# Improving the Productivity of the Pennsylvania Transportation Department's Traffic Count Program

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ABSTRACT

The Pennsylvania Transportation Department has continually endeavored to improve the productivity of its functions and in the process reduce costs and manpower requirements wherever possible. To this end, the department undertook a major study to review its traffic count program, particularly that portion coordinated and managed by the central office. The study was undertaken for several reasons: (a) the program had been ongoing for at least 20 years without substantive change; (b) recent federal requirements had resulted in a sizable increase in the cost and the scope of the program; and (c) opportunities existed to streamline the program through better integration of program elements, increased use of automated procedures, and the introduction of improved traffic-counting equipment. The major findings and recommendations of the Pennsylvania Transportation Department study entitled "Review of the Department's Traffic Count Program," are summarized. Through implementation of the study recommendations the department will achieve significant cost and manpower savings, which are documented in this paper. This paper is likely to be of interest to other state transportation and highway departments because traffic counting is a basic planning function carried out by the states.

The Pennsylvania Transportation Department undertook and successfully completed a study of its traffic count program entitled "Review of the Department's Traffic Count Program" (1). Consultant assistance was provided through Peat, Marwick, Mitchell and Co.

The purpose of the study was to perform an in-depth evaluation of the department's traffic count program, which included work performed by the department's central office in Harrisburg, the department's 11 district offices located throughout the state (Figure 1), and the commonwealth's metropolitan planning organizations (MPOs). In particular, the study was intended to focus on methods to streamline and improve the efficiency of the central office program elements.

This paper, which is a summary of the major findings and recommendations of the departmental study, includes an overview of the existing traffic count program and traffic count data requirements, findings from the assessment of the department's existing count program, and the recommended program with estimated cost and manpower savings.

## STUDY OBJECTIVES

At the time the departmental study was initiated, two specific objectives were identified. The first was to evaluate the existing traffic count program to identify opportunities to reduce manpower and program costs, to streamline work activities, and to provide accurate and timely traffic count data for departmental, MPO, and federal users.

The second objective of the study was to develop a recommended integrated traffic count program that met data requirements and at the same time reduced program requirements. The recommended traffic count program built on the analysis of the existing program and, in addition, addressed the following key considerations:

- Data requirements of existing and potential users, including the central office, district offices, MPOs, the FHWA, and others;
- Sampling plans for the existing program elements [i.e., control counts, truck counting, Highway Performance Monitoring System (HPMS), speed monitoring, and other less significant program elements];
- Data collection, count processing, and data management and storage procedures;
- Data collection and count-processing equipment requirements and costs;
- Overall manpower requirements; and
- Procedures for implementing the traffic count program recommendations.

## STUDY ORGANIZATION

To help capture the needs of existing and potential traffic data users, the study was guided by a steering committee that represented the following functional areas:

- Planning,
- Highway design,
- Highway safety administration, and
- Program development and management.

In addition to the functional areas noted, representatives from the FHWA and a large MPO were also members of the steering committee. The study was initiated under the direction of the department's Deputy Secretary for Transportation Planning.

## OVERVIEW OF EXISTING TRAFFIC COUNT PROGRAM

The department's existing traffic count program consists of the following key elements:

- Control counts,
- HPMS,

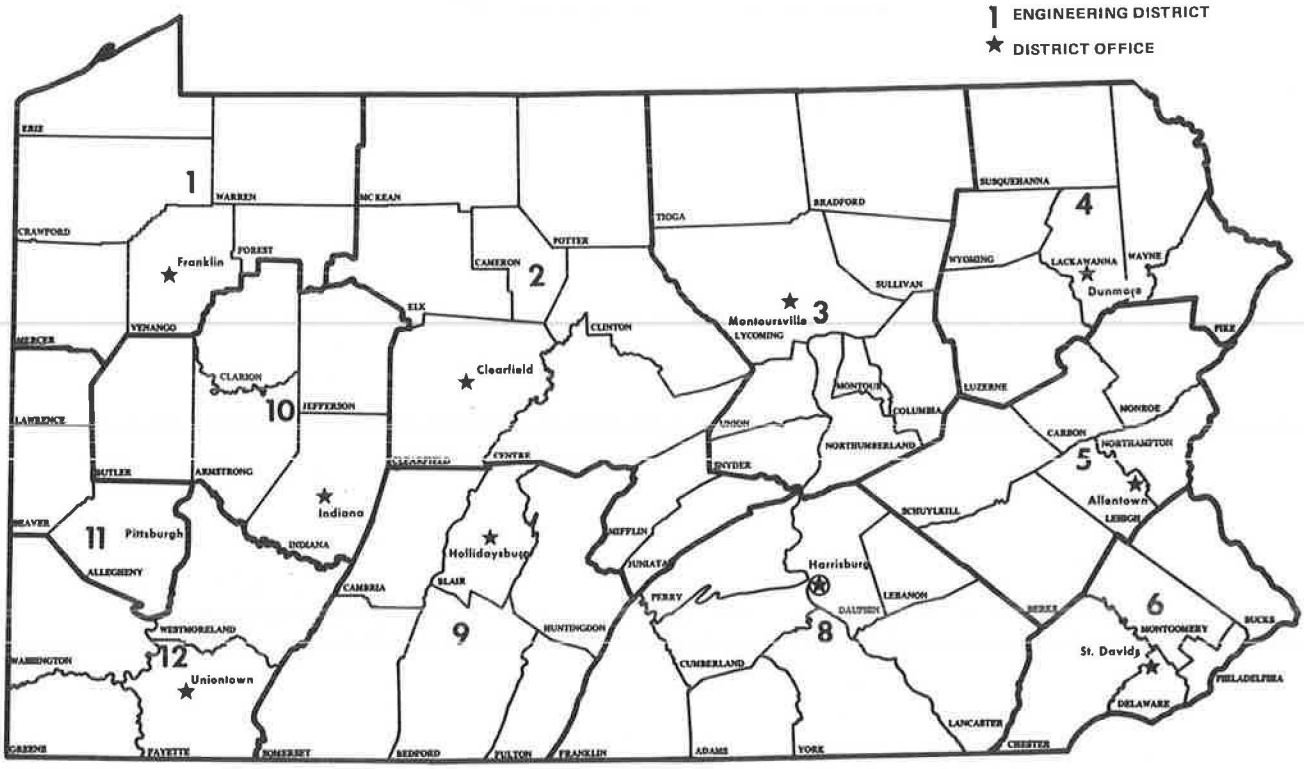


FIGURE 1 Pennsylvania state highway engineering districts.

- Truck counting,
- Speed monitoring, and
- Special counts.

All of these, except special counts, are coordinated and managed by the department's central office. Table 1 gives a summary of the types of counts conducted and the number of locations counted annually under each program element at the time of the study.

## Control Count (ATR/PTR) Program

Because the existing automatic traffic recorder (ATR) and portable traffic recorder (PTR) count programs are highly interrelated, they are described jointly.

The ATR program provides continuous hourly traffic volume data at 67 permanent stations throughout the commonwealth. These counts are taken 365 days a year. The principal uses of automatic traffic recorder data are to monitor long-term trends in traffic and to develop seasonal adjustment factors to convert traffic counts taken at different times during the year to an estimate of annual average daily traffic (AADT).

The PTR program uses portable traffic recorders to collect seasonal control counts at from 175 to 350 fixed PTR stations. Seasonal control counts consist of six 24-hr counts taken during the course of a year. These counts are used in two principal applications:

- To determine the appropriate seasonal adjustment factor for converting traffic counts taken at various locations to an estimate of AADT and
- As an aid in estimating growth trends in average daily traffic levels.

## HPMS

The states are requested by FHWA to annually provide traffic volumes, vehicle classification data, accident data, pavement condition ratings, and physical and operational characteristics for a random sample of roadway segments.

The department's HPMS sample consisted of 3,758

TABLE 1 Characteristics of Existing Traffic Count Program

| Program Element | No. of Sites | No. of Counts Taken Annually | Count Duration | Organizational Responsibility | |
|---|---|---|---|---|---|
| | | | | Management/Coordination | Data Collection |
| Control counts | | | | | |
| ATR | 67 | Continuous | Continuous | CO | CO |
| PTR | 175-350 | 1,050 | 24 hr | CO | CO |
| HPMS | 3,758 | 3,760[a] | 24 hr | CO | Districts, MPOs |
| Truck counting | 2,000 | 670 | 24 hr | CO | CO |
| Speed monitoring | 40 | 88 | 24 hr | CO | CO |
| Special | Varies | Varies | Varies | Districts, MPOs | Districts, MPOs |

Note: CO = central office.

[a]Includes approximately 1,000 manual vehicle classification counts.

roadway segments at the time of the study. Following FHWA guidelines, 2,760 24-hr volume counts are taken annually. In addition, 8-hr manual classification counts are taken on 25 percent of the 3,758 HPMS sample segments each year to provide truck percentage data at these locations (Table 1).

The central office is responsible for HPMS program coordination and management and quality control of all HPMS data. Data collection, however, is actually done by departmental district offices and MPOs.

### Truck Count Program

As noted in Table 1, the department conducts approximately 2,000 24-hr vehicle classification counts over a 2- to 3-year period on a sample of its priority commercial network (PCN). The PCN is a network of high-volume truck routes (more than 500 trucks per day) comprising primarily arterial highways.

The objective of this program is to determine the amount and type of truck traffic on the network. This information is used for planning, design, project selection, maintenance, and other departmental activities. These counts are taken with modern, automated vehicle classification equipment.

### Speed-Monitoring Program

The states are required by law to monitor vehicle speeds for compliance with the national 55 mph speed limit. The department has designed a speed-monitoring program that has been approved by FHWA.

The department has selected 40 speed-monitoring locations throughout the state. A total of 88 24-hr speed and volume counts are made at these locations each year. Sixteen locations serve as control stations and have four counts taken annually. The remaining 24 locations are only counted once a year. All counts are taken with the same automated vehicle classification equipment used for the truck-counting program because these units have the additional capability of monitoring speed.

### Special Counts

Special traffic counts are commonly conducted by the departmental district offices and MPOs. These counts are made for many purposes including, but not limited to, maintenance requirements, project-level planning, traffic engineering assessments, access permit reviews, safety analyses, problem identification, and travel monitoring. The role of the central office is limited to providing traffic-counting equipment to these agencies, processing this data for estimating AADTs on request, and maintaining a central traffic data file. The number and cost of these counts were not addressed during the department's study, but it appears that many, perhaps several thousand, such counts are conducted annually.

### Traffic-Counting Program Costs

In Fiscal Year 1982-1983, the department (including district offices and MPOs) was budgeted to spend approximately $1.3 million on traffic counting. This excludes the cost of special counts taken by district offices and MPOs. The control count (ATR/PTR), truck count, and HPMS programs made up approximately 95 percent of this budget.

## TRAFFIC COUNT DATA REQUIREMENTS

To develop an effective, integrated traffic count program, the type of traffic count data needed by all existing and potential users was determined as part of the study effort. The users included departmental central and district office staff responsible for strategic planning, project planning, environmental impact statements, design, traffic engineering, highway safety, maintenance, and project ranking and programming. Other important users of count data included MPOs and the FHWA.

During the initial phases of the study, interviews were conducted with selected representatives of each potential user group to determine the type, level of accuracy, and level of detail of traffic count data required. This information was supplemented by direct input from study steering committee members and by reviewing available reports and other materials indicating how count information was being used.

Table 2 gives the types of traffic count data required by, or of strong interest to, the noted users.

## ASSESSMENT OF EXISTING PROGRAM

The department's existing traffic count program was assessed to identify problems and opportunities to

**TABLE 2 Traffic Count Data Requirements**

| Type of Data | Planning | | Project Planning and Design | | Traffic Engineering | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Monitoring and Reporting | Studies | Project Planning and Road Design | Pavement Design | Intersection and Signalization | Access Permits | Safety | Maintenance | Program Development |
| Daily/seasonal adjustment factors | x | | | | | | | | |
| Peak-hour factor/volume | x | x | x | | x | x | x | | x |
| Design-hour factor | x | x | x | | | | | | |
| Traffic growth trends | | | | | | | | | |
| Segment/site | x | x | x | x | x | x | x | x | x |
| Traffic pattern group/functional class | x | x | | | | | | x | x |
| Jurisdiction | x | x | x | x | x | x | | x | x |
| AADT | | | | | | | | | |
| Segment/site | x | x | x | x | x | x | x | x | x |
| Screen line/cordon line | | x | x | | | | | | |
| VMT | | | | | | | | | |
| Segment/site | | | x | | | | x | | |
| Functional class | x | x | | | | | x | | x |
| Jurisdiction | x | x | | | | | x | | x |
| Intersection turning movements | | | x | | x | | x | x | x |
| Directional factors | x | | x | | x | x | x | | |
| Vehicle classification | x | x | x | x | x | x | x | x | x |
| Speed | x | | | | | | x | | |

increase productivity and provide improved count information while reducing costs and manpower requirements. A summary of the major findings of this assessment follows:

- The key elements of the traffic count program evolved largely independently. Some program elements overlapped, and many opportunities existed to achieve cost and manpower savings by better integrating these count activities.
- Given the labor-intensive nature of traffic counting, it would be necessary to focus strategies on payroll reduction for significant cost savings to occur.
- Because the central office conducts extensive manual processing, checking, and factoring of traffic counts, many opportunities existed to automate these steps to improve staff productivity.
- Considerable staff time and cost are expended by central office field staff in taking PTR counts and visiting ATR stations. Purchasing new automated traffic counters capable of transmitting data directly to the central office through telemetry would reduce costs and manpower requirements.
- The structure of the ATR program was not easily integrated with other program elements.
- The need for and scope of the PTR program (for seasonal control count) needed to be evaluated.
- The central office, district offices, and MPOs collect significant numbers of counts annually. The central office uses a manual microfiche system for filing such counts. This system was implemented many years ago and is not efficient for quick data storage and retrieval.

## RECOMMENDED INTEGRATED TRAFFIC COUNT PROGRAM

The recommended traffic count program is summarized in this section and compared with the count program as it existed during the study. Major recommendations and budget and manpower implications are described.

### ATR/PTR Program

A comprehensive assessment of the ATR/PTR program elements was conducted. Major changes to these program elements focused on

- Traffic count factors and procedures used by the department to estimate AADTs from "raw" traffic counts and
- Procedures and equipment used by the department to perform ATR counts.

These are discussed hereafter.

#### Traffic Count Factors and Procedures

Several types of factors should be used to convert a typical field traffic count to an estimated AADT and to subsequently update the estimated AADT to a current year:

- Seasonal adjustment factors, which account for seasonal variations in traffic;
- Axle correction factors, which adjust road tube counts to account for three-or-more-axle vehicles in the traffic stream; and
- Traffic growth factors, which are used to update AADTs to a current year.

The department currently uses seasonal adjustment factors and traffic growth factors in its procedures. It has just begun exploring the use of an axle correction factor.

#### Seasonal Adjustment Factors

The department collects traffic volume data year round, although weather does affect production levels during the winter months. To estimate AADTs consistently, using traffic counts taken at different times during the year, seasonal adjustment factors must be used.

##### *Existing Seasonal Adjustment Factors and Procedures*

The existing seasonal adjustment factors used by the department are calculated for individual days of the year using the continuous ATR data. The daily factors calculated for each of the 67 ATR stations are currently grouped to form a set of seven traffic pattern groups (TPGs): urban, primary rural, secondary rural, moderate recreational, recreational, extreme recreational, and winter recreational.

Individual traffic volume counts are categorized in one of the TPGs for factoring. The current process for applying seasonal factors is presented here as four steps.

First, daily traffic volume factors are calculated for each of the 67 individual ATR stations as follows:

- The daily traffic volume recorded at the ATR station during the year is totaled and divided by the number of days in the year.
- The traffic volume on each day is divided by the average volume calculated over the year. This gives the individual daily volumes expressed as a multiple of the annual average volume.

Second, the daily traffic volume factors for the 67 ATR locations are grouped together and averaged to create more generally applicable seasonal factors, which can be associated with individual traffic volume counts. The grouping process is currently performed manually.

Third, the PTR control count data are analyzed to determine the TPG that best fits the pattern of 24-hr counts taken at each PTR location during the year. The best-fit TPG is determined by calculating the variance between the AADTs estimated from the six 24-hr traffic counts at a control count location using each of the seven TPGs. The control count is assigned to the TPG the factors of which yield the most consistent estimates of AADT when applied to the six separate 24-hr volume counts.

Fourth, individual traffic volume counts are manually assigned to TPGs by the traffic data analysts in the central office.

##### *Recommended Seasonal Adjustment Factors and Procedures*

The existing TPG system requires considerable judgment both in forming the seasonal adjustment factors and in assigning the factors to the numerous traffic counts taken each year. An alternative process is discussed that uses structured TPGs based on (a) the functional classification of the road on which the count was taken and (b) the geographic area of the commonwealth. The recommended system uses four functional classes of roadway: Interstates and freeways, primary arterials, minor arterials, and collectors.

These four classes were initially combined with four geographic breakdowns of the commonwealth:

- The major metropolitan areas (Philadelphia and Pittsburgh);
- The other 13 urbanized areas in the commonwealth;
- The rural parts of the southern half of the commonwealth, south of I-80; and
- The northern part of the commonwealth, roughly the area north of I-80.

The geographic divisions were developed by inspecting the TPG maps developed in past years by the traffic analysts in the department.

The four functional classes, combined with the four geographic areas, provided 16 combinations of seasonal factors. To determine whether the number of proposed groupings could be reduced, the following analysis was performed:

- Seasonal adjustment factors for the 16 structured TPGs were plotted on transparencies and compared visually,
- A record was kept of TPGs with similar distributions of traffic over time,
- The groups were reformulated by combining the ATRs recorded as having similar seasonal distributions of traffic, and
- The combined distributions were plotted and evaluated.

The following groupings were combined because they were found to have similar seasonal variations in traffic:

- The major metropolitan and other urban area categories,
- The minor arterial and collector functional classes within the urban and metropolitan geographic area class, and
- The rural north and rural central areas within each of the Interstate and primary arterial functional classes.

The visual analysis of the traffic pattern groups was supported by statistical analyses. The variances within the TPGs were evaluated for (a) the existing groups, (b) the original 16 structured groups, and (c) the reduced set of 9 structured groups. The reduction from 16 to 9 structured groups did not significantly affect the statistical reliability of the seasonal factors.

The recommended TPGs provide a number of benefits:

- The structured TPGs based on functional classifications and geographic areas are more easily understood than the set of seven TPGs currently used by the department.
- The structured approach provides the opportunity to automate the factoring process, which will reduce costs.
- The use of structured TPGs will yield more consistent estimates of AADT from year to year, especially if several analysts participate in the traffic count factoring process.
- The structured approach gives a "statistically fair" estimate of the uncertainty of the seasonal factors applied to the traffic count data. It is impossible to determine the true uncertainty in the factoring of traffic counts with existing departmental procedures because different information is used to create the groups than is used to assign traffic counts to them.
- The structured groups are essentially equal to the current judgmental groups in terms of uncertainty within the group average factors. The standard errors within each of the judgmental and structured TPGs were calculated for 1980 and 1982 using the ATR data available for Pennsylvania.

### *Recommended Revisions to ATR and PTR Data Collection Programs*

The ATR and PTR programs serve primarily to provide information for the calculation and assignment of seasonal adjustment factors to traffic counts. With the recommended changes in the seasonal factoring process, it was necessary to reassess the design of the ATR and PTR data collection programs.

It was recommended that the PTR program be eliminated. The PTR program primarily provides information used to assign traffic counts to seasonal factor groups, but with the structured groups this information is no longer needed.

## Traffic Growth Factors

Counts are not taken every year on all roads for which current estimates of AADT are needed. Counts may be taken periodically, such as every 3 to 5 years, and the AADT may be estimated for the years in between using the last count taken, which is then adjusted using an estimated traffic growth factor.

### *Existing Traffic Growth Factors*

Growth factors are currently calculated on a county-level basis. This requires data for the estimation of 67 separate growth factors. The 67 county growth factors are calculated using the ATR and PTR data, providing a data base of roughly 242 counts per year (i.e., 67 plus 175).

Most county growth rates change from 0 to 3 percent per year. The current system estimates small changes in traffic volumes using an average of roughly four traffic count locations per county.

### *Recommended Traffic Growth Factors*

To increase confidence in the traffic growth factors, it was recommended that two fundamental changes be made:

- The number of growth factors should be reduced from the 67 counties to a more aggregate representation of the geographic areas of the commonwealth and
- The HPMS traffic count data, along with the ATR counts, should be the primary sources of information used to calculate the growth factors.

It was recommended that a set of approximately 15 geographic areas be defined for which growth factors will be calculated. The geographic regions should provide sufficient detail to identify high- and low-traffic-growth areas of the commonwealth while keeping the number small enough to develop reasonably accurate growth estimates for each. To select these areas, the department should evaluate the results of the HPMS data taken to date.

The HPMS data recommended for use in calculating the growth factors should be collected on a 3-year cycle. As discussed later, the recommended HPMS sample includes 1,174 annual counts. It is important that the same 1,174 counts be taken every 3 years. This will provide 1,174 paired comparisons of growth across the commonwealth each year and will also provide a 3-year base of growth from which to calculate the annual growth rate.

### Recommended Data Collection Procedures and Equipment for the ATR Program Element

The data collection and processing phases of the recommended ATR program should be automated to the maximum extent possible to increase productivity and reduce costs.

With regard to the collection of ATR counts, it was recommended that the department purchase and install solid-state traffic recorders and telemetry equipment at all recommended ATR stations to automate the collection of these counts. Although the telemetry system is expensive to install, several significant benefits make it desirable for the collection and data manipulation of traffic counts for the department's ATR program element:

- Labor costs for collecting and processing the ATR data will be lower than for other ATR data collection and processing systems.
- The paper tape reading machine currently used by the central office to process ATR tapes is old, with a current life expectancy of less than 5 years. Because the machine is no longer manufactured and parts are scarce, its replacement or a major rehabilitation of the existing machine may not be feasible.
- The use of telemetry will allow earlier detection of malfunctioning ATR recorders, thus improving the quality and amount of data obtained with the ATR program.
- The replacement of the existing ATR recorders with solid-state recorders capable of telemetric operation also allows the use of the ATR stations to collect data on truck volumes and vehicle speeds in addition to overall traffic volumes.

## HPMS Program Element

### Existing HPMS Program

The department's volume and vehicle classification counts for HPMS purposes are currently performed on three separate cycles:

- All Interstate segments are counted every year;
- HPMS freeway, principal arterial, and minor arterial sample segments are counted annually;
- Sample collector segments are counted every 3 years; and
- Vehicle classification counts are taken on HPMS segments on a 4-year cycle.

Almost all HPMS data are currently collected by district and MPO personnel. Traffic counts are collected using paper tape recording traffic counters. Two-person 8-hr manual counts are used to provide vehicle classification data.

Although fulfilling all FHWA requirements, this program presents several difficulties to the department:

- The program is costly. The overall HPMS program is budgeted at $486,377 in FY 1982-1983. This cost is largely driven by FHWA's request that all Interstate sections and all other freeway, principal arterial, and minor arterial HPMS sample segments be counted annually. Significant cost and manpower reductions can be achieved by the department by conducting these counts less frequently.
- Management of this program element is difficult because of the problems of coordinating three different count cycles. For example, most sites are counted separately for traffic volume and vehicle classification data because of their respective 3- and 4-year count cycles.

### Recommended HPMS Program Element

After evaluating the HPMS program element and the uses of the HPMS data, it is recommended that the department make the following changes to this program element:

- Conduct all HPMS counts on a 3-year cycle instead of annually. This will reduce costs without undermining the usefulness of the HPMS data to monitor travel trends and the performance of the commonwealth's highway system. Under this recommendation, all HPMS sample road segments will have traffic counts and vehicle classification counts performed simultaneously once every 3 years.
- Use automatic vehicle classification counters whenever possible to collect both volume and vehicle classification data simultaneously with a minimum of manpower.

Consolidation of the count program serves several major purposes:

- It simplifies management of this program element and
- It reduces the number of counts taken in a year without sacrificing the HPMS program's objectives or the statistical validity of the data; this will enable the department to achieve significant manpower and cost savings.

## Truck Count Program Element

The department is conducting an ongoing truck count program element to determine the amount and type of truck travel on the commonwealth's priority commercial highway network. On the basis of this evaluation, major changes to this program element are not recommended. However, several changes were recommended in the procedures used to process data collected in this effort including the use of seasonal truck traffic adjustment factors for vehicle classification counts based on data to be collected from the revised ATR program.

## Speed-Monitoring Program Element

The possibility of moving the department's speed-monitoring sites to correspond with the recommended telemetry ATR locations was investigated. FHWA indicated that movement of the speed sites from their current locations would seriously affect the statistical reliability of the sample. To the FHWA, this was an unacceptable outcome. The use of the existing speed-monitoring locations for ATR sites also was investigated. This option was dropped because of the expense of moving a large number of ATR sites. It is recommended that no changes be made to the speed-monitoring program element.

## Summary of Major Recommendations

In summary, five major recommendations were made to facilitate implementation of the recommended program scope. These recommendations fostered a substantial reduction in the number of counts taken annually and improved methods for collecting and processing count data.

The five major recommendations are summarized as follows:

• Restructure the control count program (ATR) on the basis of functional classification and geographic area. The existing structure was unique to this program element and had little utility, or application, for other program elements. The new structure will allow significant automation of many central office count-processing activities. Furthermore, given a new program structure, the PTR element (seasonal control counts) was determined to be unnecessary.

• Reduce the number of HPMS sample segments counted annually from 2,760 to 1,174 by converting all HPMS traffic volume and vehicle classification counting to a 3-year cycle. The new cycle should both serve user needs and satisfy federal reporting requirements. Introduce automated vehicle classification equipment wherever possible to minimize manual counting.

• Install a telemetry system for the collection of ATR data. Both total volume and vehicle classification counts should be taken at all ATR stations using the new equipment designed for this purpose.

**TABLE 3 Comparison of Existing and Recommended Traffic Count Programs**

| Program | Type of Count | No. of Locations Counted Annually: Existing | No. of Locations Counted Annually: Recommended |
|---|---|---|---|
| Control counts | | | |
| ATR | Continuous | 67 | 61 |
| PTR | Six 24-hr counts | 175 | 0 |
| HPMS | 24-hr volume counts | 2,760 | 1,174 |
| | 8-hr manual classification counts | 1,000 | 484[a] |
| Truck counting | 24-hr counts | 670 | 670 |
| Speed monitoring | Eighty-eight 24-hr counts | 40 | 40 |
| Total | | 4,712 | 2,429 |

[a]Automatic vehicle classification equipment will be used except where traffic congestion makes results unreliable.

• Implement an automated system for the storage and retrieval of traffic count data. The new system should be compatible with the department's highway inventory data base system, which contains current estimates of AADT.

• Automate the count factoring process to minimize manual processing of counts. This process should include seasonal, axle correction, and growth factors.

No major changes were recommended for either the truck-counting or speed-monitoring programs.

Overall, the recommended traffic count program would require considerably fewer traffic counts than the existing program (Table 3).

## Cost and Manpower Implications

The cost and manpower effects of the recommended program are given in Tables 4 and 5.

If all recommendations were implemented, the department would eventually save an estimated $272,100 (1982-1983 dollars) annually, which is approximately a 21 percent reduction in the FY 1982-1983 budget of $1.3 million. A significant portion of the net savings was estimated to accrue from changes to the HPMS program.

In comparison, a one-time cost of approximately $306,000 would be required. The purchase and installation of a telemetry system for the ATR stations represented almost 90 percent of the estimated one-time cost. The remaining start-up costs are for software development, staff training, and the introduction of automated vehicle classification counters to the HPMS program on a demonstration program basis.

Table 5 gives the estimated reductions in manpower, given the implementation of all recommendations. Approximately 9 person-years of effort could be eliminated by implementing the recommended program.

**TABLE 4 Summary of Cost Savings**

| Recommendation | Annual Savings ($) | To be Reinvested ($) | Net Annual Savings ($) | One-Time Cost ($): Total | One-Time Cost ($): FY 1983-1984 | One-Time Cost ($): FY 1984-1985 |
|---|---|---|---|---|---|---|
| Restructure control count program[a] | 131,900 | 50,900 | 81,000 | 7,700 | 7,700 | 0 |
| Install telemetry at permanent control count stations (ATR) | 48,000 | 48,000 | 0 | 273,200 | 30,000 | 243,200 |
| Restructure HPMS traffic count requirements[b] | 204,400 | 13,300 | 191,100 | 25,000 | 25,000 | 0 |
| Total | 384,300 | 112,200 | 272,100 | 305,900 | 62,700 | 243,200 |

[a]Includes elimination of the PTR program and the automation of count factoring.
[b]Includes demonstration program to introduce use of automated vehicle classification equipment.

**TABLE 5 Summary of Manpower Savings**

| Recommendation | Annual Person-Years Saved: Field | Office | District and MPOs | To Be Reinvested | Net Savings |
|---|---|---|---|---|---|
| Restructure control count program[a] | 2.0 | 1.5 | 0 | (1.5) | 2.0 |
| Install telemetry at permanent control count stations (ATR) | 1.0 | 0.5 | 0 | (1.5) | 0 |
| Restructure HPMS traffic count requirements[b] | 0 | | 7.25 | 0 | 7.25 |
| Total | 3.0 | 2.0 | 7.25 | (3.0) | 9.25 |

[a]Includes elimination of the PTR program and the automation of count factoring.
[b]Includes demonstration program to introduce use of automated vehicle classification equipment.

## Implementation Schedule

Since the completion of the study, the department has elected to go forward with several of the more significant recommendations. These include

- Restructuring the ATR program on a functional class and geographic area basis;
- Eliminating the PTR program;
- Installing a telemetry system at ATR locations;
- Reducing HPMS annual count requirements, including the introduction of automated vehicle classification equipment to minimize present manual counting; and
- Automating the count factoring process.

An 18-month schedule, which promises implementation by January 1985, has been adopted.

The FHWA has endorsed the implementation of this set of recommendations. The only real exception, which the department has agreed to, is counting HPMS Interstate sample segments annually instead of on the recommended 3-year count cycle.

## IMPLICATIONS FOR OTHER STATES

This paper will likely have implications for other state transportation and highway departments. Traffic counting is a fundamental program, but unfortunately it can be extremely labor intensive and costly.

Because most state agencies conduct traffic count programs with similar elements (e.g., control counts, HPMS), the recommendations described herein will likely have nationwide applicability and provide opportunities for structuring more productive programs.

## REFERENCE

1. Peat, Marwick, Mitchell and Co. Review of the Department's Traffic Count Program. Pennsylvania Department of Transportation, Harrisburg, June 1983.

# Development of Washington State's Transportation Information and Planning Support System

H. K. GUPTA

ABSTRACT

In this paper is described the Transportation Information and Planning Support (TRIPS) system currently being developed by the Washington State Department of Transportation. The system is being developed in three major phases: analysis, design, and implementation. The information presented here is based on the work done in the analysis phase and in the early part of the design phase. TRIPS will be a data-based, integrated system that will include transportation information related to the highways in the state system. The major categories of data include physical attributes, counts, and accidents. The TRIPS system will be expandable to allow for future inclusion of additional data categories. Districts, headquarter's divisions, and other authorized state agencies will have access, via computer terminals, to the information stored in the data base. This will permit authorized personnel to retrieve traffic counts, accident data, roadway data, and other key information directly from the data base. The findings of the analysis phase, the basic functions and features of the trips system, the computer-related technical environment, and a summary benefit-cost analysis are included.

Washington State DOT has an extensive data collection and analysis responsibility for the state highway system, which can be summarized under two major categories:

1. Traffic and travel, which consist primarily of the inventory and analysis of data related to operational characteristics of the total transportation system. These include vehicle-miles traveled, average daily traffic, vehicle speeds, origin-destination studies, vehicle classification, truck weight studies, and accident analysis. The data are used in project-oriented analyses such as project feasibility, project location, and project design. Private business also makes extensive use of these data through direct inquiries to DOT staff or through publications such as the Annual Traffic Report.
2. Systems data, which consist of data related