STRATEGIC REASSESSMENT OF THE HIGHWAY PERFORMANCE MONITORING SYSTEM

Consultant Report by
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INTRODUCTION

The Federal Highway Administration (FHWA) is conducting a strategic reassessment of the Highway Performance Monitoring System (HPMS). The purpose of the reassessment is to review HPMS in light of current issues, anticipate future needs, and determine what changes may be beneficial.

HPMS was developed in 1978 as our national highway transportation system database. It presently includes limited data on:

- all public roads,
- more detailed data for a sample of the arterial and collector functional systems, and
- area-wide summary information for urbanized, small urban, and rural areas.

HPMS replaced numerous, uncoordinated, annual state data reports as well as biennial special studies conducted by each state. A major purpose of HPMS was (and still is) to provide data that reflects the extent, condition, performance, use, and operating characteristics of the nation's highways. HPMS has gone through an evolutionary process that has recognized the changing needs for data related to these objectives.

This review includes the identification and assessment of critical issues that impact the implementation of HPMS by FHWA and its state partners. The review is also designed to assist FHWA in developing and conducting a public outreach program. The outreach program is intended to provide maximum opportunity for participation in the strategic reassessment.

The reauthorization of the Intermodal Surface Transportation Efficiency Act (ISTEA) provides an excellent opportunity for FHWA to reassess HPMS. There are many other pressing reasons for this review:

- ❒ changing technology, including the development and deployment of the Intelligent Transportation System (ITS),
- ❒ changing requirements of the Government Performance and Results Act (GPRA), and
- ❒ changing state and local data needs, including the increased use of management systems.

OBJECTIVES OF THE REASSESSMENT

- ⇨ **Conduct a comprehensive analysis of HPMS and its mission.**
- ⇨ **Make HPMS a more efficient and user-friendly system.**
- ⇨ **Examine more cost-effective methods for collecting data, including new technologies such as ITS.**
- ⇨ **Examine ways to create or enhance data partnerships with state, regional, and local governments as well as the private sector and other data source entities.**
- ⇨ **Consider the emerging needs of GPRA.**
- ⇨ **Ensure that HPMS is the definitive federal source of information on roadway extent, characteristics and performance.**
- ⇨ **Conduct a fully participatory review.**
- ⇨ **Review current data entries and consolidate or remove those items which are of marginal use.**

PURPOSE OF THIS REPORT AND THE OUTSIDE CONSULTANT EFFORT

The Federal Highway Administration has developed a multi-faceted approach to this reassessment. The process began in conjunction with the HPMS Steering Committee, which is comprised of federal, state, and local officials who have meet three times in the past two years to identify critical issues for review. The notion of a comprehensive reassessment originated in conjunction with the steering committee. The committee is currently addressing several technical issues associated with HPMS, including:

- ➢ guidance on the proper use of HPMS data,
- ➢ VMT (vehicle miles traveled) estimating and forecasting,
- ➢ HPMS training,
- ➢ measurement of congestion, and
- ➢ short-term refinements.

With input from the steering committee, FHWA produced an options paper which was published in the Federal Register in December, 1996. Comments are being received to FHWA Docket 97-10.

In the reassessment process, a consultant was hired to assist FHWA. This report has been produced by the consultant. The report examines the critical issues involved in the reassessment from the viewpoints of users and providers of data. It identifies issues which require additional discussion and analysis.

The report will be made available for comments and will be used as input to a national workshop on HPMS to be held June 29 - July 1 in Minneapolis. Following the workshop, the consultant will conduct further analysis and prepare a synthesis and recommendations report by September 30, 1997.

PROCESS USED TO PREPARE THIS REPORT

Since one of the objectives of this reassessment was to allow for full participation of affected and interested users of HPMS, the process of compiling information for this report relied on a number of outreach efforts. In addition to reviewing the work of the HPMS Steering Committee and other written documentation on HPMS, the following outreach efforts were conducted:

- ❒ presentation before TRB data committees,
- ❒ meeting with Washington-based organizations involved in transportation, with a follow-up survey form mailed to 32 organizations,
- ❒ interviews with over 21 federal employees who are customers of HPMS data or involved in federal data and policy analysis activities,
- ❒ preparation and distribution of a survey of all states (under the auspices of the AASHTO Standing Committee on Planning),
- ❒ presentations to the Association of Metropolitan Planning Organizations (AMPO) and AMPO distribution of a survey of the larger member MPOs,
- ❒ examination of HPMS reassessment as a current transportation issue at the Conference on Information Needs to Support State and Local Transportation Decision Making into the 21st Century, March 2-5, 1997,
- ❒ review of the responses to FHWA Docket 97-10, and
- ❒ presentations at SCOP (May) and NASTO (June).

ORGANIZATION OF REPORT

The report is organized into seven sections.

- ↳ **SECTION ONE** describes key factors which are common to all areas of the reassessment and background for any recommendations of possible change.

- **SECTION TWO** examines the mission of HPMS and the responses to a proposed set of objectives from the various users and providers of HPMS data. A draft mission and set of objectives is established for further comment and discussion.

- **SECTION THREE** examines HPMS user viewpoints and uses from the federal and national perspectives.

- **SECTION FOUR** examines HPMS user viewpoints and uses from state perspectives.

- **SECTION FIVE** examines HPMS user viewpoints and uses from regional and local perspectives.

- **SECTION SIX** examines the role of new technologies in HPMS.

- **SECTION SEVEN** provides a summary of the critical issues of reassessment. This will be used for: discussion at the Minneapolis workshop in late June; further review through the FHWA Docket 97-10; and additional analysis during the remainder of this project.

This paper will not deal with specific data items for reduction. Many respondents to this process, especially states responsible for data collection, have commented on a number of items under consideration for data reduction. These items are being tabulated and will be assessed once the objectives, scope, and structure of the future HPMS have been decided.

There are several opportunities currently available for data reduction if the current format continues. However, several comments addressed the need for additional data, indicating that HPMS only measures a portion of congestion and is just one indicator of pavement condition. Tradeoffs in data items collected and methods of collection will also be reviewed.

This report will not deal with the issues of making HPMS a “world class” highway data and performance measurement system. There are a number of activities underway to look at practices with similar systems in other countries. These activities will be monitored and evaluated in subsequent stages of the reassessment.

The report also does not deal with the issue of using private data sources (data collected and processed by private companies for commercial purposes) as a means of supplementing HPMS. Additional information and viewpoints on this issue would be welcome for the next phase of the process.

The report was compiled from a variety of sources, including several surveys. The summarization of the survey results and the conclusions drawn from the surveys are subject to individual interpretation and, in some cases, are subjective. Therefore, the conclusions and recommendations presented in this report are solely those of the consultant and do not necessarily represent the views of the federal government, states, MPOs, or any other group, unless specifically cited in the report. The conclusions and recommendations are put forth for discussion and review.

SECTION 1: KEY FACTORS AFFECTING THE REASSESSMENT

A number of key factors emerged from review of the various efforts previously described. These factors, which affect the entire reassessment, are presented here so they will be considered when reading all the other sections of the report.

A. HPMS HAS AN EXCELLENT REPUTATION IN THE TRANSPORTATION AND GOVERNMENTAL FIELD

While many issues were raised in the outreach portion of the reassessment, the overwhelming response to HPMS has been positive. It is viewed as an integral part of the national transportation database and a premier system for government performance measurement. A study conducted by the U.S. Advisory Commission on Intergovernmental Relations, *Intergovernmental Accountability*, reviews 13 federal agencies and applauds the scope of the USDOT's performance monitoring system for highways. In fact, many of interviewees who praised FHWA for its open approach to the reassessment were concerned that the system would be changed or diminished. The issues of change and refinement that this report will address are built upon a system which already has tremendous support.

B. REASSESSMENT IS OCCURRING AT A TIME OF MAJOR TRANSITION IN TRANSPORTATION AND HPMS

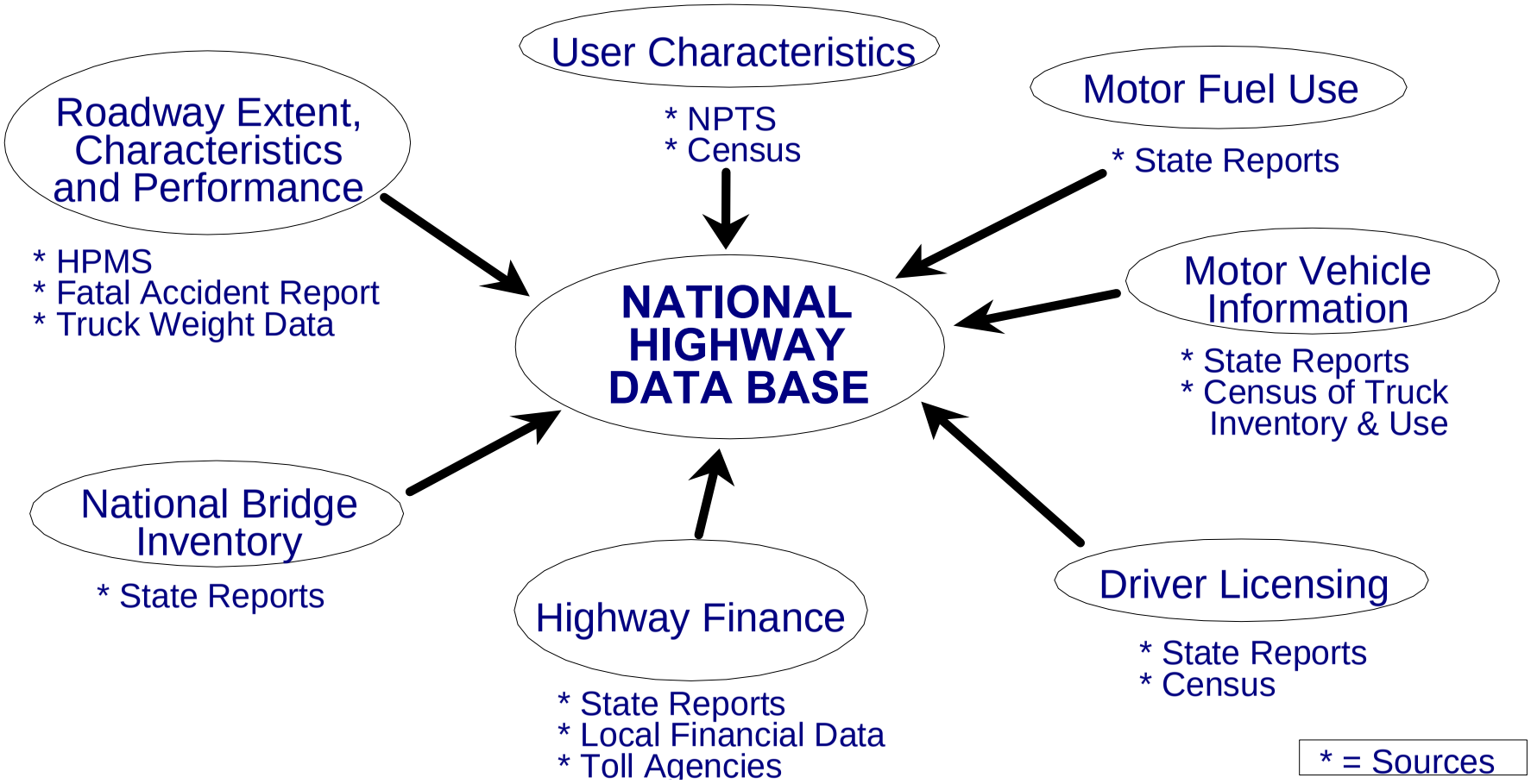
The fact that the reauthorization of ISTEA is occuring at the same time as the strategic reassessment is both an opportunity and a challenge. It is an opportunity because the reassessment process will be essentially completed when the reauthorization is scheduled to be completed. FHWA can quickly adapt HPMS to new federal legislation, if necessary. Timing is also a challenge since agencies and organizations are focusing on the larger question of reauthorization. Concern for data systems often takes a back seat to the reauthorization process. The strategic reassessment process has evaluated HPMS under the current ISTEA environment, distancing itself from various agency and organization positions on reauthorization.

HPMS is undergoing a transition from a mainframe-based system to a personal computer (PC) environment, and the use of the Internet and geographic information systems (GIS) are in their infancy. A new operating environment and increased ease of data sharing may help resolve some of the issues raised.

C. HPMS IS A SUBSET OF THE NATIONAL HIGHWAY DATA SYSTEM

Figure 1 illustrates the role of HPMS data in the total highway data set. A review of the two major federal highway reports – *Highway Statistics* and *Status of the Nation s Surface Transportation System: Condition and Performance* – shows that all the various data sets are

FIGURE 1
HPMS AS A SUBSET OF A NATIONAL HIGHWAY DATA BASE



used. Therefore, the review of HPMS must address compatibility with other data sets when presenting issues dealing with the National Highway database.

D. THE HIGHWAY DATASET IS A SUBSET OF A LARGER TRANSPORTATION DATASET

While this report deals only with HPMS, several people interviewed for this study have commented on the need to have similar systems for other modes. They stressed the importance of looking at intermodal and multi-modal issues, which are consistent with the intent of ISTEA. Issues affecting multi-state corridors, international trade, and intermodal connections on the NHS were mentioned as policy issues being studied without an adequate database. The TRB panel which produced the report, *Data for Decisions*, has recommendations for dealing with these issues which are still outstanding. The report led to the creation of the Bureau of Transportation Statistics and should be reviewed when regarding intermodal and multi-modal issues. The Federal Transit Administration is currently in the process of developing the transit equivalent of HPMS.

E. HPMS IS BOTH A DATASET AND AN ANALYTICAL PROCESS

The *Conditions and Performance Report* relies on HPMS and other highway data as well as an analytical process which assesses performance under different funding scenarios. The tendency in a reassessment of this nature is to focus on the data aspect of the review and not on the products of the process. This report attempts to do both and comments are welcome on both aspects of HPMS.

F. A DISTINCTION SHOULD BE MADE BETWEEN THE FEDERAL USE OF HPMS DATA AND THE NATIONAL HIGHWAY DATABASE

One of the key issues in the reassessment is the distinction between the use of HPMS data for federal policy and planning purposes, and the obligation of the federal government to provide a national highway database for a variety of public and private uses. These can be two distinctly different databases in scale and geographic coverage.

G. HPMS SERVES MANY PURPOSES AT THE FEDERAL LEVEL, INCLUDING MANY WHICH WERE NOT ORIGINALLY ENVISIONED WHEN HPMS WAS ESTABLISHED

Federal officials interviewed for this study cited numerous instances where HPMS was used to answer questions from DOT executives, Congress, and other outside inquiries because it was the only analytical process available. They cited the limitations on the data and analysis

The HPMS dataset is too robust for its original purposes and not nearly robust enough for the current requests for data and analysis.

One of the issues for the reassessment is to strike the proper balance between maintaining: a very large, continual dataset which can deal with current and anticipated future issues; and a smaller continuous dataset which meets the current objectives, but which can't deal with every issue with continuous data.

H. THE COLLECTION OF HPMS DATA WILL ALWAYS BE AN INTERGOVERNMENTAL ACTIVITY

Continuing the traditional federal-state relationship in the highway program, FHWA relies on state governments to collect HPMS data. Three categories are used in collecting data on the highway system:

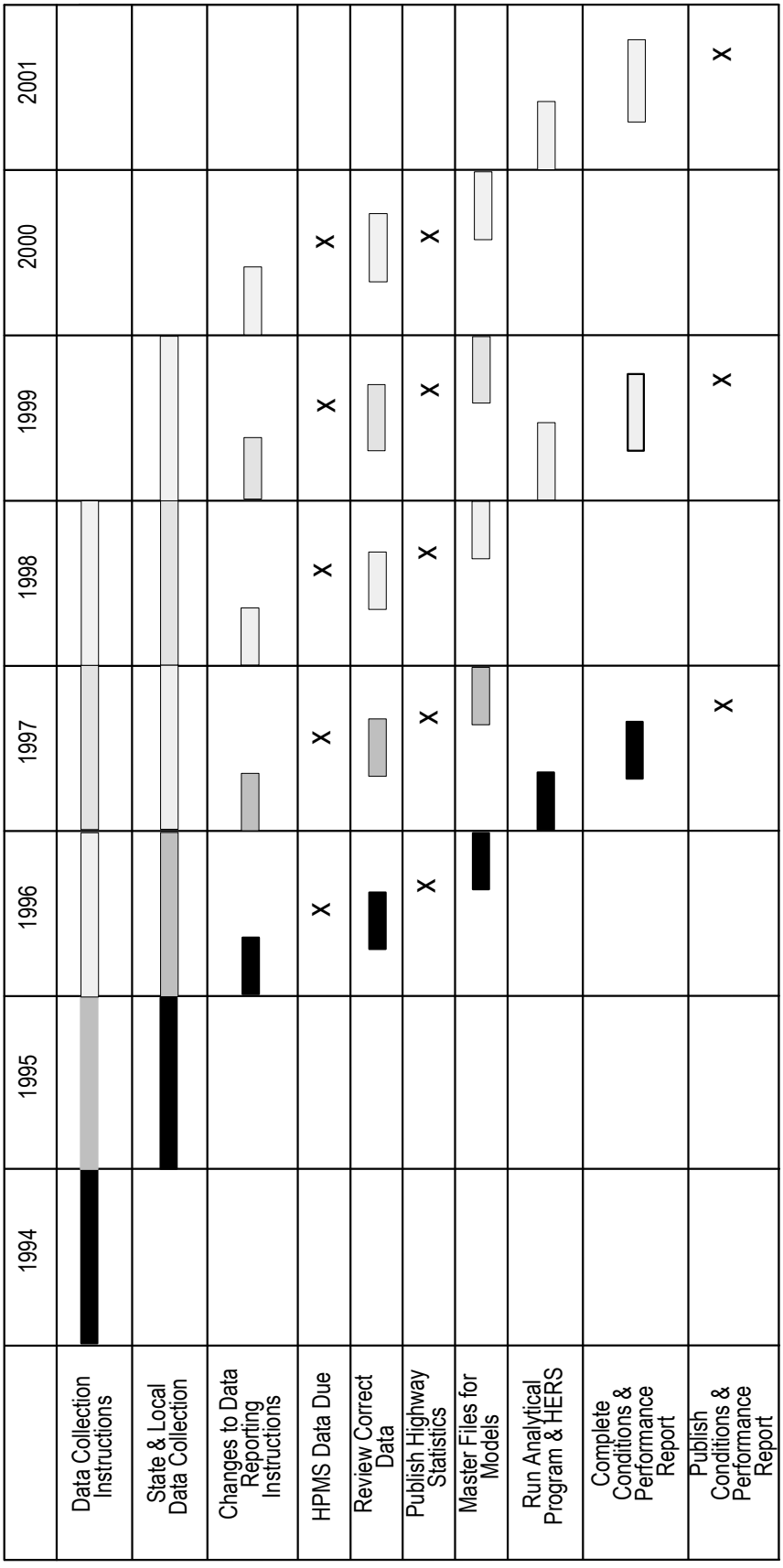
- **functional classification**
- **NHS and other federal aid highway systems**
- **jurisdiction for the facility**

Many states maintain a complete inventory of the state highway system within their operating jurisdiction and do not maintain records on other agencies' highway systems. State highway systems vary greatly among the states. In rural areas, the range of state responsibility for rural highways is from a low of 7.7% of highway mileage accommodating 50% of daily VMT to a high of 96% of highway mileage covering 99.5% of DVMT. Four states have over 90% of the mileage under state jurisdiction while 10 states have less than 10%. Similar statistics occur in urban areas. Nineteen states have less than 10% of urban mileage, with a low of 4% handling 28.8% of DVMT. Six states have over 40% of the urban mileage, with a high of 78% handling 93% of DVMT. The degree of intergovernmental data collection is greater for the states with smaller state jurisdictional systems.

The alignment of state and local jurisdiction with the functional classification of highways is not along jurisdictional lines. For example, states have jurisdictional responsibility for about 150,000 miles of roads functionally classified as local. Similarly, local governments have jurisdictional responsibility for some principal arterials. Furthermore, the alignment of jurisdiction with federal-aid highways is not consistent.

Limiting HPMS to the National Highway System (NHS), which was one of the options presented in the FHWA options paper, would still require data collection on county, city, town and independent toll and bridge agency facilities which are included in NHS. Likewise, the data collection efforts to support the National Highway Planning Network (NHPN) would require additional intergovernmental data collection (see Figure 2). The collection of

FIGURE 2
HPMS TIMELINE



data

and the possible sharing of data across intergovernmental lines is implied in all the various options for restructuring HPMS.

I. THE IMPLICATIONS OF THE GOVERNMENT PERFORMANCE AND RESULTS ACT ON HPMS WILL NOT BE KNOWN FOR SOME TIME

GPRA requires each federal agency to:

- develop strategic plans prior to federal fiscal year (ffy)1998,
- prepare annual plans setting performance goals beginning with ffy 1999, and
- report annually on actual performance compared to goals starting in March, 2000.

FHWA has begun discussions with AASHTO on the appropriate role of national performance measures vis-à-vis the states, the use of HPMS to meet the requirements, and many other challenging issues. These discussions will be continuing after this report is prepared.

J. THE TIMELINESS OF DATA COLLECTION AND PRESENTATION AND THE TIMING OF ANY CHANGES TO HPMS ARE CRITICAL PARTS OF THE REASSESSMENT

Figure 3 presents an illustration of the time cycles involved in the HPMS process. The cycle for the HPMS process is a rolling three-and-one-half-year cycle from consideration of instructions to publication of the *Conditions and Performance Report*. During this time period, three years of data are in various stages of collection and analysis. Several points emerge for the purposes of this report. Under current cycles, any changes to HPMS resulting from this reassessment would be reflected in the 1998 instructions for the 1999 data collection. This would be reported in the 2000 version of highway statistics and the 2001 *Conditions and Performance Report*. Advances in data collection, data transmission, and analysis techniques present opportunities to possibly tighten the cycle times shown in Figure 3.

K. ONE OF THE MOST IMPORTANT INDICATORS FOR POLICY MAKERS IS CONSISTENT TIME SERIES DATA WHICH SHOW TRENDS

Interviewees stressed the need to preserve time series data if changes are made to HPMS. The implications of this concern are that either:

- a duplicate set of data would need to be collected until a new time series relationship is established; or
- the old time series data can be replicated or related to the new data and measures.

FIGURE 3
THEORETICAL FRAMEWORK

JURISDICTION / FUNCTIONAL CLASS	COUNTY	TOWN	MUNICIPALITY	STATE DOT	OTHER STATE	FEDERAL-AID SYSTEM
INTERSTATE				xxxxxxxxxx	x	INTERSTATE
PRINCIPAL ARTERIAL	x	x	x	xxxxxxx	x	NHS
MINOR ARTERIAL	xx	xx	xx	xxxx		NHS/OTHER FED.-AID
COLLECTOR	xxxx	xxxx	xxxx	xx		NHS/OTHER FED.-AID
LOCAL	xxx	xxxxxx	xxxxxx	x		NHS/OTHER FED.-AID
DATA COLLECTION	↑	↑	↑	↑	↑	

xxx = Indication of % mileage by jurisdiction.

L. THERE IS A LARGE SUNK COST IN THE CURRENT HPMS DATA COLLECTION SYSTEM CHANGES SHOULD RECOGNIZE COST IMPLICATIONS

The current HPMS system has been established over a number of years. For some data collection agencies, the cost and labor requirements to maintain and periodically update the data set have become manageable. There is fear that large scale changes to HPMS will, in fact, create more work. This is particularly important is creating new sample sections, which is very costly verses updating information on existing sample sections.

M. A THEORETICAL FRAMEWORK AND PRINCIPLES FOR INTER-GOVERNMENTAL DATA COLLECTION AND SHARING CAN BE PROPOSED AS A GUIDE

There are several data collection principles and trends which were discussed at the recent *State and Local Data Needs Conference* and can be incorporated into a theoretical data framework for HPMS (see Figure 2):

- ❒ State and local agencies are reducing staffing levels; in particular, staffing for planning and data collection are at risk. Reduced staffing leads to concerns about the quality of the data collected. Data collection agencies are unanimous in their concern for limiting the data collected to the minimum essential for the objectives which will, in turn, assist in improving data quality.

- ❒ With reduced staffing, agencies must minimize the collection of data which is not of use to their own mission. Data, therefore, should be collected at the level consistent with the use of that data;, e.g. to control the quality of the data collected, it should be collected by an agency which has use for the data and is affected by the outcomes of its use.

- ❒ There is a move toward democratization and increased accessibility of data through the Internet, GIS, and the Freedom of Information Acts. Standardization of data definitions and quality, plus reduction of subjective data items, may limit the improper or deliberate misuse of data.

- ❒ Data partnerships, sharing, and warehousing arrangements should be explicit objectives of any data collection and analysis process.

- ❒ Resulting performance measures which are consistent with state and local objectives, but also share elements of common national goals, can be shared upward.

- ❒ Figure 2 illustrates a theoretical framework in which data is collected and shared upward using a common geo-referencing system. The current HPMS system is a long way from this ideal framework. One question for discussion is whether the collection of HPMS data can be modified through data partnerships or other data sharing mechanisms so that at least some of the principles can be achieved over time. Several organizations have suggested developing prototypes for meeting the principles.

SECTION 2: MISSION, SCOPE, AND OBJECTIVES OF HPMS

The first step in the comprehensive reassessment of the HPMS process was to reexamine its mission, scope, and objectives, and to test the support and acceptance of these objectives. After the mission and objectives are set and agreed upon, the various components of the system can be assessed for consistency with the objectives. In this study, a draft goal and set of objectives were developed and tested through a series of surveys and interviews. The following goal and objectives were presented.

Goal of HPMS

To provide a database and analysis process for assessing and reporting the condition and performance of the nation's highway system in the most cost-effective manner.

Objective 1

To meet FHWA's highway stewardship responsibilities, including preserving the national interest in NHS.

Objective 2

To support federal transportation policy analysis and planning activities at USDOT and other federal agencies.

Objective 3

To meet various legislative requirements, including the *Conditions and Performance Report* and the Clean Air Act requirements.

Objective 4

To provide a publicly accessible, high quality, timely, and comprehensive national database on highways for state governments, local agencies, and other organizations and individuals.

Objective 5

To provide, at the option of state and local government, a database and analytical process for state and local purposes.

Opportunity was provided in the survey and interviews to comment on the objectives, suggest modifications, and/or propose additional objectives.

A. RESULTS

Federal and National Organization Response

Based on interviews with various federal officials who are involved in HPMS or are customers of HPMS data, there was generally agreement with its goals and objectives. From the limited attendance at a briefing session and telephone conversations with industry representatives, there is also agreement. Attempts to solicit comments from national organizations involved in transportation were only marginally successful. To date, two comments from national organizations have been received to FHWA Docket 97-10. While the objectives were not mentioned in the Docket, those responding indicated support for HPMS and offered suggestions for improving the process.

State Response

A survey was distributed by the AASHTO Standing Committee on Planning. One of the questions asked for indication of Strong Support, Support, Do Not Support, or Propose Modifications for each objective. With 47 states responding, the results are:

Objective 1: Federal Stewardship	
✪ Strong support	21
✪ Support	22
✪ Do Not Support	1
✪ Propose modifications	3

Modifications were proposed to limit federal involvement to the NHS or arterials, and to have the federal government responsible for the collection and integrity of the data. Comments included:

⇒ the need to concentrate on national issues only,
⇒ let each state deal with its own issues,
⇒ keep collecting data on the entire highway system, and
⇒ limit data collection to cost-effective items.

A question was raised on whether HPMS was the best way to meet FHWA's stewardship responsibility.

Objective 2: Support Federal Policy Analysis*	
✪ Strong Support	17
✪ Support	28
✪ Do not Support	0
✪ Propose Modifications	2
(One state did not select.)	

Modifications and comments received were the same as objective 1, with increased emphasis on the need to reduce and simplify the data requirements and process, and include state concerns and the qualifier: "*to the extent data are reasonably available*."

Objective 3: Meet Legislative Requirements	
✪ Strong Support	9
✪ Support	31
✪ Do Not Support	0
✪ Propose modifications	7

Comments dealt primarily with dropping or modifying the Clean Air Act support requirements, with a concern that either the state or the MPO should be responsible, not both. Other comments included:

⇒ requiring standardized equipment for measuring pavement condition,
⇒ changing the Objective 3 heading to "**Help** Meet Legislative Requirements,"
⇒ reporting only on items legislatively required,
⇒ limiting data collection to current items,
⇒ conducting a biennial data submittal,
⇒ requiring all parties to agree to the uses, models, and standards, and
⇒ calling for federal funding for data collection activities.

Objective 4: National Database	
✪ Strong Support	13
✪ Support	21
✪ Do Not Support	8
✪ Propose Modifications	5

Those who do not support the national database are concerned with inappropriate use or misuse of information for creating comparisons between states. Among the concerns are the:

⇒ variable quality of information among the states;
⇒ necessity for state data reports being the same;
⇒ subjective nature of some data items; and
⇒ lack of standards in some areas.

Modifications and comments were along the same lines as those who did not support objective 4. The national database should be of consistent quality between states and include data that is objectively defined and accurate. Those who only collect the data and send it to Washington should receive some benefit in return.

Objective 5: Optional State and Local Use	
✪ Strong Support	11
✪ Support	22
✪ Do Not Support	11
✪ Propose Modifications	2
(One state did not select.)	

Comments from those who did not support objective 5 indicated that the states had their own database and did not need or use the HPMS process. One state suggested a modification to include *using HPMS and other sources* in the objective. Modifications and comments included the same concern raised by those not supporting the objective. Several states called for making the analytical process more useful to states and local governments by simplifying the models and making them less "data-rich." The use of data from management systems was also raised.

Additional Objectives Proposed

The only proposed objective that received more than one comment emphasized states having the ability to use HPMS for comparative information between states and for benchmarking purposes. This was suggested by seven states and opposed by one state. The use of HPMS information by states for comparisons between states also shows up in responses to other questions.

Responses from MPOs

In conjunction with the Association of Metropolitan Planning Organizations (AMPO), a survey was distributed to 128 of the larger member MPOs. Forty-four surveys were returned. While the survey and the responses are not statistically based, the results are from a broad range of MPO sizes, cover 25 states, and should be fairly representative of the MPOs.

Objective 1: Federal Stewardship	
✪ Strong Support	10
✪ Support	28
✪ Do Not Support	3
✪ Propose Modifications	1
(Two MPOs did not select.)	

The proposed modification, which applies to all objectives, was to recognize subsequent federal mandates in the HPMS objectives.

Objective 2: Support Federal Policy Analysis	
✪ Strong Support	12
✪ Support	29
✪ Do Not Support	1
✪ Propose modifications	1
(One MPO did not select.)	

Objective 3: Meet Legislative Requirements	
✪ Strong Support	9
✪ Support	27
✪ Do Not Support	5
✪ Propose Modifications	2
(One MPO did not select.)	

Those who did not support questioned the use of HPMS for meeting the Clean Air Act requirements.

Objective 4: National Database	
✪ Strong Support	12
✪ Support	26
✪ Do Not Support	4
✪ Propose Modifications	1
(One MPO did not select.)	

Comments included the need to improve accuracy and limit the data to the NHS. It was observed that HPMS does not meet local needs for a database.

Objective 5: Optional State and Local Use	
✪ Strong Support	17
✪ Support	15
✪ Do Not Support	6
✪ Propose Modifications	3
(Three MPOs did not select.)	

A modification was suggested to drop “local” since local governments can not use the database. Other comments indicated that the use of HPMS should not be optional, the collection should be the states responsibility, and the use should be for the federal government only.

Additional Comments

A number of additional comments were offered. The most common comments concerned:

⇒ local input into the process of data collection and selection of samples,
⇒ publishing the data on a finer scale, such as by region or county,
⇒ using MPO data and models for some of the data, and
⇒ encouraging the integration of federal, state and regional data files.

Two MPOs responded to FHWA Docket 97-10. One indicated it did not use HPMS and viewed HPMS as a sample for national use. The other supported HPMS and is in a state where there is a direct partnership between the state and MPO in the collection and use of HPMS. One association of local governments supported only incremental changes to HPMS and urged that HPMS be used to build data partnerships with local governments.

Summary and Conclusions

Based on the outreach process results to date, there is support for the proposed goal and objectives. The least supported objective, #5, still had the support of over two-thirds of the states and three-fourths of the MPOs. Some important qualifications and comments which were presented in this section suggest modification to the proposed wording. Other comments will be dealt with in other sections of this report. It is, therefore, proposed that a revised set of objectives be brought forward for review and discussion. Two additional objectives are proposed for discussion:

⇒ **Objective 6:**
dealing with the use of HPMS for comparisons among states and for benchmarking purposes; and

⇒ **Objective 7:**
a broad objective dealing with some of the data quality and collection issues raised in the responses and in line with the comments from the Conference on State and Local Data. (See section 1, paragraph M.)

The HPMS goal has also been changed to a mission statement, therefore, it is proposed that the following mission statement and revised objectives be discussed and used to evaluate the current HPMS and any modifications to HPMS.

MISSION

It is the Mission of the Highway Performance Monitoring System, as an integral part of the National Highway database, to provide a database and analysis process for assessing and reporting the condition and performance of the nation's highway system in the most cost-effective manner consistent with the following objectives:

Objective 1: Meet FHWA's highway stewardship responsibilities, including preserving the national interest in the NHS.

Objective 2: Support federal transportation policy analysis and planning activities at USDOT and other federal agencies

Objective 3: Meet the various congressional requirements, including the *Conditions and Performance Report* and the Clean Air Act requirements. (Note: the Clean Air Act requirements will be reviewed at the workshop and subsequent meetings before finalization.)

Objective 4: Provide a publicly accessible, consistently high quality, objective, timely, and comprehensive national database on highways for state governments, local agencies, and other organizations and individuals.

Objective 5: Provide, at the state and local government option, a database and analytical process which meets the needs of state, regional, and local agencies.

Objective 6: Provide a consistent database which will allow for state-to-state comparisons and benchmarking.

Objective 7: Evolve HPMS to a data system which:

- builds from the data systems of local, regional, and state governments,
- is connected with a common geo-referencing system, and
- avoids, whenever possible, collecting data which is not used by the collecting agency.

SECTION 3: USERS AND USES OF HPMS DATA FROM THE FEDERAL AND NATIONAL VIEWPOINT

The following section is based on: reading documentation on the HPMS process; reading minutes of the HPMS Steering Committee; interviews with 21 FHWA and USDOT officials; a session held with Washington-based transportation organizations; responses to FHWA Docket 97-10; and the industry survey.

A. USDOT USES AND USERS

The following is a list of the uses of HPMS gathered from interviews within USDOT. This is probably not a complete list, but it does cover those activities required by Congress and major policy initiatives.

- Publication of *Highway Statistics, Selected Highway Statistics and Charts,* and *Our Nation s Highways, Selected Facts and Figures,* and assorted publications from the Bureau of Transportation Statistics.

- Publication of the *Biennial Conditions and Performance Report*.

- FHWA budget proposal, including the impact of alternative funding scenarios.

- Use of HPMS derived VMT for:
  - allocation of Interstate Maintenance Funds,
  - requirements of the Clean Air Act Amendments of 1990, including tracking travel (VMT);
  - accident and fatality rates for the Section 207 Highway Safety Report.

- Lane miles of interstate for the allocation of Interstate Maintenance Funds.

- Data for system and area description for the Section 207 safety report.

- Analysis of the impacts of alternative allocation formulas.

- IRI information to analyze trends in pavement condition and alert field offices of pavement condition concerns on federal-aid highways.

- The truck-weight study which was promised to Congress.

- The cost-allocation study, which will be published this year and is proposed to be repeated periodically.

- The National Highway Planning Network (NHPN), which is used to document the NHS and to fulfill ad-hoc data and analysis requests.

- The HPMS is used within and outside FHWA for national highway data to fulfill numerous ad-hoc requests for data and analysis from other federal agencies, Congress, and other organizations.

Discussion:

The users (customers) at USDOT are basically satisfied with the current HPMS. Many would welcome more detailed data to handle some of the requests which come in, but most officials are aware of and sympathetic to the increasing data burden on state and local officials. Some of the customer concerns include:

User friendliness:

The occasional user is turned away by the apparent complexity of the data set.

Timeliness of the data:

Several offices could use data at an earlier point in the year.

Lack of understanding of HPMS:

The occasional user in DOT doesn't understand the data or analytical capabilities of HPMS and several requested briefings on HPMS.

Additional data:

Additional data was requested on pavement condition and congestion. At the request of the HPMS Steering Committee, FHWA is also preparing a paper for uses of HPMS data to explain the significance of HPMS data to the data providers.

B. USES OF HPMS BY OTHER FEDERAL AGENCIES

The Defense Department and the Environmental Protection Agency are the only other Federal agencies which use HPMS. The Defense Department uses HPMS information on the STRAHNET for analysis of troop movements. FHWA and the Defense Department are currently working on a joint program which will enhance the use of HPMS for defense purposes. FHWA and EPA entered into an agreement to use HPMS derived VMT and forecasted VMT for CAAA purposes. The agreement, however, allows EPA to agree with local and state agencies to use VMT forecasts derived from other methods in lieu of using HPMS derived VMT.

In order to provide VMT estimates in non-attainment areas, additional traffic information must be gathered outside the urban area. At the same time, it must be within the area declared to be in non-

attainment of Clean Air Act standards. This additional traffic data produces a statistically significant estimate of VMT and a basis for projecting future VMT. One of the issues to be reviewed in this reassessment is the whether the agreement, which is about 5 years old, is in fact working and producing the results expected with the additional data.

New EPA rules to be issued shortly may modify the need for this review. The HPMS review is not the appropriate venue to discuss the process for meeting Clean Air Act requirements. The issue for the HPMS review concerns the establishment of **clear procedures** for determining when and where to collect additional data to permit HPMS to be used for this purpose. If EPA, state, and local officials agree on an alternative method, additional HPMS data **should not** be collected and reported.

C. USES OF HPMS BY OTHER NATIONAL ORGANIZATIONS

Several organizations commented on their use of HPMS data for a variety of purposes, including:

- ⇒ tracking highway condition and performance,
- ⇒ making comparisons between states on highway condition and performance, and
- ⇒ scaling use of industry products.

FHWA conducted a survey of some 20^{+} organizations who have purchased data and analyses from HPMS. The users who responded indicated satisfaction with the products purchased.

No major concerns were raised with the current data set or analysis.

D. FEDERAL AND NATIONAL ISSUES WITH HPMS ANALYSIS; COMMENTS RECEIVED ON THE USE OF HPMS FOR NATIONAL POLICY ANALYSIS

In the surveys and interviews, respondents were concerned about HPMS addressing the appropriate transportation policy issues.

1. Federal and National Organization Issues

At the federal level, there was support for the current policy analysis. As previously mentioned, several people suggested that the analysis be on a multi-modal basis, but not at the expense of the current HPMS. Several national organizations expressed comments on the policy analysis.

a) The Timing and Content of the *Conditions and Performance Report*

While supporting the HPMS effort and the current analysis, there were concerns that the publication of the *Conditions and Performance Report* was not timely for major issues before the Congress. The report is usually made available to the public in the middle of the year. Organizations would like to see the report at the beginning of the calendar year. Organizations also suggested that the analysis could be more specific regarding the impact of various funding levels on highway condition and performance. For example, what is the impact of the Administration's Reauthorization proposal on condition and performance if the fully authorized level is funded? What is the impact if only historic obligation ceiling funding levels are allowed? What is the impact of delay in the preservation of the infrastructure? ("Pay me now or pay me a lot later.") What is the real cost of deterioration?

b) Reduction of Calculated Needs Using Non-HPMS Data

The *Conditions and Performance Report* (pg. 173) indicates that the projected year 2013 lane-mile requirements were reduced by 42% from the HPMS derived lane mile requirements by:

- ☑ **reducing HPMS derived VMT forecasts based on MPO forecasts;**
- ☑ **making adjustments for spreading the peak hour;**
- ☑ **factoring into account the new *Highway Capacity Manual*; and**
- ☑ **considering transportation system management strategies.**

FHWA should conduct a study on the impact of these adjustments, individually and in combination, on the resulting performance of the highway system under various funding scenarios before the next *Conditions and Performance Report*. Adjustments of this magnitude call into question the need for the detailed database which was used to develop the unadjusted estimates.

c) Presentation on the Escalation of Construction Prices Which Will Require Additional Funds at the Year of Construction

In the *Conditions and Performance Report*, annual investment requirements are presented in 1994 dollars. Estimates based on historic price increases should be presented to illustrate that authorization and appropriation levels will need to be higher (or lower) based on trends in construction prices to meet the performance targets presented in the report.

d) Presentation of Performance of the System from the User s Perspective

HPMS measures the performance from a system viewpoint, but several participants recommended looking at performance from the user's viewpoint. The information from the *National Personal Transportation Survey* (NPTS) and the *National Quality Initiative* (NQI) reveals interesting facts from the user's viewpoint. For example, the surveys found significantly different perceptions of the performance of the system between men and women, and between different age groups. Ranked as major considerations surpassing traffics issues were concerns over crimes against motorists, air quality, and being stranded. One should consider if this information should be added to the measurement of condition and performance.

2. State Issues with the Analysis

Of the 47 states that responded to the survey, 12 states had no comment while 22 states expressed support for the current policy issues. Several states questioned the reliability of the data and the remainder had comments on the relationship between federal and state analyses. In response to a question on new policy issues to be addressed by HPMS, several suggestions were made:

- **Expand HPMS to a transportation performance monitoring system.**
- **Address new policy issues through other means, not HPMS.**
- **Analyze commercial vehicle travel separately.**
- **Change emphasis from improvements to preservation and management.**
- **Mandate participation by MPOs and other regional organizations.**
- **Address data collection issues and needs on local jurisdiction highways and implications of the National Air Quality Standards.**

3. MPO Issues with the Analysis

Thirteen MPOs said that the information and analysis provided by HPMS was adequate for addressing federal policy and financing issues while three said it needs improvement. Six MPOs said that HPMS was not adequate, citing the:

- need to use MPO data directly in the process;
- need for more detailed local data;
- lack of analysis of alternative modes; and
- the unrealistically high estimates of future highway needs.

Twenty-two MPOs either did not respond or said that they did not have sufficient knowledge to make a judgment. This illustrates the need for a better method of reaching out to local agencies on the purposes and uses of HPMS. Discussions with AMPO members also highlighted the need to

look at the view of condition and performance from the user perspective. Several MPOs are trying to adapt the planning process to include the user perspective and perceptions. The ultimate progression of HPMS to a Transportation Performance Management System (TPMS) was also suggested.

In response to a question of other federal policy issues which should be addressed with HPMS, the 12 responses included:

- ✧ doing a multi-modal analysis;
- ✧ using relationships between land use and transportation;
- ✧ placing greater emphasis on local issues as a national concern;
- ✧ recognizing the need for travel time information to measure congestion;
- ✧ reporting on the maintenance status of the interstate system; and
- ✧ insuring GIS and model capabilities in HPMS

4. Summary of Federal and National Issues

a) Sample Issues

One issue which is linked to the comprehensive analysis is whether to continue to have a sample which is statistically significant at the state level[*] or to cut back to a nationally significant sample – between 2,000 and 10,000 samples. States are reporting that the collection of sample information is the costliest part of providing HPMS data, ranging from 60 to 70% of data collection costs. The Federal cost of maintaining and analyzing this information is also large. Thus, the decision on this issue will have important cost implications.

At the request of the steering committee, FHWA is preparing an analysis of various sample requirements. It is recommended that the analysis be expanded to look at the impact and implications of a nationally statistically significant sample for the majority of the data items used in the analytical process. Information on state significant vehicle miles of travel and pavement roughness would still be required to meet several HPMS objectives. However the need for the other items required for each sample section, on a state statistically significant basis, should be reviewed. One impact would be that several of the tables which are historically available in highway statistics would no longer be available for all functional classifications. If a smaller sample can be developed, the resulting sample should utilize existing samples and not require new samples.

Another sample issue is the concern that the volume ranges from which samples are selected are too narrow and that as traffic grows on roads, the roads fall into different sample ranges which will require that new samples be selected. The creation of the database for any new sample is the costliest part of data collection in HPMS. Therefore, it is recommended that the volume ranges be

[*] Currently HPMS uses about 110,000 samples, although about 100,000 are necessary for state significance.

reviewed with the intent of minimizing "volume range creep." Finally, several respondents have suggested that the use of volume ranges as the basis for sampling be reviewed.

b) Pavement Condition Issues

A significant issue regarding the current information about the condition of pavements on the nation's highway network in HPMS is that it is limited to roughness indicators. It is recognized that the roughness indicator is only one of several indicators of pavement condition. If the full spectrum of pavement condition indicators is to be collected and reported to Congress, it is questionable whether the current HPMS process is the most cost-effective method for collecting additional pavement information. Several important activities are underway which can help.

- While the requirement for each state to develop a pavement management system has been relaxed, a recent survey conducted by the U.S. General Accounting Office reported that all states are in the process of implementing pavement management systems.

- FHWA and AASHTO have been developing a distress measurement protocol which, if adopted by each state, could provide the opportunity to achieve a more comprehensive and standard pavement assessment.

- A new standard protocol has been developed for the IRI which will improve consistency of data reported.

- A great deal of information on pavement performance is currently being collected through the Strategic Highway Research Program (SHRP) with the Long-term Pavement Performance (LTPP) sections. The integration of this information into the evaluation of pavement condition needs to be explored further.

Pavement related projects constitute a large portion of annual federal highway obligations. In 1995, almost 50% of funds obligated for roadway projects were classified as system preservation projects. Therefore, it is important that additional, more comprehensive information about the condition of pavements be available.

It is recommended that FHWA, working with AASHTO:

- develop a process for the use of state pavement management systems; and
- incorporate standard distress protocols as the basis for an enhanced evaluation of the true conditions on the nation's highways.

One can draw a helpful analogy between the analysis of our pavements and the analysis of the nation's bridges. The national bridge information system is founded on a detailed inventory of each bridge in the country, based on standard inspection procedures. Each bridge must be inspected at least every two years or more often, depending on the condition of the bridge. The cost of the national bridge inspection is not currently known, however, one state spends more that $30 million per year on bridge inspections. This is twice the amount that all states report as expenditures on the entire HPMS. The annual expenditure on pavement projects (reconstruction and 3R) is about twice the expenditure for bridges. While the consequences of a bridge failure are certainly more serious than the failure of a pavement, additional expense on evaluating pavement condition seems warranted. Also, some of the problems concerning comparisons between states on pavement conditions can be overcome with a more standard state system based on an in-depth approach to pavement condition analysis.

c) Congestion Measurement

The current method used in HPMS to measure congestion is limited to measuring the service level on the road. It does not measure congestion caused by incidents, which are estimated to be as much as 50 to 60% of daily congestion, and also does not measure the extent and duration of congestion.

It is doubtful HPMS is the way to measure this additional congestion. The HPMS Steering Committee has done much work on this issue and is currently working with FHWA on a number of options. It is recommended that this effort continue and that FHWA analyze the potential for using information collected from Intelligent Transportation Systems for planning and policy purposes, such as estimating current congestion in all dimensions.

Where ITS has been established, this information is routinely collected for operating purposes and then often discarded without having been analyzed for planning and policy purposes. It is estimated there are six or seven areas where ITS is sufficiently developed so that case studies can be performed on the costs and benefits of using ITS for these purposes.

To establish better national estimates of both recurring and non-recurring congestion, the study should seek to develop relationships between ITS collected data in several areas and HPMS data collected nationwide.

d) National Database

One HPMS objective with a high degree of acceptance is the federal responsibility to create and maintain a national highway database. The scope and coverage of the HPMS portion of this database needs to be established. Several issues are evident from the various outreach efforts.

- One issue is the consistency of the data reported by each state. States currently have the option of submitting more information than is required, e.g., more sample information if additional samples are collected for state purposes. States also have the option of submitting section-by-section information for lower functionally classified highways or lumping the data together on a geographic basis. It is recommended that FHWA consider requiring a consistent data response from each state to ensure that each state is equally represented in the national database and subsequent analyses.

- Another issue deals with the cutoff point where the national database should include section-by-section data and where area-wide summaries should be the reporting framework. The National Highway Planning Network (NHPN) uses the cutoff point of urban principal arterials and rural minor arterials. It is recommended that the impact and implications of shifting the cutoff between section and area-wide summaries in the National Highway HPMS database be discussed further.

e) Analysis Process and the *Conditions and Performance Report*

The production of the next *Conditions and Performance Report* should be reviewed in light of the concerns expressed:

- ✓ **timing,**
- ✓ **impact of different funding scenarios,**
- ✓ **reduction of HPMS derived needs outside the HPMS process,**
- ✓ **effect of inflation on conditions and performance, and**
- ✓ **addition of information on the user perspective of highway conditions and performance from NPTS and NQI surveys.**

f) Quality of the Data Collected

To ensure that all staff responses are of a consistent high quality, FHWA should review the current quality control procedures, including the role of the division offices.

SECTION 4: USERS AND USES OF HPMS DATA FROM THE STATE VIEWPOINT

In conjunction with the AASHTO Standing Committee on Planning (SCOP), a survey form was prepared and sent to SCOP representatives from each state. Forty-seven states responded to the survey and the other three states responded to an abbreviated phone survey. Twenty-three states responded to the options paper in FHWA Docket 97-10 and an additional four states who were members of the steering committee responded to the draft options paper. Their comments are also used in this section.

A. SUPPORT FOR HPMS

One of the most significant findings was the almost unanimous support for the first three objectives of HPMS:

- ✓ **for USDOT and FHWA stewardship responsibilities,**
- ✓ **for Federal policy analysis, and**
- ✓ **to meet legislative requirements, including the *Conditions and Performance Report.***

Many respondents recognized these federal responsibilities and indicated they would continue to do the best job possible in providing quality data, although resources were limited or diminishing. Of the 22 states that responded to the options paper and expressed an opinion on the options, eight selected little or no change and four states selected only incremental changes. This result may be a recognition of several factors, including:

- the large sunk cost of the existing system,
- satisfaction with the current process, and
- concern that change will require more work.

B. STATE USES OF HPMS DATA AND ANALYTICAL PROCESS

1. Categorization of States as HPMS Users

It is difficult to segregate states into user categories because of the vast difference in size, complexity, and jurisdictional responsibility of state DOTs, but the following is a categorization based on the survey results of all 50 states.

- Six states report that they use HPMS as their basic highway information data system and the HPMS analytical process as their state policy process.

- Two states use the HPMS as their state highway database, but do not use the analytical process.
- Eighteen states report that they basically collect HPMS for federal purposes and the data items unique to HPMS are not used by the state.
- The remaining 24 states are somewhere in the middle. For example eight states say they use or have used the HPMS analytical process.

2. State uses of HPMS Data

A series of questions were established to determine the extent of the use of HPMS data by the states. Since one of the objectives is to provide an optional database for state and local use, the answers give some indication of the success of this objective. The results are for the 47 states which completed the full survey.

a) Area-wide Data

Twenty-five states reported use of the area-wide summaries, with the greatest use being VMT summaries by the different breakdowns.

b) Universe Data

All but eight states reported using HPMS universe data for various activities. Much of the use is from existing state databases, in some cases supplemented with HPMS items.

c) Sample Data

- Twenty-eight states reported that they only collect the minimum sample size required under HPMS.
- Four states collected the minimum, but collected 100% of the interstate system.
- Two states collected 100% on the state system.
- The remainder of the states did not specify their sampling in the questionnaire.
- Eighteen states reported that they use sample information for state purposes, with two states indicating that their use is restricted to the samples on the state system.

d) Donut Sample Data

Ten states reported that they did not have non-attainment areas in their states and, therefore, did not collect donut sample data. Of the remaining states, 14 said that they used the data. The implication

is that the other states collect but do not use the data. While the survey may not be totally accurate, the results indicate an area for further evaluation and discussion. New EPA rules would make the collection of this data optional with the states, MPOs, and EPA if an alternative method of collecting VMT data in non-attainment areas can be agreed upon. In that case, HPMS manuals should be revised to establish clear procedures on when and where this data should be collected and submitted.

e) State Uses of HPMS for Legislative or State Policy Purposes

Eighteen states reported that they use HPMS data for state legislative or state policy purposes. Many uses were cited:

- to support management systems (3);
- use of HPMS derived data in state allocation formulas (3);
- condition reporting (3);
- state requirement for mileage reporting (2);
- estimation of long range needs (2);
- VMT for conformity purposes (2);
- VMT for other purposes (2);
- performance measures for state budgeting purposes (1);
- support for the state GIS (1);
- state budgeting purposes (1);
- legislation preparation (1);
- establishing typical standards (1);
- comparing VMT vs. fuel sales (1); and
- 5-year needs report (1).

f) State Uses of HPMS Data for Comparison with Other States

Twenty-seven states use HPMS data to compare their operations with other states, with 12 states qualifying their use as being occasional or infrequent. Seventeen states reported they do not use the data for comparison. Three states did not respond to this question.

g) State Uses of FHWA Computer Analysis Programs

Of the 50 states which responded:

- 34 states use the data preparation package,
- 32 states use the data review package,
- 14 states use the analytical package,
- five states used the analytic package in the past, and
- two states used the highway economic (HERS) package.

Several states reported that they were not familiar with all of the available computer software and requested additional information. The current workshops being held by FHWA on changes to the computing environment should inform users of the capabilities of these programs.

h) State Uses of Federal Reports

Thirty-three states report using the *Conditions and Performance Report* at least occasionally. Eight states commented on the importance of the report and its use for comparative purposes. All but three states use *Highway Statistics*, with five states qualifying their use as limited or occasional. For many states, *Highway Statistics* is listed as a valuable resource and many states use it for comparisons with other states. Similar results were obtained from the use of *Selected Highway Statistics* and *Charts and Our Nation s Highways, Selected Facts and Figures*. The latter report was cited by several states as an excellent resource which is distributed to MPOs and local governments for their information. The responses showed seven states are currently using the Internet. Seventeen states indicated they were unaware of their ability to use the Internet or that they planned to use it in the future.

i) Uses of HPMS by other State Agencies or Organizations

Twenty states reported no outside use or knowledge of any outside use. Five states did not respond and the remaining 25 states reported uses. Examples included filling of data and analysis requests from:

- **legislatures,**
- **other state agencies, such as state environmental agencies,**
- **motor vehicle agencies,**
- **public safety agencies,**
- **comptrollers office,**
- **tax agencies,**
- **research institutions,**
- **local governments, and**
- **private organizations.**

C. COST OF COLLECTING HPMS DATA

In framing this question in the survey to the states, it was recognized that it would be difficult to obtain detailed and accurate information on the incremental cost of HPMS for several reasons:

- State accounting systems are not set up to detail costs in this manner.
- The amount of data on the state database and the amount of data needed to be collected off the state system result in different costs.

- Where HPMS is integrated into the state database, it is difficult to separate out the HPMS cost.

- The entire highway data collection effort is eligible for federal and state planning, and research (SPR) funds.

The responses to the survey indicated a wide range of costs:

- from $9,900 per year in a state with its own database, where HPMS is not used and the cost is merely reformatting data to federal formats,

- to a state cost of almost $2 million, where the state system is very extensive and HPMS is integrated into the state and regional database.

Using reported data and extrapolating for non-reporting states, the average cost is about $300,000 per year, with a total cost of about $15 million. Of this cost, about $9 million is charged to federal SPR funds. This represents about 3.7% of the amount of SPR funds made available to the states for non-research activities. The range of the percentage use of SPR for HPMS purposes by the states is from 23% to less than 1%. Other fund sources, in the order of $1.8 million (mainly PL funds), were used for HPMS, with the remainder being classified as state matching funds. Again, most of the costs were described by respondents as estimates.

Eighteen states were able to breakout or estimate the cost by the different categories of data collection. About 13% of the effort is spent on the area-wide data, 24% on universe data, and 63% on sample data. Information on the cost of donut samples was too vague to estimate, but it is less than10% of the total sample cost.

D. TOP ISSUES RAISED BY THE STATES REGARDING HPMS

Each state was asked to provide a list of the top five items recommended for review in the HPMS reassessment. States could also add additional items. The following is a summary of their priority items.

1. First Priority Issues Related to Data Collection and Data Reduction

This area was ranked as the top issue for the states by a two-to-one ratio over other issues. There was support for:

- the current effort of the HPMS Steering Committee to look for short-term reductions in data items; and
- identifying specific data items for reduction.

As stated earlier, these data items have been cataloged and will be used in a subsequent phase of this effort after the scope and scale on any revision to HPMS has been decided. FHWA has compiled a list of data items for review from the steering committee and will investigate the impact of deleting less significant data items from the modeling process.

2. Second Priority Issues Related to the Scope of HPMS

These comments were split between those recommending that the scope be restricted to the NHS, NHS and state facilities, or other combinations, and those favoring status quo or incremental change. This split also shows up in the response to FHWA Docket 97-10, where of the 23 states which expressed a choice of options:

- ✧ eight states favored little or no change,
- ✧ four states favored incremental change,
- ✧ four states favored reducing the scope to the NHS and some other roads,
- ✧ two states favored collecting only a national sample, and
- ✧ five states favored a combination of a reduced sample and reduced scope to the NHS, plus some other highways.

3. Third Priority Issues labeled FHWA Should

Issues related to what FHWA should do include:

- ✧ providing additional training,
- ✧ providing better technical support,
- ✧ resolving the English-metric issue,
- ✧ opening up the analytical process to include the involvement of states and regional organizations in the framing of policy issues and the resulting analysis, and
- ✧ addressing concerns with the conversion to the PC-based software.

4. Fourth Priority the Collection and Use of VMT Information and the Relationship of HPMS to the EPA Programs

Regarding the collection and use of VMT information, this is an area currently under review by the steering committee. FHWA is continuing to conduct case studies on the linkage between traffic counting, HPMS-based travel forecasting, and MPO model-based travel forecasting in several major urbanized areas. After completion of the case studies, FHWA will develop an overview report. Regarding the relationship of HPMS to EPA programs, new EPA rules, when issued, may clarify this concern as discussed previously.

5. Fifth Issue Concerns for the Quality of Data Collected

Concerns for quality of data collected included:

- the need for better data standards,
- the need to collect only that data which can be collected accurately with limited staffing, and
- the desire to see the various data systems required by the federal government integrated with those at the state and local level.

6. Other Issues

Other issues, in order of priority, included:

- timing of data submission and reporting,
- cost,
- proper use of HPMS data,
- measuring congestion,
- sample issues,
- IRI issues,
- alternate approaches to data collection, and
- intergovernmental coordination.

The responses to FHWA Docket 97-10 have also been cataloged and the results from the states are nearly identical to the survey results.

E. ADDITIONAL COMMENTS FROM STATES

A section in the survey was provided for states to present additional comments or qualify their survey responses in the light of their reauthorization position. Nineteen states provided comments.

The responses indicated that the states did, in fact, respond to the survey within the context of the current ISTEA legislation, as requested. Three states presented their reauthorization position. Most of the comments were a clarification on the state position on the reassessment and were consistent with the split of opinion described above.

F. SUMMARY OF STATE ISSUES

The summary of the information gathered from the states shows that there is overwhelming support for the continuation of HPMS and recognition of the federal need for highway information and policy analysis. There is also support for a national highway database of which HPMS is a critical part.

The survey reveals a mixed picture on the use of HPMS information and analytical processes by the states, with many expressing limited or no use for the additional information required by HPMS for state policy and planning purposes. This is particularly focused on the use of sample information, which was shown to be the costliest portion of the state data collection effort.

This finding further supports the recommendation that FHWA prepare alternative sampling schemes, which can be evaluated for their impacts and implications. An alternative sampling scheme can then be evaluated for possible cost savings versus the desire to collect more complete data on pavement condition and congestion.

The issues of data quality and data consistency with a smaller data effort can also be considered. Further discussion is recommended. The merits of a reduced sample, and the cost and data implications, should be discussed. The state implications of national database, which includes a consistent, standardized data response from each state should be discussed. (See Section 3.)

Several states described data partnerships with MPOs and local agencies, but the majority of states indicated little or no contact with regional and local governments. It should be determined if:

- ❒ progress can be made toward the theoretical data framework and principles described in Section 1,
- ❒ there is a better framework or set of principles,
- ❒ the extent of intergovernmental jurisdictional fragmentation is too extensive and at this time not worth the effort to deal with,
- ❒ this an issue for reauthorization language, as several states suggested, and
- ❒ data partnerships do, in fact, reduce fragmentation and improve data consistency.

Further discussion is recommended concerning the impact of the new computing environment and FHWA's long range plans for improving the computing environment on the survey results. In addition, it needs to be determined if the PC-based system will:

- ☑ encourage the use of FHWA analytical programs,
- ☑ help solve some of the timing issues raised in Section 1, and
- ☑ allow for the ease of data sharing.

Also to be determined is the states' response to the recommendation for increased information on pavement condition and congestion using other sources and processes than HPMS.

There were many comments on the quality of the data collected. FHWA has a process established through the FHWA Division Offices to monitor and check the quality of the state data collection. One suggestion would be to review the effectiveness of this monitoring program, look at the responses provided by the division offices, and take the necessary steps to upgrade the monitoring to assure consistently high quality.

SECTION 5: REGIONAL AND LOCAL USES OF HPMS DATA

Since the jurisdiction of highways is split among many state and local jurisdiction, the collection of HPMS data is an intergovernmental activity. In addition, metropolitan planning organizations are required in urbanized areas. As part of their planning processes, they collect and analyze large amounts of transportation and land use data. The purpose of this section was to determine from a variety of sources the extent of use of HPMS at the regional and local level.

A. INVOLVEMENT AND USE OF HPMS BY MPOs

As mentioned previously, a survey was conducted of 128 MPOs in conjunction with AMPO. The results presented here are from 44 completed surveys, which represent a broad spectrum of MPOs.

1. Involvement of MPOs in Collecting HPMS Data

MPOs were asked to report if they were involved in the collection of several different types of data for HPMS.

- 19 reported that they had no involvement in the data collection.
- 14 collected highway inventory information.
- 13 collected traffic counts.
- 16 provided traffic forecasts.
- 5 coordinated the local collection of data for the state.

- 10 said that the data collected was from existing data resources.
- 5 said that the data was partially from existing data.
- 3 said that they collected the data for HPMS only.
- The remainder of MPOs did not specify how the data were collected.
- Only 17 MPOs reported cost information. Costs ranged from $300 to $122,000. The average cost was about $22,000 per MPO.

The MPOs were asked to suggest modifications to HPMS which would facilitate their involvement.

- By a three-to-one margin, the MPOs chose to have better integration, linkages, and coordination between state, regional, and local databases. This way, data is collected only once, at the appropriate level, and can be used by all participants. One MPO described a pilot project to accomplish this objective.

- The second ranking modification was to allow access to the raw or disaggregated HPMS data for local use. Several MPOs wanted to obtain this information.

- Designing HPMS to be statistically significant at the local level was the third ranking modification. Several MPOs reported that they did not have enough information on HPMS and its capabilities, and requested some type of outreach program.

2. Uses of HPMS by MPOs

- 29 MPOs reported that they used HPMS data at least partially.
- 15 MPOs said they did not use the data.
- Primary uses were for Clean Air Act purposes. The second most mentioned use was for traffic count information.
- 18 MPOs said that they produce reports from HPMS data; again, Clean Air Act reports were the large majority of the use.

A series of questions was asked to better understand how HPMS is being used for Clean Air Act purposes. Under an existing agreement between FHWA and EPA, HPMS was cited as the primary data source for VMT information, unless the state and local governments, DOT, and EPA agree to alternative ways of calculating and projecting travel. The results of the survey are not conclusive, but they do indicate the need to study this issue further.

Of the MPOs reporting:

- 10 said that they were in attainment areas and did not fall under this agreement;
- 10 indicated that they had no confidence in the HPMS / VMT numbers;
- 14 said that the HPMS / VMT numbers were used;
- two said the state calculated the VMT; and
- the remainder said they had limited confidence in the numbers.

When asked if HPMS forecast data is used for conformity analysis, those MPOs responding from non-attainment areas reported mixed results:

- 12 said yes and 17 said no,

- 18 reconciled their models with HPMS data and 21 did not, and
- 14 indicated they use HPMS data to benchmark or validate their models while 17 said they did not use HPMS for this purpose.

During a discussion with several MPOs, there was concern that the agreement between FHWA and EPA was being interpreted differently in different parts of the country. There was also concern with the calculation of VMT on roads classified as local roads. There is no standard process required for the calculation of local VMT, although guidance exists in the *Traffic Monitoring Manual*. Several areas have found that this calculation has had a large impact on the overall VMT projection and the conformity process. As identified in the state section, the reevaluation of the use of HPMS data for Clean Air Act purposes seems warranted based on the experience of the past five years, with the implications for HPMS focusing on developing clear instructions on where and when to collect supplemental information.

3. Use of Federal Reports by MPOs

The most widely used report by the MPOs is *Highway Statistics*, with 34 MPOs reporting that they use the report at least sometime. *Our Nation s Highways* was also mentioned as a frequently used report. The biennial *Conditions and Performance Report* was used by 20 MPOs. A similar number used the Internet. When asked the degree of satisfaction with these reports, the results were split between those satisfied and those not satisfied. Many MPOs stated that they did not have enough detailed knowledge of the reports to make a judgment.

4. Suggestions for Changes to HPMS

Suggestions included:

having information statistically significant at the local level,

permitting access to the raw or disaggregated data,

encouraging more integration of data between the various levels of government,

letting local governments have a role in selection of sample sections,

having the reports provide greater local focus on the issues, and

learning more about HPMS.

5. Potential for MPOs to Play a Larger Role in HPMS

Each MPO was asked to check off a list of data items traditionally associated with the planning process and to indicate whether they collected, processed and/or used the data. For the data items related to HPMS the results were:

	Collected	Processed	Used
• **Number of lanes/Capacity**	**24**	**29**	**40**
• **Intersection Capacity**	**13**	**21**	**35**
• **Vehicle Volumes**	**21**	**29**	**39**
• **Vehicle Occupancy**	**17**	**18**	**35**
• **Vehicle Miles of Travel**	**13**	**23**	**36**
• **Highway Travel Time**	**17**	**24**	**35**
• **HPMS**	**10**	**15**	**29**

The responses show that many of the data items collected and processed by the MPOs for planning purposes are data items required for HPMS. Yet the responses from the state and MPO surveys indicate that the role of MPOs in providing data for HPMS is not uniform. For example, some states collect the information independently, such as traffic count information, which is also collected by MPOs and local agencies. The results show that the role of the MPOs in the provision and use of HPMS could be expanded in some areas.

B. STATE REPORTING OF REGIONAL AND LOCAL USES OF HPMS

Of the 50 states reporting:

- ☐ 25 said that there was no use by regional or local governments of HPMS data or that they had no knowledge of any local use,
- ☐ 4 states said that there was only limited use,
- ☐ 4 states did not answer this question,
- ☐ 17 states identified specific regional and local uses, and
- ☐ 9 states reported use of basic VMT and traffic information, in conjunction with MPOs, for conformity purposes and model calibration purposes.

Other uses included: IRI and PSR information, local data requests, and congestion management systems.

As reported in the AASHTO survey, Pennsylvania and Michigan have extensive interaction with MPOs with HPMS:

PENNSYLVANIA

The MPOs in Pennsylvania are full partners in the HPMS program. They are contracted annually through the Unified Planning Work Programs to collect HPMS information. The MPOs consistently use the information for their regional planning activities, including:

- ◊ **travel forecasting,**
- ◊ **CAAA requirements,**
- ◊ **long range planning, and**
- ◊ **policy development.**

The department routinely responds to requests for information from the MPOs and others for data that is derived from RMS (Pennsylvania's Roadway Management System) or HPMS.

MICHIGAN

Collection of HPMS data outside of MPOs (and with MPOs) in Michigan is accomplished by MDOT through a work item in annual contracts with Michigan's regional planning agencies. The planning agencies perform this task in a variety of ways:

→ Some make traffic counters available to county road commissions and communities who, in turn, provide HPMS data free of charge to the planning agency.

→ Other planning agencies pass funds to counties and communities to provide the data.

→ Still other agencies operate under variations of these methods.

As a result, counties and many communities, as well as the MPOs, are familiar with the HPMS data collection process and are using the data in various ways:

- ➢ Regions identify growth areas.
- ➢ Regions assist counties to assemble transportation profiles (inventories).
- ➢ Regions and counties, townships, and communities provide information to developers, which is very popular.
- ➢ Regions assist counties and townships, and others prepare the transportation portion of master plans.
- ➢ Regions prepare GIS generated traffic flow maps for counties, townships, and others.

C. SUMMARY OF ISSUES FROM THE REGIONAL AND LOCAL VIEWPOINT

From input of metropolitan planning organizations and the limited contact with local governments, there is support for the objectives of HPMS and the recognition of HPMS as a federal policy activity. The major concern expressed in the surveys is the need for reevaluation of the data collection process to examine opportunities and, thus, better integrate the various federal and state data collection processes. Many of the data items required for HPMS are, in fact, already collected at the regional and local levels for other purposes. Yet, not all MPOs or local governments are involved in the process.

Several issues require further discussion:

How can better data partnerships be established between federal, state, regional, and local programs? Are there models of partnerships which can be used in other areas, such as the partnerships in Pennsylvania and Michigan?

Should FHWA, AASHTO, and AMPO establish several pilot areas to encourage data partnerships and data sharing?

How can HPMS be modified in a cost-effective manner to deal with local issues which are of national importance? For example, there is concern that local highways and bridges are deteriorating at a faster rate and are in worse condition than state highways. Is this an issue of national concern? Should HPMS be reporting on this issue?

How can the various activities of the MPOs, including the Congestion Management Systems, be integrated into HPMS?

Is the agreement between FHWA and EPA regarding the use of HPMS for Clean Air Act purposes working or should the requirements for data collection and use be optional?

If new technologies prove to be cost-effective, what role should MPOs and local governments have in the use of these technologies? Can the use of innovations such as ITS data for planning purposes help create new partnerships?

How can FHWA more effectively inform MPOs and local governments about the capabilities and uses of HPMS?

SECTION 6: POTENTIAL FOR THE USE OF NEW TECHNOLOGY

The state survey and the AMPO survey contained a question on the potential opportunities for using advanced technology for collecting and analyzing HPMS data.

A. STATE RESPONSES TO USES OF NEW TECHNOLOGY

Nine states did not provide any specific suggestions on the use of advanced technologies, however, the remaining states did include specific comments.

1. GIS & GPS

The area of greatest interest to 25 states is the use of GIS and global positioning systems (GPS). Many states have established GIS or are in the process of establishing it. GPS is being used to establish spatial relationships. FHWA has incorporated GIS into HPMS with a linear referencing system (LRS) which is used with the National Highway Planning Network (NHPN).

2. GEO-REFERENCING SYSTEMS

The issue of compatibility and establishment of a common geo-referencing system needs to be discussed. The discussion should include the National Spatial Data Initiative (NSDI) and the role of the NSDI to help create a common geo-referencing system. While most states have complied with the provision of LRS information, maintenance of that system will be expensive and should have multiple purposes.

3. OTHER ADVANCED TECHNOLOGIES

Seven states commented on the use of automatic roadway analyzers for their potential to increase the accuracy and consistency of HPMS data while reducing overall cost. Several states called for research on advanced methods to collect traffic count information because of the labor-intensive and inherently dangerous nature of current traffic count methods. Use of ITS data was mentioned and is discussed in Section 4. Additional work is necessary in this area. The use of digital video logging was also mentioned as a promising technology.

Several states were concerned that the use of new technologies would, in fact, add work rather than reduce it. A careful cost-effectiveness analysis should be conducted before these techniques are incorporated into HPMS.

B. MPO RESPONSES TO NEW TECHNOLOGIES

Again, the technology of greatest interest is GIS for a geo-referencing system:

- ☐ 23 mentioned this in their responses.
- ☐ 12 mentioned the use of sensors to gain information.
- ☐ 10 mentioned the use of ITS information for planning purposes.

SECTION 7: SUMMARY OF CRITICAL ISSUES FOR REASSESSMENT

This report has identified a number of additional issues which should be discussed further during the reassessment process. Opportunities for further discussion on the impacts and implications of these issues will be provided at the Minneapolis workshop, June 29 – July 2. Opportunities will also be available for comments through the Federal Register, FHWA Docket 97-10. Additional meetings will be held with organizations involved in this process.

From the outreach and research accomplished to date in the reassessment, there are a number of conclusions which can be drawn:

- ❒ HPMS has wide acceptance as the highway performance monitoring system for a variety of federal policy and planning purposes and is a key component of the national highway data base.

- ❒ The goals and objectives for HPMS are accepted and supported by the various state and local agencies who collect data for input to HPMS.

- ❒ HPMS is not always well integrated into state and local planning processes. In many cases the collection of HPMS data is regarded as a separate activity to fulfill Federal requirements; the full potential of HPMS as a state and local planning tool is not well understood and/or not being utilized.

- ❒ In many cases, regional and local planning and transportation agencies are not brought into the HPMS process; this can result in duplicate data collection activities.

- ❒ There is widespread concern for the cost and commitment of time for collecting HPMS data given constrained resources at the state and local level. There are concerns regarding the quality of the data collected, especially data off the state highway system. The need for standardization of data collection is becoming more important as data collection resources diminish.

- ❒ As data becomes more easily available to outside users because of freedom of information laws, the Internet, and other technology advances, there is increased concern for the accuracy, quality, and standardization of data to minimize the misuse of the database.

- ❒ There is not a uniform understanding of the HPMS dataset and the analytical capability of HPMS in the different offices in USDOT, states, and local governments.

- ❒ The collection of HPMS data will always be an intergovernmental effort given the diffusion of jurisdictional responsibility between state and local governments in most states. There are some examples of integrated data collection including data partnerships.

- ❒ The national analysis of highway conditions and performance is widely used, but there are some concerns about the scope and content of the analysis.

- ❒ Many data collection agencies are employing advanced technologies for the collection of HPMS data, but there does not appear to be a good way for the various agencies to share information and experiences with new techniques and equipment.

These conclusions lead to a number of issues which are presented for further discussion during the reassessment process. The challenge in dealing with these issues over the next few months is to assess if the respected and useful data base and analysis process can in fact be made better for most parties while still meeting stated objectives. There are critical issues for discussion.

1. Mission and Objectives of HPMS

While the five objectives received wide support, two additional objectives are proposed for discussion. **Objective six**, which would explicitly recognize that HPMS should be used for state-by-state comparisons and for benchmarking, could require a more extensive data base (statistically significant at the state level) than the data base required to fulfill objective 4, the national highway database objective. The pros and cons of adding this objective need to be discussed. Similarly adding **objective seven** on data integration would change the way data is collected in many states and urban areas. It has been suggested that several pilot efforts be undertaken to determine the feasibility and benefits of such an approach.

2. Scope of HPMS

There are two major issues regarding the scope of HPMS.

The first issue relates to the extent of the highway system to be included in HPMS. While there is some support for limiting the data collection to the NHS or the NHS plus some additional higher class highways, there is not a consensus on the different scope options on page 33.

There are several arguments for maintaining the current scope:

- ⇨ Many of the data items are used by a variety of HPMS users.
- ⇨ Local governments are concerned that local highway needs are not being well presented and that lower class highways are in worse condition than the NHS. They feel that conditions on local highway systems are in the national interest and should be reported to Congress.
- ⇨ The ability to create data partnerships and cooperative planning would be hindered.
- ⇨ There is a large sunk cost in the current HPMS system.

- ⇨ Federal funds are spent on lower class systems; Congress and the public need to know the condition and performance of these systems.

There are also several arguments for limiting the data collection to the NHS or the NHS plus some higher order roads:

- ⇨ Limit the cost of the data collection through greater reliance on existing state highway databases and minimum intergovernmental data collection.

- ⇨ Improve the quality of the data and analyses for the higher order systems.

- ⇨ There is a lack of consistently high quality data on local systems.

- ⇨ The Federal role may need to be limited to or concentrated on the NHS.

The second issue is to consider the need to collect additional information in two areas:

1. pavement condition
2. congestion

This report presents the arguments for collecting this information and recommends that it be collected through methods other than the current HPMS data collection.

3. Scale of HPMS

There are a number of issues raised in this report regarding the future scale of HPMS. The largest issue concerns the level (national, state, regional) at which the information collected from the sampled data items is statistically significant. Currently, 45 data items are collected on 110,000 sample sections to achieve statistical significance at the state level. It is a conclusion of this report that VMT information and pavement condition information should continued to be collected for state statistical significance because of the various requirements and uses of this information, which are documented in the report. The need to continue to collect the other 40 data items at the same level of accuracy should be discussed.

There are several possible reasons for continuing the current sample:

- ⇨ Some of this information is included in traditional tables in *Highway Statistics* on a state-by-state basis.

- ⇨ Some of the data is used to make state-by-state comparisons and for benchmarking purposes.

- ⇨ The data is used for many federal data requests and for several federal activities, such as the cost allocation study.

- ⇨ Data is used by consultants and other outside organizations.

There are also reasons for having a nationally significant data sample:

- ⇨ There is a potential for significant cost savings to the states and local governments since the sample information is the costliest portion of the HPMS data collection effort. Federal costs could also be reduced with a smaller data set to process and analyze.

- ⇨ The analytical process does not need state level significant data to produce the information contained the current Conditions and Performance report.

- ⇨ The projected future highway conditions were reduced by 42% using non-HPMS data in the last report. This calls into question the need for the detailed database.

- ⇨ Sample data is collected every year but is only used every other year for analytical reporting.

- ⇨ States who use HPMS for state planning purposes would be free to collect the additional information for state purposes; the additional information would not be sent to FHWA for national processing and analysis.

The second issue raised regarding scale is to determine where the information should be reported on a section-by-section basis for the higher functional classification systems and on an area-wide basis for the lower functional classification systems. The report makes a recommendation for a uniform cutoff and data set consistent with the NHPN.

The third issue of scale concerns requiring a uniform data set to be submitted by each state. This report makes that recommendation.

The fourth issue concerns the processes and regulations for determining the need for collecting additional information for Clean Air Act purposes. Pending the review of the new EPA rules on this subject, the HPMS manual should be revised to clearly indicate the process for making the decision on this data collection. If there is a decision to use an alternative method for VMT information, the additional HPMS information need not be collected and it should not be sent to Washington for processing.

The fifth issue regarding scale concerns the timing of the process. As described in the report, the current HPMS process is a rolling 3½-year process. Advances in technology and a potentially smaller data set could reduce current timeframes.

The final issue of scale concerns the review of individual data items in HPMS, with the objective to eliminate those items which are of marginal value. This effort is well underway and additional information was gathered from the various surveys. The HPMS Steering Committee will play an active role in this next phase.

4. Issues Concerning Conditions and Performance Reporting

Suggestions have been made on the analysis and reporting, including:

- ★ adding a "user perspective,"
- ★ determining the timing of the release of the report, and
- ★ utilizing the full potential of the analytical process to examine additional cost scenarios and impacts of alternative funding proposals.

5. Issues Concerning Data Collection, Quality, Standardization and Institutional Arrangements

- The report recommends that AASHTO, AMPO, and FHWA pursue several pilot projects to examine the benefits and challenges associated with creating data partnerships for the collection of HPMS data and other data which is shared by the various federal, state, and local agencies. The report cited experience in Michigan and Pennsylvania on data partnerships as well as a current activity underway in Pinellas County, Florida.

- The responses to the surveys indicated that there was not a uniform understanding of: the requirements; potential analytical capability; and products of HPMS among federal offices, state agencies, and local governments. To improve understanding, FHWA may want to consider a state-by-state information effort which could involve discussions with high level officials as well as those involved in the day-to-day HPMS activities at the state and local level. Consideration should also be given to delegating this effort to the Division offices.

- Many states and local agencies are using different technologies for the collection and analysis of HPMS data and for their own data collection efforts. Are the current TRB and AASHTO committees providing the appropriate evaluation and feedback to HPMS data providers on the experience with the various technologies or is there a need to modify or create a better mechanism to share information?

- FHWA has a quality assurance process in place through the Division offices to ensure that HPMS data is high quality. Yet the responses to the surveys questioned the quality of some of the data. Should FHWA review the implementation of the quality assurance process and add emphasis to this effort?

- The issue of a common geo-referencing system and the ability of the various participants to reconcile LRS with other GIS systems needs to be resolved. The progress of the NSDI and the results of that effort should be integrated into HPMS. The proposed pilot studies will also deal with the need for a geo-referencing system.