. The responses to this question are shown in Table 9. Over half (55.6%) of the respondents indicated that analyses were being performed occasionally, with 26.4% responding the analyses were being performed frequently. Less than 3% indicated that such analyses were not being performed.

TABLE 9

HOW OFTEN ARE ANALYSES PERFORMED IN YOUR JURISDICTION TO EVALUATE THE EFFECTIVENESS OF TRAFFIC AND SAFETY IMPROVEMENTS?

| Frequency | Respondents | |
|---|---|---|
| | Number | Percent |
| Frequently | 19 | 26.4 |
| Occasionally | 40 | 55.6 |
| Seldom | 9 | 12.5 |
| Never | 2 | 2.8 |
| Blank | 2 | 2.8 |

## Sources of Revenue

Table 10 presents the data on use of state and federal sources of revenue. A little over half of all respondents indicated that they used §402 safety funds available through the Virginia Department of Transportation Safety. A fairly large percentage of the respondents to Form A indicated that they used state funds and other federal funds. Respondents to Form B left many of the categories blank.

TABLE 10

DO YOU USE ANY OF THE FOLLOWING SOURCES OF REVENUE?

| | | Form A | | | Form B | | |
|---|---|---|---|---|---|---|---|
| | | Yes | No | Blank | Yes | No | Blank |
| (a) | §402 safety funds available through Virginia Dept. of Transportation Safety | 39 (54.2%) | 24 (33.3%) | 9 (12.5%) | 39 (54.9%) | 11 (15.5%) | 21 (29.6%) |
| (b) | Other federal funds | 25 (34.7%) | 6 ( 8.3%) | 41 (56.9%) | 28 (39.4%) | 5 ( 7.0%) | 38 (53.5%) |
| (c) | State funds | 53 (73.6%) | 5 ( 6.9%) | 14 (19.4%) | 22 (31.0%) | 15 (21.1%) | 34 (47.9%) |
| (d) | Other | 7 ( 9.7%) | 0 ( 0.0%) | 65 (90.3%) | 1 ( 1.4%) | 3 ( 4.2%) | 67 (94.4%) |

## Traffic Engineering Responsibilities

Traffic engineering and safety activities and the individual or organization associated with performing or implementing those activities are shown in Table 11. Table 12 shows the individuals or organizations most frequently associated with performing or implementing these activities as indicated by respondents to Form A.

TABLE 11

INDICATE THOSE WHO USUALLY PERFORM OR IMPLEMENT THE FOLLOWING ACTIVITIES

| Activity | City or Traffic Engr. | Police | Other | State Police | Dept. Hwys. & Trans. | Other State Agency | Consultant | Contractor | Study Not Performed | Planning | Electric | Public Works | Parks or Rec. | Other (Please Specify) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| a. Accident studies | 26 | 42 | 1 | 1 | 19 | | 1 | | 2 | | | | | |
| B. Volume counts | 35 | 2 | 1 | | 54 | | | | 1 | 1 | | | | |
| c. Speed studies | 28 | 25 | 1 | 1 | 29 | | | | 6 | | | | | |
| d. Sidewalk and pedestrian safety | 46 | 18 | 2 | | 11 | | 1 | | 3 | 1 | | 3 | | 2 |
| e. Evaluation of intersection hazards | 45 | 27 | 3 | | 26 | 1 | 2 | | 4 | 1 | | | | |
| f. Skid resistance studies | 7 | 5 | 2 | | 16 | 1 | 1 | | 28 | | | 1 | | 1 |
| g. Traffic control in maintenance and construction zones | 45 | 20 | 4 | | 23 | | | 3 | 2 | | 1 | 2 | | 1 |
| h. Traffic signals - | | | | | | | | | | | | | | |
| (1) Design and timing | 40 | 5 | 1 | | 32 | | 14 | 2 | 2 | | 2 | 2 | | 1 |
| (2) Installation | 32 | | 3 | | 23 | 1 | 3 | 23 | 1 | | 3 | 3 | | |
| (3) Operations and maintenance | 36 | 2 | 5 | | 15 | | 1 | 8 | 1 | | 3 | 5 | | 3 |
| i. Pavement Markings - | | | | | | | | | | | | | | |
| (1) Planning & design | 51 | 7 | 3 | | 28 | | 3 | 1 | 1 | | | 1 | | 1 |
| (2) Installation | 43 | | 3 | | 15 | 1 | 1 | 15 | 1 | | | 5 | | 1 |
| (3) Maintenance | 43 | 1 | 4 | | 13 | | | 6 | 1 | | | 6 | | 1 |
| j. Transportation plans | 29 | 3 | 7 | | 35 | 2 | 10 | 1 | 5 | 11 | | | | 2 |
| k. Transit routes and stops | 19 | 3 | 5 | | 14 | 1 | 5 | | 15 | 4 | | | | 8 |
| l. Illumination | 36 | 3 | 10 | | 11 | | 3 | 2 | 6 | | 12 | 2 | | 3 |
| m. Detours | 40 | 19 | 6 | 1 | 18 | 1 | | 2 | 3 | | 1 | 3 | | |
| n. Turning restrictions | 45 | 14 | 5 | | 19 | | 1 | | 1 | | 1 | 1 | | 1 |
| o. Truck routes | 36 | 12 | 6 | | 23 | | | | 7 | 2 | 1 | | | 3 |
| p. School zones | 37 | 23 | 6 | | 18 | | 1 | | 2 | | 3 | 2 | | 4 |
| q. Bicycle routes | 28 | 6 | 8 | | 13 | | 1 | | 12 | 4 | 1 | | 2 | 1 |
| r. Parking | 44 | 19 | 8 | | 12 | | 1 | | 1 | 3 | | 1 | | 1 |

TABLE 12

INDIVIDUALS OR ORGANIZATIONS MOST FREQUENTLY ASSOCIATED WITH TRAFFIC AND SAFETY ACTIVITIES

| | Activity | Individual or Organization |
|---|---|---|
| a. | Accident studies | Local police |
| b. | Volume counts | Department of Highways and Transportation |
| c. | Speed studies | Department of Highways and Transportation |
| d. | Sidewalk and pedestrian safety | City or traffic engineer |
| e. | Evaluation of intersection hazards | City or traffic engineer |
| f. | Skid resistance studies | STUDY NOT PERFORMED |
| g. | Traffic control in maintenance and construction zones | City or traffic engineer |
| h. | Traffic signals: | |
| | 1. Design and timing | City or traffic engineer |
| | 2. Installation | City or traffic engineer |
| | 3. Operations and Maintenance | City or traffic engineer |
| i. | Pavement markings: | |
| | 1. Planning and design | City or traffic engineer |
| | 2. Installation | City or traffic engineer |
| | 3. Maintenance | City or traffic engineer |
| j. | Transportation plans | Department of Highways and Transportation |
| k. | Transit routes and stops | City or traffic engineer |
| l. | Illumination | City or traffic engineer |
| m. | Detours | City or traffic engineer |
| n. | Turning restrictions | City or traffic engineer |
| o. | Truck routes | City or traffic engineer |
| p. | School zones | City or traffic engineer |
| q. | Bicycle routes | City or traffic engineer |
| r. | Parking | City or traffic engineer |

These activities were most frequently being performed by the city or town engineer or traffic engineer, and often by the Department of Highways and Transportation. Of particular interest are those activities designated as not being performed. The category checked most frequently for skid resistance studies, for example, was "study not performed," with 28 communities responding in this manner. Other activities marked "study not performed" include transit routes and stops (15 communities) and bicycle routes (12 communities).

## Identification of Hazardous Locations

Responses to the question on the identification of hazardous locations are presented in Table 13. Over half of all the respondents indicated that they had a program to identify hazardous locations, and almost 70% of the respondents to Form A gave such an indication. Most of the respondents indicated that they used several methods for identifying hazardous locations, with numbers of accidents being rated as the method used most often.

TABLE 13

A. DO YOU HAVE A PROGRAM TO IDENTIFY HAZARDOUS LOCATIONS?

| Response | Respondents to Form A | | Respondents to Form B | |
|---|---|---|---|---|
| | Number | Percent | Number | Percent |
| Yes | 50 | 69.4 | 39 | 54.9 |
| No | 19 | 26.4 | 17 | 23.9 |
| Blank | 3 | 4.2 | 14 | 19.7 |
| N/A | 0 | 0.0 | 1 | 1.4 |

TABLE 13 (Cont.)



B. IF YOU HAVE SUCH A PROGRAM, WHAT METHOD DO YOU USE MOST OFTEN?

| Method | Respondents to Form A | | Respondents to Form B | |
|---|---|---|---|---|
| | Number | Percent | Number | Percent |
| Accident rate | 0 | 0.0 | 1 | 1.4 |
| Number of accidents | 20 | 27.8 | 15 | 21.1 |
| Accident severity | 2 | 2.8 | 1 | 1.4 |
| Other | 2 | 2.8 | 3 | 4.2 |
| Several of the above | 29 | 40.3 | 21 | 29.6 |
| Not applicable | 3 | 4.2 | 8 | 11.3 |
| Blank | 16 | 22.2 | 22 | 31.0 |

## Identification of Operational and Safety Problems

Table 14 presents the responses to the question of identification of traffic operations and highway safety problems on Form A and Table 15 gives the categories checked most frequently for each type of problem.

As noted in Table 15 the traffic operations and highway safety problems are most frequently identified by complaint by police department, with citizen complaint and study by respondent's organization being fairly evenly divided. Of particular interest is the need for skid resistance treatment, which was most commonly indicated as not being identified.

Table 16 shows the responses to the same question on Form B, and Table 17 lists the categories checked most frequently for each type of problem.

As seen in Table 17, according to respondents to Form B the traffic operations and highway safety problems are most often identified by citizen complaint. It is interesting to note, as in the case of the responses to Form A, that the need for skid resistance treatment was the problem most often not identified.

TABLE 14

FORM A: HOW ARE THE FOLLOWING TRAFFIC OPERATIONS AND HIGHWAY SAFETY PROBLEMS USUALLY IDENTIFIED IN YOUR JURISDICTION? (CHECK ONE OR MORE CATEGORIES AS APPROPRIATE).

| Type of Problem | Routine Inspection | Citizen Complaint | Complaint by Police Dept. | Study by Your Organization | Study by Consultant | Study by Other Organization | Other (Please Specify) | Not Identified | Planning |
|---|---|---|---|---|---|---|---|---|---|
| a. Need for additional control devices | 28 | 55 | 50 | 40 | 10 | 10 | 1 | | 1 |
| b. Missing, damaged or malfunctioning traffic control devices | 55 | 47 | 53 | 15 | | 1 | | | |
| c. Need for improved signal timing | 33 | 42 | 40 | 35 | 3 | 6 | | 4 | |
| d. Need for additional or improved pavement markings | 48 | 35 | 39 | 36 | 2 | 5 | | 1 | |
| e. Need for skid resistant treatment | 12 | 7 | 10 | 8 | | 5 | 4 | 32 | |
| f. Inadequate or nonexistent roadway lighting | 15 | 43 | 27 | 24 | 2 | 5 | 2 | 5 | |
| g. Roadway congestion and capacity | 23 | 33 | 32 | 42 | 10 | 8 | | | 1 |
| h. Intersection safety | 27 | 39 | 47 | 38 | 2 | 5 | 1 | | 1 |
| i. Need for school crossing protection | 18 | 36 | 43 | 29 | | 7 | 1 | 2 | |
| j. Need for other pedestrian protection | 18 | 40 | 42 | 37 | 2 | 4 | 2 | 1 | 1 |
| k. Parking availability | 16 | 33 | 23 | 39 | 5 | 5 | 1 | 1 | 1 |
| l. Need for speed zoning | 15 | 38 | 44 | 39 | | 4 | | 3 | |
| m. Need for construction signing | 31 | 16 | 23 | 41 | 1 | 4 | 2 | 2 | |
| n. Roadway obstacles | 32 | 33 | 38 | 35 | 1 | 2 | | 2 | |
| o. Other (please specify) | | | | 1 | | | | 1 | |

TABLE 15

MOST FREQUENTLY USED METHODS OF IDENTIFYING TRAFFIC OPERATIONS AND HIGHWAY SAFETY PROBLEMS

| Type of Problem | Method of Identification |
|---|---|
| a. Additional traffic control devices | a. Citizen complaint |
| b. Missing or inoperative traffic control devices | b. Routine inspection |
| c. Improved signal timing | c. Citizen complaint |
| d. Additional or improved pavement markings | d. Routine inspection |
| e. Skid resistance treatment | e. NOT IDENTIFIED |
| f. Improved roadway lighting | f. Citizen complaint |
| g. Roadway congestion and capacity | g. Study by respondent's organization |
| h. Intersection safety | h. Complaint by police department |
| i. School crossing protection | i. Complaint by police department |
| j. Other pedestrian protection | j. Complaint by police department |
| k. Parking availability | k. Study by respondent's organization |
| l. Speed zoning | l. Complaint by police department |
| m. Construction signing | m. Study by respondent's organization |
| n. Roadway obstacles | n. Complaint by police department |

TABLE 16

FORM B: HOW ARE THE FOLLOWING TRAFFIC OPERATIONS AND HIGHWAY SAFETY PROBLEMS USUALLY IDENTIFIED IN YOUR JURISDICTION? (CHECK ONE OR MORE CATEGORIES AS APPROPRIATE.)

| Type of Problem | Routine Inspection | Citizen Complaint | Study by Your Organization | Study by Consultant | Study by Other Organization | Other (please specify) | Not Identified | Traffic Engineer | Police Patrols |
|---|---|---|---|---|---|---|---|---|---|
| a. Need for additional control devices | 20 | 28 | 19 | 10 | 15 | | 1 | 1 | 3 |
| b. Missing, damaged or malfunctioning traffic control devices | 36 | 34 | 7 | | 9 | 2 | 1 | | 3 |
| c. Need for improved signal timing | 20 | 25 | 13 | 3 | 12 | 1 | 1 | 2 | 3 |
| d. Need for additional or improved pavement markings | 27 | 25 | 22 | 4 | 13 | 2 | 1 | 2 | 3 |
| e. Need for skid resistance treatment | 8 | 12 | 4 | 5 | 12 | 1 | 19 | 2 | 3 |
| f. Inadequate or nonexistent roadway lighting | 14 | 26 | 12 | 2 | 14 | 1 | 4 | 2 | 3 |
| g. Roadway congestion and capacity | 20 | 23 | 20 | 6 | 16 | | 4 | 2 | 2 |
| h. Intersection safety | 21 | 25 | 26 | 5 | 16 | 1 | 2 | 2 | 3 |
| i. Need for school crossing protection | 17 | 27 | 22 | 2 | 14 | 2 | 2 | 1 | 3 |
| j. Need for other pedestrian protection | 16 | 26 | 19 | 2 | 17 | 1 | 2 | 2 | 3 |
| k. Parking availability | 18 | 22 | 19 | 4 | 12 | | 5 | 2 | 2 |
| l. Need for speed zoning | 21 | 31 | 23 | 4 | 16 | | | 2 | 4 |
| m. Need for construction signing | 19 | 18 | 15 | 1 | 13 | 1 | 3 | 2 | 3 |
| n. Roadway obstacles | 23 | 29 | 18 | 2 | 11 | 1 | 1 | 2 | 3 |
| o. Other (please specify) | | | | | | | 1 | | |

TABLE 17

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MOST FREQUENTLY USED METHODS TO IDENTIFY
TRAFFIC OPERATIONS AND HIGHWAY SAFETY PROBLEMS

| Type of Problem | Method of Identification |
|---|---|
| a. Additional traffic control devices | a. Citizen complaint |
| b. Missing or inoperative traffic control devices | b. Routine inspection |
| c. Improved signal timing | c. Citizen complaint |
| d. Additional or improved pavement markings | d. Routine inspection |
| e. Skid resistance treatment | e. NOT IDENTIFIED |
| f. Improved roadway lighting | f. Citizen complaint |
| g. Roadway congestion and capacity | g. Citizen complaint |
| h. Intersection safety | h. Study by respondent's organization |
| i. School crossing protection | i. Citizen complaint |
| j. Other pedestrian protection | j. Citizen complaint |
| k. Parking availability | k. Citizen complaint |
| l. Speed zoning | l. Citizen complaint |
| m. Construction signing | m. Routine inspection |
| n. Roadway obstacles | n. Citizen complaint |

## Frequency of Traffic Operations Activities

A question on the frequency of performing specific traffic operations and highway safety activities was included in Form A. The responses to this question are shown in Table 18. Those activities indicated as being performed only occasionally (defined as once or twice a year) include pedestrian studies, volume studies, identification of substandard or deficient roadway lighting, adjustment of speed limits based on current speed studies, travel and delay studies, highway capacity analysis, and studies relating accidents to specific design features of the roadway. Particularly important is the identification of substandard or non-skid resistant pavement, which was most often indicated as never being performed.

TABLE 18

How often are the following activities performed?

| | Never | Experimentally | Occasionally (once or twice a year) | Often (once a month) | Routinely | Not Applicable | Blank |
|---|---|---|---|---|---|---|---|
| (a) Adjustment of speed limits based on current speed studies | 7 (9.7%) | 13 (18.1%) | 25 (34.7%) | 3 (4.2%) | 16 (22.2%) | 2 (2.8%) | 6 (8.3%) |
| (b) Identification of substandard or non-skid resistant pavement | 21 (29.2%) | 9 (12.5%) | 8 (11.1%) | 3 (4.2%) | 8 (11.1%) | 16 (22.2%) | 7 (9.7%) |
| (c) Identification of substandard or deficient roadway lighting | 5 (6.9%) | 6 (8.3%) | 26 (36.1%) | 1 (1.4%) | 18 (25.0%) | 6 (8.3%) | 8 (11.1%) |
| (d) Travel and delay studies | 12 (16.7%) | 12 (16.7%) | 25 (34.7%) | 3 (4.2%) | 7 (9.7%) | 6 (8.3%) | 7 (9.7%) |
| (e) Volume studies | 2 (2.8%) | 7 (9.7%) | 29 (40.3%) | 3 (4.2%) | 24 (33.3%) | 3 (4.2%) | 4 (5.6%) |
| (f) Accident analysis | 1 (1.4%) | 3 (4.2%) | 23 (31.9%) | 9 (12.5%) | 29 (40.3%) | 2 (2.8%) | 5 (6.9%) |
| (g) Highway capacity analysis | 6 (8.3%) | 14 (19.4%) | 24 (33.3%) | 1 (1.4%) | 13 (18.1%) | 8 (11.1%) | 6 (8.3%) |
| (h) Pedestrian safety studies | 3 (4.2%) | 7 (9.7%) | 33 (45.8%) | 4 (5.6%) | 14 (19.4%) | 6 (8.3%) | 5 (6.9%) |
| (i) Evaluation of existing traffic control devices and pavement markings | 1 (1.4%) | 4 (5.6%) | 18 (25.0%) | 11 (15.3%) | 34 (47.2%) | 1 (1.4%) | 3 (4.2%) |
| (j) Studies relating accidents to specific design features of the roadway | 4 (5.6%) | 6 (8.3%) | 23 (31.9%) | 7 (9.7%) | 19 (26.4%) | 6 (8.3%) | 7 (9.7%) |
| (k) Identification of roadside obstacles | 5 (6.9%) | 8 (11.1%) | 20 (27.8%) | 6 (8.3%) | 26 (36.1%) | 2 (2.8%) | 5 (6.9%) |
| (l) Studies to determine compliance with sign standards in the Manual on Uniform Traffic Control Devices | 3 (4.2%) | 1 (1.4%) | 22 (30.6%) | 3 (4.2%) | 37 (51.4%) | 3 (4.2%) | 3 (4.2%) |
| (m) Identification of hazardous locations | 0 (0.0%) | 7 (9.7%) | 18 (25.0%) | 7 (9.7%) | 36 (50.0%) | 0 (0.0%) | 4 (5.6%) |

## Priorities For Safety Projects

In developing a traffic operations and highway safety program, one of the considerations involves developing a method for establishing priorities for safety projects. All respondents were questioned as to whether or not they had such a method. As seen in Table 19, the responses were fairly evenly divided between those who had and those who did not. However, for all respondents, less than half indicated that they had a method for establishing priorities for safety projects. The methods vary widely in sophistication. Of those who responded that they do have such a program, some of the methods indicated were:

1. Availability of funds
2. Accident frequency, data, and analysis
3. Hazard index and accident potential
4. Annual survey of traffic, police and fire needs
5. Citizen participation
6. Traffic volume and analysis
7. Complaints
8. Cost estimates
9. Environmental effects
10. City or local transportation safety committee.

TABLE 19

DO YOU HAVE A METHOD FOR ESTABLISHING PRIORITIES FOR SAFETY PROJECTS?

| Response | Respondents to Form A | | Respondents to Form B | |
|---|---|---|---|---|
| | Number | Percent | Number | Percent |
| Yes | 33 | 45.8 | 27 | 38.0 |
| No | 35 | 48.6 | 27 | 38.0 |
| Not Applicable | 0 | 0.0 | 3 | 4.2 |
| Blank | 4 | 5.6 | 14 | 19.7 |

## Use of the MUTCD

Form A of the questionnaire included a question on the availability and use of the MUTCD. As can be seen in Table 20, most of the communities indicated that they had a copy of the MUTCD, and of these respondents a large percentage said that they routinely used the MUTCD when installing signals, signs, pavement markings, etc. Less than 2% indicated that they used the MUTCD only occasionally, and none said that they never used the MUTCD standards.

## Highway Safety Program Standard 13

In 1971, Highway Safety Program Standard 13, Traffic Engineering Services, was issued. This standard, which is administered by the Federal Highway Administration, requires that "Each state, in cooperation with its political subdivisions, and each Federal department or agency which controls highways open to public travel or supervises traffic operations, shall have a program for applying traffic engineering measures and techniques, including the use of traffic control devices, to reduce the number and severity of traffic accidents" (see Appendix D). Both Form A and Form B surveyed the respondents' familiarity with Standard 13. As seen in Table 21, the majority of respondents indicated that they were not familiar with it.

TABLE 20

a. Do you have a copy of the MUTCD?

| Response | Number | Percent |
|---|---|---|
| Yes | 66 | 91.7 |
| No | 4 | 5.6 |
| Blank | 2 | 2.8 |

b. If yes, do you use the MUTCD standards when installing signals, signs, pavement markings, etc.?*

| Response | Number | Percent |
|---|---|---|
| Never | 0 | 0.0 |
| Occasionally | 1 | 1.5 |
| Often | 11 | 16.7 |
| Routinely | 54 | 81.8 |

*Six respondents left this question blank.

TABLE 21

ARE YOU FAMILIAR WITH HIGHWAY SAFETY PROGRAM STANDARD 13?

| Response | Respondents to Form A | | Respondents to Form B | |
|---|---|---|---|---|
| | Number | Percent | Number | Percent |
| Yes | 29 | 26.4 | 18 | 25.4 |
| No | 48 | 66.7 | 38 | 53.5 |
| Blank | 5 | 6.9 | 15 | 21.1 |

Accident Records

Since accident data are often used in the development of countermeasures for traffic operations and highway safety problems, Form A included a question on the timeliness, availability, and accuracy of accident report information. Interestingly, over 60% of the respondents indicated that they had experienced no problems with delay in receiving accident report information, availability of accident report information, or accuracy and completeness of accident report information (see Table 22). However, this result must be interpreted in light of their needs and uses of accident data, i.e., some do not need or use the data, thus no problems are indicated.

TABLE 22

ARE THE FOLLOWING A PROBLEM IN YOUR JURISDICTION?

| | | Yes | No | Do Not Know | Blank |
|---|---|---|---|---|---|
| (a) | Delay in receiving accident report information | 21 (29.2%) | 44 (61.1%) | 5 (5.6%) | 3 (4.2%) |
| (b) | Unavailability of accident report information | 15 (20.8%) | 49 (68.1%) | 5 (6.9%) | 3 (4.2%) |
| (c) | Deficiencies in accident report information (inconsistencies in information, incomplete information, etc.) | 15 (20.8%) | 47 (65.3%) | 7 (9.7%) | 3 (4.2%) |

## Summary of Activities

The activities of the communities surveyed indicate that while some efforts were being made to improve traffic operations and safety, further improvements could be made. Over half of the communities responding to Form A maintained an inventory of traffic control devices (i.e., signs, signals, and pavement markings) although the percentage was not very high. Most of the respondents to Form A indicated that their jurisdictions were performing some analyses to evaluate the effectiveness of traffic and safety improvements; less than 3% indicated that such analyses were not being performed. A little over half of the respondents to Form A were using §402 safety funds available through the Virginia Department of Transportation Safety; a large percentage of them indicated that they were using state funds. Skid resistance studies, including determination of the need for treatments to improve skid resistance and the identification of substandard or non-skid resistant pavement, often were indicated as not being performed. Other activities often cited as not being performed were studies of transit routes and stops and bicycle routes. Most of the respondents had a method for identifying hazardous locations. While several methods were being used by some respondents, the method most often cited was based on number of accidents. Less than half of all respondents indicated that they had a method for establishing priorities for safety projects. Most of the communities indicated that they had a copy of the MUTCD, and of these respondents a large percentage said they routinely used it when installing signals, signs, pavement markings, etc. No communities said that they never used the MUTCD standards. Few respondents indicated that they were familiar with Highway Safety Program Standard 13. Over 60% indicated that they had experienced no problems with delay in receiving accident report information, or with the accuracy and completeness of accident report information.

## Traffic Operations and Highway Safety Needs

In addition to the questions designed to identify characteristics of the respondents and to determine what was being done in the area of traffic operations and safety, the survey included questions on what the respondents considered to be traffic operations and highway safety needs. Some of these questions required respondents to rank specific issues. Several open-ended, discussion questions were included in the questionnaire to provide respondents an opportunity to expand on some of the issues mentioned in the questionnaire and to describe aspects of traffic operations and highway safety programs in their jurisdictions. Respondents were also encouraged to make any comments they desired. Following are discussions of the responses to some of these questions.

## Need for Traffic Operations and Safety Improvements

Table 23 lists the needs for improving specific traffic operations and highway safety activities as ranked by respondents to Form A. The 15 activities listed were rated according to whether the respondents indicated that there was a great need, some need, little need, or no need for the improvements. "Some need" was the most common rating for each of the activities, except for highway capacity analysis and studies to determine compliance with sign standards in the MUTCD, which were most frequently rated "little need."

The needs were ranked by assigning a value of 3, 2, and 1 to each response in the categories of great need, some need, and little need, respectively. These values were added for each category of need, and the resultant figures used to rank the needs, with the highest figure being the highest priority and the lowest figure the lowest priority. In order of priority, the needs were ranked as follows:

1. Identification of hazardous locations
2. Accident analysis
3. Studies relating accidents to specific design features of the roadway
4. Pedestrian safety studies
5. Evaluation of existing traffic control devices and pavement markings
6. Development of methods for identifying substandard or deficient roadway lighting
   AND
   Highway capacity analysis
7. Volume studies
8. Identification of roadside obstacles
9. Simplified techniques for conducting travel and delay studies
10. Methods by which speed zones are established
11. Adjustment of speed limits based on current speed studies

12. Development of procedures for correcting sub-standard or non-skid resistant pavement

13. Studies to determine compliance with sign standards in the MUTCD

14. Identification of substandard or non-skid resistant pavement

The needs for improving traffic operations and highway safety activities as ranked by the respondents to Form B are shown in Table 24. Each of the 15 activities listed was rated according to whether there was a great need, some need, little need, or no need for it. The needs listed in Table 24 were ranked as described above for the responses to Form A. The needs were ranked as follows:

1. Identification of hazardous locations

2. Studies relating accidents to specific design features of the roadway

3. Accident analysis

4. Evaluation of existing traffic control devices and pavement markings

5. Pedestrian safety studies

6. Development of methods for identifying substandard or deficient roadway lighting
   AND
   Highway capacity analysis

7. Identification of roadside obstacles

8. Methods by which speed zones are established
   AND
   Volume studies

9. Adjustment of speed limits based on current speed studies
   AND
   Identification of substandard or non-skid resistant pavement

10. Studies to determine compliance with sign standards in the MUTCD

TABLE 23



How would you describe the need for improving the following:

| | | Great Need | Some Need | Little Need | No Need | Not Applicable | Blank |
|---|---|---|---|---|---|---|---|
| (a) | Methods by which speed zones are established | 2 (2.8%) | 31 (43.1%) | 21 (29.2%) | 10 (13.9%) | 3 (4.2%) | 5 (6.9%) |
| (b) | Adjustment of speed limits based on current speed studies | 2 (2.8%) | 31 (43.1%) | 19 (26.4%) | 10 (13.9%) | 4 (5.6%) | 6 (8.3%) |
| (c) | Identification of substandard or non-skid resistant pavement | 3 (4.2%) | 25 (34.7%) | 17 (23.6%) | 12 (16.7%) | 10 (13.9%) | 5 (6.9%) |
| (d) | Development of procedures for correcting substandard or non-skid resistant pavement | 5 (6.9%) | 24 (33.3%) | 18 (25.0%) | 8 (11.1%) | 10 (13.9%) | 7 (9.7%) |
| (e) | Development of methods for identifying substandard or deficient roadway lighting | 11 (15.3%) | 31 (43.1%) | 13 (18.1%) | 8 (11.1%) | 3 (4.2%) | 6 (8.3%) |
| (f) | Simplified techniques for conducting travel and delay studies | 9 (12.5%) | 27 (37.5%) | 17 (23.6%) | 7 (9.7%) | 5 (6.9%) | 7 (9.7%) |
| (g) | Volume studies | 11 (15.2%) | 25 (34.7%) | 17 (23.6%) | 12 (16.7%) | 2 (2.8%) | 5 (6.9%) |
| (h) | Identification of hazardous locations | 13 (18.1%) | 37 (51.4%) | 12 (16.7%) | 6 (8.3%) | 0 ( 0.0%) | 4 (5.6%) |
| (i) | Accident analysis | 16 (22.2%) | 31 (43.1%) | 14 (19.4%) | 4 (5.6%) | 1 (1.4%) | 6 (8.3%) |
| (j) | Highway capacity analysis | 16 (22.2%) | 18 (25.0%) | 24 (33.3%) | 6 (8.3%) | 2 (2.8%) | 6 (8.3%) |
| (k) | Pedestrian safety studies | 15 (20.8%) | 31 (43.1%) | 11 (15.3%) | 6 (8.3%) | 3 (4.2%) | 6 (8.3%) |
| (l) | Evaluation of existing traffic control devices and pavement markings | 14 (19.4%) | 30 (41.7%) | 15 (20.8%) | 7 (9.7%) | 0 (0.0%) | 6 (8.3%) |
| (m) | Studies relating accidents to specific design features of the roadway | 12 (16.7%) | 36 (50.0%) | 12 (16.7%) | 4 (5.6%) | 1 (1.4%) | 7 (9.7%) |
| (n) | Identification of roadside obstacles | 5 (6.9%) | 31 (43.1%) | 22 (30.6%) | 7 (9.7%) | 1 (1.4%) | 6 (8.3%) |
| (o) | Studies to determine compliance with sign standards in the Manual on Uniform Traffic Control Devices | 5 (6.9%) | 19 (26.4%) | 26 (36.1%) | 15 (20.8%) | 2 (2.8%) | 5 (6.9%) |

TABLE 24

HOW WOULD YOU DESCRIBE THE NEED FOR IMPROVING THE FOLLOWING:

| | Great Need | Some Need | Little Need | No Need | Not Applicable | Blank |
|---|---|---|---|---|---|---|
| (a) Methods by which speed zones are established | 8 (11.3%) | 24 (33.8%) | 13 (18.3%) | 10 (14.1%) | 2 (2.8%) | 14 (19.7%) |
| (b) Adjustment of speed limits based on current speed studies | 10 (14.1%) | 19 (26.8%) | 15 (21.1%) | 11 (15.5%) | 2 (2.8%) | 14 (19.7%) |
| (c) Identification of substandard or non-skid resistant pavement | 8 (11.3%) | 24 (33.8%) | 11 (15.5%) | 7 (9.9%) | 5 (7.0%) | 16 (22.5%) |
| (d) Development of procedures for correcting substandard or non-skid resistant pavement | 7 (9.9%) | 25 (35.2%) | 9 (12.7%) | 6 (8.5%) | 7 (9.9%) | 17 (23.9%) |
| (e) Development of methods for identifying substandard or deficient roadway lighting | 12 (16.9%) | 23 (32.4%) | 11 (15.5%) | 8 (11.3%) | 3 (4.2%) | 14 (19.7%) |
| (f) Simplified techniques for conducting travel and delay studies | 7 (9.9%) | 22 (31.0%) | 14 (19.7%) | 6 (8.5%) | 7 (9.9%) | 15 (21.1%) |
| (g) Volume studies | 9 (12.7%) | 23 (32.4%) | 12 (16.9%) | 5 (7.0%) | 5 (7.0%) | 17 (23.9%) |
| (h) Identification of hazardous locations | 19 (26.8%) | 23 (32.4%) | 13 (18.3%) | 1 (1.4%) | 2 (2.8%) | 13 (18.3%) |
| (i) Accident analysis | 14 (19.7%) | 27 (38.0%) | 12 (16.9%) | 2 (2.8%) | 2 (2.8%) | 14 (19.7%) |
| (j) Highway capacity analysis | 7 (9.9%) | 30 (14.3%) | 12 (16.9%) | 4 (5.6%) | 4 (5.6%) | 14 (19.7%) |
| (k) Pedestrian safety studies | 13 (18.3%) | 26 (36.6%) | 12 (16.9%) | 3 (4.2%) | 2 (2.8%) | 15 (21.1%) |
| (l) Evaluation of existing traffic control devices and pavement markings | 11 (15.5%) | 32 (45.1%) | 8 (11.3%) | 4 (5.6%) | 2 (2.3%) | 14 (19.7%) |
| (m) Studies relating accidents to specific design features of the roadway | 16 (22.5%) | 25 (35.2%) | 13 (18.3%) | 2 (2.8%) | 2 (2.8%) | 13 (18.3%) |
| (n) Identification of roadside obstacles | 6 (8.5%) | 25 (35.2%) | 19 (26.8%) | 5 (7.0%) | 2 (2.8%) | 14 (19.7%) |
| (o) Studies to determine compliance with sign standards in the Manual on Uniform Traffic Control Devices | 7 (9.9%) | 20 (28.2%) | 20 (28.2%) | 7 (9.9%) | 2 (2.8%) | 15 (21.1%) |

11. Development of procedures for correcting sub-standard or non-skid resistant pavement

12. Simplified techniques for conducting travel and delay studies.

## Traffic Engineering Problems

Table 25 shows the results of the question included in Form A which required the respondents to rank on a scale from 1 to 8 with 1 indicating most important and 8 being least important a list of traffic engineering problems in order of importance in their jurisdictions. The problem ranked most often as most important was funding and budget, with almost half of the communities considering it their most important problem. Lack of personnel and training of personnel were also frequently ranked as "most important".

TABLE 25

HOW WOULD YOU CATEGORIZE THE MAJOR TRAFFIC ENGINEERING PROBLEMS IN YOUR JURISDICTION?
(RANK THEM IN ORDER OF IMPORTANCE: 1 = MOST IMPORTANT, 8 = LEAST IMPORTANT)

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Blank | Problem |
|---|---|---|---|---|---|---|---|---|---|
| 32 | 18 | 6 | 4 | 1 | 2 | 3 | | 6 | (a) Funding and budget |
| 15 | 18 | 15 | 2 | 4 | 4 | 4 | | 10 | (b) Lack of personnel |
| 10 | 10 | 15 | 16 | 5 | 6 | | 2 | 8 | (c) Training of personnel |
| 5 | 6 | 6 | 9 | 11 | 8 | 15 | 4 | 8 | (d) Need additional traffic control devices |
| 4 | 2 | 4 | 7 | 13 | 13 | 18 | 2 | 9 | (e) Coordination with other organizations |
| 2 | 4 | 10 | 11 | 12 | 13 | 8 | 3 | 9 | (f) Identification of hazardous locations |
| 5 | 5 | 5 | 11 | 9 | 11 | 15 | 2 | 9 | (g) Public support |
| 2 | 2 | 1 | 2 | 2 | | | 9 | 54 | (h) Other (please specify) |

Another question in Form A asked respondents to list specific traffic engineering and safety problems in their respective areas. Many of the responses were related to specific locations and problem areas for individual localities. Listed in no particular order, some of the general problems were as follows:

1. Upgrading of existing traffic control devices and improved pavement markings
2. Installation of additional traffic control devices
3. Lack of adequate staff and need for trained personnel
4. Need for additional funds
5. Disregard of speed limits by motorists
6. Accidents at signalized intersections
7. Identification of hazardous locations
8. Upgrading of railroad crossings
9. Improved pedestrian safety
10. Unavailability of consultants
11. Evaluation and improvement of sight distances
12. Need for increased street capacity.

As in Form A, respondents to Form B were asked to list specific traffic engineering and safety problems in their respective areas. Again, many of the responses were specific to individual localities, however, some general problems as noted below were cited.

1. Heavy volume of traffic
2. Poorly designed intersections and markings
3. Need increased enforcement of speed limits
4. Limited funding for training and enforcement
5. Lack of qualified traffic engineering personnel
6. Need evaluation of traffic control devices
7. Signalized intersections.

## Traffic Operations and Safety Improvements

The rankings of measures to improve traffic operations and safety as indicated by the responses to Form A are presented in Table 26. The improvements listed were ranked from 1 to 9, with 1 = most important and 9 = least important. Increased funding was indicated as the most important improvement by almost half of the respondents. It was followed in order of importance by additional personnel and training for personnel.

TABLE 26

WHAT DO YOU THINK COULD BE DONE TO IMPROVE TRAFFIC OPERATIONS AND SAFETY? (RANK THEM IN ORDER OF IMPORTANCE: 1 = MOST IMPORTANT, 9 = LEAST IMPORTANT

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Blank | Improvement |
|---|---|---|---|---|---|---|---|---|---|---|
| 32 | 18 | 6 | 3 | 1 | 2 | 3 | 3 | 1 | 3 | (a) Increased funding |
| 15 | 15 | 17 | 2 | 3 | 5 | 5 | 2 | 1 | 7 | (b) Additional personnel |
| 13 | 11 | 13 | 17 | 5 | 6 | 1 | 2 | | 4 | (c) Training for personnel |
| 5 | 4 | 7 | 10 | 10 | 9 | 13 | 8 | 1 | 5 | (d) Improved traffic control devices |
| | 6 | 5 | 10 | 16 | 14 | 7 | 4 | | 8 | (e) Operational measures |
| 3 | 3 | 2 | 6 | 13 | 12 | 7 | 18 | 2 | 6 | (f) Improved coordination with other organizations |
| 2 | 4 | 4 | 12 | 7 | 10 | 10 | 13 | 3 | 7 | (g) Procedure for identifying hazardous locations |
| 4 | 4 | 7 | 9 | 8 | 3 | 14 | 13 | 2 | 8 | (h) Increased public support |
| 5 | 1 | 1 | 1 | 1 | | | | 11 | 52 | (i) Other (please specify) |

Form B also included rankings of measures to improve traffic operations and highway safety and are shown in Table 27. Increased funding was indicated as the most important improvement by almost 30% of the respondents. Additional personnel and increased public support were among those ranked highest.

TABLE 27

WHAT DO YOU THINK COULD BE DONE TO IMPROVE TRAFFIC OPERATIONS AND SAFETY? (RANK THEM IN ORDER OF IMPORTANCE: 1 = MOST IMPORTANT, 9 = LEAST IMPORTANT)

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Blank | Problem |
|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 9 | 8 | 5 | 5 | 2 | 3 | | 1 | 18 | (a) Increased funding |
| 8 | 10 | 12 | 7 | 5 | 4 | 3 | 4 | 1 | 17 | (b) Additional personnel |
| 4 | 8 | 14 | 8 | 8 | 4 | 4 | 1 | 1 | 19 | (c) Training for personnel |
| 5 | 5 | 3 | 13 | 6 | 7 | 8 | 4 | 3 | 17 | (d) Improved traffic control devices |
| | 1 | 3 | 6 | 12 | 9 | 10 | 10 | 1 | 19 | (e) Operational measures |
| 1 | 4 | 3 | 4 | 2 | 12 | 11 | 13 | 3 | 18 | (f) Improved coordination with other organizations |
| 6 | 7 | 3 | 5 | 9 | 6 | 7 | 9 | 1 | 18 | (g) Procedure for identifying hazardous locations |
| 17 | 11 | 5 | 3 | 4 | 3 | 2 | 7 | 1 | 18 | (h) Increased public support |
| 2 | | | 2 | | 1 | | | 9 | 57 | (i) Other (please specify) |

Respondents were also asked to list traffic engineering and safety problems they would like to see studied. Again, many of the responses were specific to the individual localities, but some of the studies most often cited as being needed by respondents to Form A were the following:

1. Evaluation of intersections, including signalized intersections
2. Evaluation of appropriate staffing
3. Evaluation of funding
4. Standardization and evaluation of traffic control devices and pavement markings
5. Improved railroad crossings

6. Pedestrian safety studies

7. Identification of hazardous locations

8. Highway capacity studies

9. Evaluation of mountain pavement markings

10. Evaluation of street lighting

11. Availability of consultants

Respondents to Form B were also asked to list traffic engineering and safety problems they would like to see studied, and some of their general responses were as follows:

1. Pedestrian safety

2. Enforcement of speed limits

3. Evaluation of speed zones

4. Increased personnel and funding

5. Evaluation of sight distances

6. Evaluation of traffic control devices

7. Identification of high accident locations

8. Evaluation of high accident rate intersections.

## Summary of Needs

The traffic operations and highway safety needs identified by the survey were similar for respondents to Form A and Form B. In one question, respondents were asked to rate the need for improving specific traffic operations and highway safety activities. The needs were ranked from highest priority to lowest priority as given in Table 28.

TABLE 28

COMPARISON OF NEEDS RATED BY RESPONDENTS
TO FORM A AND FORM B

| Form A (Traffic Engineers) | Form B (Law Enforcement Officials) |
|---|---|
| 1. Identification of hazardous locations | 1. Identification of hazardous locations |
| 2. Accident analysis | 2. Studies relating accidents to specific design features of the roadway |
| 3. Studies relating accidents to specific design features of the roadway | 3. Accident analysis |
| 4. Pedestrian safety studies | 4. Evaluation of existing traffic control devices and pavement markings |
| 5. Evaluation of existing traffic control devices and pavement markings | 5. Pedestrian safety studies |
| 6. Development of methods for identifying substandard or deficient roadway lighting AND Highway capacity analysis | 6. Development of method(s) for identifying substandard or deficient roadway lighting AND Highway capacity analysis |
| 7. Volume studies | 7. Identification of roadside obstacles |
| 8. Identification of roadside obstacles | 8. Methods by which speed zones are established AND Volume studies |
| 9. Simplified techniques for conducting travel and delay studies | 9. Adjustment of speed limits based on current speed studies AND Identification of substandard or non-skid resistant pavement |
| 10. Methods by which speed zones are established | 10. Studies to determine compliance with sign standards in the Manual on Uniform Traffic Control Devices |
| 11. Adjustment of speed limits based on current speed studies | 11. Development of procedures for correcting substandard or non-skid resistant pavement |
| 12. Development of procedures for correcting substandard or non-skid resistant pavement | 12. Simplified techniques for conducting travel and delay studies. |
| 13. Studies to determine compliance with sign standards in the Manual on Uniform Traffic Control Devices | |
| 14. Identification of substandard or non-skid resistant pavement. | |

Interestingly, the needs were similarly ranked by traffic engineers and law enforcement officials. Also, traffic engineering problems were categorized much the same by traffic engineers and law enforcement officials. Both groups ranked funding and additional personnel as top needs. In addition, while some of the comments in the discussion questions were specific to individual jurisdictions, many of the general categories of responses were the same for traffic engineers and law enforcement officials. These comments also substantiated some of the results of the other questions on traffic operations and highway safety needs.

One of the recurring findings concerns funding. Increased funding appears to be one of the needs commonly existing throughout the state.

Another need has to do with increased personnel and training of personnel. Throughout Virginia there seems to be a need for increased personnel with expertise in traffic operations and highway safety. Training opportunities need to be provided. Lack of qualified traffic engineering personnel does not, however, seem to be a problem of simply increasing personnel. Since many of the localities are too small to support a full-time traffic engineer, many of the respondents suggested the possibility of obtaining qualified traffic engineering personnel by making such personnel available on a rotating, consulting basis throughout the state.

Other recurring areas of concern were evaluation of traffic control devices, identification of hazardous locations, and evaluation of intersections, particularly signalized intersections.

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Traffic Improvement Association of Oakland County. May 1977. Comprehensive Traffic Engineering Project, Oakland County, Michigan.

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# APPENDIX A

## SAMPLE QUESTIONNAIRE FORM A WITH TABULATED RESPONSES AND COVER LETTER

1218

DEPARTMENT OF HIGHWAYS & TRANSPORTATION
HAROLD C. KING, COMMISSIONER

LEO E. BUSSER, III
DEPUTY COMMISSIONER AND
CHIEF ENGINEER

OSCAR K. MABRY
DIRECTOR OF PLANNING

UNIVERSITY OF VIRGINIA
DR. FRANK L. HEREFORD, JR., PRESIDENT

SCHOOL OF ENGINEERING & APPLIED SCIENCE
JOHN E. GIBSON, DEAN

DR. LESTER A. HOEL, CHAIRMAN
DEPARTMENT OF CIVIL ENGINEERING

# COMMONWEALTH of VIRGINIA

## HIGHWAY & TRANSPORTATION RESEARCH COUNCIL

JACK H. DILLARD, HEAD
VIRGINIA HIGHWAY & TRANSPORTATION RESEARCH COUNCIL

BOX 3817 UNIVERSITY STATION
CHARLOTTESVILLE, VIRGINIA 22903

March 12, 1979

IN REPLY PLEASE
REFER TO FILE NO. _____

In recognition of the continuing need to improve the efficiency and safety of transportation in Virginia, the Virginia Highway and Transportation Research Council has recently initiated a comprehensive traffic operations and safety research management program which is being conducted for the Virginia Department of Transportation Safety. Although traffic and safety research has been an integral part of the Council's efforts for a number of years, the program is to develop a comprehensive long-range plan for research activities in traffic engineering and highway safety. The research program includes (1) identifying traffic and safety management problems and research needs in the state, including those of cities and towns; (2) categorizing and establishing priorities on major research areas based on identified needs; (3) examining the prioritized traffic engineering problems; (4) disseminating the results of research through training, seminars, workshops, etc.; and (5) conducting demonstration projects.

To assist in identifying traffic and safety needs we have prepared the attached questionnaire which we would appreciate your completing and returning to us. Please consider each question carefully. The questions have been designed to determine current problems, and your responses will be used to develop a comprehensive program to improve traffic operations and safety in Virginia. We would appreciate receiving your reply by Monday, April 16, 1979. If you have any questions, please call Deborah Mitchell or Martin Parker at (804) 977-0290.

Thank you for your assistance.

Very truly yours,

Jack H. Dillard

Jack H. Dillard, Head
Va. Highway & Transportation
Research Council

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Return Completed Questionnaire To:

Deborah A. Mitchell
Research Analyst
Virginia Highway & Transportation Research Council
Box 3817 University Station
Charlottesville, Virginia 22903

Virginia Highway and Transportation Research Council

SURVEY QUESTIONNAIRE

IDENTIFICATION OF TRAFFIC AND SAFETY MANAGEMENT NEEDS

Name _____

Title _____

Name of Organization _____

Name of Department _____

Address _____

_____

_____

_____

Telephone Number _____ (  ) _____

Your assistance and cooperation in completing this questionnaire will assist in determining traffic engineering and highway safety needs in Virginia. The information you provide will be tabulated along with data from other jurisdictions and summarized in a report. If you have any questions regarding the questionnaire, please contact Deborah Mitchell, at (804) 977-0290. Please indicate below if you would like to receive a copy of the final report.

_____ Yes, please send me a copy of the final report.

Title:

| | |
|---|---|
| District Traffic Engineer | 9 |
| State Traffic and Safety Engineer | 4 |
| City or Town Traffic Engineer | 21 |
| City or Town Manager | 17 |
| Planning OFficer | 1 |
| Town Engineer | 4 |
| Director of Public Works | 9 |
| Administrative Assistant, Administrator | 7 |
| Other | 0 |
| Blank | 0 |

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1. How would you characterize your role in traffic engineering and highway safety activities?

49 (a) administrative

1 (b) research oriented

15 (c) engineering/operational

2 (d) technical assistance

2 (e) other (please specify) _____

Blank 3

2. a. How many traffic engineers are currently employed in your jurisdiction on a full-time basis? _____ None 37 1-10 31 11-20 2 Blank 2

b. How many traffic engineers are currently employed in your jurisdiction on a part-time basis (for example, engineers hired as consultants)? _____
None 55 1-10 11 11-20 1 N/A 1 Blank 4

3. a. How many traffic technicians are currently employed in your jurisdiction on a full-time basis? _____ None 28 1-10 35 21-30 1 More than 30 3 Blank 5

b. How many traffic technicians are currently employed in your jurisdiction on a part-time basis (for example, technicians contracted for part-time work)? _____
None 53
1-10 11
N/A 1
Blank 7

4. Do you have specific education/experience requirements for your traffic engineering personnel?

31 Yes 34 No N/A 4 Blank 3

5. a. Is in-house training in traffic engineering provided for your employees having traffic engineering responsibilities?

35 Yes 32 No N/A 3 Blank 2

b. Have you conducted any training in traffic engineering for your employees having traffic engineering responsibilities?

30 Yes 37 No N/A 3 Blank 2

c. Are you familiar with any traffic engineering seminars conducted by the Department of Transportation Safety and Virginia Commonwealth University?

50 Yes 20 No N/A 0 Blank 2

6. What is the highest level of training obtained by the traffic personnel on your staff?

| Number of Employees | | | | | | Type of Training | Number of Employees |
|---|---|---|---|---|---|---|---|
| 1-5 | 6-10 | 11-20 | ✓ | N/A | Blank | | |
| 15 | | | 3 | 4 | 47(a) | registered professional engineer | |
| 17 | | | 4 | 4 | 46(b) | graduate engineer | |
| 9 | 1 | | 9 | 4 | 48(c) | attended engineering school | |
| 10 | | 1 | 2 | 4 | 47(d) | previous related job experience | |
| 13 | 3 | | 14 | 4 | 37(e) | in-house training in traffic engineering on the job | |
| 4 | | | 5 | 4 | 54(f) | other (please specify) | |

7. Please list the traffic engineering or highway safety seminars you or your staff have attended in the past three years.

| Number of Seminars | Number of Respondents |
|---|---|
| None | 18 |
| 1-5 | 26 |
| 6-10 | 8 |
| More than 10 | 3 |
| Some | 8 |
| Blank | 9 |

8. Of what professional organizations are you a member?

| | |
|---|---|
| 0 | (a) American Society of Civil Engineers |
| 1 | (b) Institute of Transportation Engineers |
| 8 | (c) Virginia Section, Institute of Transportation Engineers |
| 7 | (d) American Public Works Association |
| 4 | (e) Other (please specify) |
| 32 | Two or more |

9. a. Do you have written job descriptions for traffic engineering positions in your jurisdiction?

32 Yes 36 No Blank 4

b. Do you have specific assignment of traffic engineering responsibilities by state or city law or ordinance?

29 Yes 37 No Blank 6

10. How would you describe the need for the following?

| | Great Need | Some Need | Little Need | No Need | Not Applicable | Blank |
|---|---|---|---|---|---|---|
| (a) Education/experience requirements for traffic engineering personnel | 13 | 31 | 6 | 3 | 12 | 7 |
| (b) Training in traffic engineering for employees having traffic engineering responsibilities | 28 | 33 | 4 | 1 | 4 | 2 |
| (c) Training (seminars, workshops, etc.) in traffic engineering for policy makers (legislators, city council, manager, county executive, etc.) | 20 | 30 | 9 | 3 | 7 | 3 |
| (d) Written job descriptions for traffic engineering positions | 6 | 16 | 20 | 12 | 12 | 6 |
| (e) Formal assignment of traffic engineering positions | 6 | 14 | 20 | 11 | 13 | 8 |
| (f) An assessment of traffic engineering manpower needs | 15 | 25 | 14 | 4 | 6 | 8 |
| (g) Additional traffic engineering manpower | 18 | 23 | 16 | 3 | 7 | 5 |

11. a. Are you responsible for collecting data for the Highway Safety Plan for the Department of Transportation Safety (Highway Safety Division of Virginia)?

29 Yes 35 No Partly 3 Blank 5

b. Are you responsible for collecting data for the transportation plan as required by the Federal Highway Administration and Urban Mass Transportation Administration in your jurisdiction?

22 Yes 38 No Partly 3 Blank 9

12. Do you maintain an inventory of traffic control devices, i.e., signs, signals, and pavement markings?

49 Yes 17 No At least one of the above 3 Blank 3

13. How often are analyses performed in your jurisdiction to evaluate the effectiveness of traffic and safety improvements?

19 Frequently
40 Occasionally
9 Seldom
2 Never
2 Blank

14. How would you rate the attitude of the public in your jurisdiction toward traffic operations and safety?

33 (a) Interested and involved

33 (b) Interested but not involved

3 (c) Not interested

3 Blank

15 a. How frequently do you deal with the following organizations?

| | Never | Occa-sionally | Often | Routinely | Not Applicable | Blank |
|---|---|---|---|---|---|---|
| (a) Va. Dept. of Highways & Transportation | | 7 | 29 | 27 | 7 | 2 |
| (b) Va. Dept. of Trans. Safety | 7 | 41 | 10 | 10 | | 4 |
| (c) State Police | 18 | 31 | 5 | 10 | 4 | 4 |
| (d) Division of Motor Vehicles | 20 | 29 | 7 | 5 | 6 | 5 |
| (e) Your Planning District | 4 | 30 | 16 | 17 | 2 | 3 |
| (f) Adjacent Jurisdictions | 4 | 32 | 16 | 12 | 3 | 5 |
| (g) Your City Council | 3 | 8 | 20 | 29 | 9 | 5 |
| (h) Your Police Officials | | 6 | 25 | 35 | 4 | 2 |
| (i) Other (please specify) | | 1 | 1 | 2 | | 68 |

b. Please indicate your working relationship with each of the following organizations.

| | Excellent | Good | Fair | Poor | Not Applicable | Blank |
|---|---|---|---|---|---|---|
| (a) Va. Dept. of Highways & Transportation | 41 | 18 | 4 | | 6 | 3 |
| (b) Va. Dept. of Trans. Safety | 29 | 28 | 2 | | 7 | 6 |
| (c) State Police | 31 | 14 | 2 | | 21 | 4 |
| (d) Division of Motor Vehicles | 22 | 20 | 2 | | 24 | 4 |
| (e) Your Planning District | 27 | 31 | 6 | | 5 | 3 |
| (f) Adjacent Jurisdictions | 26 | 32 | 6 | | 6 | 2 |
| (g) Your City Council | 33 | 23 | 2 | 1 | 11 | 2 |
| (h) Your Police Officials | 43 | 19 | 2 | | 6 | 2 |
| (i) Other (please specify) | 2 | 2 | | | | 68 |

c. What problems, if any, have you experienced with any of these organizations?

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16. Do you use any of the following sources of revenue?

| | Yes | No | Blank |
|---|---|---|---|
| (a) §402 safety funds available through Virginia Department of Transportation Safety | 39 | 24 | 9 |
| (b) Other federal funds (please specify) _____ | 25 | 6 | 41 |
| (c) State funds | 53 | 5 | 14 |
| (d) Other (please specify) _____ | 7 | | 65 |

17. Indicate those who usually perform or implement the following activities by checking the appropriate space(s). Please specify if other persons or agencies are involved.

| | Your Jurisdiction's | | | State Police | Dept. of Highways and Trans. | Other State Agency | Consultant | Contractor | Study is Not Performed | Other (please specify |
|---|---|---|---|---|---|---|---|---|---|---|
| | City or Town Engineer (City or Trf. Engr.) | Police | Other | | | | | | | |
| a. Accident studies | 26 | 42 | 1 | 1 | 19 | | 1 | | 2 | |
| b. Volume counts | 35 | 2 | 1 | | 54 | | | | 1 | 1 |
| c. Speed studies | 28 | 25 | 1 | 1 | 29 | | | | 6 | |
| d. Sidewalk and pedestrian safety | 46 | 18 | 2 | | 11 | | 1 | | 3 | 6 |
| e. Evaluation of intersection hazards | 45 | 27 | 3 | | 26 | 1 | 2 | | 4 | 1 |
| f. Skid resistance studies | 7 | 5 | 2 | | 16 | 1 | 1 | | 28 | 2 |
| g. Traffic control in maintenance and construction zones | 45 | 20 | 4 | | 23 | | | 3 | 2 | 4 |
| h. Traffic signals - (1) Design and timing | 40 | 5 | 1 | | 32 | | 14 | 2 | 2 | 5 |
| (2) Installation | 32 | | 3 | | 23 | 1 | 3 | 23 | 1 | 6 |
| (3) Operations and maintenance | 36 | 2 | 5 | | 15 | | 1 | 8 | 1 | 11 |
| i. Pavement markings - (1) Planning and design | 51 | 7 | 3 | | 28 | | 3 | 1 | 1 | 2 |
| (2) Installation | 43 | | 3 | | 15 | 1 | 1 | 15 | 1 | 6 |
| (3) Maintenance | 43 | 1 | 4 | | 13 | | | 6 | 1 | 7 |
| j. Transportation plans | 29 | 3 | 7 | | 35 | 2 | 10 | 1 | 5 | 13 |
| k. Transit routes and stops | 19 | 3 | 5 | | 14 | 1 | 5 | | 15 | 12 |
| l. Illumination | 36 | 3 | 10 | | 11 | | 3 | 2 | 6 | 17 |
| m. Detours | 40 | 19 | 6 | 1 | 18 | 1 | | 2 | 3 | 4 |
| n. Turning restrictions | 45 | 14 | 5 | | 19 | | 1 | | 1 | 3 |
| o. Truck routes | 36 | 12 | 6 | | 23 | | | | 7 | 6 |
| p. School zones | 37 | 23 | 6 | | 18 | | 1 | | 2 | 9 |
| q. Bicycle routes | 28 | 6 | 8 | | 13 | | 1 | | 12 | 8 |
| r. Parking | 44 | 19 | 8 | | 12 | | 1 | | 1 | 5 |

18. a. Do you have a program to identify hazardous locations?

50 Yes 19 No Blank 3

b. If you have such a program, what method do you use most often to identify hazardous locations?

_____ (a) Accident rate (accidents per 100 million vehicle miles)

20 (b) Number of accidents

2 (c) Accident severity

2 (d) Other, (please specify) _____

29 Several methods

3 (e) Not applicable

16 Blank

19. How are the following traffic operations and highway safety problems usually identified in your jurisdiction? (Check one or more categories as appropriate.)

| Type of Problem | Routine Inspection | Citizen Complaint | Complaint By Police Dept. | Study by Your Organization | Study By Consultant | Study By Other Organization | Other (please specify) | Not Identified |
|---|---|---|---|---|---|---|---|---|
| a. Need for additional control devices | 28 | 55 | 50 | 40 | 10 | 10 | 2 | |
| b. Missing, damaged or malfunctioning traffic control devices | 55 | 47 | 53 | 15 | | 1 | | |
| c. Need for improved signal timing | 33 | 42 | 40 | 35 | 3 | 6 | | 4 |
| d. Need for additional or improved pavement markings | 48 | 35 | 39 | 36 | 2 | 5 | | 1 |
| e. Need for skid resistant treatment | 12 | 7 | 10 | 8 | | 5 | 4 | 32 |
| f. Inadequate or non-existent roadway lighting | 15 | 43 | 27 | 24 | 2 | 5 | 2 | 5 |
| g. Roadway congestion and capacity | 23 | 33 | 32 | 42 | 10 | 8 | 1 | |
| h. Intersection safety | 27 | 39 | 47 | 38 | 2 | 5 | 2 | |
| i. Need for school crossing protection | 18 | 36 | 43 | 29 | | 7 | 1 | 2 |
| j. Need for other pedestrian protection | 18 | 40 | 42 | 37 | 2 | 4 | 3 | 1 |
| k. Parking availability | 16 | 33 | 23 | 39 | 5 | 5 | 2 | 1 |
| l. Need for speed zoning | 15 | 38 | 44 | 39 | | 4 | | 3 |
| m. Need for construction signing | 31 | 16 | 23 | 41 | 1 | 4 | 2 | 2 |
| n. Roadway obstacles | 32 | 33 | 38 | 35 | 1 | 2 | | 2 |
| o. Other (please specify) | | | | 1 | | | | 1 |

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20. How often are the following activities performed?

| | Never | Experimentally | Occasionally (once or twice a year) | Often (once a month) | Routinely | Not Applicable | Blank |
|---|---|---|---|---|---|---|---|
| (a) Adjustment of speed limits based on current speed studies | 7 | 13 | 25 | 3 | 16 | 2 | 6 |
| (b) Identification of substandard or non-skid resistant pavement | 21 | 9 | 8 | 3 | 8 | 16 | 7 |
| (c) Identification of substandard or deficient roadway lighting | 5 | 6 | 26 | 1 | 18 | 6 | 8 |
| (d) Travel and delay studies | 12 | 12 | 25 | 3 | 7 | 6 | 7 |
| (e) Volume studies | 2 | 7 | 29 | 3 | 24 | 3 | 4 |
| (f) Accident analysis | 1 | 3 | 23 | 9 | 29 | 2 | 5 |
| (g) Highway capacity analysis | 6 | 14 | 24 | 1 | 13 | 8 | 6 |
| (h) Pedestrian safety studies | 3 | 7 | 33 | 4 | 14 | 6 | 5 |
| (i) Evaluation of existing traffic control devices and pavement markings | 1 | 4 | 18 | 11 | 34 | 1 | 3 |
| (j) Studies relating accidents to specific design features of the roadway | 4 | 6 | 23 | 7 | 19 | 6 | 7 |
| (k) Identification of roadside obstacles | 5 | 8 | 20 | 6 | 26 | 2 | 5 |
| (l) Studies to determine compliance with sign standards in the Manual on Uniform Traffic Control Devices | 3 | 1 | 22 | 3 | 37 | 3 | 3 |
| (m) Identification of hazardous locations | | 7 | 18 | 7 | 36 | | 4 |
| (n) Other (please specify) | | | | | 1 | | 71 |

21. a. Do you have a method for establishing priorities for safety projects?

33 Yes 35 No Blank 4

b. If yes, please describe your method _____

22. a. Do you have a copy of the Manual on Uniform Traffic Control Devices (MUTCD)?

66 Yes 4 No Blank 2

b. If yes, do you use the MUTCD standards when installing signals, signs, pavement markings, etc.?

_____ (a) Never
1 (b) Occasionally
11 (c) Often
54 (d) Routinely
6 Blank

23. Are you familiar with Highway Safety Program Standard 13?

19 Yes 48 No Blank 5

24. How would you describe the need for improving the following?

| | Great Need | Some Need | Little Need | No Need | Not Applicable | Blank |
|---|---|---|---|---|---|---|
| (a) Methods by which speed zones are established | 2 | 31 | 21 | 10 | 3 | 5 |
| (b) Adjustment of speed limits based on current speed studies | 2 | 31 | 19 | 10 | 4 | 6 |
| (c) Identification of substandard or non-skid resistant pavement | 3 | 25 | 17 | 12 | 10 | 5 |
| (d) Development of procedures for correcting substandard or non-skid resistant pavement | 5 | 24 | 18 | 8 | 10 | 7 |
| (e) Development of method(s) for identifying substandard or deficient roadway lighting | 11 | 31 | 13 | 8 | 3 | 6 |
| (f) Simplified techniques for conducting travel and delay studies | 9 | 27 | 17 | 7 | 5 | 7 |
| (g) Volume studies | 11 | 25 | 17 | 12 | 2 | 5 |
| (h) Identification of hazardous locations | 13 | 37 | 12 | 6 | | 4 |
| (i) Accident analysis | 16 | 31 | 14 | 4 | 1 | 6 |
| (j) Highway capacity analysis | 16 | 18 | 24 | 6 | 2 | 6 |
| (k) Pedestrian safety studies | 15 | 31 | 11 | 6 | 3 | 6 |
| (l) Evaluation of existing traffic control devices and pavement markings | 14 | 30 | 15 | 7 | | 6 |
| (m) Studies relating accidents to specific design features of the roadway | 12 | 36 | 12 | 4 | 1 | 7 |
| (n) Identification of roadside obstacles | 5 | 31 | 22 | 7 | 1 | 6 |
| (o) Studies to determine compliance with sign standards in the Manual on Uniform Traffic Control Devices | 5 | 19 | 26 | 15 | 2 | 5 |
| (p) Other (please specify) _____ | 1 | 1 | | | | 70 |

25. How often are the following transportation system management techniques used in your area?

| | Never | Experimentally | Occasionally | Often | Routinely | Not Applicable | Blank |
|---|---|---|---|---|---|---|---|
| (a) Encouragement of pooling (car pooling, van pooling, etc.) | 22 | 11 | 18 | 5 | 6 | 6 | 4 |
| (b) Use of preferential lanes | 43 | 2 | 4 | 4 | 3 | 12 | 4 |
| (c) Transit priority at intersections | 46 | 2 | 5 | 1 | 1 | 13 | 4 |
| (d) Park & ride facilities | 29 | 7 | 10 | 7 | 2 | 12 | 5 |
| (e) Staggered work hours | 30 | 6 | 12 | 3 | 6 | 11 | 4 |

26. Are the following a problem in your jurisdiction?

| | Yes | No | Do Not Know | Blank |
|---|---|---|---|---|
| (a) Delay in receiving accident report information | 21 | 44 | 4 | 3 |
| (b) Unavailability of accident report information | 15 | 49 | 5 | 3 |
| (c) Deficiencies in accident report information (inconsistencies in information, incomplete information, etc.) | 15 | 47 | 7 | 3 |

27. How would you categorize the major traffic engineering problems in your jurisdiction? (Rank them in order of importance: 1 = most important, 8 = least important)

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 31 |
|---|---|---|---|---|---|---|---|---|---|
| _____ (a) Funding and budget | 32 | 18 | 6 | 4 | 1 | 2 | 3 | | 7 |
| _____ (b) Lack of personnel | 15 | 18 | 15 | 2 | 4 | 4 | 4 | | 10 |
| _____ (c) Training of personnel | 10 | 10 | 15 | 16 | 5 | 6 | | 2 | 6 |
| _____ (d) Need additional traffic control devices | 5 | 6 | 6 | 9 | 11 | 8 | 15 | 4 | 8 |
| _____ (e) Coordination with other organizations | 4 | 2 | 4 | 7 | 13 | 13 | 18 | 2 | 9 |
| _____ (f) Identification of hazardous locations | 2 | 4 | 10 | 11 | 12 | 13 | 8 | 3 | 9 |
| _____ (g) Public support | 5 | 5 | 5 | 11 | 9 | 11 | 15 | 2 | 9 |
| _____ (h) Other (please specify) _____ | 2 | 2 | 1 | 2 | 2 | | | 9 | 54 |

28. What do you think could be done to improve traffic operations and safety? (Rank them in order of importance: 1 = most important, 9 = least important)

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Blank |
|---|---|---|---|---|---|---|---|---|---|---|
| _____ (a) Increased funding | 32 | 18 | 6 | 3 | 1 | 2 | 3 | 3 | 1 | 3 |
| _____ (b) Additional personnel | 15 | 15 | 17 | 2 | 3 | 5 | 5 | 2 | 1 | 7 |
| _____ (c) Training for personnel | 13 | 11 | 13 | 17 | 5 | 6 | 1 | 2 | | 4 |
| _____ (d) Improved traffic control devices | 5 | 4 | 7 | 10 | 10 | 9 | 13 | 8 | 1 | 5 |
| _____ (e) Operational measures | | 6 | 5 | 10 | 16 | 14 | 9 | 4 | | 8 |
| _____ (f) Improved coordination with other organizations | 3 | 3 | 2 | 6 | 13 | 12 | 7 | 18 | 2 | 0 |
| _____ (g) Procedure for identifying hazardous locations | 2 | 4 | 4 | 12 | 7 | 10 | 10 | 13 | 3 | 7 |
| _____ (h) Increased public support | 4 | 4 | 7 | 9 | 8 | 3 | 14 | 13 | 2 | 8 |
| _____ (i) Other (please specify) _____ | 5 | 1 | 1 | 1 | 1 | | | | 11 | 52 |

29. Please list specific traffic engineering and safety problems in your area.

_____

_____

_____

30. What traffic engineering and safety problems would you like to see studied?

_____

_____

_____

Please feel free to make any additional comments. Thank you for your time and cooperation.

# APPENDIX B

## SAMPLE QUESTIONNAIRE FORM B WITH TABULATED RESPONSES AND COVER LETTER

1232

DEPARTMENT OF HIGHWAYS & TRANSPORTATION
HAROLD C. KING, COMMISSIONER

LEO E. BUSSER, III
DEPUTY COMMISSIONER AND
CHIEF ENGINEER

OSCAR K. MABRY
DIRECTOR OF PLANNING

UNIVERSITY OF VIRGINIA
DR. FRANK L. HEREFORD, JR., PRESIDENT

SCHOOL OF ENGINEERING & APPLIED SCIENCE
JOHN E. GIBSON, DEAN

DR. LESTER A. HOEL, CHAIRMAN
DEPARTMENT OF CIVIL ENGINEERING

# COMMONWEALTH of VIRGINIA

## HIGHWAY & TRANSPORTATION RESEARCH COUNCIL

BOX 3817 UNIVERSITY STATION
CHARLOTTESVILLE, VIRGINIA 22903

JACK H. DILLARD, HEAD
VIRGINIA HIGHWAY & TRANSPORTATION RESEARCH COUNCIL

March 12, 1979

IN REPLY PLEASE
REFER TO FILE NO. _____

In recognition of the continuing need to improve the efficiency and safety of transportation in Virginia, the Virginia Highway and Transportation Research Council has recently initiated a comprehensive traffic operations and safety research management program which is being conducted for the Virginia Department of Transportation Safety. Although traffic and safety research has been an integral part of the Council's efforts for a number of years, the program is to develop a comprehensive long-range plan for research activities in traffic engineering and highway safety. The research program includes (1) identifying traffic and safety management problems and research needs in the state, including those of cities and towns; (2) categorizing and establishing priorities on major research areas based on identified needs; (3) examining the prioritized traffic engineering problems; (4) disseminating the results of research through training, seminars, workshops, etc.; and (5) conducting demonstration projects.

To assist in identifying traffic and safety needs we have prepared the attached questionnaire which we would appreciate your completing and returning to us. Please consider each question carefully. The questions have been designed to determine current problems, and your responses will be used to develop a comprehensive program to improve traffic operations and safety in Virginia. We would appreciate receiving your reply by Monday, April 16, 1979. If you have any questions, please call Deborah Mitchell or Martin Parker at (804) 977-0290.

Thank you for your assistance.

Very truly yours,

Jack H. Dillard

Jack H. Dillard, Head
Va. Highway & Transportation
Research Council

Return Completed Questionnaire To:

Deborah A. Mitchell
Research Analyst
Virginia Highway & Transportation Research Council
Box 3817 University Station
Charlottesville, Virginia 22903

Virginia Highway and Transportation Research Council

SURVEY QUESTIONNAIRE

IDENTIFICATION OF TRAFFIC AND SAFETY MANAGEMENT NEEDS

Name _____

Title _____

Name of Organization _____

Name of Department _____

Address _____

_____

_____

_____

Telephone Number _____ ( ) _____

Your assistance and cooperation in completing this questionnaire will assist in determining traffic engineering and highway safety needs in Virginia. The information you provide will be tabulated along with data from other jurisdictions and summarized in a report. If you have any questions regarding the questionnaire, please contact Deborah Mitchell, at (804) 977-0290. Please indicate below if you would like to receive a copy of the final report.

_____ Yes, please send me a copy of the final report.

| | | |
|---|---|---|
| Title: | Chief of Police or Assistant | 43 |
| | Communications Coordinator/Grant Coordinator | 4 |
| | Other position in police department | 10 |
| | Safety and Community Support Officer | 1 |
| | Sherriff | 2 |
| | Other | 6 |
| | Blank | 0 |

1. How would you characterize your role in traffic engineering and highway safety activities?

| | |
|---|---|
| 27 | (a) administrative |
| 1 | (b) research oriented |
| 1 | (c) engineering/operational |
| 3 | (d) technical assistance |
| 13 | (e) other (please specify) |
| 16 | Enforcement |
| 10 | Blank |

2. a. Is in-house training in traffic engineering provided for your employees having traffic engineering responsibilities?

6 Yes 38 No N/A 14 Blank 13

b. Have you conducted any training in traffic engineering for your employees having traffic engineering responsibilities?

2 Yes 42 No N/A 13 Blank 14

c. Are you familiar with any traffic engineering seminars conducted by the Department of Transportation Safety and Virginia Commonwealth University?

24 Yes 28 No N/A 5 Blank 14

3. Please list the traffic engineering or highway safety seminars you or your staff have attended in the past three years.

| Number of Seminars | Number of Respondents |
|---|---|
| None | 24 |
| 1-5 | 9 |
| 6-10 | 1 |
| Some | 8 |
| N/A | 5 |
| Blank | 24 |

4. Of what professional organizations are you a member?

| | |
|---|---|
| | (a) American Society of Civil Engineers |
| | (b) Institute of Transportation Engineers |
| 2 | (c) Virginia Section, Institute of Transportation Engineers |
| | (d) American Public Works Association |
| 4 | (e) Other (please specify) |
| 1 | IACP |
| 4 | VACOP |
| 8 | Two or more |
| 52 | Blank |

5. Are you responsible for collecting data for the Highway Safety Plan for the Department of Transportation Safety (Highway Safety Division of Virginia)?

32 Yes 24 No N/A 1 Blank 14

6. Do you maintain an inventory of traffic control devices, i.e., signs, signals, and pavement markings?

12 Yes 43 No N/A 4 Blank 12

7. How would you rate the attitude of the public in your jurisdiction toward traffic operations and safety?

25 (a) Interested and involved

32 (b) Interested but not involved

2 (c) Not interested

12 (d) Blank

8 a. How frequently do you deal with the following organizations?

| | Never | Occa-sionally | Often | Routinely | Not Applicable | Blank |
|---|---|---|---|---|---|---|
| (a) Va. Dept. of Highways & Transportation | 4 | 29 | 13 | 10 | 3 | 12 |
| (b) Va. Dept. of Trans. Safety | | 24 | 22 | 11 | 1 | 13 |
| (c) State Police | 1 | 16 | 18 | 18 | 5 | 13 |
| (d) Division of Motor Vehicles | 3 | 11 | 19 | 25 | 1 | 12 |
| (e) Your Planning District | | 29 | 14 | 14 | 2 | 12 |
| (f) Adjacent Jurisdictions | | 19 | 21 | 15 | 2 | 14 |
| (g) Your City Council | 1 | 17 | 21 | 15 | 3 | 14 |
| (h) Your Police Officials | | 3 | 18 | 22 | 10 | 18 |
| (i) Other (please specify) | | | 1 | 1 | 2 | 67 |

b. Please indicate your working relationship with each of the following organizations.

| | Excellent | Good | Fair | Poor | Not Applicable | Blank |
|---|---|---|---|---|---|---|
| (a) Va. Dept. of Highways & Transportation | 21 | 27 | 4 | | 7 | 12 |
| (b) Va. Dept. of Trans. Safety | 33 | 19 | 4 | | 2 | 13 |
| (c) State Police | 30 | 21 | 3 | | 5 | 12 |
| (d) Division of Motor Vehicles | 31 | 23 | 2 | | 2 | 13 |
| (e) Your Planning District | 18 | 21 | 6 | 1 | 1 | 13 |
| (f) Adjacent Jurisdictions | 19 | 33 | 4 | | 2 | 13 |
| (g) Your City Council | 23 | 27 | 2 | 2 | 3 | 14 |
| (h) Your Police Officials | 28 | 14 | 2 | | 11 | 16 |
| (i) Other (please specify) | 3 | 1 | | | 1 | 66 |

c. What problems, if any, have you experienced with any of these organizations?

9. Do you use any of the following sources of revenue?

| | Yes | No | Blank |
|---|---|---|---|
| (a) §402 safety funds available through Virginia Department of Transportation Safety | 39 | 11 | 21 |
| (b) Other federal funds (please specify) | 28 | 5 | 38 |
| (c) State funds | 22 | 15 | 34 |
| (d) Other (please specify) | 1 | 3 | 67 |

10. a. Do you have a program to identify hazardous locations?

39 Yes 17 No N/A 1 Blank 14

b. If you have such a program, what method do you use most often to identify hazardous locations?

1 (a) Accident rate (accidents per 100 million vehicle miles)
15 (b) Number of accidents
1 (c) Accident severity
3 (d) Other, (please specify)
8 (e) Not applicable
21 (f) Several of the above
22 (g) Blank

11. How are the following traffic operations and highway safety problems usually identified in your jurisdiction? (Check one or more categories as appropriate.)

| Type of Problem | Routine Inspection | Citizen Complaint | Study by Your Organization | Study by Consultant | Study By Other Organization | Other (please specify) | Not Identified |
|---|---|---|---|---|---|---|---|
| a. Need for additional control devices | 20 | 28 | 19 | 10 | 15 | 4 | 1 |
| b. Missing, damaged or malfunctioning traffic control devices | 36 | 34 | 7 | | 9 | 5 | 1 |
| c. Need for improved signal timing | 20 | 25 | 13 | 3 | 12 | 6 | 1 |
| d. Need for additional or improved pavement markings | 27 | 25 | 22 | 4 | 13 | 7 | 1 |
| e. Need for skid resistant treatment | 8 | 12 | 4 | 5 | 12 | 6 | 19 |
| f. Inadequate or non-existent roadway lighting | 14 | 26 | 12 | 2 | 14 | 6 | 4 |
| g. Roadway congestion and capacity | 20 | 23 | 20 | 6 | 16 | 4 | 4 |
| h. Intersection safety | 21 | 25 | 26 | 5 | 16 | 6 | 2 |
| i. Need for school crossing protection | 17 | 27 | 22 | 2 | 14 | 6 | 2 |
| j. Need for other pedestrian protection | 16 | 26 | 19 | 2 | 17 | 6 | 2 |
| k. Parking availability | 18 | 22 | 19 | 4 | 12 | 4 | 5 |
| l. Need for speed zoning | 21 | 31 | 23 | 4 | 16 | 6 | |
| m. Need for construction signing | 19 | 18 | 15 | 1 | 13 | 6 | 3 |
| n. Roadway obstacles | 23 | 29 | 18 | 2 | 11 | 6 | 1 |
| o. Other (please specify) | | | | | | | 1 |

12. a. Do you have a method for establishing priorities for safety projects?

27 Yes 27 No N/A 3 Blank 14

b. If yes, please describe your method _____

_____

_____

13. Are you familiar with Highway Safety Program Standard 13?

18 Yes 38 No Blank 15

123?

14. How would you describe the need for improving the following?

| | Great Need | Some Need | Little Need | No Need | Not Applicable | Blank |
|---|---|---|---|---|---|---|
| (a) Methods by which speed zones are established | 8 | 24 | 13 | 10 | 2 | 14 |
| (b) Adjustment of speed limits based on current speed studies | 10 | 19 | 15 | 11 | 2 | 14 |
| (c) Identification of substandard or non-skid resistant pavement | 8 | 24 | 11 | 7 | 5 | 16 |
| (d) Development of procedures for correcting substandard or non-skid resistant pavement | 7 | 25 | 9 | 6 | 7 | 17 |
| (e) Development of method(s) for identifying substandard or deficient roadway lighting | 12 | 23 | 11 | 8 | 3 | 14 |
| (f) Simplified techniques for conducting travel and delay studies | 7 | 22 | 14 | 6 | 7 | 15 |
| (g) Volume studies | 9 | 23 | 12 | 5 | 5 | 17 |
| (h) Identification of hazardous locations | 19 | 23 | 13 | 1 | 2 | 13 |
| (i) Accident analysis | 14 | 27 | 12 | 2 | 2 | 14 |
| (j) Highway capacity analysis | 7 | 30 | 12 | 4 | 4 | 14 |
| (k) Pedestrian safety studies | 13 | 26 | 12 | 3 | 1 | 15 |
| (l) Evaluation of existing traffic control devices and pavement markings | 11 | 32 | 8 | 4 | 2 | 14 |
| (m) Studies relating accidents to specific design features of the roadway | 16 | 25 | 13 | 2 | 2 | 13 |
| (n) Identification of roadside obstacles | 6 | 25 | 19 | 5 | 2 | 14 |
| (o) Studies to determine compliance with sign standards in the Manual on Uniform Traffic Control Devices | 7 | 20 | 20 | 7 | 2 | 15 |
| (p) Other (please specify) _____ | | | | | 1 | 70 |

15. What do you think could be done to improve traffic operations and safety? (Rank them in order of importance: 1 = most important, 9 = least important)

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Blank |
|---|---|---|---|---|---|---|---|---|---|---|
| _____ (a) Increased funding | 20 | 9 | 8 | 5 | 5 | 2 | 3 | | 1 | 18 |
| _____ (b) Additional personnel | 8 | 10 | 12 | 7 | 5 | 4 | 3 | 4 | 1 | 17 |
| _____ (c) Training for personnel | 4 | 8 | 14 | 8 | 8 | 4 | 4 | 1 | 1 | 19 |
| _____ (d) Improved traffic control devices | 5 | 5 | 3 | 13 | 6 | 7 | 8 | 4 | 3 | 17 |
| _____ (e) Operational measures | | 1 | 3 | 6 | 12 | 9 | 10 | 10 | 1 | 19 |
| _____ (f) Improved coordination with other organizations | 1 | 4 | 3 | 4 | 2 | 12 | 11 | 13 | 3 | 18 |
| _____ (g) Procedure for identifying hazardous locations | 6 | 7 | 3 | 5 | 9 | 6 | 7 | 9 | 1 | 18 |
| _____ (h) Increased public support | 17 | 11 | 5 | 3 | 4 | 3 | 2 | 7 | 1 | 18 |
| _____ (i) Other (please specify) _____ | 2 | | | 2 | | 1 | | | 9 | 57 |

16. Please list specific traffic engineering and safety problems in your area.

17. What traffic engineering and safety problems would you like to see studied?

Please feel free to make any additional comments. Thank you for your time and cooperation.

# APPENDIX C

## SAMPLE FOLLOW-UP LETTER

DEPARTMENT OF HIGHWAYS & TRANSPORTATION
HAROLD C. KING, COMMISSIONER

LEO E. BUSSER, III
DEPUTY COMMISSIONER AND
CHIEF ENGINEER

OSCAR K. MABRY
DIRECTOR OF PLANNING

1242

UNIVERSITY OF VIRGINIA
DR. FRANK L. HEREFORD, JR., PRESIDENT

SCHOOL OF ENGINEERING & APPLIED SCIENCE
JOHN E. GIBSON, DEAN

DR. LESTER A. HOEL, CHAIRMAN
DEPARTMENT OF CIVIL ENGINEERING

# COMMONWEALTH of VIRGINIA

## HIGHWAY & TRANSPORTATION RESEARCH COUNCIL

JACK H. DILLARD, HEAD
VIRGINIA HIGHWAY & TRANSPORTATION RESEARCH COUNCIL

BOX 3817 UNIVERSITY STATION
CHARLOTTESVILLE, VIRGINIA 22903

April 27, 1979

IN REPLY PLEASE REFER TO FILE NO. 7.1

Dear

A copy of the attached questionnaire was mailed to you on March 15, 1979. After compiling the questionnaires which have been returned, I noticed we have not received your response.

We would like to have every Virginia community represented in our survey of traffic operations and safety needs in Virginia. I would sincerely appreciate your completing the attached questionnaire and returning it at your earliest convenience.

Sincerely,

Deborah Mitchell

Deborah Mitchell
Research Analyst

DM/tt

CC: Mr. J. H. Dillard
Mr. W. S. Ferguson
Mr. M. R. Parker, Jr.

Attachment

APPENDIX D

Issued November 19, 1971

Highway Safety Program Standard 13*

# TRAFFIC ENGINEERING SERVICES

**Purpose**

To assure the full and proper application of modern traffic engineering principles and uniform standards for traffic control to reduce the likelihood and severity of traffic accidents.

**Standard**

Each State, in cooperation with its political subdivisions, and each Federal department or agency which controls highways open to public travel or supervises traffic operations, shall have a program for applying traffic engineering measures and techniques, including the use of traffic control devices, to reduce the number and severity of traffic accidents.

I. The program as a minimum shall consist of:

A. A comprehensive manpower development plan to provide the necessary traffic engineering capability, including:

1. Provisions for supplying traffic engineering assistance to those jurisdictions unable to justify a full-time traffic engineering staff.

2. Provisions for upgrading the skills of practicing traffic engineers, and providing basic instruction in traffic engineering techniques to subprofessionals and technicians.

B. Utilization of traffic engineering principles and expertise in the planning, design, construction, and maintenance of the public roadways, and in the application of traffic control devices.

C. A traffic control devices plan including:

1. An inventory of all traffic control devices.

2. Periodic review of existing traffic control devices, including a systematic upgrading of substandard devices to conform with standards issued or endorsed by the Federal Highway Administrator.

3. A maintenance schedule adequate to insure proper operation and timely repair of control devices, including daytime and nighttime inspections.

4. Where appropriate, the application and evaluation of new ideas and concepts in applying control devices and in modifying existing devices to improve their effectiveness through controlled experimentation.

D. An implementation schedule to utilize traffic engineering manpower to:

1. Review road projects during the planning, design, and construction stages to detect and correct features that may lead to operational safety difficulties.

2. Install safety-related improvements as a part of routine maintenance and/or repair activities.

3. Correct conditions noted during routine operational surveillance of the roadway system to rapidly adjust for the changes in traffic and road characteristics as a means of reducing accident frequency or severity.

*Administered by the Federal Highway Administration.

1244

4. Conduct traffic engineering analyses of all high accident locations and develop corrective measures.

5. Analyze potentially hazardous locations, such as sharp curves, steep grades, and railroad grade crossings and develop appropriate counter-measures.

6. Identify traffic control needs and determine short and long range requirements.

7. Evaluate the effectiveness of specific traffic control measures in reducing the frequency and severity of traffic accidents.

8. Conduct traffic engineering studies to establish traffic regulations such as fixed or variable speed limits.

II. This program shall be periodically evaluated by the State, or appropriate Federal department or agency where applicable, and the Federal Highway Administration shall be provided with an evaluation summary.