US Department
of Transportation

Federal Highway
Administration

Case Studies of Traffic Monitoring Programs in Large Urban Areas

July 1997

Joseph Mergel

Prepared by:

Center for Transportation Information
Volpe National Transportation Systems Center
US Department of Transportation
Cambridge, MA 02142

Prepared for:

Federal Highway Administration, Office of Highway Information Management
Washington, DC 20590

PREFACE

This is one of two documents prepared by the Center for Transportation Information of the Volpe National Transportation Systems Center in support of the Federal Highway Administration's Office of Highway Information Management.
This report presents the results of four case studies of traffic monitoring data operations within urban areas. The companion report documents the status of traffic monitoring data collection and program activities found in all large urbanized areas.

The purpose of this project is to document a series of examples of urban traffic monitoring data collection programs in order to support the development of urban traffic monitoring databases and promote the upgrading of urban traffic monitoring programs.

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

1.1 PURPOSE

Many metropolitan areas have begun or are planning to implement traffic monitoring programs to meet the growing demand for traffic data. Several of these areas have requested information regarding FHWA guidance or program development in other jurisdictions. The latest FHWA guidance for urban areas was produced in the early 1980's and is out of date. This study is intended to respond to the existing need to update guidance information through the identification of current program models and the dissemination of that information.

The Volpe National Transportation Systems Center (VNTSC) researched the status of traffic monitoring operations in urbanized areas of over 200,000 population by conducting telephone interviews with a number of staff from States, counties, cities, and metropolitan planning organizations responsible for traffic monitoring operations. The inquiries were used to document the status of traffic monitoring in urban areas and to identify a number of areas to be studied in more detail. The results are presented in the report *An Overview of Traffic Monitoring Programs in Large Urban Areas* (forthcoming). The second phase of the project involves a series of four case studies, which are reported herein.

1.2 APPROACH

Each of the selected areas was visited to interview responsible program managers or staff and explore the specifics of the traffic monitoring data program. Information on institutional arrangements, organization, staffing, data sharing, funding, costs, objectives, program size, procedures, data processing, data collection equipment, constraints, difficulties encountered, outputs, reports produced, etc., was considered. The examination emphasized the successes achieved and problems surmounted in the collection of reliable data. Since it is expected that traffic data within an urban area may be collected by a variety of organizations, the interaction, cooperation, organizational arrangements, agreements, and data sharing of the involved entities was explored. Due to the importance and need for traffic data to support urban planning requirements, estimates of vehicle miles of travel, and the Highway Performance Monitoring System, the link between the traffic data collected and its use in these programs was emphasized.

The major points for consideration in the case studies that surfaced as a result of the first phase of the project are as follows:

- Institutional Arrangements
  - inter agency contracting
  - inter agency coordination/cooperation
  - single agency data collection
- Use of ATMS/Traffic Management Center Data for Planning
- Data Use
  - input to Air Quality models
  - input to HPMS
  - support of CMS
  - State DOT needs
  - local agency needs
- How Various Data Needs Fit Together in the Context of the Overall Data Collection Effort
- Funding Sources/Mechanisms

1.3 THE CASE STUDY AREAS

Four case study areas were selected to highlight the major issue areas identified in the first phase of the study. These cases are not presented as perfect models, but rather as examples for practice. It is hoped that readers will benefit from the information presented and find some applicability to their own area. The major issue areas addressed by each case study site, and selected characteristics of the areas are summarized in the tables below.

Major Points Highlighted in the Candidate Case Study Areas

	Inter Agency Contracting	Inter Agency Coordination/ Cooperation	Single Agency for Data Collection	Funding Sources	Use of ATMS Data for Planning
Minneapolis		X		X	X
Philadelphia	X		X	X	
Portland		X			
Tampa		X			X

Characteristics of the Candidate Case Study Areas[1]

	Total Roadway Miles	Population	Net Land Area (Square Miles)	Ozone designation	CO designation
Minneapolis	10,301	2,228,000	1,192	Attainment	Moderate
Philadelphia	13,383	4,531,000	1,350	Severe	Moderate
Portland	5,509	1,329,000	469	Attainment	Attainment
Tampa	7,406	1,756,000	650	Attainment	Attainment

[1] The mileage, population and land area for the urbanized areas were those indicated in the table titled "Selected Characteristics -1995" in *Selected Highway Statistics, 1995.*

2. FOCUS AREAS AND FINDINGS

2.1 FOCUS AREAS

The conclusions of the first phase of the project are indicated below. These were based both on our review of the literature and our interviews with individuals involved in traffic data collection at various levels of government throughout the country.

- **The quality of urban area traffic data collection efforts, and presumably of the resulting data, varies widely. Many programs would appear to meet currently accepted standards, many others would not, and in many cases there is no program.**

- **Data within urban areas would not appear to be collected in any kind of coordinated fashion. Most data exchange is informal. The CMS requirement of ISTEA appears to have forced agencies within urban areas to take stock of their local jurisdictions' programs.**

- **Funding and staffing cutbacks have hurt data collection efforts in the recent past, and continue to pose a threat in the future.**

- **New technology would seem to hold promise as a solution to budget/staff reductions, but does not seem to have lived up to its full potential.**

These conclusions implied a need to explore three areas in the in-depth case studies. First there is the need for assured funding for traffic monitoring data collection. In addition, there is a need for the efficient use of data collection resources. This has two aspects: one is the increased use of automation for traffic monitoring data collection, as in ITS/ATMS: the other is in the consolidation/coordination of traffic monitoring data collection among jurisdictions within a given urbanized area.

To these was added the question of data use (input to Air Quality models, input to HPMS, support of CMS, State DOT needs, local agency needs), and how various data needs fit together in the context of the overall data collection effort.

Specifically we were looking for answers to the following questions:

- **Could ATMS be used to provide planning type data?**

- **How were traffic data collection programs funded in those urban areas that managed to maintain viable programs, given that many agencies reported that traffic data collection programs had been eliminated or curtailed because of a lack of funding?**

- **What were the key ingredients needed to achieve a coordinated / cooperative data collection program within a given urban area and to provide all agencies in an area with the data they needed, in the proper form, and in a timely fashion?**

2.2 FINDINGS

The conclusions of this report are based on our interviews with individuals involved in traffic data collection at various levels of government in the four case study areas. Specific observations from the individual areas are presented in the following section. The general conclusions are as follows:

There are no unusual or innovative funding sources for traffic data collection in widespread use at the present time.

State agencies and MPOs were found to use standard federal program funds to pay for data collection. State and local agencies did not have a secure independent source of funding. Even in the case of Philadelphia, the MPO's contracts with the state DOTs involved essentially a pass through of standard federal planning funds to the MPO. However, implicit pressure from various types of growth management legislation, and aid allocation programs appear to have kept transportation planning data relatively high on the list of budget priorities for local governments.

In a related vein, staff levels at state DOTs appear to be as much of a policy decision as a budget question. Decreased staff size as opposed to decreased budget levels appears to be more of a threat to maintaining viable data collection programs at the State DOT level.

ATMS type systems can be used to collect planning data, but a well thought out ATMS implementation plan is necessary if ATMS is to provide useful planning type data.

Currently available hardware and software from traffic signal control systems and ramp metering systems is being utilized by various agencies to collect traffic data. The keys to success seem to be a desire to use the system to collect planning data in the first place, designing the system so that it is capable of collecting meaningful data, and maintaining the system so that reliable data is obtained over time. ATMS is seen as a solution to the problem of declining staff levels and increasing data needs i.e., automation to increase productivity, and the safety of data collection.

There also is a move toward automation of data collection in terms of increased use of permanent continuous count stations for increased productivity and safety.

There is no magic ingredient in the success of coordinated data collection programs.

Successful programs were based on a spirit of cooperation and professionalism among all involved parties within a region. However, it appears to be helpful to have one agency take the lead in advocating and coordinating the program.

While the consolidation of most traffic data collection efforts within a single agency just happened in the Philadelphia area, it could be made to happen elsewhere if all parties were in agreement.

While current programs generally provide the data that is needed, data quality and accessibility are major concerns.

Agency needs, CMS requirements, HPMS requirements, and air quality modeling requirements all seem to be adequately served by the current programs. However, if CMS is to be real and not just a paper exercise, more and different types of data may be needed. HPMS data did not appear to be widely used in urban areas except for meeting federal reporting requirements.

Quality control of all aspects of data collection and processing is essential. This issue emerged during the course of the case study site visits. The loss of permanent staff devoted to data collection appears to have had an adverse impact on the quality of data. The reliability of equipment especially AVC technology also surfaced as a concern. Another concern expressed was that of making data collected by all involved agencies available to all partners in a consistent format on a timely basis.

The recommendations of this report are as follows:

All new ATMS systems should be designed and built with the capability of collecting traffic monitoring type data.

> Despite the fact that ATMS type systems in a number of areas now collect data for planning purposes, there are many other areas where this capability is not utilized. In an age of increasing data needs and declining data collection budgets and staff levels, this source of data should be utilized to its full potential.

The concept of a central clearinghouse for the evaluation of data collection equipment , and the widespread dissemination of the resultant information to data collection agencies, including those below the state DOT level, should be vigorously pursued.

> A number of concerns regarding the accuracy of available traffic data collection equipment, especially that used for vehicle classification and speed, were volunteered by case study participants in the course of the site visits. Some of the local agencies had been forced to conduct their own tests on the equipment. The time and expense for each transportation agency to do their own testing is clearly wasteful and inefficient.
>
> The state DOTs and FHWA, working through a pooled fund project, have attempted to establish a test center and clearinghouse for vehicle detector equipment. Observations from the site visits reinforced the crying need for such a facility, and more importantly the dissemination of the results to all transportation agencies involved in data collection, especially those at the city, county, and MPO level.
>
> The need for such a facility will become even more evident as new technologies such as Global Positioning Systems come into more widespread use.

2.3 OBSERVATIONS FROM THE CASES

2.3.1 Philadelphia

2.3.1.1 Value - The Philadelphia experience highlights three ingredients for a successful traffic data collection program:

- the need for a “critical mass” in data collection;
- the old adage, that practice makes perfect;

- and, the need to pursue innovative funding approaches.

Critical mass : This implies a need to do a certain amount of data collection in order to justify a program, and concurrently implies a need to fully utilize equipment and personnel. DVRPC makes extensive use of equipment and crews. They have a year round count program (except for days with snow cover) employing their crews every day, every week of the year.

Conversely, the City of Philadelphia found that it was not economically feasible to maintain an independent program in their Streets Department, and that it was more economical to hire DVRPC to do their required data collection.

This is a strong argument for pooling resources in an urban area to establish a single viable program as opposed to struggling to maintain a number of independent programs.

Practice makes perfect : This simply means that experience gained on a full time job by permanent staff results in a better quality program than one staffed by temporary staff with a high degree of turnover. This helps to build a program's reputation and in the case of DVRPC has resulted in more requests for work by other agencies. (PENNDOT, for example, was highly complementary of DVRPC.)

PENNDOT also noted that quality control in data collection was an issue with some other MPOs and District offices due to the lack of full time staff for data collection.

Innovative funding : In the Philadelphia area context this means a mix of outside "contracts" and internal agency line item money for the data collection group. DVRPC's Office of Travel Monitoring seems to have developed a unique approach to funding which is a mix of outside sponsor support and internal agency funds.

2.3.1.2 Adaptability/Cautions - DVRPC appears to have assumed their predominant role in traffic data collection by default. They had a need for data for the own use in an area where the city and state historically had weak data collection programs at best, and the counties did not collect data at all. They have a highly competent in house staff. This situation may not be present in all areas. However, that is not to say that responsible data collection agencies in a given urban area could not get together and agree to assign data collection responsibility to a single agency. In certain areas, a data collection agency at one level may be faced with staff but not with budget restrictions, while a data collection agency at another level of government may not have any hiring restrictions, but would require additional funding in order to expand their traffic data collection program. In the Philadelphia case, staff cuts at the state level forced the transfer of data collection responsibilities from the State DOT to local level agencies with a commensurate transfer of funds.

While there may be administrative implications involved in inter agency contracting, as well as political implications connected with the transfer of a traditional agency function to another agency, these need not be insurmountable. The requirement to collect more and better quality data with less, or at best the same amount of resources may leave agencies with little choice, and certainly makes a consolidation of traffic data collection programs an option worth exploring in detail.

2.3.2 Tampa - St. Petersburg - Clearwater

2.3.2.1 Value - The Tampa situation highlights three major points related to traffic data collection:

- planning type data can be pulled from a computer controlled traffic signal system with existing off-the-shelf software;
- there is a need for common data collection standards in order to make quality data available to all partners in a form that meets everyone's unique needs; and
- a successful cooperative data collection and pooling effort seems to be based on an intangible - a spirit of good will, and mutual respect and trust among the individuals at the various agencies.

Traffic Volume Data Can Be Obtained From An ATMS With Existing Software: Planning data can be pulled from a computer controlled traffic signal system with existing off-the-shelf vendor software. For example, both the City of Clearwater and Hillsborough County systems can produce “summary” reports of numbers of vehicles by 15 minute intervals. However, there may be a need for software to produce system summary data as a database as opposed to a report, and to store/transfer the data via electronic media. In Pinellas County, the City of Clearwater's hard copy reports produced by the signal system have to be entered by hand into the MPO's county wide database. Overcoming this would appear to be a trivial problem, and Clearwater is in the process of developing an electronic version of the system's output.

There are a number of ingredients essential to the success of an automated data collection program.

Intelligent system design is a prerequisite. For example, it helps to have loops in all lanes of multilane roadways if the system is to provide meaningful traffic volume data.

A commitment to ongoing data checking/quality control and to loop maintenance is essential to the successful use of data. Malfunctioning loop detectors must be identified and repaired in a timely fashion if the system is to be used as a source of quality traffic count data.

The data users must define what they want to see, so that raw data can be summarized via electronic media in the format they desire. In Hillsborough County massive amounts of system data, e.g., vehicle counts by lane by second are stored on CD ROM, but are not used for planning purposes.

Common Traffic Data Formats, And Data Collection Standards Are Needed At Least Within A Given Region: There is a need for common data formats, standards, etc. Adequacy of coverage is not a problem in Florida since the 80's because of concurrency. Making quality data available to all parties in a common format that meets everyone's needs is the real challenge. The Pinellas County MPO has such a database, the Hillsborough County MPO is developing one and FDOT District Seven is planning on developing one. Here the major problem appears to be one of getting all agencies collecting data to produce the output in one consistent format in electronic form. As indicated above the Pinellas County MPO currently has to transform the data obtained from the jurisdictions into a common format for use in their county wide database.

The Success Of A Cooperative/Coordinated Data Collection Program Seems To Be Based On An Intangible: The success of a cooperative/coordinated data collection program seems to be a function of the personalities involved and their approach to solving a common problem. In Florida the local jurisdictions must collect data because of concurrency, but nothing makes them share data except a spirit of good will among the individuals at the specific agencies, and the realization that it is in their own best interest to cooperate with other agencies involved in traffic data collection. The long term continuity of the individuals involved at each agency also seems to be an important factor. These comments would also apply to the level of cooperation achieved between the multiple MPOs serving the region.

2.3.2.2 Adaptability/Cautions - While it is possible to obtain traffic volume data from an ATMS type system today, a number of impediments to doing so may be present in existing systems. First, all ATMS type systems may not have been well planned in terms of loop placement, and would require extensive and expensive retro fitting with additional detectors in order to allow the system to provide meaningful traffic volume data. Moreover, all currently operating ATMS type systems do not maintain loops adequately, and do not monitor data adequately, if at all. The former problem may require additional funding specifically designated for system maintenance. Both problems may require a change in mind set on the part of the operating agencies.

Data conversion and database construction can be an expensive and time consuming process. Once in place, a common traffic database may provide long term savings for all "partner" agencies. However, many agencies at the local level who are struggling to maintain their existing programs may not have the resources to invest in such an effort. Additional funding may be required to help local agencies put their data "production" efforts on a common electronic basis.

All states do not have concurrency legislation, and adequate data is not always available. Thus, agencies who are hard pressed to meet their own data collection requirements, may not always find it easy to respond to requests for data from an outside agency. However, a spirit of cooperation should be possible anywhere, as long as everyone can be convinced that it is in their own best interest to "buy in" to a cooperative/coordinated program.

2.3.3 <u>Minneapolis - St. Paul</u>

2.3.3.1 Value - The Minneapolis meetings reinforced three points related to traffic data collection:

- planning type data can be pulled from an ATMS, in this case a ramp metering system;

- a successful cooperative data collection and pooling effort seems to be based on an intangible - a spirit of good will, and mutual respect and trust among the individuals at the various agencies;

- in addition, the Minneapolis situation highlighted the need for a "lead" agency (in this case the state DOT) in making a regional data collection program successful.

Traffic Volume Data Can Be Obtained From An ATMS With Existing Software: Planning data can be pulled from a computer controlled ramp metering system with existing software. The TMC can produce "summary" reports of numbers of vehicles in the AM peak, PM peak and 24 hour counts for various freeway segments. They have developed software to produce system summary data in the same format as that of a continuous traffic counter and are developing a DBMS in order to make the data more user friendly and usable to planners.

There are a number of ingredients essential to the success of such a program.

Intelligent system design is a prerequisite. For example, it helps to have loops in all lanes of multilane roadways if the system is to provide meaningful traffic volume data.

A commitment to ongoing data checking/quality control and to loop maintenance is essential to the successful use of data. Malfunctioning loop detectors must be identified and repaired in a timely fashion if the system is to be used as a source of quality traffic count data.

The data users must define what they want to see, so that raw data can be summarized via electronic media in the format they desire.

The Success Of A Cooperative/Coordinated Data Collection Program Seems To Be Based On An Intangible: The success of a cooperative/coordinated data collection program seems to be a function of the professional approach of the individuals involved and their wish to solve a common problem. In Minnesota the local jurisdictions collect data because these data are used in determining their state aid allocation for highways. However, there are no mandates requiring them to do so. Nothing makes them share data except a spirit of good will among the individuals at the specific agencies, and the realization that it is in their own best interest to cooperate with MNDOT.

There Is A Need For A Lead Agency In Making A Regional Data Collection Program Successful: The Minneapolis area traffic data collection program could be viewed as a "meat and potatoes" program, but it works. While it is undergoing changes, especially in the area of automation and data processing methods, it makes data accessible to users in a form that they need when they need it. This fact is due to MNDOT, who long ago designed the program and established basic standards for data quality and consistency which are followed by the jurisdictions. The state aid program is implicitly behind the need to have traffic data by jurisdiction on a comparable basis.

2.3.3.2 Adaptability/Cautions - While it is possible to obtain traffic volume data from an ATMS type system today, a number of impediments to doing so may be present in existing systems. First, all ATMS type systems may not have been well planned in terms of loop placement, and would require extensive and expensive retro fitting with additional detectors in order to allow the system to provide meaningful traffic volume data. Moreover, all currently operating ATMS type systems do not maintain loops adequately, and do not monitor data adequately, if at all. The former problem may require additional funding specifically designated for system maintenance. Both problems may require a change in mind set on the part of the operating agencies.

All states do not have a state aid allocation program for highways implicitly tied to traffic data. Thus, agencies who are hard pressed to meet their own data collection requirements, may not always find it easy to respond to requests for data from an outside agency. However, a spirit of cooperation should be possible anywhere, as long as everyone can be convinced that it is in their own best interest to "buy in" to a cooperative/coordinated program.

2.3.4 <u>Portland</u>

2.3.4.1 Value - The Portland situation is unusual in that as much can be learned from the weaknesses of the program as its strengths. The former are recognized by the participants. The major observations are as follows:

- a successful cooperative data collection and pooling effort seems to be based on an intangible - a spirit of good will, and mutual respect and trust among the individuals at the various agencies;

- there is a need for a "lead" agency (in this case the MPO) in order to make a regional data collection program successful; and

- common data collection standards and software are necessary in order to make quality data available to all partners in a form that meets everyone's unique needs.

The Success Of A Cooperative/Coordinated Data Collection Program Seems To Be Based On An Intangible: The success of a cooperative/coordinated data collection program seems to be a function of the personalities involved and their approach to solving a common problem. In

Portland, nothing makes the jurisdictions share data except a spirit of good will among the individuals at the specific agencies, and the realization that good data supports good decision making. However, there are no mandates requiring the sharing of data, and while the MPO defines its data needs, it must take whatever the jurisdictions provide.

The Portland area data collection program is far from perfect . Potential budget cuts are a threat to the local programs. Staffing cuts appear to be hurting the quality of the ODOT program. There are some problems of data incompatibility and difficulties in translating different GIS languages and data..

The program is as good as it is primarily because of the dedication of the staff at all agency levels in doing the best they can with what they have now, while they work toward a better system. All participants try their best, and cooperate voluntarily in the face of declining budgets and staff levels, to maintain a quality regional data collection program.

There Is A Need For A Lead Agency In Making A Regional Data Collection Program Successful: Metro administers Portland's regional count program, and has recently acquired a small amount of funding to collect traffic count data. Metro designed the regional count program and is the driving force behind its continuation. The count program was developed in order to support the region's travel demand model, which the jurisdictions can access in order to do their own analysis. Metro may be viewed as the region's leading agency in terms of analytical capability related to transportation planning models. Metro maintains and enhances the regional planning model, and provides training to the jurisdictional staff regarding the use of the model, the theory of travel demand modeling, and computer network simulation analysis.

Common Traffic Count Data Formats, And Data Collection Standards Are Needed At Least Within A Given Region: Making quality data available to all parties in a common format that meets everyone's needs is the real challenge. Here the major problem appears to be one of getting all agencies collecting data to produce the output in one consistent electronic format.

While both the City of Portland and ODOT have their data in electronic form, it is not in one consistent format. Furthermore, within ODOT, the data from various data collection activities, such as their annual freeway counts, HPMS counts , etc., are not in one consolidated data base (because the information is collected for differently funded and mandated programs). The MPO currently has to transform the data obtained from the jurisdictions into a common format for use in their traffic count data spreadsheets (and anticipated regional database).

There is also a need for a commonly accepted GIS platform for the region (or development of a better translation software), if the GIS is to be used to its full potential in the display and analysis of traffic data.

2.3.4.2 Adaptability/Cautions - Agencies who are hard pressed to meet their own data collection requirements, may not always find it easy to respond to requests for data from an outside agency. However, a spirit of cooperation should be possible anywhere, as long as everyone can be convinced that it is in their own best interest to “buy in” to a cooperative/coordinated program.

Data conversion and database construction can be an expensive and time consuming process. Once in place, a common traffic database may provide long term savings for all “partner” agencies. However, many agencies at the local level who are struggling to maintain their existing programs may not have the resources to invest in such an effort. Additional funding may be required to help local agencies put their data “production” efforts on a common electronic basis.

3. CASE DESCRIPTIONS

3.1. PHILADELPHIA CASE STUDY

3.1.1 Introduction To The Case Study Area

The Philadelphia urbanized area has a population of 4,531,000, a land area of 1,383 square miles, and a roadway system of 13,383 miles. It is a Severe nonattainment area for ozone, and a Moderate nonattainment area for CO[2]. The Delaware Valley Regional Planning Commission or DVRPC (the Philadelphia MPO) is the primary traffic data collection agency in the area. In addition, the New Jersey DOT has an independent data collection program in the New Jersey portion of the urbanized area. There are 352 municipalities or minor civil divisions in the DVRPC region including the cities of Philadelphia, Trenton, Camden and Chester. The nine county DVRPC region is shown in Figure 3.1.

DVRPC as an agency is best described by their mission statement.

> *Created in 1965, the Delaware Valley Regional Planning Commission (DVRPC) is an interstate, intercounty and intercity agency which provides continuing, comprehensive and coordinated planning for the orderly growth and development of the Delaware Valley region. The region includes Bucks, Chester, Delaware, and Montgomery counties as well as the City of Philadelphia in Pennsylvania and Burlington, Camden, Gloucester, and Mercer counties in New Jersey. The Commission is an advisory agency which divides its planning and service functions between the Office of the Executive Director, the Office of Public Affairs, and three line Divisions: Transportation Planning, Regional Planning, and Administration. DVRPC*s mission for the 1990s is to emphasize technical assistance and services and to conduct high priority studies for member state and local governments, while determining and meeting the needs of the private sector.*

This case study is based on information gathered during meetings held during a site visit made to Trenton NJ (10/15/96), Philadelphia (10/16/96), and Harrisburg PA (10/17/96). Meetings were held with staff of the New Jersey Department of Transportation (NJDOT), the Delaware Valley Regional Planning Commission (DVRPC), and Pennsylvania Department of Transportation (PENNDOT) respectively in order to learn more about traffic data collection and use in the Philadelphia area. This information was supplemented by documentation

---

[2] The nonattainment area includes the total nine-county DVRPC region as well as Salem and Cumberland counties in New Jersey, New Castle County in Delaware, and Cecil County in Maryland.

supplied by the participating agencies, and information provided through the telephone interviews conducted under the first phase of this project.

3.1.2 Data Collection Program

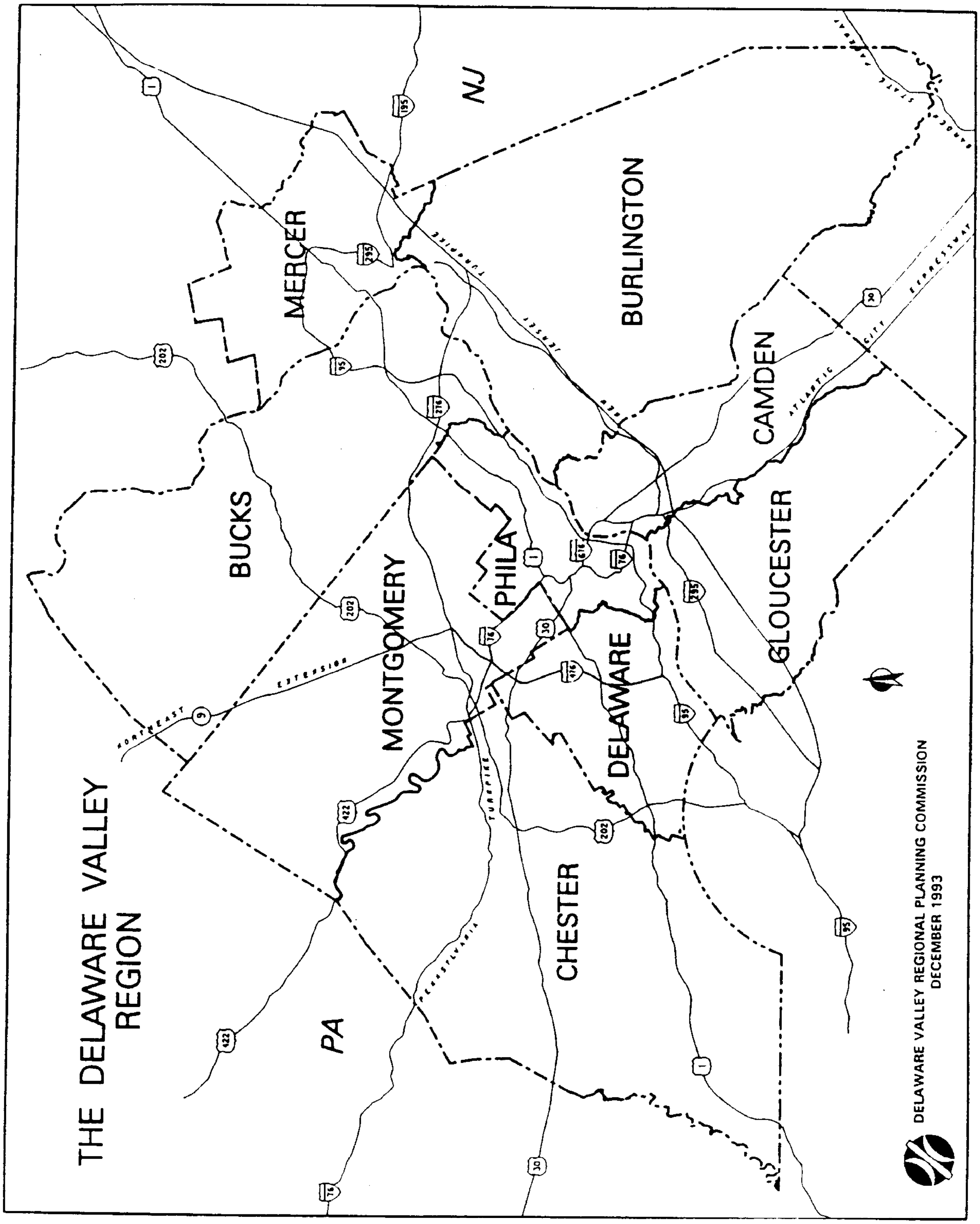
3.1.2.1 Introduction - The Delaware Valley Regional Planning Commission (DVRPC) is the primary traffic data collection agency in the Philadelphia area. The MPO maintains an extensive data collection program for their own purposes, and working under contract, DVRPC also does all counts for PENNDOT, and the City of Philadelphia. DVRPC also does counts for PENNDOT District 6 and the Pennsylvania counties. These counties also hire consultants to do counts. In the four New Jersey counties DVRPC or NJDOT through it's consultants do counts for the counties. The New Jersey DOT has an independent data collection program in the New Jersey portion of the urbanized area.

3.1.2.2 Type of Program - *DVRPC* - The DVRPC's Office of Travel Monitoring maintains an extensive data collection program in the Philadelphia region. They have a program supporting their own agency requirements including cordon line and screen line counts, traffic monitoring in selected highway corridors, and in support of area wide VMT estimation. In addition they collect data for their member governments, and collect data under contract for PENNDOT, NJDOT, PENNDOT - District 6, and the City of Philadelphia. Counts are done year round, on a full time basis .

In Pennsylvania, the DVRPC traffic count data collection program utilizes 25 permanent loop counters. Data is also collected at 1500 stations on an annual cycle, 300 stations on a 3 year cycle, and 100 stations as needed by program requirements. All data is collected for a duration of 48 hours, and reported to PENNDOT for a full 24 hour duration. On the New Jersey side data is collected at 800 stations on an annual cycle, and about 120 stations on a 3 year cycle. All data is collected for a duration of 48 hours. In addition to this permanent program the DVRPC conducts additional manual counts and mechanical counts on an as needed basis.

City of Philadelphia data is collected on about a 6 year cycle - one area of the City each year. The City of Philadelphia data also goes to PENNDOT for state routes and local federal aid routes. Data is collected for counties upon request. DVRPC also collects HPMS and other supplemental count data for PENNDOT. The HPMS sample sites are selected by PENNDOT.

FIGURE 3.1 - THE DVRPC REGION



DVRPC's traffic data collection program for the upcoming year is summarized in Table 3.1.

The requirements driving the DVRPC data collection program are summarized in Table 3.2. Figure 3.2 illustrates their overall approach to traffic data collection.

In Pennsylvania, DVRPC's vehicle classification data collection program for PENNDOT collects data at 50 stations on a 3 year cycle, and at 20 stations as needed by program requirements.   All data is collected for a duration of 48 hours. In addition to this permanent program the DVRPC conducts about 10 manual classification counts and 50 mechanical counts per year in the Pennsylvania side of the area on an as needed basis. In New Jersey, DVRPC's vehicle classification data collection program collects data at 30 stations on a annual cycle (count duration of 48 hours). In addition, the DVRPC conducts about 48 manual counts per year. (They do 12 sites once every quarter.)

It might be noted that DVRPC found that AVC machines were not reliable for vehicle classification at medium to high volumes over multiple lanes or where operating speeds were below 25 M.P.H.. Their solution was to use this equipment on only one lane at a time, where operating conditions were appropriate.

DVRPC has conducted a one time vehicle occupancy study in New Jersey involving 54 sites and in Pennsylvania at 55 sites. The recent vehicle occupancy study was the first done in the past 15-20 years.

Figure 3.3 shows the data processing requirements necessitated by the need to service multiple "clients". A sample/example from the traffic count database is shown in Table 3.3.

DVRPC has complete traffic data files from 1985 to 1995 in a GIS format. GIS traffic records contain year, month, and day of the count; state, county, and municipality; road and SR (state route) number; from and to end points; AADT, AM peak percent of AADT, and PM peak percent of AADT; weather; and hourly counts - 1:AM, 2:AM, 3:AM .... midnight.

PENNDOT - Traffic monitoring in Pennsylvania is a partnership between the department, the 14 MPOs, several Local Development Districts and the District Offices. The partnership takes shape through the annual Unified Planning Work Program drafted by each agency. Traffic counting and other activities are contracted through these documents. With limited Department staff, other agencies play a major role in data collection. In the Philadelphia area, DVRPC is the traffic data collection agent for PENNDOT.

TABLE 3.1 - DVRPC DATA COLLECTION PROGRAM

FY 1997
TRAFFIC COUNTING and MONITORING PROJECTS

Project	Number of Traffic Counts NJ	PA
• **Transportation Data Collection** System Coverage Update	650	1,100
• **HPMS/Control Sites** and Highway Functional Classification System	50	250
• **City of Philadelphia Traffic** Counting Program		500
• **PADOT District 6-0 Traffic** Counts		200
• **NJDOT Manual Classification** Counts	50	
• **Alternative Test**	50	100
• **Vehicle Occupancy Monitoring** Pennsylvania		55
• **CMS and Others** Special Studies, Member Government Projects, Simulation Calibration, etc.	100	150
Total Traffic Locations	900	2,355

Delaware Valley Regional Planning Commission

TABLE 3.2 - DVRPC TRAFFIC COUNTING AND MONITORING ACTIVITIES

Traffic Monitoring	Engineering/Safety	Planning/Research	Support Activities
• VMT - Area System Coverage	• Alternative Tests	• Traffic Impacts	• CMS
• Air Quality	• Travel Forecast	• Traffic Trends	• TMS
• HPMS/Control Stations	• Pavement Design	• Traffic Simulations	• Special Request
• City of Phila. Counts	• Problem Sites	• Surveys	• Public Inquiries

FIGURE 3.2 - DVRPC APPROACH TO TRAFFIC DATA COLLECTION

STEPS IN A TYPICAL TRAFFIC COUNTING ACTIVITY

DATA COLLECTION

- DETERMINE TYPE AND DURATION OF COUNT
- DEVELOP SCHEDULE
- ASSIGN FIELD WORK

PROCESSING

- VERIFY FOR VALIDITY
- EDIT FOR QUALITY
- ADJUST FOR SEASONAL, TRUCK AXLE, ETC.,

DISSEMINATION

- DISTRIBUTE COUNTS
- PROVIDE SUMMARY
- CREATE REPORTS

RETENTION

- FILE DOCUMENTATION
- RETAIN RAW COUNTS
- PREPARE DATA BASE FILES (GIS)

Delaware Valley Regional Planning Commission

FIGURE 3.3 - DVRPC DATA PROCESSING FLOW

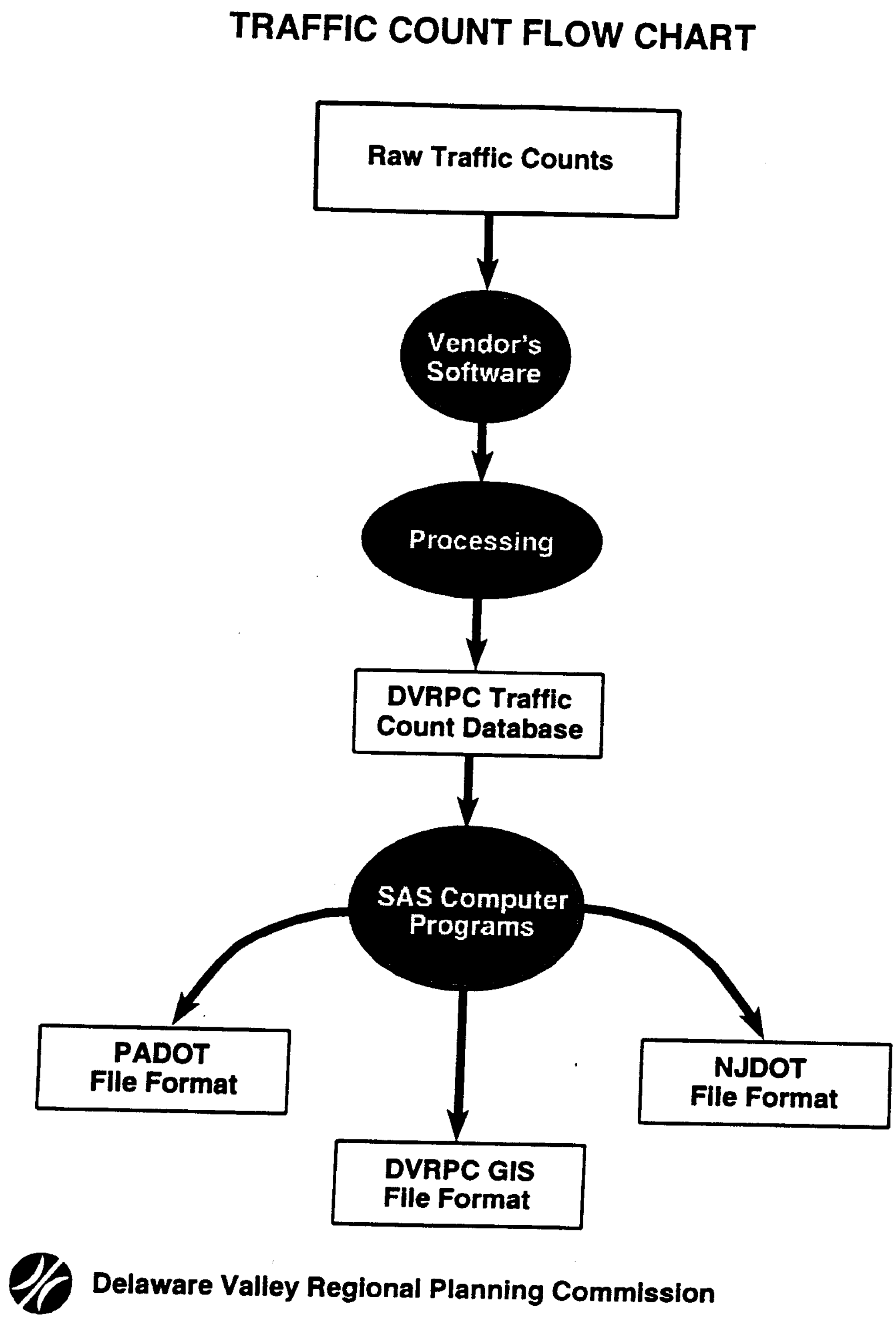


TABLE 3.3 - SAMPLE TRAFFIC COUNT DATA FROM THE DVRPC DATABASE

Delaware Valley Regional Planning Commission
Traffic Count Database
Count Number 207825

County:	45-Delaware Co.	Road:	TR 252
MCD:	151-MARPLE TOWNSHIP	From:	PALMER MILL RD
Date:	07/31/95	To:	TIMBERLAKE DR
Duration:	3	SR/Seg:	0252/0140
DIR CNT:	BOTH	Project:	VMT-PAU32
DIR TRAF:	BOTH	Factor:	3

Hour Ending	Mon* 07/31F	Tue 08/01F	Wed 08/02F	Thu	Fri	Sat	Sun
1AM		78	108				
2AM		41	51				
3AM		30	43				
4AM		31	36				
5AM		33	36				
6AM		159	156				
7AM		696	643				
8AM		1696	1692				
9AM		1744	1728				
10AM		1236	1254				
11AM	950	1142	1199				
12PM	1187	1170					
1PM	1014	1116					
2PM	1017	1152					
3PM	1326	1279					
4PM	1426	1409					
5PM	1674	1661					
6PM	1737	1731					
7PM	1204	1254					
8PM	1042	1051					
9PM	984	903					
10PM	595	607					
11PM	375	428					
12AM	216	248					
Totals	14747	20895	6946	0	0	0	0

1995 AADT 18576
1995 AADT Factor 0.889

AM Peak % 8.35 Hour Ending 9AM
PM Peak % 8.28 Hour Ending 6PM

Pennsylvania's basic traffic counting program is comprised of 24 hour machine volume counts, supplemented with a lesser number of (and a limited number of short duration manual) vehicle classification counts. All highway traffic counts are stored in the Department's Roadway Management System (RMS).

HPMS in Pennsylvania includes approximately 5,500 sample sections that are counted on a three-year cycle. In addition, 1000 so-called "donut" count locations - needed to support CAAA VMT analyses outside urbanized areas but within nonattainment areas - are included under the HPMS umbrella. A subset of HPMS traffic count locations has been selected for classification counts. Each of these 500 locations (selected across all highway functional classes) is counted triennially.

Since HPMS is a sample based program, total coverage of the state system requires additional traffic counting efforts, the "Supplemental Count Program". Consequently, segments not associated with at least one HPMS sample section have been fitted with a supplemental traffic counting site. These sites are counted on a triennial basis. Additionally, other locations with no recent traffic count history are also counted.

A limited amount of short count traffic data is accomplished by way of manual counts. Manual counts are taken were placement of machines is not possible, practical, or safe. The predominant number of machine counts involve counters equipped with road tubes. However, Pennsylvania has begun a program to install inductive loop systems on selected sections of its expressway system. For the most part these are double loop systems (two per lane) capable of estimating speed and vehicle length.

PENNDOT has undergone serious downsizing in the last 16 years. They now have a central staff of 3 involved in traffic data collection. They have a pilot program where they (the central staff) have hired temporary employees for data collection and report production. They may expand this in the future.

The MPOs collect data for the state within the TMAs under contract to PENNDOT. None of the MPOs do anything other than what the State asks/tells them to with the exception of Philadelphia. The district people supplement the MPO work for PENNDOT in the TMAs although this varies from TMA to TMA. Data from ATRs in the DVRPC region are still collected by PENNDOT via telemetry.

A GIS is used to schedule counts for the upcoming year. The GIS data includes information on who did the count, the type, how often its done, the year of the cycle, and roadway attribute data. PENNDOT is still working on the capability of automatically loading count data into the GIS.

PENNDOT currently produces statewide flow maps by hand, but are going to automate with GIS. They can do maps on their GIS, but need to check these manually (e.g., the placement of numbers over links, general “cosmetics” and the validity of numbers). They are currently unable to keep up with their reporting requirements, e.g. producing county flow maps in a timely fashion.

NJDOT - NJDOT collects volume, spot vehicle speed, AVC, weigh-in-motion, average passenger occupancy, and turning movement data. They are involved in a cooperative data collection effort with DVRPC in the Trenton and Philadelphia Urbanized Areas.

Of the three New Jersey MPOs, only DVRPC has its own active traffic monitoring program. Their activities for NJDOT are limited to volume counting, some vehicle classification, and local counts for estimating VMT. They perform manual 8-hour classification counts for NJDOT at 12 locations each quarter; and they recently completed an evaluation of four models of AVC recorders and an analysis of the comparability of truck percentages between 8-hour and 24-hour datasets.

Statewide, NJDOT operates 48 permanent traffic counting stations; 57 major traffic counting stations that are monitored for one week per month with portable equipment; 13 semi-permanent speed monitoring stations; 3 permanent AVC stations; and 17 weigh-in-motion stations. New Jersey’s TMS/H includes 2,990 sites including these permanent and major stations, and sites to be monitored using portable equipment for 48 hours on a three-year update cycle.

There are four field staff left to do traffic volume and AVC data collection. There are two technicians engaged in speed monitoring activities in addition to other work. Five office staff process traffic volume and vehicle classification data, and two others process WIM and speed monitoring data. The traffic volume, AVC, and occupancy data collection was privatized at the end of 1995 with the execution of four regional traffic monitoring contracts with consulting firms. The consultant only collects count data for HPMS. The rest of the input is produced by internal staff. Another firm was engaged to perform light maintenance on the permanent traffic monitoring stations. There is also a $2.27 million construction program to build 28 new permanent count stations throughout the state.

In the four New Jersey counties of the DVRPC area, for the three year data collection cycle 1996 -1998, the NJDOT will be collecting speed data at 8 sites, WIM data at 28 sites, classification data at 107 sites, and volume data at 732 sites. The New Jersey DOT also collects traffic count data in the area under a permanent program utilizing 13 continuous counters. All count data is up on GIS(DBMS), which also maps/displays data. They are in the process of converting to a standard system for the state.

3.1.2.3 Data Collection Equipment - DVRPC has 105 traffic volume counters for use in the area. Sixty of these can also collect classification data. Twenty five traffic count stations have permanently installed loops, while all other count stations and classification stations are utilized with road tubes.

The New Jersey DOT has 13 permanent continuous count stations in the four county area making up the New Jersey portion of the Philadelphia urban area. Other equipment data was not available.

3.1.2.4 Data Collection Staff Levels - DVRPC relies on permanent in house staff for data collection, supplemented by temporary help. The following are full time equivalents : 2 management and analysis; 3 data collection, processing and evaluation (2 of these 3 are temporary co-op positions); and 5 field persons. Staff levels for the New Jersey DOT were not available for the Philadelphia area.

3.1.2.5 Data Use - The purpose for which each agency within the urban area collected the type(s) of data they did are indicated below.

The NJDOT collects traffic count data for the following purposes:

HPMS input;
VMT estimates;
statewide transportation planning;
environmental planning;
other - pavement design and support of other management systems.

DVRPC collects traffic count, vehicle classification, and vehicle occupancy data for the following purposes:

HPMS input;
VMT estimates;
CMS programs;
local traffic planning;
region-wide transportation planning;
travel simulation models;
corridor planning;
major investment studies;
pavement design and bridge projects;
traffic trend analysis;
preliminary engineering;
traffic & signal improvements;
air quality studies;
travel forecasts; and
private sector traffic requests.

3.1.2.6 Data Flows Within the Urban Area - Each individual interviewed as part of the initial phase of the project was asked if their agency shared or pooled data with other agencies within the urban area. They were also asked if the data were provided informally or formally.

Informal exchange means that it was done as needed, on a case by case basis, e.g. an individual in one agency calling an individual in another to see if they had any recent data on a certain intersection or road segment. Formal exchange involves the transfer of a comprehensive data set on a regular or routine basis, e.g. each year, an agency provides other agencies within the area with a copy of all the traffic data it collected during the past year.

In the Pennsylvania portion of the region DVRPC provides traffic count data to the Pennsylvania DOT and its member counties and cities on a formal basis. Vehicle classification data is also provided to PENNDOT. DVRPC also obtains whatever other traffic count data the cities, counties, or PENNDOT have available (primarily from counts performed by consultants) on an “informal” basis. Problems with the later include incompatible and inconsistent format, and identification of counts as to location, duration, etc.

In the New Jersey portion of the region the New Jersey DOT exchanges traffic count data with DVRPC on a “formal” basis, and with the counties and cities on an “informal” basis. The New Jersey DOT has no problems with the current data sharing arrangements. DVRPC noted that it provided traffic count data to the New Jersey DOT and its member counties on a “formal” basis, and that it received data from New Jersey DOT and consultants hired by the cities, counties or developers on an “informal” basis. DVRPC has no problems with the current data sharing arrangements.

3.1.3 Issue Areas

The traffic monitoring program in the Philadelphia area should be of interest because of the somewhat unusual approach to institutional arrangements and funding sources for the primary data collection agency, specifically the use of inter agency contracting in data collection, and the role of a single agency for much of the data collection in the region. These are discussed more fully below.

3.1.3.1 Institutional Arrangements - Inter Agency Contracting: Much of DVRPC’s data collection is done under contract to other agencies, specifically PENNDOT, PENNDOT District 6, the City of Philadelphia, and NJDOT. While the DVRPC work for PENNDOT is part of a larger statewide program, the relationship between DVRPC and PENNDOT is unique relative to that of PENNDOT and other MPOs in the state.

Six years ago DVRPC only collected HPMS data for PENNDOT on a 3 year cycle. Now they also collect other "supplemental" counts. At one time all counts were classification counts, but now they use the TMG (Traffic Monitoring Guide) approach where classification counts are a subset of volume counts.

PENNDOT shifted data collection from a central staff to the MPOs in the early eighties. This was done in order to eliminate central office staff, to cut the budget and reduce the size of government. In addition there is no central traffic analysis capability. This is all done by the Districts and consultants. PENNDOT still has 3 central staff who do counts on Interstates, special requests, and train MPO staff. They have hired temporary summer help to do supplemental counts, but can't hire any more permanent full time staff.

PENNDOT has contracts with the MPOs, the District offices, and Local Development Districts (like MPOs in rural areas) to collect data over the entire highway system. PENNDOT provides equipment to the MPOs (except for DVRPC), and the Districts. However, this is changing, and PENNDOT will be giving the MPOs money to buy their own equipment.

Quality control is an issue with data coming from the some of the MPOs (quality varies widely). This is due to personnel turnover in the data collection staff at the MPOs. This is also a problem with some of the Districts. Moreover some of the Districts tend to view data collection as a nuisance. However, PENNDOT feels that they have a good working relationship with the MPOs.

PENNDOT District 6 also hires DVRPC or consultants to do project type counts.

NJDOT has several projects with DVRPC, including manual classification counts, local road counts for estimating VMT and other VMT counts at selected locations. Consultants now do all other counts for NJDOT statewide. DVRPC also collects data for its own purposes at sites in the New Jersey portion of the DVRPC region.

Inter Agency Coordination/Cooperation: In Pennsylvania, data from the MPOs, and Districts goes into the RMS database on the PENNDOT mainframe. Only DVRPC, and the MPO in Pittsburgh have access, although all agencies provide input. PENNDOT does provide data to the other MPOs on request. The RMS contains all count data in the state, regardless of the year of the count. (RMS data for every link in the state is not for a common year, but for whatever the year of collection.) However, all traffic data stored in RMS is adjusted annually to provide current year traffic estimates for all roadway segments.

Base year traffic data for each roadway segment is also displayed.

NJDOT makes ADT data available on an electronic bulletin board.

Single Agency Data Collection: DVRPC's role as the predominant traffic data collection agency has evolved over time. The Penn-Jersey Transportation Study in 1959 was the predecessor of DVRPC. They did an origin-destination (O-D) study and traffic counts. DVRPC was created in 1965. The data collection program gradually expanded on a project by project basis in order to meet internal DVRPC needs. DVRPC gradually developed their traffic data collection capability, and gradually took over the PENNDOT data collection program in the Philadelphia area. They have done HPMS for PENNDOT since the start of HPMS.

They also do project specific counts for PENNDOT District 6. Note that all data that goes to the Districts also goes back to PENNDOT in Harrisburg, and vice versa.

DVRPC has collected data for the City of Philadelphia for the last 5-6 years. The City eliminated their program since it was too costly to maintain one in their Streets Department. Apparently their were no economies of scale, and the City could not justify an independent program.

The Pennsylvania counties have not had count programs in recent memory. The local jurisdictions in New Jersey are focused on projects and have no permanent programs.

3.1.3.2 Use Of ATMS/Traffic Management Center Data For Planning - There are no operational ITS/ATMSs in the DVRPC region at present.

NJDOT is just getting into the use of ITS /ATMS in the Philadelphia area (Route 70 for example), but no "operating "data is to be saved for "planning" purposes. In a related vein, NJDOT seems to be moving toward permanent counters and use of telemetry for data collection wherever possible. Permanent counters are felt to be more reliable, and safer than having crews manually place portable counting equipment.

PENNDOT noted that the "TIMS", the planned Traffic Management Center for the Philadelphia area located at St., David's, is supposed to provide "planning " data to PENNDOT Headquarters. However, it was noted that this would not happen unless it was vigorously pursued by Headquarters.

3.1.3.3 Data Use - Input to Air Quality Models: DVRPC conducts air quality planning in a complex institutional environment. The non-attainment area covers four states and contains all or part of four MPOs. DVRPC is the only MPO with in-house staff capable of completing the technical steps to determine conformity of the Plan and TIP. The other MPOs rely on their respective state DOTs to conduct the analyses to determine air quality conformity.

To determine the VMT for the region as required by the Clean Air Act Amendments of 1990 (CAAA), DVRPC has derived two sets of VMT figures using two methodologies: the travel simulation model and the enhanced HPMS method. The latter consists of the HPMS records supplemented by a number of counts collected at other locations in order to : 1) enlarge the sample size, and 2) have a more balanced representation of roads in rural and urban areas and at all functional classification levels, including the local system.

EPA requires that estimates of VMT for past years be based on Highway Performance Monitoring System (HPMS) sample traffic counts and/or regional travel simulation models. However, these methods of estimating VMT have disadvantages; HPMS does not monitor travel characteristics on local roads, and travel simulation models traditionally include only a small portion of the local roads and collectors. Therefore DVRPC developed a third method to estimate VMT. This enhanced method involved a new round of traffic counts taken by DVRPC, which included a randomly selected panel of roads in the Delaware Valley Region. This method followed the FHWA HPMS field manual guidelines. The sample panel included the current HPMS stations as well as count locations on local roads and collectors. The sample size was compared to the states' existing HPMS samples and additional locations were selected to supplement these existing samples.

Mobile source emissions are calculated on simulated hourly VMT and speed data from the computerized highway assignments. Hourly link level emissions, reflective of the appropriate set of MOBILE5a emissions factors are calculated and aggregated to daily totals by state and for the region.

VMT that is projected to occur on local streets not included in the regional network is estimated independently from traffic assignments. Prior to calculating emissions, off-network VMT is apportioned by hour to 5-km grid cells by the emissions calculator program. Hourly simulated travel speeds on local streets included are used as a proxy for speeds on the excluded local streets when calculating emissions. These hourly off-network gridded emissions are then summed to daily totals by state and for the region and are included in the vehicular travel and emission tables.

As indicated above, NJDOT does the air quality analysis for the two counties of the Philadelphia nonattainment area that are not part of the DVRPC region.

NJDOT uses a travel demand model to estimate VMT required as input to their air quality models. They “reconcile” volumes to match HPMS for future forecast, i.e., adjust models to make the model forecast match forecast HPMS volumes. They do not try to match historical numbers. They had to develop extra counts (1000/yr.) to get good county level estimates. They have completed the first year of a 3 year cycle under this program.

PENNDOT does not do any VMT estimates for air quality analysis purposes for the Philadelphia area.

Input to HPMS: All HPMS data collection for the Pennsylvania portion of the region is done by DVRPC, and the data is input directly to the PENNDOT computer system.

In New Jersey, NJDOT's consultants only do the traffic volume counts for HPMS. DVRPC also does local road counts for VMT estimates.

Support of CMS: The Philadelphia area CMS is still in the planning stage. No data has been collected yet, but they have identified corridors and data collection needs. DVRPC is in the process of identifying additional counts that will be required to support the CMS.

NJDOT is doing a network based CMS for the State. Their effort is further along than that of DVRPC. The New Jersey CMS is based on available data, and is baseline only at this point. “Delay” is the preferred measure although with the available data they can use other measures , e.g., LOS, V/C ratio, and travel time. The New Jersey CMS was developed in conjunction with DVRPC for the four New Jersey counties of the DVRPC region.

3.1.3.4 How Various Data Needs Fit Together In The Context Of The Overall Data Collection Effort - At DVRPC there is no formal mechanism for coordinating data collection, but it is checked informally - to avoid duplication of efforts for different clients. They check their current count data, and whenever possible try to update counts at the same count locations. They now have their traffic database, location maps, and flow maps (for specific corridors only) on a GIS and are working on using their MIS to prioritize projects for the TIP.

The ISTEA had mandated six new management systems by 1995. Each of these would depend on data from a Traffic Monitoring System (TMS/H) being defined by each state. At the state level TMS/H was to provide a coordinated and systematic process for the collection, analysis, summary, and retention of highway traffic data and characteristics. TMS/H was to support ISTEA management systems at all levels, national monitoring programs, and internal state DOT data requirements.

NJDOT has not made a final decision on implementation of the now optional management systems. However, it was felt that their TMS/H would be implemented as described in their plan.

At PENNDOT all ISTEA management systems are in place now. The former ISTEA mandate was a driving force in the implementation of the management systems.

3.1.3.5 Funding Sources/Mechanisms - The two State DOTs, FHWA, FTA and member counties are the source of DVRPC funds (90 to 95% of the funds are State and federal).

DVRPC's Office of Travel Monitoring is funded by DVRPC, but also gets outside projects/contracts, e.g. the City of Philadelphia, and PENNDOT District 6. Roughly 40% of their funding comes from these "outside contracts". They also do "bill" other departments within DVRPC for certain special studies.

All of NJDOT's data collection money is federal STP (Surface Transportation Program), and SPR (State Planning and Research) funds. This also pays for the consultant contracts. Their budget is fixed for the fiscal year with an allowance for special project counts. They do "bill" projects for design related counts, if the project can afford it.

The funding source for the PENNDOT's data collection program is all federal SPR, and PL (Metropolitan Planning) funds. There is no internal transfer of funds to the data collection group.

3.1.3.6 The Participants' View of Their Program's Strengths and Weaknesses - The participants also provided an indication of what they felt were the strongest and weakest points of their respective programs, or what they felt that they did best and what they would do differently to improve their programs.

DVRPC - Making data useful and available to users is the major challenge. Getting all data into a useable database/GIS is their major accomplishment. Transforming the raw data into a comprehensive database is the most demanding part of the process and will be completed in 1997.

The rapidly changing technology in hardware and software requires funds for computer equipment and processing. Inadequate funding in this arena was seen as a major weakness in DVRPC's current program.

PENNDOT - The development of their database management system, RMS (Roadway Management System), is viewed as their major accomplishment.

At PENNDOT, lack of in-house staff knowledge related to application of the TMG and statistics, inadequate coverage in the state count program, and the lack of an experienced, permanent in house staff for data collection were viewed as the major flaws in the program.

NJDOT - They viewed their strong point as their contracting process which utilizes performance based “services contracts” that are awarded on merit, not lowest bid.

Developing reliable truck numbers has been NJDOT's greatest problem, due primarily to problems with AVC equipment.

3.1.4 Further Information

Mr. John L. Burger, Senior Traffic Analyst
Delaware Valley Regional Planning Commission
The Bourse Building
111 South Independence Mall East
Philadelphia, PA 19106-2515

Telephone: (215)-592-1800

Mr. George W. Kuziw
Manager, Bureau of Transportation Data Development
New Jersey Department of Transportation
1035 Parkway Avenue CN600
Trenton, NJ 08625-0600

Telephone: (609)-530-3522

Mr. Joseph McGinnes, Division Manager
Transportation Performance Monitoring Division
Bureau of Planning and Research
Pennsylvania Department of Transportation
6th Floor
555 Walnut Street
Harrisburg, PA 17101-1900

Telephone: (717)-787-3200

3.2. TAMPA - ST. PETERSBURG - CLEARWATER CASE STUDY

3.2.1 Introduction To The Case Study Area

The Tampa - St. Petersburg - Clearwater area has a population of 1,756,000, a land area of 650 square miles, and a roadway system of 7,406 miles.

This case study is based on information gathered during meetings held during a site visit made to Tampa (11/12/96 - 11/13/96), and Clearwater, FL (11/14/96). Meetings were held with staff of the Florida Department of Transportation - District 7, Hillsborough County Florida - Traffic Engineering Department, Hillsborough County Metropolitan Planning Organization, Pinellas County Metropolitan Planning Organization, and City of Clearwater - Traffic Engineering Department in order to learn more about traffic data collection and use in the Tampa - St. Petersburg - Clearwater area. This information was supplemented by documentation supplied by the participating agencies, and information provided through the telephone interviews conducted under the first phase of this project. All jurisdictions involved in traffic data collection within the region were not contacted as part of this study.

The five counties comprising Florida Department of Transportation (FDOT) - District Seven are shown in Figure 3.4. The Tampa - St. Petersburg - Clearwater urbanized area covers Hillsborough, Pinellas, and parts of Pasco Counties. The City of Tampa is located in Hillsborough County, while Pinellas County contains the Cities of St. Petersburg and Clearwater.

FDOT is decentralized in accordance with legislative mandates. The Central Office in Tallahassee is responsible for policy, procedure and quality assurance. The Districts are responsible for construction and maintenance of roads and bridges, thus allowing local governments and planning organizations direct input into agency operations. Each District is managed by a District Secretary. While the districts vary in organizational structure, each in general has major divisions for Administration, Planning, Production and Operations.

One unusual feature of the area is that there are three MPOs in the urbanized area, one for each county. The MPOs have set up several coordinating mechanisms both at a policy level and a technical level The coordinating mechanisms are designed to ensure ongoing communication and coordination in the planning and project development process for the MPOs. In addition, Pinellas and Hillsborough Counties are part of the same air shed. Consequently, coordination of planning activities is necessary in order to comprehensively address the air quality issues and other transportation matters of regional concern.

The reason for multiple MPOs is due to the difference in the nature of the individual counties.   For example, Hillsborough County is urban with rural open space and a great deal of new development. Pinellas County is almost totally urbanized, with very limited existing rural and agricultural uses. These conditions imply different agenda regarding land use, transportation, etc., and have led to a preference for keeping “planning” decision making at the lowest local level possible.

Another unusual feature underlying transportation planning in the area and the State of Florida as a whole is the concept of “concurrency”. Florida is a leader in growth management legislation. One of the major features of the growth management legislation is “concurrency”. In concept, concurrency means that development cannot occur unless the infrastructure exists to support the development.

The 1985 Growth Management Act requires local governments to adopt minimum level of service (LOS) standards for public facilities identified in the Act. The adopted level of service standards are incorporated into local government Concurrency Management Systems to ensure that local roadway facilities needed to accommodate new growth are available concurrent with the impacts of such growth. Thus, a roadway level of service can be decisive in determining under what conditions a development is allowed to proceed under the growth management law.

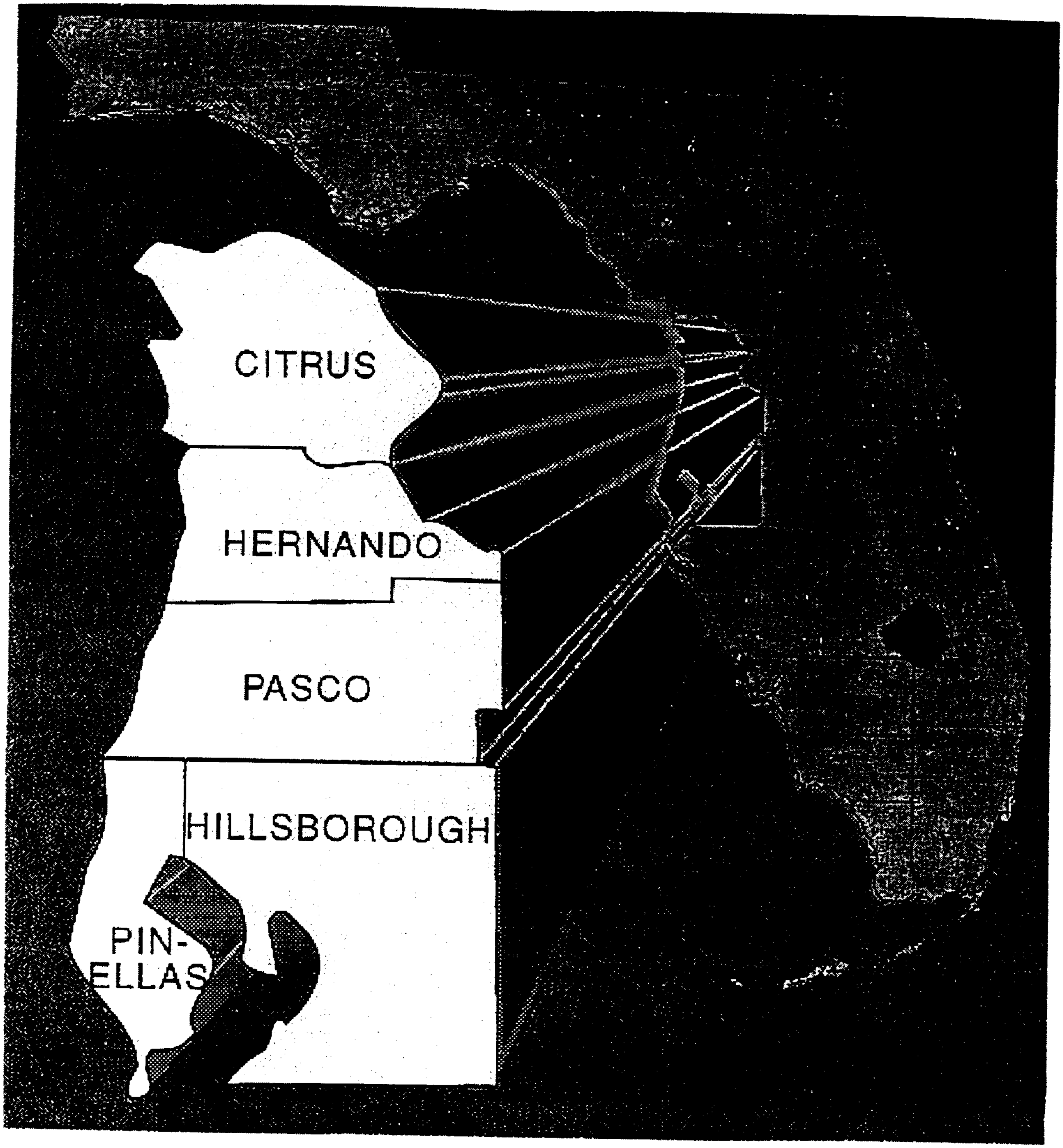
An important aspect of Florida's growth management legislation is the link with Congestion Management Systems (CMSs). Concurrency and CMSs have several important elements in common, such as performance standards, on-going data collection and system monitoring, and linkage to implementation strategies. The data that local governments are required to collect to meet Florida's comprehensive planning requirement have generally formed the basis for developing the CMS at the metropolitan level, without requiring local governments or MPOs to collect additional information.

3.2.2 <u>Data Collection Program</u>

3.2.2.1 Introduction - Traffic data collection in the Tampa region takes place within the context of a complex institutional environment.   The program descriptions below do not cover all programs but do cover the programs of the major players in the area and those which are somewhat out of the ordinary. Available project resources did not allow for a comprehensive inventory of the programs of all jurisdictions.

FIGURE 3.4 - FDOT DISTRICT SEVEN

FIGURE 3.4 - FDOT DISTRICT SEVEN



While the Tampa urbanized area includes Pasco, Pinellas and Hillsborough counties, this study concentrated on programs in the later two counties which contain the largest cities in the region. In addition FDOT District Seven includes Citrus and Hernando counties. These are primarily rural and are not included in the urban area.

The Pinellas County MPO and Hillsborough County Traffic Engineering Department provided data on their programs as part of this project's initial phone interviews. FDOT District 7, the Hillsborough County MPO, Hillsborough County Traffic Engineering Department, Pinellas County MPO, and City of Clearwater were involved in the site visit. The information on the City of Tampa and Plant City programs was taken from documentation obtained during the site visit meetings.

In addition to the programs outlined below, traffic count data is collected by the Pinellas County Public Works Department, and the Cities of Dunedin, Gulfport, Pinellas Park and St. Petersburg in Pinellas County, Temple Terrace in Hillsborough County and the Pasco County Traffic Engineering Department.

3.2.2.2 Type of Program - *Pinellas County MPO* - Since 1991, the MPO has been developing and updating its Highway Inventory System Database which continues to be a primary source of information for its transportation planning efforts. About 550 counts/year go into their database. About 30% of these are done by the MPO, 30% by FDOT, and 40% by the locals jurisdictions. All share the data. There are no duplicate counts. The MPO designed their program to fill in the gaps of the local and state programs. The MPO does about 175 counts/year. These are 48 hour portable counts. In addition to this permanent program the MPO conducts mechanical counts on an as needed basis. A few vehicle classification counts and speed studies are also conducted each year as needed.

They feel they have good quality control on the count data. Adjustment factors come from FDOT, but the MPO is trying to develop their own factors because they feel that FDOT's are not representative due to the seasonal peaking characteristics of the County's beach facilities. The MPO has data going back to 1989, since they need historical data to do trend analysis.

One product of their data base is their annual flow map "Average Annual Daily Traffic Counts in Pinellas County". They could produce the flow map from their GIS, but given the large demand for the maps, its more economical to print them by conventional means.

The MPO also provides coordination and consistency review between local government plans. To assist in this effort, the MPO prepares an annual roadway Level of Service Report. The Report provides a comprehensive analysis of roadway operating levels of services, based on traffic volumes, signalization, scheduled improvements, projected traffic growth, etc. This information provides a standardized base of information that is made available to local communities for use in state mandated growth management/concurrency plans, and for other local transportation planning requirements. A sample output from this report is shown in Table 3.4, giving some indication of the variety of data available in the Highway Inventory System Database.

Hillsborough County - The County currently has 61 permanent count stations and anticipates expanding this number to 85 within the next six months. These count stations also collect data necessary for classification and speed counts. These are polled by telemetry. The Traffic Engineering Department has contracted with Diamond Traffic Products to write software and a procedures manual that will enable the processing, downloading, and reporting of permanent count station information. Data collected from permanent count stations are downloaded each night and compiled into monthly files. The 12 monthly files are then combined into a yearly file.

The County also implemented an extensive traffic control system. In addition to signal detection loops, 21 signalized locations have system loops from which traffic volume data can be collected. These system loops have been in operation for up to three years. However, data from the system, loops have not been integrated with the traffic count program. An additional 109 locations will be added to the traffic control system by December 1996. They also have a video surveillance system for incident management.

Data is also collected using portable counters at 288 stations on a 3 year cycle. All data is collected for a duration of 24 hours. In addition to this permanent program the County conducts additional manual counts (primarily turning movement counts), and mechanical counts for signal timing and warrants on an as needed basis.

FDOT District Seven - The District Seven office of FDOT is responsible for performing traffic counts on all state roads within the District. District Seven collects data at about 1000 count locations. Three quarters of these are done yearly. One fourth of all District counts are done quarterly and are classification counts. About 45% of the remaining 3/4 are also classification counts. All of their counts are 48 hour duration. The location of the count sites was both planned and based on historical sites. Segment breaks are selected based primarily on relatively significant changes in volumes. The volumes are reviewed annually to identify the need for new segmentation. A section is comprised of numerous segments that are identified with beginning and ending mileposts along the section.

Almost all counts are done with road tubes. They have some sites with permanent loops, but these don't work. The loops were installed, but no money was set aside for operations/maintenance. In some cases the data collection group wasn't told where the loops were located.

The District supplies "raw data" to the Central Office, who applies the various adjustment factors.

The Department also collects traffic count data on state roads using permanent traffic counters. The several permanent count stations in the District provide historical traffic volume information, and are used to adjust for seasonal traffic patterns. The Central Office gets data via telemetry from these 12 permanent continuous count sites in the District. One issue is the inaccessibility of the permanent count station data. All data is transferred electronically to the Central Office in Tallahassee, resulting in little or no control over the data at the District office. However, arrangements can be made to access the data by modem.

It should also be noted that a large amount of data is also collected at the corridor level from Project Development and Environment (PD&E) and traffic operations studies sponsored by the Department.

The District does not collect speed data, occupancy data , or WIM data. WIM is done by the Central Office.

Historical traffic count data are available on disk for the years 1993 through 1995. Data prior to 1993 are available only in hard copy. "SPS" software (developed by a consultant) is used to screen the data. All traffic data is in report format. They have a GIS, but don't use it. A lot of data "cleanup" is needed before a GIS based system will become a reality.

City of Tampa - The Public Works Department, Traffic Operations performs 861 24 hour traffic counts for concurrency management purposes. The City also performs traffic counts on roads within city limits that are part of the State Highway System. It is their opinion that the traffic counts performed by FDOT cannot be used for concurrency management purposes because the count stations are too far apart. Tampa also collects traffic turning movement counts at all 500+ of its signalized intersections annually. Counts are collected for 15 hours each weekday on a rotating basis. In addition, special studies are conducted that may require signal warrants and turning movement counts. These are performed on an as needed basis. These special studies are maintained in both hard copy and electronic form. Special counts are also performed at the request of citizens, but are handled separately from the standard counts.

The Public Works Department, Traffic Planning Office, manually enters the raw counts provided in hard copy reports into a Microsoft Excel spreadsheet. The spreadsheet is designed to estimate AADT using seasonal adjustment factors. The actual count is used regardless of when it is collected; no counts from previous years are inflated to the current year. Old count data are always replaced and are not saved or archived electronically. However, historical hard copy records are maintained. The City has maintained AADT traffic counts since 1990 in a spreadsheet and hard copy tabular listing. Hard copy files of traffic counts also are available back to 1989. Table 3.5 provides an example of the city's traffic data spreadsheet.

Plant City - Plant City performs traffic counts in response to requests from the MPO and special requests from citizens. An estimated 5 to 10 counts are performed every couple of weeks for the MPO on approximately 30 segments. The counts performed for the MPO are 48 hour, 15-minute increment counts. A traffic signalization system is in place that has the capability to perform continuous counts at 27 intersections in Plant City. Sensory and system loops are in each lane at these locations. The system automatically generates a report that is provided to the MPO. This system is separate from the County Traffic Signal Control System.

3.2.2.3 Data Collection Equipment - The Pinellas County MPO has 24 traffic volume counters for use in the area. In addition, they have eight classification counters which also can collect speed data. All count stations are utilized with portable equipment.

Hillsborough County has 107 traffic volume counters. These are used at 85 count stations have that have permanently installed loops, and another 288 stations that utilize road tubes. In addition, 16 counters are used for special study programs.

3.2.2.4 Data Collection Staff Levels - The Pinellas County MPO relies on permanent in house staff for data collection. The following are full time equivalents: 1 administrative; and 2 field.

Hillsborough County has 2 permanent in house field staff involved in data collection, plus an additional .5 permanent in house staff in administration and .5 permanent in house staff in data processing/editing.

TABLE 3.4 - PINELLAS COUNTY MPO'S LEVEL OF SERVICE REPORT

PINELLAS COUNTY MPO
2015 Policy Plan Rev 8-19-96

	Filenames	Filedates
Mrn:	F:\USERS\PLNDF15\LOS96\MRN.D	September 24, 1996
Analysis:	F:\USERS\PLNDF15\LOS96\A1995.	September 24, 1996

Date:	25-Sep-96
Time:	10:53:29

Id	Seg No	On Street	From	To	Length	Lanes	Type	Perf_Std	CS1	CS2	CAFT	No_sig	D_Fac	K100	Fyvolm	Source	AADT
					Art Class	Sat Flow	PHF	%Turns	Area	Spd Limit	Arr Type	%No Pass	Ctrl Type	Sr Cyc Len	Cyc Len	Sr G C	G C Ratio
					Peak Vol	Vmt	VHT	Psmult	SvcCap	PCap	V S CAP	V:P CAP	Spd1	Los1	Agg Seg #	Agg Spd	Agg Los
6710	0	100th Wy	54th Av N	Bay Pines Bl	0.46	2	U	D	6710	0	5	1	0.568	0.091			3217
					0	1800	0.925	16	2	30	3	0	2	MPO	120	MPO	0.320
					293	135	0.0	1.00	988	1207	0.296	0.242	0.00	C	0	0.00	C
6870	103	102nd Av N	Alt US 19	113th St N	0.49	4	D	D	6870	0	2	1	0.568	0.091			22018
					1	1850	0.925	12	2	35	4	0	2	MPO	120	MPO	0.400
					2004	982	43.9	1.00	2749	2961	0.729	0.676	22.37	C	103	24.61	C
6880	102	102nd Av N	113th St N	Ridge Rd	0.17	2	U	D	6900	0	4	0	0.568	0.091			14083
					1	1850	0.925	12	2	35	0	0	0	MPO	0	MPO	0.000
					1282	218	8.6	1.00	2019	3013	0.635	0.425	33.03	C	102	24.59	C
6890	102	102nd Av N	Ridge Rd	125th St N	0.85	2	U	D	6900	0	4	0	0.568	0.091			14083
					1	1850	0.925	12	2	35	0	0	0	MPO	0	MPO	0.000
					1282	1089	31.2	1.00	2019	3013	0.635	0.425	34.90	C	102	24.59	C
6900	102	102nd Av N	125th St N	137th St N	0.52	2	D	D	6900	0	2	1	0.568	0.091			14083
					1	1850	0.925	12	2	35	4	0	1	MPO	120	MPO	0.400
					1282	666	36.4	1.00	1333	1480	0.961	0.866	18.30	D	102	24.59	C
6910	102	102nd Av N	137th St N	Oakhurst Rd	0.73	2	U	D	6900	0	2	1	0.568	0.091			14083
					1	1850	0.925	12	2	35	4	0	1	MPO	120	MPO	0.400
					1282	936	44.1	1.00	1427	1480	0.898	0.866	21.22	D	102	24.59	C
6920	0	102nd Av N	Oakhurst Rd	Hamlin Bl	0.51	4	D	D	6900	0	3	0	0.568	0.091			14083
					1	1850	0.925	12	2	35	0	0	0	MPO	0	MPO	0.000
					1282	654	18.7	1.00	4760	6026	0.269	0.212	34.97	A	0	34.97	A
7570	0	102nd Av N	60th St N	66th St N	0.75	2	D	D	7570	0	5	1	0.568	0.091			9246
					0	1800	0.925	16	2	35	4	0	2	MPO	155	MPO	0.420
					841	631	0.0	1.00	1325	1585	0.635	0.530	0.00	D	0	0.00	D
7580	0	102nd Av N	US 19	60th St N	1.02	2	U	D	7580	0	4	0	0.568	0.091			6658
					1	1850	0.925	12	2	45	0	0	0	MPO	0	MPO	0.000
					606	618	13.7	1.00	2109	3013	0.287	0.201	45.11	B	0	45.11	B

TABLE 3.5 - CITY OF TAMPA TRAFFIC DATA SPREADSHEET

City of Tampa Traffic Counts

Link Identifier	ON	From - To (S to N or W to E)	Maint. Respons.	Exist Road Type	Dist (MI)	Date of Count (mm/dd/yr)	Annual Avg Volume	Existing LOS D Capacity	Existing V/C (@ los D)
2.1.1	4th Ave	13th St to 21st St	CITY	2LU	0.67	5/30/95	2,155	10,300	0.21
2.1.2	4th Ave	21st St to 22nd St	CITY	2LU	0.06	5/30/95	2,035	10,300	0.20
2.1.3	4th Ave	22nd St to 34th St	CITY	2LU	0.77	5/30/95	2,049	10,300	0.20
2.2.1	7th Ave	Nebraska Ave to Nuccio Parkway	CITY	2LU	0.25	5/30/95	7,703	10,300	0.75
2.2.2	7th Ave	Nuccio Parkway to 21st St	CITY	2LD	0.66	5/30/95	7,451	17,200	0.43
2.2.3	7th Ave	21st St to 22nd St	CITY	2LU	0.06	5/30/95	7,263	17,200	0.42
2.2.4	7th Ave	22nd St to 34th St	CITY	2LU	0.77	5/30/95	7,231	16,100	0.45
2.2.5	7th Ave	34th St to 39th St	CITY	4LU	0.42	5/30/95	9,115	34,200	0.27
2.2.6	7th Ave	39th St to 43rd St	CITY	4LU	0.33	5/30/95	12,752	34,200	0.37
1.1.1.	13th St	Platt St to Kennedy Blvd	STATE	4LD	0.40	6/13/95	11,686	29,400	0.40
1.1.2.	13th St	Kennedy Blvd to Twiggs St	STATE	5LU	0.11	6/8/94	27,051	29,400	0.92
1.1.3.	13th St	Twiggs St to Adamo Dr	STATE	5LU	0.17	6/13/95	22,950	29,400	0.78
2.3.1	13th St	Adamo Dr to 4th Ave	CITY	4LU	0.16	5/30/95	3,263	22,800	0.14
2.3.2	13th St Ext	4th Ave to Nuccio Pkwy	CITY	2LD	0.24	5/30/95	3,263	10,300	0.32
2.4.1	14th St (A.R.D.C.)	Nuccio Parkway to Columbus Dr	COUNTY	2LO	0.25	5/30/95	3,355	24,429	0.14
2.4.2	14th St (A.R.D.C.)	Columbus Dr to 21st Ave	COUNTY	2LO	0.25	5/30/95	3,356	24,429	0.14
2.4.3	14th St (A.R.D.C.)	21st Ave to Lake Ave	COUNTY	2LO	0.53	5/30/95	2,962	24,429	0.12
2.5.1	15th St	Sligh Ave to Hanna Ave	CITY	2LU	0.51	1/24/94	2,997	10,300	0.29
2.5.2	15th St	Hanna Ave to Hillsborough Ave	CITY	2LU	0.49	1/24/94	3,982	10,300	0.39
2.5.3	15th St	Hillsborough Ave to Osborne Ave	CITY	2LU	0.50	5/30/95	5,175	10,300	0.50
2.5.4	15th St	Osborne Ave to M.L.K. Jr Blvd	CITY	2LU	0.48	1/24/94	5,119	10,300	0.50
2.5.5	15th St	M.L.K. Jr Blvd to Lake Ave	CITY	2LU	0.25	1/24/94	6,699	10,300	0.65
2.5.6	15th St	Lake Ave to 21st Ave	CITY	2LO	0.50	1/24/94	4,065	21,000	0.19
2.5.7	15th St	21st Ave to Columbus Dr	CITY	2LO	0.30	1/24/94	4,311	21,000	0.21
2.5.8	15th St	Columbus Dr to Nuccio Parkway	CITY	2LO	0.25	2/1/94	4,518	21,000	0.22
4.1.1	15th St	Linebaugh Ave to Bougainvillea Ave	CITY	2LU	0.25	9/22/94	3,758	10,300	0.36
4.1.2	15th St	Bougainvillea Ave to 109th Ave	CITY	2LU	0.25	9/22/94	6,590	10,300	0.64
4.1.3	15th St	109th Ave to Fowler Ave	CITY	2LU	0.49	9/22/94	8,379	10,300	0.81
2.6.1	17th Ave	A.R.D.C.(14th St) to 15th St	COUNTY	2LO	0.08	2/7/94	3,139	21,000	0.15
2.6.3	17th Ave	15th St to 22nd St	COUNTY	2LO	0.51	12/19/94	2,897	21,000	0.14
2.6.4	17th Ave	22nd St to 29th St	COUNTY	2LO	0.41	2/7/94	2,546	21,000	0.12
2.7.1	18th Ave	29th St to 36th St	COUNTY	2LO	0.56	5/30/95	2,315	21,000	0.11

COUNT2A.XLS Page 1 Source: City of Tampa Oct. 4, 1995

3.2.2.5 Data Use - The reasons why each type of agency within the urban area collected the kind of data that they did are indicated below.

The Pinellas County MPO collects traffic count data for the following purposes:

- CMS programs;
- local transportation planning;
- regional transportation planning models;
- corridor planning;
- major investment studies; and
- ongoing systems monitoring.

Hillsborough County collects traffic count data for local traffic planning.

3.2.2.6 Data Flows Within the Urban Area - Each individual interviewed was asked if their agency shared or pooled data with other agencies within the urban area. They were also asked if the data were provided informally or formally.

Informal exchange means that it was done as needed, on a case by case basis, e.g. an individual in one agency calling an individual in another to see if they had any recent data on a certain intersection or road segment. Formal exchange involves the transfer of a comprehensive data set on a regular or routine basis, e.g. each year, an agency provides other agencies within the area with a copy of all the traffic data it collected during the past year.

The Pinellas County MPO provides traffic count data to the Florida DOT and the county and cities on a informal basis. They also obtain traffic count data from the cities, county, and Florida DOT on an "informal" basis. The agency has no problems with the current data sharing arrangements.

Hillsborough County provides traffic count data to the MPO on a informal basis. They also obtain traffic count data from the Florida DOT on an "informal" basis. The agency has no problems with the current data sharing arrangements.

FDOT noted that all data flow to/from other agencies is informal.

3.2.3 Issue Areas

The traffic monitoring program in the Tampa - St. Petersburg - Clearwater area should be of interest because of the degree of interagency cooperation and coordination that has been achieved in a complex institutional environment; the use of ATMS/Traffic Management Center data for planning purposes; and the on going development of common transportation data bases. These are discussed more fully below.

3.2.3.1 Institutional Arrangements - Inter Agency Coordination/ Cooperation: In the Tampa - St. Petersburg - Clearwater region, inter agency coordination/ cooperation has been achieved at two levels; at the regional level between multiple MPOs; and also within the individual MPOs representing the counties in the region.

The FDOT District Seven MPOs meet on a regular basis in order to ensure regional coordination in transportation planning and related issues. Examples include their participation in the Coordinated Urban Transportation Study(CUTS), the Regional Air Quality Task Force, the Joint Citizens Advisory Committee, regional planning studies, such as the Regional Goods Movement Study, and the Tampa Bay Commuter Rail Authority Plan. Policy level regional coordination is accomplished through the Chairman's Coordinating Committee, which meets on a quarterly basis and includes the chairman of the four MPOs in the area, as well as the FDOT District Secretary, and a representative of the Tampa Bay regional Planning Council. MPO staff also participate in FDOT's Regional Transportation Analysis (RTA). In addition, the MPOs and FDOT are coordinating the development of a fully operational regional congestion management system that functions as a component of the individual MPO CMSs.

As an example of "intra-MPO" coordination, the Pinellas County MPO provides coordination and consistency review between local government plans. To assist in this effort, the MPO prepares an annual roadway Level of Service Report. The Report provides a comprehensive analysis of roadway operating levels of services, based on traffic volumes, signalization, scheduled improvements, projected traffic growth, etc. This information provides a standardized base of information that is made available to local communities for use in state mandated growth management/concurrency plans, and for other local transportation planning requirements. This report is based on data on the MPO's Highway Inventory System Database. This database is the result of coordinated data collection, and a cooperative data sharing arrangement on the part of all agencies collecting traffic data in the county.

3.2.3.2 Use Of ATMS/Traffic Management Center Data For Planning - There are no State ITS initiatives in the area, but both Hillsborough County and various jurisdictions in Pinellas County are heavily involved in the use of ITS type systems.

In Pinellas County, the signal system in the entire county is under computer control. The system is divided into three pieces, the City of Clearwater, the City of St. Petersburg, and the rest of Pinellas County, but the pieces are coordinated. The same system is used in the County and St. Petersburg as in

Clearwater. The system is based on UTCS software modified by Computran System Corp. About 270+ intersections are under control of the County system, and 250 under the St. Petersburg system.

The City of Clearwater has 128 intersections under computer control. They can and do collect traffic volume data from the signal system loop detectors which function like ATRs. All of their traffic count data comes from the traffic signal system. It is their count program. This is the data that is provided to the MPO.

They produce a daily report of volumes at 15 minute intervals, and have hard copy data since 1992. Table 3.6 provides an example output report. All data is on paper, but they are going produce an electronic version in the near future. The system does store detector data for the last 13 days.

The data from the output reports is examined every day in order to spot potentially faulty loops. They view themselves as fanatical about loop maintenance, which is seen as a key ingredient to a successful system.

Hillsborough County now has 70 intersections under control of their “MIST” system. “MIST”, Management Information System for Transportation , was developed by Farradyne Systems, Inc. This is only part of the County’s traffic signal system. The rest is under UTCS control. However, they will be expanding the MIST system to another 100 -110 intersections in the near future. The MIST software collects and stores traffic count data, and has a DBMS capability which can be used to do various sorts and reports.

The County does not use the signal system data for planning purposes. Storage, retrieval, and quality control of the raw traffic volume data is a major concern. They save the last 90 days of data on the system, and then transfer it to CD ROM.

They also have a video system which is used for incident detection. The video surveillance allows them to assess the severity of an incident and inform police and emergency response crews. However, it was noted that individuals with car phones were usually the first to notify police of incidents. A primary use of the video system is to visually check the effects of offset changes in the signal system on traffic flow.

TABLE 3.6 - CITY OF CLEARWATER TRAFFIC SIGNAL SYSTEM
SUMMARY TRAFFIC VOLUME REPORT

THU NOV 14, 1996 TIME 9:55 VOLUME AND OCCUPANCY SUMMARY

TUE NOV 12, 1996

	CURB LANE				CENTER LANE				MEDIAN LANE			
	LINK 4301				LINK 4302				LINK 4303			
	VOL		OCC		VOL		OCC		VOL		OCC	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
0015	25	169	1	7	39	180	2	10	18	144	1	8
0030	18	195	1	7	23	199	1	11	11	154	0	10
0045	8	162	0	7	23	185	1	10	12	115	1	7
0100	10	162	0	6	22	187	1	10	8	124	0	8
0015	14	144	0	6	18	174	1	9	8	120	0	7
0030	13	149	0	6	15	161	1	9	6	125	0	7
0045	10	132	0	5	6	169	0	8	5	120	0	8
0200	11	137	0	5	7	176	0	9	6	140	0	8
0015	8	138	0	5	17	155	1	8	7	126	0	8
0030	10	130	1	5	14	179	1	9	5	132	0	8
0045	3	150	0	6	9	200	0	10	2	129	0	8
0300	4	174	0	7	10	196	0	10	5	122	0	7
0015	3	154	0	6	9	186	0	9	1	131	0	8
0030	5	155	0	6	5	193	0	10	2	136	0	9
0045	3	165	0	6	8	201	0	11	3	131	0	8
0400	7	192	0	7	7	225	0	10	3	139	0	7
0015	3	163	0	6	15	187	1	10	4	128	0	9
0030	7	152	0	5	12	187	1	8	3	156	0	8
0045	6	175	0	7	21	207	1	10	4	150	0	9
0500	7	153	0	6	19	182	1	9	8	138	1	8
0015	12	210	1	8	21	238	1	13	5	183	0	9
0030	16	177	0	7	30	204	1	11	15	156	1	9
0045	22	158	1	6	48	201	2	10	19	151	1	9
0600	32	137	1	5	57	153	2	8	22	142	1	8
0015	49	146	2	5	69	165	3	8	24	114	1	6
0030	53	151	2	6	79	166	4	8	35	126	2	7
0045	65	126	2	5	83	154	3	7	59	95	2	5
0700	96	126	3	4	108	124	5	6	63	90	3	5
0015	93	98	3	3	126	133	6	6	95	82	5	5
0030	126	89	4	3	161	108	7	6	126	80	6	4
0045	123	90	4	3	148	109	8	5	108	73	6	4
0800	150	78	6	3	181	86	9	4	110	65	6	3
0015	157	79	5	2	170	92	8	4	110	49	6	2
0030	137	58	5	2	165	81	8	4	114	51	6	3
0045	118	70	4	2	152	80	7	4	101	58	6	4
0900	126	50	5	2	151	71	8	3	107	53	5	2
0015	121	58	5	2	150	81	7	4	97	53	6	3
0030	132	58	5	2	164	71	8	3	97	45	6	2
0045	125	53	5	2	149	63	7	3	119	47	6	2
1000	137	36	5	1	184	64	9	3	125	37	7	2
0015	134	40	5	1	166	46	9	2	114	30	7	1
0030	150	39	6	1	166	63	8	3	126	42	8	2
0045	129	50	5	2	163	56	8	3	116	29	7	1
1100	143	30	6	1	174	38	9	2	131	26	9	1
0015	158	28	6	1	173	54	9	2	127	27	9	1
0030	157	26	6	1	188	41	10	3	134	23	8	1
0045	134	34	5	1	184	43	9	2	143	24	8	1
1200	170	22	7	1	190	32	10	2	123	14	8	1
TOTAL	8708				10645				7311			
	LANE				LANE				LANE			

3.2.3.3 Data Use - Input to Air Quality Models: In Hillsborough County, because of concurrency the jurisdictions are collecting the traffic volume data required to support the MPO's air quality analyses.

Likewise, in Pinellas County the MPO does the conformity analysis. The available traffic count data is sufficient for their purposes, and they did not have to request additional counts.

Input to HPMS: FDOT District Seven has primary responsibility for compiling the Highway Performance Monitoring System (HPMS) data. HPMS data is reported to the federal government on a segment basis. The reported data includes a wide variety of items such as traffic volumes, pavement condition, functional classification, geometry and other basic information.

Physical characteristics data such as lane width, number of lanes, type of shoulders, etc. comes from FDOT's Roadway Characteristics Inventory (RCI) file. Traffic volumes on state maintained roads come from the latest available state counts. Traffic volumes on other roads are provided by the local agencies. No additional data collection efforts were required in order to support the HPMS submittal.

Support of CMS: FDOT noted that CMS will happen in the MPOs, regardless of changing federal requirements, since a CMS - like requirement is part of state legislation.

In Pinellas County, because of concurrency and data needed to support the Long Range Plan, the traffic data currently collected is adequate to support the CMS. In addition to the highway system data, the MPO's database includes transit routes, bicycle and pedestrian facilities, intermodal facilities, etc. While additional data may be needed in the future to meet CMS requirements, the Pinellas County MPO has an adequate database and monitoring system to meet the current requirements. However, one data requirement, vehicle occupancy, is not being addressed at this time. In the upcoming year such data will be collected on a limited basis. However, they anticipate that funding may be a major problem in collecting all the data needed.

The Hillsborough County MPO will serve as the “CMS Clearinghouse” using its Geographic Information System (GIS) database. The database currently stores roadway and transit operating characteristics, such as existing traffic volumes reported by state and local agencies, number of lanes, signals per mile, functional classification, transit route locations, headways, etc. A variety of geometric and operational data are stored to aid in level of service analysis.

The MPO has established a link between its forecasting software (FSUTMS) and its Geographic Information System(GIS). The output from the MPO's travel demand forecasting model is uploaded into the GIS, which can then display roadway or transit level of service characteristics. This information can be used to monitor existing and future congestion levels in the context of land use, transportation facilities and accident locations.

Data used for the travel demand forecasting model and database are provided to the MPO from FDOT and the MPO's member jurisdictions. In Hillsborough County, because of concurrency, the jurisdictions are generally collecting the required data, but this is "hit or miss" by jurisdiction.

Local Agency Needs: The 1985 Growth Management Act requires local governments to maintain Concurrency Management Systems to ensure that local roadway facilities needed to accommodate new growth are available concurrent with the impacts of such growth. Thus, the data that local agencies are required to collect to meet Florida's comprehensive planning requirement have generally proved sufficient to meet most other local transportation planning data requirements, without requiring local governments or MPOs to collect additional information.

3.2.3.4 How Various Data Needs Fit Together In The Context Of The Overall Data Collection Effort - Because of "Concurrency" most jurisdictions collect an adequate quantity of traffic data to meet their own needs, plus those imposed by the need to provide input to air quality analyses, and such ISTEA requirements as Congestion Management Systems. The real issues in the Tampa area have revolved around the questions of data quality and compatibility, and making data available to all agencies in a common format

In Pinellas County, the MPO has developed and maintains its Highway Inventory System Database. The database includes data on other transportation facilities such as transit routes, bicycle facilities, and sidewalks. Currently, all jurisdictions provide data to the MPO who enters it into the database. However, the database is currently not accessible by the jurisdictions, and they must request various reports from the MPO.

The Florida Department of Transportation Maintains their Roadway Characteristics Inventory (RCI). The RCI covers physical characteristics of lane width, number of lanes, shoulders and intersection data. The RCI also contains information on the number of traffic signals per mile, and is used for a variety of purposes, including level of service analysis.

District Seven is currently conducting a traffic and roadway data collection survey of cities and counties in the District. The purpose of this effort is to encourage the sharing of traffic and roadway data, eliminate duplication of collection efforts, and provide participants with additional data which would not otherwise be available. They view the survey as a "feasibility study" to determine and define current data collection programs at all levels in the District and data collection needs. They feel that there is a need for compatible data in a district-wide, network database, and also a need to have assured funding for database development, and for the hardware, software, and communications necessary to support access by all jurisdictions.

The Hillsborough County MPO has a consultant building a database similar to the one in Pinellas County. Their project is farther along than FDOT's, but behind Pinellas County who already has a common database in place. They hope to have an analysis capability by March/April 97. When completed, this project will put all data in a common database and will be accessible to all jurisdictions.

The County-Wide Data Collection and Analysis project was conceived to identify, collect, manage, and analyze data required by Federal(ISTEA) and State regulations. The focus on traffic counts in this project was intended to move towards the compatibility and transfer of traffic count data and information among agencies performing traffic counts, including FDOT District Seven, Hillsborough County, City of Tampa, and Plant City.

The Transportation Inventory Management and Analysis System (TIMAS) will allow the user to maintain an inventory of transportation facilities in the community and provide a mechanism for analyzing past, current, and future conditions of the transportation system. The foundation on which TIMAS is based is a relational database of transportation facility characteristics. The database will include four types of data, including: 97 standard transportation data attributes; 9 database look-up tables; 43 FDOT-requested, linearly referenced data attributes for selected non-state roads; and 23 other attributes identified for Congestion Management, the Transportation Plan, and other specific data requirements of the MPO.

3.2.3.5 Funding Sources/Mechanisms - In District 7 all data collection for the District is done by consultants, while processing and analysis is done in house. Most of the budget of $500 to $750k goes to consultants. Funding for data collection was a budget line item. All districts in the state are organized and operate differently.

For the Pinellas County MPO funding for data collection is a line item in the budget. About 80% of the funds are Federal/State PL (Planning), or Section 8 funds, with some State “D” funds.

STP money is the funding source for the Hillsborough County MPO.

3.2.3.6 The Participants' View of Their Program's Strengths and Weaknesses - The agencies also provided an indication of what they felt were the strongest and weakest points of their respective programs, or what they felt that they did best and what they would do differently to improve their programs.

FDOT District Seven - The data integrity of the existing data in their RCI; their recently started quarterly count program; and a good historical database were viewed as their program's strong points.

The need for cross training of staff, and better in house expertise; an over dependence on consultants; the lack of maintenance of loop detectors; and the lack of permanent count stations in locations needed to meet current data needs were seen as the program's weak points.

Hillsborough County MPO - They considered building the relationship between the MPO and the jurisdictions; and their current efforts at developing a system of compatible data with good quality control for use by the MPO and jurisdictions as the best features of their program.

The fact that the current program suffers from little quality control and incompatible data formats was seen as the weakest feature.

Pinellas County MPO - They viewed their cooperative arrangement with the jurisdictions, that is having achieved “buy in” to a common data base by the jurisdictions, as the best feature of their program. This success is based on a continuity of personnel, good communication, and mutual respect.

The weakest part of the program was seen as their getting required data from FDOT in a timely fashion.   Specifically it was felt that FDOT's data collection and reporting schedule barely met the deadlines required for input to the concurrency management and TIP preparation processes. As an example, the local governments may need the MPO's Annual LOS Report to meet various local schedules at times which are incompatible with the state's schedule for finalizing data collection. Attempts are being made to resolve these scheduling issues.

3.2.4 Further Information

Mr. Charles Gray, Statistics Administrator
Planning and Programs M.S. 7340
Florida Department of Transportation - District Seven
11201 North McKinley Drive
Tampa, FL 33612

Telephone: (813) 975-6439

Mr. Joe Zambito
Senior Planning Manager
Hillsborough County Metropolitan Planning Organization
601 E. Kennedy Boulevard
Tampa, FL 33602

Telephone: (813) 272-5940

Ms. Gina Goodwin, Transportation Planner
Department of Planning
Pinellas County Metropolitan Planning Organization
14 S. Ft. Harrison Avenue
Clearwater, FL 34616

Telephone: (813) 464-4751

3.3 MINNEAPOLIS - ST. PAUL CASE STUDY

3.3.1 Introduction To The Case Study Area

The Minneapolis area has a population of 2,228,000, a land area of 1,192 square miles, and 10,301 mile roadway system. It is a Moderate nonattainment area for CO. The State DOT, and both city and county level agencies have permanent traffic data collection programs. The MPO, Metropolitan Council, Twin Cities Area, does no data collection.

This case study is based on information gathered during meetings held during a site visit made to St. Paul (11/18/96), and Minneapolis (11/19/96). Meetings were held with staff of the Minnesota Department of Transportation (MNDOT), Metropolitan Council of the Twin Cities (the region's MPO), and the Minnesota Department of Transportation, Traffic Management Center in order to learn more about traffic data collection and use in the Minneapolis - St. Paul area. This information was supplemented by documentation supplied by the participating agencies, and information provided through the telephone interviews conducted under the first phase of this project. All jurisdictions involved in traffic data collection within the region were not contacted as part of this study.

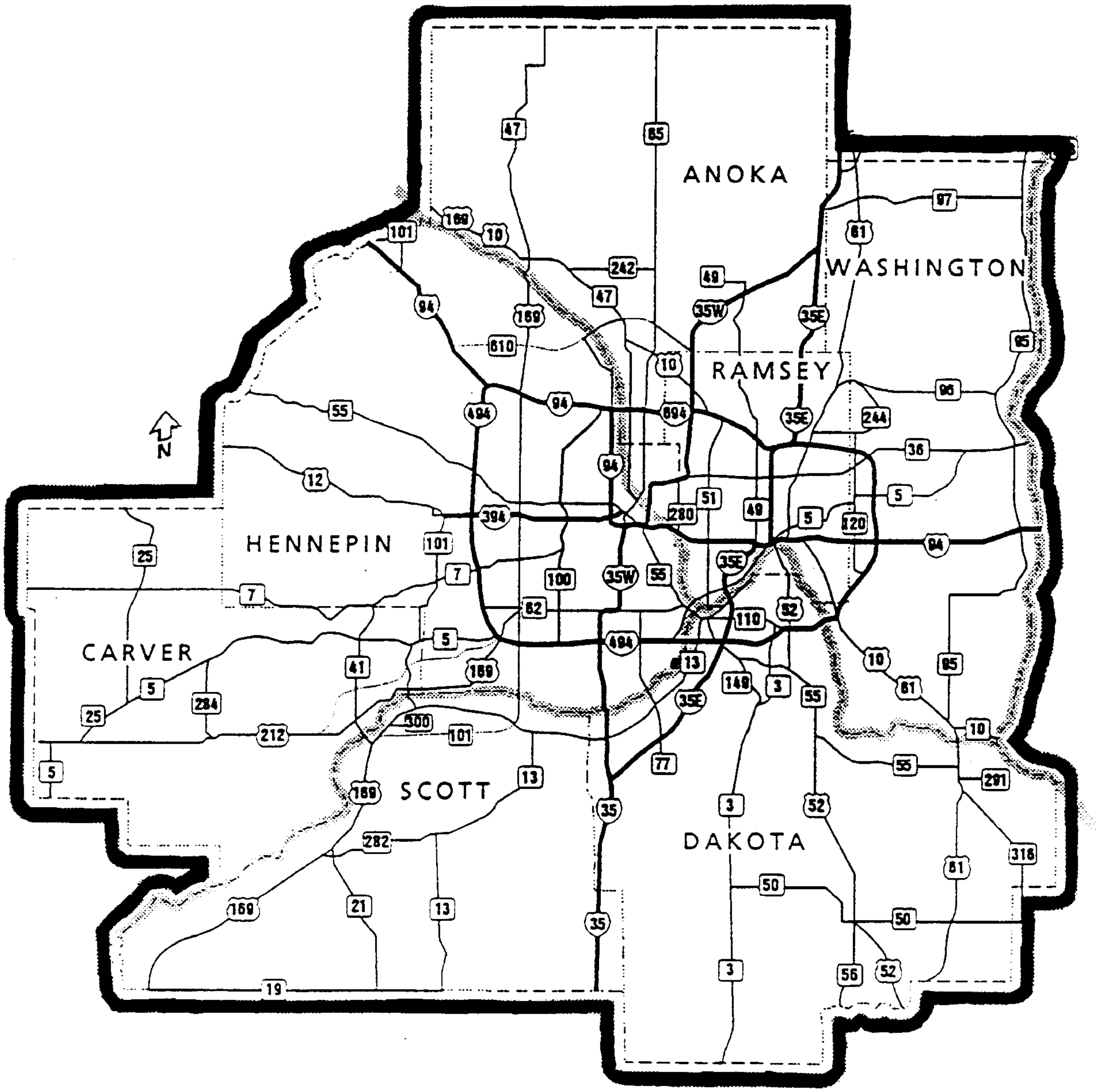
The seven county metropolitan area is shown in Figure 3.5.

The Minnesota constitution sets aside a percentage of the revenue from gas taxes and motor vehicle registration fees for local road programs. Funding is allocated according to formulas established by law and administered by MNDOT in partnership with the cities and counties. One basis of this allocation is traffic data reported to MNDOT by the jurisdictions. The funds are distributed to the individual cities and counties for use on eligible projects on municipal state aid streets and county state aid highways.

3.3.2 Data Collection Program

3.3.2.1 Introduction - The seven county cooperative counting program is the hallmark of the Minneapolis-St. Paul area's traffic data collection program. The Minnesota Department of Transportation, working with the Traffic Management Center and District Traffic Engineers in the Metro District have established a cooperative counting program with the metropolitan counties and municipalities. This cooperative program was undertaken for efficiency, convenience and to prevent duplication of vehicle counts. Special counts are also taken as the need

FIGURE 3.5 - MINNEAPOLIS - ST. PAUL METROPOLITAN AREA



is identified. This work provides a data base for identifying trends, and evaluating system performance.

In addition to the State DOT, both city and county level agencies have permanent data collection programs. There are about 187 communities in the area, about half of which collect traffic count data. The program descriptions below do not cover all programs. The programs for the City of Minneapolis and Ramsey County are representative of the programs in the metropolitan area. Project resources did not allow for a comprehensive inventory of the programs of all jurisdictions.

3.3.2.2 Type of Program - *MNDOT -* Using traffic data collected by the department, the cities and the counties, MNDOT creates “The 7 County Flow Map”. The Department also obtains data from the MNDOT TMC. The TMC monitors about 175 miles of freeway and provides data from their operations. These data are treated like that from a continuous count station.

The seven county metropolitan area count program is a cooperative counting program involving MNDOT, Metropolitan District personnel, the Traffic Management Center (which monitors and manages traffic on the metro area freeways and major arterial highways), highway department staff from each of the metropolitan counties, municipal engineers, and private consultants. The Metro counting program has been in existence since 1972. The Metro district is one of eight MNDOT districts.

Short-term counts are taken over a two year cycle at MNDOT-specified count locations. These sites are a combination of historical locations and those selected at the start of the program in order to fill in the gaps. The metropolitan trunk highways and county state-aid system road counts are completed by the end of the even years, while the municipal street system counts are completed by the end of the odd years. Minneapolis, St. Paul, and some 70 other cities provide data.   MNDOT applies seasonal, and axle adjustment factors to the raw data. Currently these factors are specific to the Metro area.

There are 52 pages in a detailed map series comprising “The 7 County Flow Map”. These maps are now done by hand, but MNDOT is moving to a GIS in the future. (Outside the Metro district, most maps are produced automatically.)

MNDOT has 81 continuous counters in the area, and also collects data at another 8,400 sites on a two year cycle (48 hr. duration). MNDOT collects vehicle classification data in the area using 6 continuous counters, and at another 23 stations where classification data is collected manually on a two year cycle (16 hr. duration). MNDOT also collects truck weight data in the area at 6 WIM sites.

Annual average daily traffic (AADT) volumes are the measure of roadway use commonly reported by MNDOT. These data are estimates of how many vehicles are traveling in both directions on the state's roadway segments during an average, or typical, day of the year. These traffic volume data are derived from three kinds of traffic counting activities. The first involves continuous traffic counting devices; the second involves short-term counting devices with road tubes; and the third activity involves either manual or portable automatic vehicle classification. Information from these tasks is analyzed and combined to create AADT volumes that are mapped, and distributed for use by MNDOT, county and local highway departments, and area planning organizations, as well as the general public.

MNDOT's continuous traffic counters are located primarily on trunk highways throughout the state. Traffic volumes are retrieved from these devices once or twice a week. The data are then edited using a PC-based expert data editing system to cull out bad data and check for equipment malfunctions. After the data have been edited, they are ready to be used to create seasonal/day-of-week adjustment factors for the short-term count data.

Short-term count data are collected primarily with equipment that senses vehicle axles and records the axle count information on portable counters located at the side of the roadway. Pneumatic road tubes are used to sense vehicle axles and the axle data are stored on counters until traffic count personnel from the local MNDOT district offices transmit the data to the Traffic Forecasting and Analysis Section for entry into the PC-based traffic count database. District traffic count personnel also can enter the data directly into the database.

After the short-term count data entered into the database, they are evaluated against past AADT estimates and recounts are ordered when anomalous data values (due to equipment malfunctions, for example) indicate the need for a recount. The value of experience in data collection staff was noted in that the recount rate on counts taken by “inexperienced” staff was found to exceed that of “experienced” staff.

The short-term counts are factored by a database application with day of week and seasonal adjustment data from the continuous count program as well as with axle corrections from the vehicle classification program to generate adjusted average daily traffic volumes for the roadway segments where counts have been taken. At the end of the counting season, the short-term counts are evaluated for spatial and temporal coherency and placed on draft traffic volume maps. The draft maps are circulated to MNDOT district and/or county and municipal engineers for feedback. Final traffic volume maps are then prepared and distributed to MNDOT's traffic volume data users.

Traffic volume data are also entered into the Department's Transportation Information System (TIS) so that MNDOT safety analysts and pavement engineers, for example, can have access to traffic information vital to their work. The TIS data resides on a mainframe computer. It contains data on about 9000 locations statewide.

MNDOT TMC - The TMC collects data (speed and lane occupancy every five minutes) at half mile intervals on the mainline freeways, and at every exit/entrance ramp. They have 3000 detectors at 700 stations and 400 ramps over the freeway system. Data from only 20-30 stations are provided for planning purposes. The TMC has 2-3 years of data stored.

Ramsey County Public Works Department - The Ramsey County Public Works Department also collects data at 250 sites on a two year cycle (48 hr. duration) , and conducts about 50 turning movement and 28 approach volume mechanical counts/year on an "as needed" basis. The County conducts about 25 speed data collection studies per year on an as needed basis. These are a mix of mechanical counts and radar.

City of Minneapolis -The City of Minneapolis, Transportation Division collects traffic volume data at 1200 sites on a two year cycle (48 hr. duration). The City also conducts about 25 classification counts /year (using mechanical counters) on an as needed basis.

Minneapolis also has started a neighborhood data collection program. This puts planning money into hands of the neighborhood organizations, most of who hire consultants to collect data on residential street systems that are generally ignored by most traditional data collection programs.

3.3.2.3 Data Collection Equipment - Ramsey County has 12 counters which collect both volume and speed data. Road tubes are used at 250 traffic volume data collection sites and 25 speed data collection sites. They also retrieve count data using their traffic signal system detectors.

The City of Minneapolis uses 35 counters to do volume counts. Road tubes are used at the 1200 traffic volume data collection sites.

3.3.2.4 Data Collection Staff Levels - All state counts are done by MNDOT district personnel. MNDOT estimated that consultants do about 1/3 of the counts for the local jurisdictions with the remainder done by the jurisdictions' in house staff.

Ramsey County has a permanent in house staff of 1.5 full time equivalents working on data collection. The City of Minneapolis also relies on permanent in house staff for data collection. The following are full time equivalents: 1 administrative; 1.5 field; and 0.1 data processing.

3.3.2.5 Data Use - The reasons why each type of agency within the urban area collected the kind of data that they did are indicated below.

The Minnesota DOT collects traffic count data, vehicle classification data, and truck weight data for the following purposes:

HPMS input;
VMT estimates;
regional transportation planning models;
statewide transportation planning;
corridor planning;
county and municipal aid allocation;
roadway design geometrics;
structural pavement design;
pavement management;
ESAL factors;
traffic and ESAL forecasting.

Ramsey County collects traffic count data and travel time/speed data for local traffic planning, and corridor planning.

The City of Minneapolis collects traffic count data and vehicle classification data for local traffic planning.

3.3.2.6 Data Flows Within the Urban Area - Each individual interviewed as part of the initial phase of the project was asked if their agency shared or pooled data with other agencies within the urban area. They were also asked if the data were provided informally or formally.

Informal exchange means that it was done as needed, on a case by case basis, e.g. an individual in one agency calling an individual in another to see if they had any recent data on a certain intersection or road segment. Formal exchange involves the transfer of a comprehensive data set on a regular or routine basis, e.g. each year, an agency provides other agencies within the area with a copy of all the traffic data it collected during the past year.

MNDOT provides traffic count data to the MPO, counties and cities on a formal basis. MNDOT receives data from the counties, cities and the Traffic Management Center on a formal basis. The agency has no problems with the current data sharing arrangements.

Ramsey County provides traffic count data to MNDOT on a formal basis, and to the MPO and the City on an informal basis. In turn the County receives traffic count data from MNDOT and the City on a formal basis. The agency has no problems with the current data sharing arrangements.

The City of Minneapolis exchanges traffic count data with the State DOT and the County on a formal basis. The agency has no problems with the current data sharing arrangements.

3.3.3 <u>Issue Areas</u>

The traffic monitoring program in the Minneapolis - St. Paul area should be of interest because of the use of ATMS data for planning purposes; the degree of interagency cooperation and coordination that has been achieved; and the role of a lead agency in defining a comprehensive data set for the region, and dividing up data collection responsibility among the jurisdictions. These are discussed more fully below.

3.3.3.1 Institutional Arrangements - Inter Agency Coordination/Cooperation: Under the seven county cooperative counting program, traffic counting is conducted on a two year cycle by Metro district, county and municipal personnel. The purpose of the traffic monitoring and evaluation program is to provide appropriate traffic data as needed to determine annual average daily traffic on trunk highways, county state aid highways, and municipal state aid streets to indicate travel trends and patterns. Data is also used for analysis of transportation caused air pollution and noise.

Counts are taken on all state trunk highways, county state aid highways, municipal state aid streets, and at selected locations on city streets for estimating vehicle miles traveled. Traffic volumes representing AADT are shown on the 52 sheet series maps covering the seven-county Metropolitan Area and individual municipal maps showing the volumes on the county and municipal state aid system. Traffic volumes are also displayed in summary fashion on a single metro traffic volume map.

This coordinated program is based on cooperation. The cities and counties are not reimbursed by MNDOT for their counts, and there has not been a problem of local jurisdictions refusing to provide data without compensation.

Moreover, while MNDOT's county and municipal count program is used by the State Aid Division as one of the tools for allocation of State highway funds for local road programs, there is no legislative mandate regarding the reporting of traffic count data.

3.3.3.2 Use Of ATMS/Traffic Management Center Data For Planning - The Traffic Management Center (TMC) is the communications and computer center for managing traffic on the areas freeways. The TMC currently operates nearly 400 ramp meters. Ramp metering increases the number of vehicles the freeway can carry.

MNDOT's TMC has been in operation since 1974. The system started with 400 loop detectors, and now has 3000 detectors in total. Data is collected at 175 sites with loop detectors located in every lane. These are located every 1/2 mile on freeways, and at exit/entrance ramps. About 5% of the detectors are out at any given time, mostly due to scheduled highway reconstruction. The system has 400 signal controllers. Each could serve up to 24 loops, but in fact each only serves 7 or 8 loops.

Real time operating data is collected every 30 seconds. The data includes volume, lane occupancy, and speed, which is calculated. At the end of each day, the system data is processed, copied and archived. The system data is stored on hard drive and optical disk. They have data on the system from January 1994.

The traffic volume data for the metro traffic volume maps is sent electronically to MNDOT's Traffic Analysis and Forecast Unit in “ATR” format. The data is at 5 minute intervals - 24 hours/day. The data processing is done by the research group of MNDOT's Metro Division using software that was developed in house. The TMC also plots this summary data for their own internal use. Figure 3.6 shows a sample freeway segment. The figures at each site indicate, in descending order, AM peak volume, PM peak volume, and 24 hour volume.

The TMC has software, which was developed in house, to screen the data and flag suspicious data (which helps detect malfunctions in the loop detectors). The output of this process must be checked manually now, but the University of Minnesota is currently working on a project to further automate this process.

Work is also underway to put their data into an “Oracle” database in order to make it more user friendly and available for planning. This should be available within 6 months to a year.

A local software company developed a traffic map for use on the Internet, which displays real time traffic conditions on area freeways . A sample display is indicated in Figure 3.7. Incidents will also be going on the Internet in the future.

The TMC is also involved in a number of ongoing studies ; a study of the coordination and integration of the freeway ramp metering system and the city traffic signal systems (St. Paul and Minneapolis have computer controlled signal systems.); a study of ramp meter delays; and a study on the maintenance of the meters.

They are also involved in the Integrated Corridor Traffic Management Project, a comprehensive program along the I-494 corridor designed to improve efficiency of traffic movement throughout the corridor. This will involve linking the traffic lights on the streets approaching the freeway ramps to the ramp meter system and loop detectors.

3.3.3.3 Data Use - Input to Air Quality Models: The MPO does Air Quality analyses for the region, although MNDOT will do “hot spot” intersection studies. They use a model approach rather than a ground count approach. Local road VMT is not considered[3], but intrazonal estimates are used instead. The available traffic data is adequate for modeling purposes. However, this data must be adjusted since MNDOT provides AADT, while the MPO’s travel forecasting models estimate travel on an Average Weekday Traffic (AWDT) basis.

Input to HPMS: The traffic count data from the Metro area counting program provides all the traffic count data needed, but these figures may have to be adjusted in order to match HPMS segments. MNDOT gets almost all other HPMS required data from its TIS.

Support of CMS: A CMS is only being done in the Metro area, with the MPO having primary responsibility. Like the air quality analyses, a model approach to estimating travel volumes is used rather than a ground count approach. However, these traffic model results are sent to the jurisdictions for a check on reasonableness.

---

[3] In the regional traffic data collection program, only 7-8 counts are taken on local roads. These are part of the HPMS sample.

FIGURE 3.6 - FREEWAY TRAFFIC VOLUMES

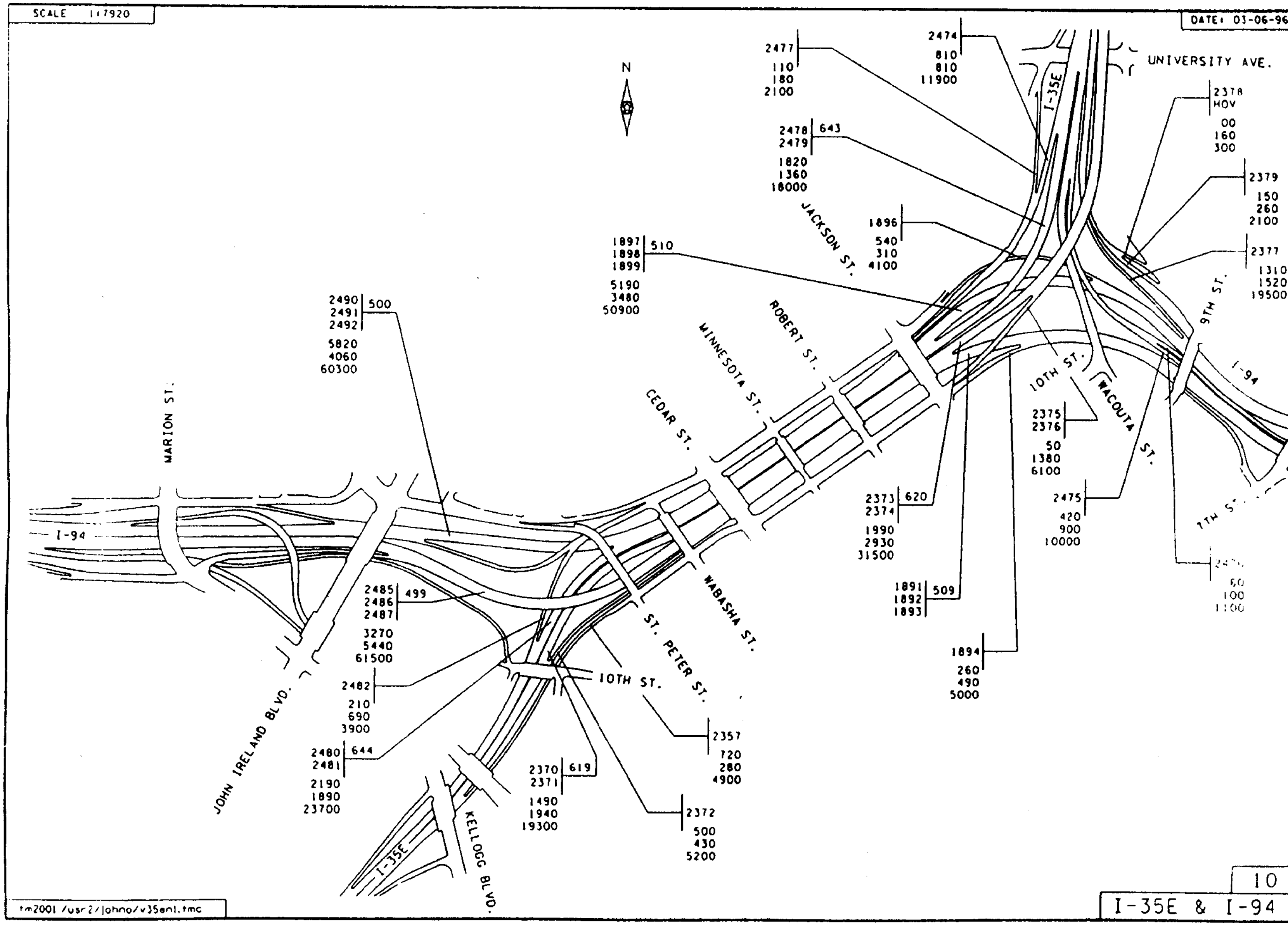


FIGURE 3.7 - DISPLAY OF REAL TIME TRAFFIC CONDITIONS

The MPO uses a model rather than ground count approach because they feel they have a "good" model based on their 1990 data collection and calibration effort. In addition, they noted that the data needed to fully support the CMS, such as peak hour traffic volumes, is not available in all cases. However, they realize that the model results are becoming less valid with the passage of time.

Local Agency Needs: The MPO gets AADTs from MNDOT's regional flow maps. The map data is usually 2 years old when the MPO gets it, and there currently is no electronic version of the data available. However, they noted that they can get the latest available data from MNDOT if needed.

The MPO feels that they get adequate count data coverage for their model calibration needs, although these AADTs have to be converted to AWDTs as indicated above.

The MPO did their own peak-hour and vehicle classification counts at selected screenlines for their 1990 Travel Behavior Inventory. This study is the source of much of the data needed to adjust the MNDOT data.

The MPO also receives auto occupancy data from the TMC, who does do an vehicle occupancy study every year at about 14 sites.

3.3.3.4 How Various Data Needs Fit Together In The Context Of The Overall Data Collection Effort - The Minnesota Department of Transportation, working with the Traffic Management Center and District Traffic Engineers in the Metro District have established a cooperative counting program with the counties and municipalities. This cooperative program was undertaken for efficiency, convenience and to prevent duplication of vehicle counts. This work provides a data base for identifying trends, and evaluating system performance.

The available count data have proved to be adequate and sufficient for the needs of MNDOT, and the MPO in supporting required HPMS data submittals and air quality analysis. With minor adjustments it has served the purposes of the MPO in their model calibration efforts. Any deficiency in the current program would seem to lie in its inability to provide some of the more detailed data elements needed to support the region's CMS.

3.3.3.5 Funding Sources/Mechanisms - MNDOT's Metro area traffic monitoring program is funded through a combination of federal and state dollars. About 80 % of the money is federal PL and SPR funds.

The source of the MPO's funding is federal money plus local property taxes. The MPO has taxing authority, since in addition to its "planning" functions it also operates the regional transit and sewage disposal systems.

3.3.3.6 The Participants' View of Their Program's Strengths and Weaknesses - The agencies also provided an indication of what they felt were the strongest and weakest points of their respective programs, or what they felt that they did best and what they would do differently to improve their programs.

MNDOT - They recognized a need to automate the data editing process, and a need for software to screen and edit count data which was not always provided in a common, compatible format. Moreover, they felt that their WIM data has more potential then currently utilized.

Metropolitan Council of the Twin Cities - They felt that the best feature of the current data collection program was that they got all the data they needed on a regular basis.

In an ideal world the MPO would prefer to have direct electronic access to the detailed count data, since they sometimes need to work with more detailed aspects of the data, like peak hour directionality. In addition they would prefer to have more up to date data. There is also a timing issue. Specifically it was felt that the availability of the latest MNDOT data barely met the deadlines required for input to the TIP preparation processes.

3.3.4 Further Information

Mr. George Cepress
Director, Traffic Forecast and Analysis Section
Office of Management Data Services
Minnesota Department of Transportation
95 John Ireland Boulevard MS - 450
St. Paul, MN 55155

Telephone: (612)-296-0217

Ms. Connie Kozlak
Metropolitan Council of the Twin Cities
Mears Park Centre
230 East Fifth Street
St. Paul, MN 55101-1634

Telephone:(612)-229-2720

Mr. Ron Dahl
Minnesota Department of Transportation
Traffic Management Center
1101 Fourth Ave. South
Minneapolis, MN 55404

Telephone:(612)-341-7269

3.4 PORTLAND CASE STUDY

3.4.1 Introduction To The Case Study Area

The Portland area has a population of 1,329,000, a land area of 469 square miles, and a 5,509 mile roadway system. It is now in attainment for both CO and ozone. The State DOT, and both city and county level agencies have permanent data collection programs. The MPO, Metro, does limited data collection. Metro, the Portland Metropolitan Planning Organization is the directly elected regional government and designated MPO for the Portland metropolitan area. The organization covers three counties and 24 cities. The Portland metropolitan area is shown in Figure 3.8.

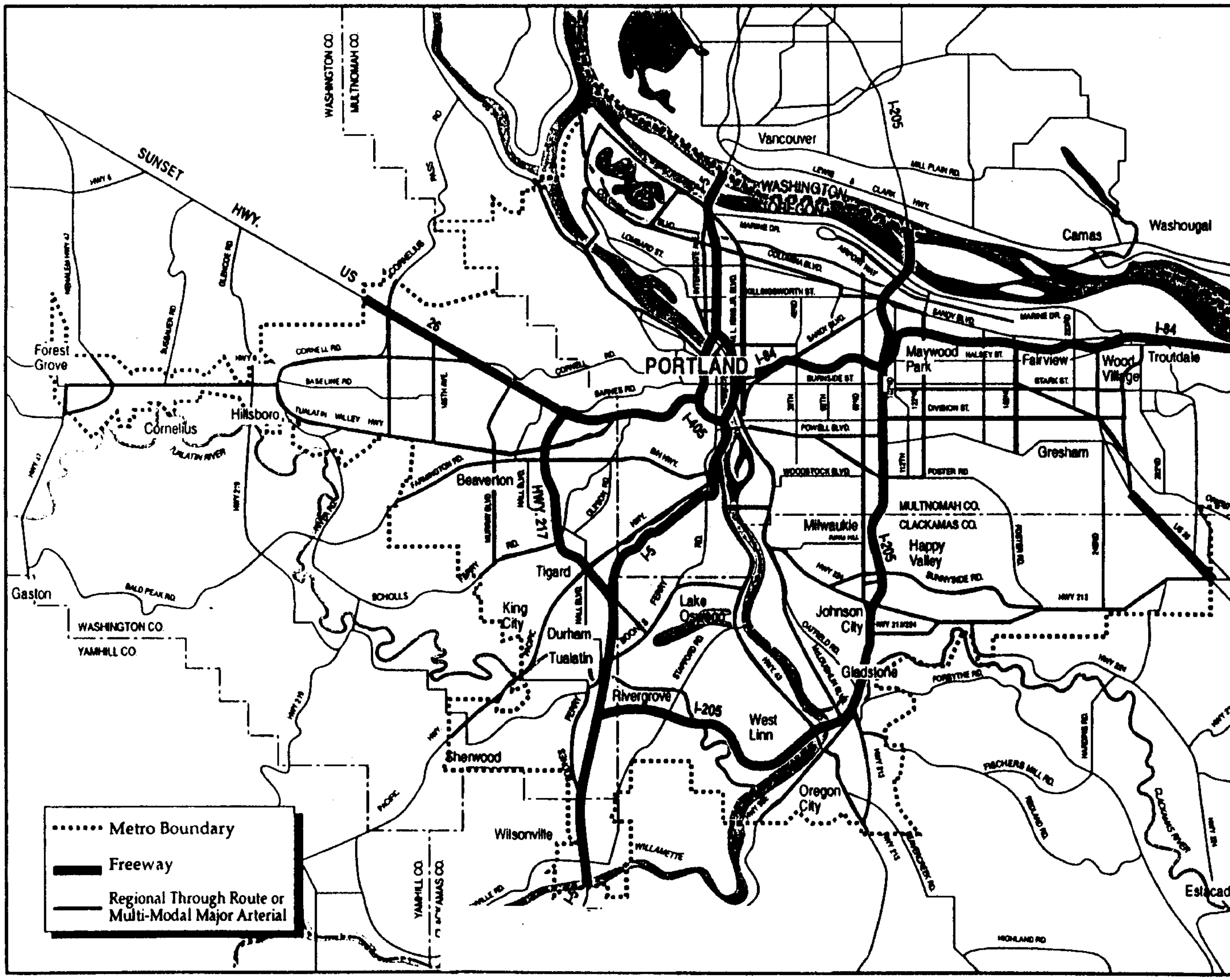
This case study is based on information gathered during meetings held during a site visit made to Portland on 11/20/96. Meetings were held with staff of the Oregon Department of Transportation, Region 1; Portland Department of Transportation, Bureau of Traffic Management; and the Metro Transportation Department, Travel Forecasting Section, in order to learn more about traffic data collection and use in the Portland area. This information was supplemented by documentation supplied by the participating agencies, and information provided through the telephone interviews conducted under the first phase of this project. All jurisdictions involved in traffic data collection within the region were not contacted as part of this study.

3.4.2 Data Collection Program

3.4.2.1 Introduction - While it does only limited data collection on its own, Metro administers the regional count program. These count data are important to Metro and the jurisdictions and are critical to the computer modeling and planning process. Metro sends a list of locations to the jurisdictions requesting traffic count data. There are currently five separate jurisdictions in the Portland metro area which measure traffic flows along designated cutlines/screenlines and submit copies of their data to Metro. These jurisdictions include the Oregon Department of Transportation, the City of Portland, and the Counties of Clackamas, Multnomah, and Washington.

The Oregon Department of Transportation's, Region 1, the City of Portland's Office of Transportation (Bureau of Traffic Management), and Multnomah County's Transportation Division provided data on their programs as part of this project's initial phone interviews. ODOT Region 1, the City of Portland, and Metro were involved in the site visit.

FIGURE 3.8 - PORTLAND METROPOLITAN AREA



The program descriptions that follow do not cover all programs. Project resources did not allow for a comprehensive inventory of the programs of all jurisdictions. In addition to the programs outlined below, traffic count data is collected by the Counties of Clackamas and Washington in Oregon. The Portland - Vancouver TMA (Transportation Management Area) also includes Clark County, Washington. However, this study concentrated on programs in Oregon, which contains Portland, the largest city in the region.

3.4.2.2 Type of Program - *ODOT Region 1 -* ODOT Region 1 collects data at 1200 sites per year on a 3 year cycle (the “statewide” program). All freeways in Region 1 are counted every year. They also perform about 800 intersection counts each year.

Region 1 does the actual counts, but the schedule for the HPMS counts and “statewide counts” comes from ODOT Headquarters. The raw count data goes to the state capitol, Salem, where the counts are tabulated. However, the adjustment factors used are specific to the Portland area, not statewide factors.

Region 1 does hourly counts (48 hr. duration), but collects data at 15 minute intervals for peak hours. These are all portable tube counts.   Equipment is not a problem. They count from March to October with 2 permanent in-house staff, using consultants if they have an overload.

Counts are done geographically, roughly on a county by county basis, just to distribute the workload. The MPO requested counts generally coincide with counts they do on a 3 year cycle as part of the statewide program.

There are also about 20 permanent continuous count stations in the Portland area. These are polled weekly. Region 1 collects this data directly, although Headquarters also can access the sites via telemetry.

All data (HPMS, statewide count, freeway) is in electronic form, but it is not in a consolidated data base.

Classification counts are done at 28 sites per year on a three year cycle for HPMS.   These are manual counts, and are done by consultants. ODOT does about 12 classification counts /year for special studies.

Vehicle occupancy studies are now done only for special studies such as the Westside Corridor, but in the future, these will have to be done on a regular basis in support of the CMS.

Multnomah County - Multnomah County collects traffic volume data at 200 stations per year (24 hour duration). They also conduct about 25 manual turning movement counts, and about 50 other mechanical counts per year as needed. In addition they conduct about 25 speed sample studies per year on an as needed basis.

City of Portland - The City of Portland collects traffic count data at 50 continuous count stations. They also collect data at 120 stations on a two year cycle (24 hour duration). In addition they conduct about 300 manual turning movement counts per year and 2000 mechanical counts per year as needed. About 85% of their counts are done as special studies.

They also conduct about 13 manual and 37 mechanical vehicle classification counts per year as needed, and about 2000 speed studies per year on request. They collect vehicle occupancy data at 4 stations every 3 months and conduct about 15 other occupancy studies per year on an as needed basis. All traffic data goes into their database.

The City does 120 counts every 2 years for Metro. They do cordon counts around the City every year opposite the Metro count requirement. They collect data at 97 intersections for the City's "CMS". This is their Traffic System Performance Evaluation (TSPE). They will also be doing travel time studies every 3-4 years using GPS as part of the TSPE. (This was only done once so far.) The TSPE also calls for an occupancy study every 3-4 years.

They have 4 people doing counts full time, year round. Their data collection program is operating at capacity now, but they could hire more people if the additional funding was available.

Metro - There are currently five separate jurisdictions in the Portland metro area which measure traffic flows along designated cutlines/screenlines and submit copies of their data to Metro, every two years, as part of the regional count program. Metro has requested that each agency report traffic count totals at certain locations to avoid both overlaps and gaps in gathering and reporting data. Further, Metro asks each organization to collect data in the spring or fall of the year (preferably either in the month of May or October) so as to obtain what is believed to be the most typical auto counts, and to summarize information by the hour, by direction of travel, and by average weekday (AWD) totals.

Data for cutlines and screenlines are tabulated for 24-hour periods. Cutlines may be defined as artificial lines or boundaries which intercept major traffic flows along selected axes. Screenlines are located along physical barriers. These chosen traffic data collection points are established to measure the major travel flows into and out of a central area, or between suburban and downtown, or suburban and outlying commercial areas. Metro has designated 52 cutlines and screenlines within the Portland metropolitan area.

The count location data are used to calibrate the regional transportation planning model. Metro has requested count data at 386 points from 1986 on. The count data is for 15 minute intervals in the peak periods, hourly the rest of the day. All conventional counts are 24 hr. duration. Table 3.7 shows an example of the available data.

The data is currently in a “Lotus type” spreadsheet format. There are plans to transfer the information to a relational database. Data may be accessible to all jurisdictions via the relational database in the future.

While there are some variations among data collecting agencies, overall they count traffic on a 24 hour basis in order to obtain an average weekday (AWD) total per location. Some agencies collect 15 - minute peak - period information at different times than others, which may hinder comparisons. The methods for collecting data used by the various agencies includes automatic counting devices (pneumatic hoses and inductive loops) at permanent record location points, as well as individuals who collected information manually. Metro gets about 60% of what they ask for on average, although this varies widely. Metro noted that the jurisdictions try their best, but that budgets do not allow them to do all that the MPO asks.

In addition to the cutline program, Metro does receive some data from various “special studies” conducted by the jurisdictions.

Metro will soon be getting vehicle classification counts at 44 locations to supplement the count data. (They have a need for data on trucks for development of truck freight models.) Count locations were selected by a committee of the region’s traffic experts. A consultant working for ODOT is now completing the counts. Additionally, Metro uses vehicle classification data from the state’s submittal to the Highway Performance Monitoring System (HPMS). Counts from approximately 100 HPMS locations are utilized.

3.4.2.3 Data Collection Equipment - Ten of ODOT’s traffic count stations have permanently installed loops. Vehicle classification data is also collected at these stations. Traffic count data is collected at all other stations with road tubes.

Multnomah County collects traffic count data with road tubes at the 200 stations monitored under their permanent program.

TABLE 3.7- PORTLAND REGIONAL COUNT PROGRAM DATA

TRAFFIC COUNTS FOR: 1986 - 1988 - 1990 - 1992 - 1994

#	YEAR	CUTLINE/COUNT ID, LOCATION, STREET, JURISDICTION	AVERAGE WEEKDAY TOTAL	AM-Peak-1 Hr 7:15-8:15AM		AM Peak-2 Hr 7:00-9:00AM		PM Peak-1 Hr 4:30-5:30 PM		PM Peak-2 Hr 4:00-6:00 PM	
				EB	WB	EB	WB	EB	WB	EB	WB
1		E-1-1, e/o N Portland Rd; Burlington RR, N MARINE DR, ODOT									
	1994		24,509	513	1,064	1,095	1,648	1,170	784	2,165	1,501
	1992		0	0	0	0	0	0	0	0	0
	1990		21,554	486	1,059	966	1,737	882	432	1,982	990
	1988		0	0	0	0	0	0	0	0	0
	1986		0	0	0	0	0	0	0	0	0
				EB	WB	EB	WB	EB	WB	EB	WB
2		E-1-2, e/o N Portland Rd; Burlington RR, N COLUMBIA, City of Portland									
	1994		18,283	619	635	1,091	1,145	767	570	1,483	1,088
	1992		17,201	615	609	1,137	1,091	789	439	1,562	887
	1990		17,092	600	610	1,064	1,122	723	551	1,430	1,037
	1988		0	0	0	0	0	0	0	0	0
	1986		0	0	0	0	0	0	0	0	0
				EB	WB	EB	WB	EB	WB	EB	WB
3		E-1-3, e/o N Portland Rd; Burlington RR, N FESSENDEN, City of Portland									
	1994		6,682	176	159	314	306	301	287	578	542
	1992		4,903	126	99	231	172	212	234	412	424
	1990		4,852	129	103	247	190	212	211	392	407
	1988		0	0	0	0	0	0	0	0	0
	1986		0	0	0	0	0	0	0	0	0
				EB	WB	EB	WB	EB	WB	EB	WB
4		E-1-4, e/o N Portland Rd; Burlington RR, N LOMBARD, ODOT									
	1994		16,328	385	463	711	841	745	618	1,416	1,196
	1992		16,466	272	271	594	605	696	535	1,408	1,121
	1990		18,447	314	304	670	757	713	668	1,520	1,309
	1988		0	0	0	0	0	0	0	0	0
	1986		0	0	0	0	0	0	0	0	0

Notes: 1) 1992 ODOT peak periods are 7-8 AM and 5-6 PM; 2) 1992 Washington Co. PM peak is 4-5; 3) All 1986/1988 counts have 1-Hr peak periods from 5-6 PM; 4) Counts on non-freeways may be exaggerated - no truck adjustment factors used.

The City of Portland collects data at 50 sites having permanent loops. Data at all other sites is collected using road tubes. They also have 6 video units for occupancy studies.

3.4.2.4 Data Collection Staff Levels - ODOT relies on a mix of permanent in house staff (0.5 administrative, 0.5 data processing and 4.5 field) and temporary contractor staff (7.5 field). Multnomah County has a permanent in house staff of 0.5 full time equivalents working on data collection. The City of Portland has a mix of permanent (2 field and 2 data processing) and temporary in house staff (1 data processing) for data collection.

3.4.2.5 Data Use - The reasons why each type of agency within the urban area collected the types of data that they did are indicated below.

ODOT collects traffic count data, vehicle classification data, travel time/speed data, and vehicle occupancy data for the following purposes:

HPMS input;
VMT estimates;
CMS programs;
regional transportation planning models;
statewide transportation planning;
corridor planning;
major investment studies;
environmental planning;
other - freight intermodal planning.

Multnomah County collects traffic count data for local traffic planning.

The City of Portland collects traffic count data, vehicle classification data, travel time/speed data, and vehicle occupancy data for local traffic planning, and environmental planning.

Metro has recently begun to collect some vehicle classification data for its truck modeling effort, but generally gathers data collected by other agencies for its traffic model of the region.

3.4.2.6 Data Flows Within the Urban Area - Each individual interviewed as part of the initial phase of the project was asked if their agency shared or pooled data with other agencies within the urban area. They were also asked if the data were provided informally or formally.

Informal exchange means that it was done as needed, on a case by case basis, e.g. an individual in one agency calling an individual in another to see if they had any recent data on a certain intersection or road segment. Formal exchange involves the transfer of a comprehensive data set on a regular or routine basis, e.g. each year, an agency provides other agencies within the area with a copy of all the traffic data it collected during the past year.

ODOT provides count and occupancy data to the counties and cities on an informal basis, and receives count data from the City, counties and consultants on an informal basis. The agency has no problems with the current data sharing arrangements.

Multnomah County exchanges data with the City and consultants on an informal basis, and data exchange with the MPO is on a formal basis and an informal basis. The agency has no problems with the current data sharing arrangements.

The City of Portland provides data to ODOT and to consultants on an informal basis, while data is provided to the MPO on both a formal and informal basis. The agency has no problems with the current data sharing arrangements.

3.4.3 Issue Areas

The traffic monitoring program in the Portland area should be of interest because of the interagency cooperation and coordination that has been achieved; and the role of a lead agency in dividing up data collection responsibility among the jurisdictions. These are discussed more fully below.

3.4.3.1 Institutional Arrangements - Inter Agency Coordination/Cooperation - While it does only limited data collection on its own, Metro administers the regional count program. These count data are important to Metro and the jurisdictions and are critical to the computer modeling and planning process. There are currently five separate jurisdictions in the Portland metro area which measure traffic flows along designated cutlines/screenlines and submit copies of their data to Metro. Metro sends a list of locations to the jurisdictions at which they collect traffic count data. These five agencies are: The City of Portland, ODOT, and the Counties of Clackamus, Multnomah, and Washington.

Metro developed the regional travel demand model, but the jurisdictions can access the model and do their own analysis. ODOT, Tri-Met, and the three counties, the City of Gresham, and the City of Portland have modem connections to the transportation planning EMME/2 database. These jurisdictions are able to use the software as a remote workstation. Metro provides training to the jurisdictional staff regarding the use of the EMME/2 Transportation Planning Package, the theory of travel demand modeling, and computer network simulation analysis. The jurisdictions perform studies to determine development, transportation policy and infrastructure impacts.

This is a selling point for cooperative data collection, i.e., the model is only as good as the data used to calibrate it. Data is the key to model validation, and the model's outputs are the basis of investment decisions.

The cooperative approach has worked to date, but this may be changing. "Measure 50", a statewide ballot measure, cut back local property taxes. This may impact traffic counts at the local level. The City of Portland indicated that they now provide data to the MPO free of charge, but that this might have to change in the future.

3.4.3.2 Use Of ATMS/Traffic Management Center Data For Planning - Both ODOT and the City of Portland have ATMS type systems in place now, but these systems are not used to their full potential in terms of collecting traffic data.

ODOT currently collects count data at state controlled signals in the area. ODOT controls the signals at the ends of ramps to/from freeways, while the City controls signals on city streets. ODOT uses "WAPITI" software to produce traffic volume reports from the signal system data.

ODOT also has a ramp metering system in place on the area's freeways. They will be implementing a system to collect data from the ramp meters and mainline detectors (much like the system in Minneapolis) in the future. This should coincide with the opening of their TMOC (Traffic Management & Operation Center) within the year. ODOT's TMOC will also have access to information on the City's signal control system. Recognizing the importance of functioning loop detectors to quality data, ODOT has earmarked $800,000 per year toward loop maintenance/replacement.

ODOT sees ATMS as a solution to the problem of declining staff levels and increasing data needs i.e., automation to increase productivity, and the problem of safety associated with data collection on urban highways.

The City of Portland also sees ATMS as way of data collection in the future. They currently collect data from their traffic signal control system for planning as needed, but not on a regular or systematic basis. While the system software can produce reports of traffic count data, the count "data" can not be easily extracted from the reports and converted into a data file. In addition about 10% of the City's loops are out at any given time, which, in their minds, casts some doubt on the quality of the data.

About 450 of the City's 930 signals are presently connected to the system. However, the system currently only collects and saves data at 20 locations. The data is saved for one week. The system uses JHK 2000 software.

Metro would like to see a system where the loop detector data could be downloaded to their data base directly. However, they feel that they will need additional funding, and institutional consensus to get to tap into the ODOT/City of Portland ATMS data.

3.4.3.3 Data Use - Input to Air Quality Models: Metro does the air quality analysis for the region, working in conjunction with the Oregon Department of Environmental Quality (DEQ). There is no ODOT work in this area. Metro uses model based VMT and speed estimates, rather than those based on ground counts. However, the integrity of the model data is ensured through a validation process.

Input to HPMS: ODOT Region 1 only collects the traffic count data, while ODOT in Salem prepares the rest of the HPMS submittal. Traffic counting on local roads is only done for the HPMS sample.

Support of CMS: Metro will be using a simulation based approach for their CMS. The proposed CMS will require the following data from the jurisdictions collected on a three year cycle: traffic volume, by hour; roadway capacity, vehicle occupancy; average vehicle speeds; and travel times on selected routes.

ODOT has indicated that the requested traffic count data would probably not present a problem, since generally they are collecting the required data already. However, the travel time data, which is not currently collected, may present a problem.

The CMS for Metro requires additional data collection on the part of the City, primarily additional volume counts, and speed data which is presently not collected at the specified locations. The City feels that the additional data collection burden is such that they may have to start charging the MPO for this extra data collection in the future.

The City has its own version of a CMS in place now. This is their Traffic System Performance Evaluation (TSPE). Legislation such as the Oregon Transportation Planning Rule (TPR) and the Intermodal Surface Transportation Efficiency Act (ISTEA) has promoted or required the development of programs that have quantified goals and a means for monitoring those goals. These new programs include the state-mandated Transportation System Plan (TSP), the ISTEA-mandated Congestion Management System (CMS), and the City of Portland's Street System Operations Plan.

The TSPE was undertaken to identify and develop indicators that can be used to monitor traffic system performance, as required by these programs. The TSPE gives the City of Portland a tool to identify current areas of operational deficiency and provide a baseline for future performance monitoring. It is envisioned as an ongoing evaluation program that will be implemented periodically (every three years). The TSPE includes five performance indicators: District Accessibility, Street Auto User Characteristics, Travel Time, Traffic Flow, and Multimodal Service Level.

3.4.3.4 How Various Data Needs Fit Together In The Context Of The Overall Data Collection Effort - Metro's regional count program was designed to support their model calibration needs and VMT estimation process. The available count data has proved to be adequate and sufficient for the needs of ODOT and the MPO in supporting required HPMS data submittals, air quality analyses, and to a certain extent, the traffic volume measures of the region's CMS. The major deficiency in the current program would seem to lie in its inability to provide the travel time measures proposed for use in the CMS.

The MPO is perceived as the regional data clearinghouse. For example, the MPO supports the City of Portland by providing them with "regional" data from neighboring counties. While there currently is no regional traffic data base, some data is exchanged electronically. A regional traffic data base, accessible to the jurisdictions, is under development.

ODOT will implement the management systems proposed under ISTEA. They already had pavement and bridge management systems before ISTEA, and they still plan on implementing the safety, transit, and intermodal management systems even though these are no longer mandatory. All management systems are being done out of ODOT Headquarters in Salem.

3.4.3.5 Funding Sources/Mechanisms - The City of Portland's traffic data collection programs are funded as part of the City's transportation fund. Sources of revenue are gasoline taxes from the State, parking meters and tickets. In addition, the City will begin selling computer time to Multnomah County in order to operate the County's traffic signal system.

About 60% of the funding for the MPO's Transportation System Monitoring Program is federal money (PL, STP, and Section 8). The remainder is provided by ODOT, Tri-Met (the region's transit agency), and Metro itself.

The member cities and counties also pay voluntary dues to the MPO, but this supports the MPO's technical assistance program. The purpose of this program is to provide technical support to the cities and counties of the region in terms of staff support to obtain data or evaluate a particular transportation problem; computer usage; and staff training.

3.4.3.6 The Participants' View of Their Program's Strengths and Weaknesses - The agencies also provided an indication of what they felt were the strongest and weakest points of their respective programs, or what they felt that they did best and what they would do differently to improve their programs.

ODOT - They would like to go to automated data collection, i.e., more permanently installed loops, or increased use of video cameras for traffic counting. They saw the collection of data on urban freeway ramps as a real problem in terms of logistics and safety, and the lack of data for freeway links as deficiencies of their current program.

In their case, the money is available for data collection, but not the people. They have lost half their field staff. While they have tried to increase productivity with better equipment, they have had to go to contractors, and temporary staff in order to keep up with their work load.

City of Portland - They felt that their staff had done a good job at the nuts and bolts of data collection and in getting data that people need. Managing the data, and making data available and accessible to users was seen as the real problem.

They indicated that they could use help in equipment evaluation, since they have had problems with speed and classification equipment. They have also had a problem in taking data from various brands of counters and converting the data to a common format. They have developed software to do this on their own.

Metro - Given limited resources at all of the agencies involved, the MPO feels lucky to have cooperative data sharing. Everybody is seen as willing to help each other out as best they can, but the MPO felt that they must constantly sell the importance of data, and the data collection process.

Metro felt that the quality of data has suffered somewhat due to various agency staff cuts, and the need to contract out data collection. The MPO believes that quality of data is of the utmost importance, and if given the choice would prefer to see less quantity (i.e., locations) and more quality.

The MPO sees a need for getting all traffic data into a common electronic format, and for a uniform GIS for the region. As an example, they noted that the City has parking data in a GIS, but that the data was somewhat difficult to translate.

Vehicle classification equipment was also seen as a problem. They would like to see the technology improved by either private sector efforts or government sponsored research.

3.4.4 <u>Further</u> <u>Information</u>

Mr. Dennis Mitchell
Regional Traffic Engineer
Oregon Department of Transportation, Region 1
123 NW Flanders
Portland, OR 97209

Telephone:(503)-731-8218

Mr. Tom Jensen
Portland Department of Transportation
Bureau of Traffic Management
1120 SW 5th Avenue
Portland, OR 97204

Telephone:(503)-823-5211

Mr. Dick Walker
Travel Forecasting Manager
Metro
600 Northeast Grand Avenue
Portland, OR 97232-2736

Telephone: (503)-797-1765

APPENDIX A - GLOSSARY

AADT (Annual Average Daily Traffic)

The estimate of typical daily traffic on a road segment for all days of the week, Sunday through Saturday, over the period of one year.

ADT (Average Daily Traffic)

The total traffic volume during a given time period (more than a day and less than a year) divided by the number of days in that time period.

ATMS (Advanced Traffic Management System)

An array of human, hardware, and software components designed to monitor, control and manage traffic on streets and highways. This includes those used for surveillance and control of traffic on freeways and arterials, detection of roadway traffic flow and incidents, and communication with vehicles, traffic management centers, and organizations responsible for traffic management.

ATR (Automatic Traffic Recorder)

A device that records the continuous passage of vehicles across a given section of roadway by hours of the day, days of the week or months of the year.

ATR Counts

Base traffic counts recorded at an automatic traffic recorder.

AVC (Automatic Vehicle Classifier)

A device that works in conjunction with computerized electronic equipment that counts and classifies vehicles by type and axle configuration.

Axle Correction Factor

The factor developed to adjust vehicle axle sensor base data for the incidence of vehicles with more than two axles, or the estimate of total axles based on automatic vehicle classification data divided by the total number of vehicles counted.

Base Count

A traffic count that has not been adjusted for axle factors (effects of trucks) or seasonal (day-of-week/month-of-the-year) effects.

Base Data

The unedited and unadjusted measurements of traffic volume, vehicle classification, and vehicle or axle weight.

Clean Air Act Amendments of 1990 (CAAA)

Legislation authorizing the Environmental Protection Agency (EPA) to establish and implement rules, which among other topics concerns mobile pollutant emission sources which affect air quality.

Congestion Mitigation/Air Quality Improvement Program (CMAQ)

A funding program for projects that contribute to the attainment of a National Ambient Air Quality Standard or are included in a State Implementation Plan pursuant to the Clean Air Act of 1990.

Congestion Management System (CMS)

A systematic process that provides information for decision makers on transportation system performance and alternative strategies to alleviate congestion and enhance the mobility of persons and goods.

Count

The data collected as a result of measuring and recording traffic characteristics such as vehicle volume, classification, speed, weight, or a combination of these characteristics.

Count Period

The beginning and ending date and time of traffic characteristic measurement.

Count Type

The traffic characteristic being measured, the measurement device, and time period.

Coverage Count

A traffic count taken as part of the requirement for system-level estimates of traffic. The count is typically short-term, and may be volume, classification, or Weigh-in-Motion.

Duration

The time period over which traffic is monitored, e.g., 48 hours.

DVMT (Daily Vehicle Miles Traveled)

Annual Average Daily Traffic on a road segment, expressed as AADT, multiplied by the length of the road segment.

ESAL (Equivalent Single Axle Load)

Summation of equivalent 18,000-pound single axle loads used to combine mixed traffic to design traffic for the design period.

Frequency

The cycle over which traffic data is collected at a location, e.g., once every 3 years.

Functional Classification

The grouping of streets and highways into classes, or systems, according to the character of service they are intended to provide. The recognition that individual roads do not serve travel independently and most travel involves movement through a network of roads is basic to functional classification.

GIS (Geographic Information System)

A method of storing, analyzing, and displaying spatial data.

HPMS (Highway Performance Monitoring System)

A federally mandated data reporting system for all roads except local.

Incident Management

A systematic approach to reduce non-recurring congestion by increased incident detection, response, and clearance; driver information systems; construction management; and traffic management.

Intelligent Transportation System (ITS)

A system that employs electronics, communications, and/or information processing to improve the efficiency of surface transportation operations and provide real-time information about travel options.

Intersection Counts

Traffic counts taken at an intersection, either manually or with counters, to study the flow of vehicles through the intersection. Generally, straight movements are recorded with counters, and turning movements are either taken manually or in combination with counters.

Loop Detector

A detector that senses changes in inductance, of its inductive loop sensor, caused by the passage or presence of a vehicle near the sensor.

Manual Counts

Measurement of traffic characteristics based on human observation, which may or may not be electronically recorded.

Mechanical Counts

Measurement of traffic characteristics by sensors and electronic recording of the measurements, independent of human observations.

MPO (Metropolitan Planning Organization)

Regional agency responsible for urbanized area transportation planning.

NHS (National Highway System)

A designated system of highways of National Significance mandated under the Intermodal Surface Transportation Efficiency Act of 1991. The purpose of the NHS is to provide an interconnected system of principal arterial routes to serve major population centers, airports and public transportation facilities, to meet national defense requirements and to serve interstate and interregional travel.

Peak Period

The highest period of traffic flow during the a.m. and p.m. time period.

Permanent Count Stations

ATRs that are permanently placed at specific locations throughout the region to record the distribution and variation of traffic flow by hours of the day, days of the week, and months of the year from year to year.

PL (Planning)

FHWA planning and research funding program. Metropolitan planning funds (the 1 percent funds authorized under 23 U.S.C. 104(f) to carry out the provisions of 23 U.S.C. 134(a)).

Project-Related Count

A traffic count taken to support a roadway or bridge project.

Seasonal Factors

Parameters used to adjust base counts which consider travel behavior fluctuations by day of the week and month of the year.

SHRP (Strategic Highway Research Program)

A five year program for pavement and operations research funded by Congress and managed through the National Academy of Sciences. One of the four research areas, long-term Pavement Performance, is planned as a 20-year program.

Special Count

A traffic count taken to respond to a request for traffic information, not included as part of the coverage or project-related count plan.

Special Purpose Count

A traffic count taken for the specific purpose of better understanding traffic flow characteristics at predetermined sections of roadway. These may include studying the effects of traffic accidents, roadway closures or traffic re-routing.

SPR (State Planning and Research)

FHWA planning and research funding program. State planning and research funds (the 2 percent funds authorized under 23 U.S.C. 307(c)(1)).

STP (Surface Transportation Program)

FHWA planning and research funding program. Surface transportation program funds authorized under 23 U.S.C. 104(b)(3) used for highway and transit research and development and technology transfer programs, surface transportation planning programs, or development and establishment of management systems under 23 U.S.C. 303.

TMA (Transportation Management Area)

An urbanized area with a population greater than 200,000. These were designated as a result of ISTEA.

TMC (Traffic Management Center)

Also known as Traffic Operations Center, it serves as the nerve center for a traffic management system. Data on traffic conditions collected in real time by any of a variety of means is transmitted to the TMC where traffic engineers, assisted by computer, monitor traffic flow and respond to congestion in a variety of ways, such as adjustments to traffic signal timing, transmitting information on current conditions to motorists via changeable message signs, etc.

Traffic Monitoring Guide (TMG)

Document that provides FHWA's recommended approach to the monitoring of traffic characteristics. The guide provides direction for persons interested in conducting a statistically based monitoring of traffic counting, vehicle classification, and truck weighing.

Traffic Monitoring System for Highways (TMS/H)

A systematic process for the collection, analysis, summary, and retention of highway related person and vehicular traffic data, on public highways and streets.

Traffic Program

The collection, editing, summarization, reporting and analysis of traffic volume, classification and weight data.

Travel Time

The amount of time a vehicle spends traversing a route or route segment.

Average speed can be computed by taking the length of the highway or street segment under consideration and dividing it by the average travel time for that segment.

Vehicle Classification

The measurement, summarization and reporting of traffic volume by vehicle type and axle configuration.

Vehicle Occupancy

The average number of people traveling in vehicles on a given roadway, within a given geographical area, etc.

VMT (Vehicle Miles Traveled)

Average Sunday through Saturday vehicle movement on a specific road segment multiplied by the length of the road segment, reported in the form of daily and annual VMT.

WIM (Weigh-in-Motion)

The process of estimating a moving vehicle's static gross weight and the portion of that weight that is carried by each wheel, axle, or axle group or combination thereof, by measurement and analysis of dynamic forces applied by its tires to a measuring device.

APPENDIX B - BIBLIOGRAPHY

PHILADELPHIA

Annual Report, Bureau of Planning and Research, Performance Monitoring Division, Pennsylvania Department of Transportation, Harrisburg, July, 1996.

Bureau of Transportation Data Development, Traffic Monitoring System, List of Monitoring Locations, New Jersey Department of Transportation, Trenton, April 4, 1995.

*Conformity of the Delaware Valley*s Direction 2020 Transportation Plan*, Delaware Valley Regional Planning Commission, Philadelphia, September, 1995.

Enhanced Planning Review of the Philadelphia Metropolitan Area, Report RSPA/VNTSC-SS-TM694-07, prepared for the Federal Transit Administration, Office of Planning and Federal Highway Administration, Office of Environment and Planning, Volpe National Transportation Systems Center, Cambridge, June 1996.

Estimating and Monitoring 1993 VMT in the Delaware Valley Region, Delaware Valley Regional Planning Commission, Philadelphia, July, 1995.

Highway Traffic Trends in the Delaware Valley Region, 1960-1985-1990, Delaware Valley Regional Planning Commission, Philadelphia, January, 1992.

New Jersey Truck Research Study, Delaware Valley Regional Planning Commission, Philadelphia, June, 1995.

*PennDOT*s Management & Monitoring Systems,* September, 1996.

*Pennsylvania*s Traffic Monitoring System for Highways*, Pennsylvania Department of Transportation, Harrisburg.

Traffic Impacts of I-476, Delaware Valley Regional Planning Commission, Philadelphia, December, 1993.

Traffic Monitoring Program for Selected Highway Corridors - Phase III, Delaware Valley Regional Planning Commission, Philadelphia, December, 1993.

Traffic Monitoring System - Highway Component, Implementation Plan, New Jersey Department of Transportation, Trenton, 9/30/94.

Travel Trends in the Philadelphia Central Business District, 1960-1985-1990, Delaware Valley Regional Planning Commission, Philadelphia, October, 1991.

TAMPA - ST. PETERSBURG - CLEARWATER

County-Wide Data Collection and Analysis, Identification of Transportation Data Attributes and Database Design, prepared for Hillsborough County Metropolitan Planning Organization, Tindale-Oliver & Associates, Inc., November, 1996.

County-Wide Data Collection and Analysis, Inventory of Existing Transportation Data and Data Needs in Hillsborough County, prepared for Hillsborough County Metropolitan Planning Organization, Tindale-Oliver & Associates, Inc., June, 1996.

Evaluation of Traffic and Highway Data Collection Survey, Off-System Public Roads Eligible for Federal-Aid Funding, Volume 1, prepared for Florida Department of Transportation, Transportation Statistics Office, Parsons Brinckerhoff, February, 1995.

*Florida*s Mobility Management Process / Congestion Management System Work Plan*, Florida Department of Transportation, December, 1994.

Hillsborough County Congestion Management System, Goals, Performance Measures, and Work Plan, prepared for Hillsborough County Metropolitan Planning Organization, JHK & Associates, Inc., Orlando, January, 1995.

Hillsborough County Congestion Management System, System Performance Report, prepared for Hillsborough County Metropolitan Planning Organization, JHK & Associates, Inc., December, 1995.

Report on the Use of the Traffic Congestion Management System in the TIP Development Process, Pinellas County MPO, August 28, 1996.

1996 Transportation Level of Service Report, Pinellas County Metropolitan Planning Organization, May, 1996.

1996/97 Unified Planning Work Program for the Pinellas Area Transportation Study, Pinellas County Planning Department, Clearwater, May, 1996.

MINNEAPOLIS - ST. PAUL

Calibration and Validation of the Highway Assignment Model for the Minneapolis St. Paul Region, prepared for Metropolitan Council, Strgar-Roscoe-Fausch, Inc., June 8, 1994.

Congestion Management System for the Twin Cities Metropolitan Area, Preliminary Draft, Metropolitan Council of the Twin Cities, St. Paul, November 1, 1995.

*MN/DOT*s Traffic Counting Program,* Minnesota Department of Transportation, St. Paul.

Prospectus for the Transportation Planning Process, Twin Cities Metropolitan Area, Metropolitan Council, St. Paul, April, 1996.

Roggenbuck, Kevin, *Minor Arterial Capacity Analysis in St. Paul*, Technical Memorandum, Metropolitan Council, St. Paul, September 12, 1996.

Roggenbuck, Kevin, *Assessment of the Traffic Impact of Work Trips from Outside the Region*, Technical Memorandum, Metropolitan Council, St. Paul, October 16, 1996.

Solicitation Process for Federal Surface Transportation Program, Congestion Mitigation Air Quality Program, and Transportation Enhancements Program, Metropolitan Council, St. Paul, October 30, 1995.

1990 Travel Behavior Inventory Summary Report, Twin Cities Metropolitan Area, Publication No. 35-95-009, Metropolitan Council, St. Paul, June, 1994.

1996 Transportation Unified Planning Work Program for the Twin Cities Metropolitan Area, Publication No. 35-95-060, Metropolitan Council of the Twin Cities Area.

1997-2000 Transportation Improvement Program for the Twin Cities Metropolitan Area, Publication No. 35-96-040, Metropolitan Council, St. Paul, August 8, 1996.

PORTLAND

Congestion Management System, Portland Metropolitan Area, Discussion Draft, June, 1996.

FY 1996-97 Unified Work Program, Transportation Planning in the Portland - Vancouver Metropolitan Area, Metro, Southwest Washington Regional Transportation Council, Oregon Department of Transportation, City of Portland, and Tri-Met, March 28, 1996.

Portland Interim CMS, undated draft

Portland Regionwide Advanced Traffic Management System Study- Advanced Traffic Management Systems (ATMS) Plan, DKS Associates, October, 1993.

State of Oregon, Traffic Congestion Management System, CMS Perspective, Oregon Department of Transportation, Traffic Section, Salem, Oregon, June, 1995.

Traffic Count Summaries, Average Weekday & Peak-Hour Volumes for METRO Cutline Locations, 1986-1988-1990-1992-1994, METRO, Portland, October, 1995.

Traffic System Performance Evaluation, prepared for City of Portland, JHK & Associates, Inc., Emeryville, CA, July, 1996.

Transportation System Monitoring Activities, METRO, Portland, January, 1993.

APPENDIX C - CASE STUDY PARTICIPANTS

PHILADELPHIA

Delaware Valley Regional Planning Commission

John Burger	(215)-592-1800
Bob Murray	(215)-592-1800
Taghi Ozbeki	(215)-592-1800
Mario Stegossi	(215)-592-1800
Thabet Zakaria	(215)-592-1800

New Jersey Department of Transportation

Jim Carl	(609)-530-3510
George W. Kuziw	(609)-530-3522
Lou Whiteley	(609)-530-3501

Pennsylvania Department of Transportation

Joe McGinnes	(717)-787-3200
David Ori	(717)-772-2736
Larry Shifflet	(717)-787-3245

TAMPA - ST. PETERSBURG - CLEARWATER

Florida Department of Transportation, District Seven

William C. Gardner	(813) 975-4834
Charles Gray	(813) 975-6439
Donald Scott	(813) 975-6444

Hillsborough County Florida, Traffic Engineering

John Vanacore	(813) 272-5912

Hillsborough County Metropolitan Planning Organization

Joe Zambito	(813) 272-5940

Pinellas County Metropolitan Planning Organization

Gina Goodwin	(813) 464-4751
Marc Hanger	(813) 464-4751
Ramon Solis	(813) 464-4751
Sarah Ward	(813) 464-4751

City of Clearwater, Traffic Engineering Department

Don Andrus	(813) 562-4747 ext. 4770

MINNEAPOLIS - ST. PAUL

Minnesota Department of Transportation

George Cepress	(612)-296-0217
Dudley Gjersvig	(612)-296-1664
Bill Martins	(612)-296-1664
Dick Murray	(612)-296-1661
Mel Roseen	(612)-725-2373
Warren Seavey Jr.	(612)-296-1659

Metropolitan Council of the Twin Cities

Mark Filipi	(612)-229-2725
Connie Kozlak	(612)-229-2720
Kevin Roggenbuck	(612)-229-2728

Minnesota Department of Transportation, Traffic Management Center

Ron Dahl	(612)-341-7269

PORTLAND

Oregon Department of Transportation, Region 1

Lee Gunderson	(503)-731-8206
Dennis Mitchell	(503)-731-8218
John Whitehead	(503)-731-8211

City of Portland, Office of Transportation, Bureau of Traffic Management

Robert Burchfield	(503)-823-5175
Tom Jensen	(503)-823-5211
Jamie Throckmorton	(503)-823-5152

Metro

David Horowitz	(503)-797-1769
Dick Walker	(503)-797-1765