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# **LINKING OF MOBILITY PERFORMANCE MEASURES TO RESOURCE ALLOCATION: SURVEY OF STATE DOTs AND MPOS**

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**December 2008**

**COLORADO DEPARTMENT OF TRANSPORTATION**  
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# LINKING OF MOBILITY PERFORMANCE MEASURES TO RESOURCE ALLOCATION: SURVEY OF STATE DOTs AND MPOS

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## **EXECUTIVE SUMMARY**

The objective of this study is to provide a summary of the best practices of state departments of transportation and metropolitan planning organizations (MPOs) throughout the country regarding the linkage between mobility performance measures and resource allocation. The only mobility performance measure currently authorized for the Colorado Department of Transportation (CDOT) to denote congestion is volume to capacity (V/C) ratio. Currently, the V/C is used to identify the segments with V/C ratio of .85 and above which are considered congested.

The project team began this study by performing a literature review of current practices of agencies across the country. Through the literature review process, a list of agencies was identified as the ones who should be contacted to fill out an on-line survey regarding performance measures and resource allocation. The agencies included all the ones in the Urban Mobility Pooled Fund Study (SPR 03-049), other state agencies with strong ties between performance measures and planning, and MPOs that work closely with departments of transportation.

The on-line survey was sent out to all the selected agencies in 2008 via e-mail. Fourteen of the twenty-eight agencies selected responded to the survey. The survey was divided into three different sections to obtain responses about each agency's policies and procedures related to performance measures and resource allocation. The sections were 1) performance measures, 2) mobility funding, and 3) resource allocation effectiveness. The project team reviewed the responses from the on-line survey and identified seven agencies to contact for a more detailed follow-up phone interview. Five of the seven agencies were able to be contacted and a 10 to 20 minute interview was conducted regarding performance measure and resource allocation.

Through the process of researching the best practices, reviewing the on-line survey responses and interviewing selected agencies via telephone the research team found that agencies have just begun to establish policies on tracking performance measures and allocating budget based on performance measures in the past five years. Because the process of allocating resources based on performance measures is so recent, results demonstrating the effectiveness of these policies

are not available. Two state agencies, Washington DOT and Ohio DOT, have established a set policy for resource allocation on mobility projects based on performance measures.

Because a universal policy linking mobility funding to performance measures among the agencies surveyed and interviewed was not identified, the research team recommends the following process in determining a resource allocation policy suitable to the needs of CDOT.

The policy must address the following areas to be effective:

- System Performance - One or more benchmark performance measures need to be determined as the best measures of mobility in Colorado for resource allocation. Based on the survey responses, agencies around the country set their mobility performance measure benchmarks on capacity-based performance measures (V/C ratio) or travel flow-based performance measures (travel time or travel speed).
- Critical Deficiencies/Needs - Once the system performance benchmark measures have been established, critical locations within the roadway network that have mobility issues will be identified.
- Prioritization - Colorado DOT will be able to prioritize the critical locations identified in the previous step based on the severity of the problem and the volume of vehicles or people being served at each location.
- Resource Allocation/Investment - Based on the annual mobility enhancement budget, the highest priority mobility projects will be funded and constructed based on need.
- Measure Effectiveness/Return on Investment - It is important to conduct before/after studies at project implementation locations in order to quantify the return on investment for specific mobility enhancement projects. The findings from these studies, based on empirical data collected from performance measures, are critical to review in order to make better decisions about the prioritization list and resource funding.

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## **1. INTRODUCTION**

The only mobility performance measure currently authorized for CDOT to denote congestion is volume to capacity (V/C) ratio. Currently, the V/C is used to identify the segments with V/C ratio of .85 and above which are considered congested. The vehicle-miles traveled (VMT) for those congested segments are used by the Transportation Commission for allocation of the Congestion Relief program funds. Since this measure is not necessarily an accurate indicator of travel delay, the Transportation Commission would prefer to use another measure for resource allocation. A measure of person delay due to congestion that is acceptable to the Transportation Commission provides a more effective way to measure the mobility performance of the transportation system. CDOT has conducted travel time delay measurements on selected corridors and is considering using that information to estimate average travel-time delay on congested State Highways, statewide. However, additional work is necessary to accurately link mobility performance to overall resource allocation decisions and incorporating mobility measures into the trade-off analysis between different investment categories. A survey of how other transportation organizations are approaching this issue will provide a foundation for future program development.

With a desire to move toward a performance-measure driven programming and budgeting, CDOT has struggled to find a good measure to drive allocation of resources set aside to improve mobility and help determine the amount of the total transportation budget to go toward mobility improvement. Policy makers want a measure that reflects travel time and delay of all transportation users and is sensitive to all strategies used to reduce congestion. Ideally, such a measure should reflect congestion-induced delay in all modes of transportation and reflect total-trip travel time. Travel time reliability is also an issue. Other trip factors to consider could include: time of day, day of the week, and rural or urban locations.

## **2. INITIAL RESEARCH FINDINGS**

A literature and internet review of department of transportation (DOT) and metropolitan planning organizations (MPO) policies and procedures related to performance measures and resource allocation was conducted by Fehr & Peers in 2007. The purpose of this section is to summarize the key findings of the review. One of the primary focuses of the literature review was to determine which agencies would be good candidates for the survey. The suggested agencies and selection criteria are also summarized in this section.

### **2.1 RESEARCH DOCUMENTATION**

The primary objective of the internet based literature review was to determine the best practices by agencies similar to CDOT related to policies and procedures for performance measures and resource allocation. Based on the discussion at the preliminary meeting in April 2007, the focus of the research was refined to linkages between performance measures and funding. For example, the Florida DOT has an extensive mobility performance measures program. However, this was not thoroughly investigated because much of the research indicates that FDOT is in the process of exploring better methods for using the measures to allocate resources.

The starting point for much of the research was State DOT websites. In addition, the websites of several organizations including Transportation Research Board, Federal Highway Administration, the Association of Metropolitan Planning Organizations, and the Texas Transportation Institute were explored for research papers on the topic. The following are the three most relevant sources found:

- Ohio Department of Transportation – Transportation Review Advisory Council
- *NCHRP Report 551: Performance Measures and Targets for Transportation Asset Management*, 2006.

- *Emerging Performance Measurement Responses to Changing Political Pressures at State DOTs: A Practitioners' Perspective*, Washington State Department of Transportation, 2004.

The key findings of these relevant sources are described in detail below.

The Ohio DOT has a project selection process that formally incorporates congestion. The process was described by Leonard Evans from ODOT in a phone conversation. He also suggested documents that could be accessed from their website that describe the process in more detail. Each year ODOT identifies congested areas throughout the state based on the volume to capacity ratio. A list of congested and high crash locations are provided to the districts for further study. If the districts decide that these locations require high-cost, long-term solutions, then the projects are submitted to the Transportation Review Advisory Council (TRAC). TRAC is used to allocate funds for all major projects. The TRAC website states that a project is considered major if it costs ODOT more than \$5 million and meets at least one of the following goals: reduce congestion, increase mobility, provide connectivity, or increase a region's accessibility for economic development. TRAC gives each proposed project a traffic and economic score. The traffic score incorporates safety, roadway classification, and congestion. The only congestion measure used is V/C. The scores are used to guide TRAC in their decision-making but they are allowed discretion when finalizing the selections.

*NCHRP Report 551: Performance Measures and Targets for Transportation Asset Management* provides current guidance on selecting performance measures and linking them to resource allocation. Key findings from this report that relate to the use of mobility performance measures are summarized below:

- Network wide measures are useful for long range planning, but more focused measures are needed at regional or district levels for project programming and budgeting.

- Performance measures do not make decision making easier or automatic. However, they serve to inform the decision-makers and effectively communicate the consequences of investment decisions.
- The following are general guidelines for the use of performance measures:
  1. The number of measures should be the minimum needed to support decisions at the intended level.
  2. Fewer measures are needed for policy formulation and planning. More measures may be needed for programming and project selection.
  3. The number of measures should not overwhelm decision makers or bog down data collection efforts.
- The following are examples of mobility performance measures:
  1. Amount of congested travel (person-miles or VMT in congestion)
  2. Travel time index (ratio of peak travel time to free-flow travel time)
  3. Average travel time between major origin and destinations, by mode
  4. Average shipment cost between selected origins and destinations
- Performance targets should be set as they are critical in assisting decision-makers. The report provides suggestions for setting performance targets. There are currently no standards for establishing performance targets or using them in asset management.
- Some helpful suggestions for establishing congestion performance targets are provided based on the experiences of other DOTs:
  1. Assigning dollar values to congestion, reliability, or travel times is a good method for combining passenger travel concerns with freight concerns.
  2. Many states use free-flow conditions or speed limit as the standard for comparison. California DOT (CalTrans) uses 35 mph as a standard for achievable target speeds in many of the urban areas. *CalTrans and WSDOT have started using an optimum combination of speed and volume as their target.*
  3. The Texas DOT and MPOs have worked together to develop a congestion standard for a statewide needs estimate. *Elimination of serious congestion is*

the target for the state. The Texas Congestion Index is the performance measure used. The Texas Congestion Index is the ratio to take a trip at peak hour compared to the time it takes to make the same trip during the off-peak. Capacity additions are used to estimate the cost of all proposed projects for calculating the congestion index. However, improvements can include lane additions, transit projects, operations improvements, demand management, or land use changes. *Each metropolitan area has a different target value depending on the mix of system conditions. The statewide target remains constant for all areas: to eliminate serious congestion.*

There are several additional resources that focus on implementing a successful performance measures program. However, very few of them provide guidance on incorporating the performance measures into the project programming process. A focus of much of this literature was on simplifying performance measurement and improving methods for communicating the information. According to the *Emerging Performance Measurement Responses to Changing Political Pressures at State DOTs: A Practitioner's Perspective* report, there are three key audiences for performance measures: decision-makers, media or general public, and internal agency management. The measures should be targeted and customized for each of these audiences. The performance measure reports provided to decision-makers will not necessarily be the same reports provided to district managers or the public.

The primary finding of this research is that CDOT is ahead of most State DOTs on the issue of linking funding to mobility performance measures. Several DOTs have recognized that there is potential for performance measures to be a powerful tool in making funding decisions. However, most of these agencies are still in the research phase as well.

## **2.2 AGENCIES TO BE SURVEYED**

Based on the initial research, twenty-eight (28) agencies were identified as candidates to receive the survey. The agencies included all the ones in the Urban Mobility Pooled Fund Study, other

state agencies with strong ties between performance measures and planning, and MPOs that work closely with departments of transportation. The selected agencies are provided below.

### **Represented in the Mobility Pooled Fund**

- Caltrans
- Florida DOT
- Maryland DOT
- New York State DOT
- Oregon DOT
- Minnesota DOT
- Texas DOT
- Kentucky Transportation Cabinet
- Virginia DOT
- Washington State DOT
- Houston-Galveston Area Council
- FHWA
- Maricopa Association of Governments (Phoenix)
- Ohio DOT

### **Current Research and Guidance**

- TTI

- AMPO

#### **Other DOTs with Strong Linkages between Performance Measures and Planning**

- Missouri DOT
- Montana DOT
- New Mexico DOT
- Wisconsin DOT
- Delaware DOT

#### **MPOs that Work Closely with DOTs to Determine Mobility Needs**

- Metropolitan Transportation Commission (San Francisco)
- Southern California Associate of Governments
- Corpus Christi Metropolitan Planning Organization
- Capital Area Metropolitan Planning Organization (Austin, TX)
- Southeast Michigan Council of Governments (Detroit)
- Miami-Dade MPO
- Mid-Region Council of Governments (Albuquerque, NM)

### **3. ON-LINE SURVEY**

With help of the CDOT project team, an invitation to participate in an on-line survey was sent to the agencies identified in the initial research phase of this project. Twenty-eight (28) surveys were sent to agency representatives in 2008. Approximately one month after the survey was sent; Fehr & Peers contacted all the invited participants to encourage a response. Fourteen (14) responses were received via the online survey that had viable agency contact information and answered the majority of the survey questions. Of the fourteen respondents, twelve (12) responses were from state departments of transportation and two (2) were from metropolitan planning organizations. The following agencies were the respondents to the on-line survey along with the corresponding contact person.

- Caltrans – John Wolf
- Florida DOT – Gordon Morgan
- New York State DOT – Joseph McClean
- Oregon DOT – Brian Gregor
- Texas DOT – Chrisy Currier
- Kentucky Transportation Cabinet – Jesse Mayes
- Virginia DOT – Michael Fontaine
- Washington DOT – Daniela Bremmer
- Ohio DOT – Leonard Evans
- Missouri DOT – Eric Curtit
- New Mexico DOT – Patricia Oliver-Wright



- Delaware DOT – Teresa Gardner
- Metropolitan Transportation Commission – Lisa Klein
- Miami-Dade MPO – Larry Foutz

Twenty (20) questions were asked regarding performance measure collection, mobility funding and effectiveness.

The survey questions were divided into three different sections to obtain responses about each agency's policies and procedures related to performance measures and resource allocation. The three sections of the survey were:

1. Performance Measures – The purpose of this section was to obtain data on what performance measures each agency is collecting and on what type of roadway facility they are collecting the performance measures. In addition, agencies were asked about tracking performance measures over time and whether there are benchmark levels for compliance.
2. Mobility Funding – The purpose of this section was to obtain funding sources and budget trends for congestion relief/congestion management projects and mobility enhancement project for each agency.
3. Resource Allocation Effectiveness – The purpose of this section was to obtain data whether each agency has a set methodology to link budget allocation to performance measures for mobility projects. In addition, it was asked whether agencies monitor performance measure outcomes after a project is implemented.

A cover letter was sent to the survey participants to solicit participation in the on-line survey. The cover letter can be found in the Appendix A of this report.

## **4. ON-LINE SURVEY RESULTS**

The purpose of this section is to summarize the major findings from the on-line survey responses. The on-line survey responses were collected and reviewed by the research team in order to determine which agencies, if any, have instituted a performance measure driven resource allocation program.

The fourteen on-line survey responses can be found in the Appendix B of this report.

### **4.1 PERFORMANCE MEASURES GENERAL TRENDS**

All the responding agencies are collecting performance measures for roadway segments under their jurisdiction. The number of performance measures and type of reporting vary between agencies. *Figure 1* displays the performance measures that the responding agencies are collecting.

Thirteen of the fourteen agencies surveyed collect the vehicle miles traveled (VMT) performance measure. Eleven agencies collect travel time data, nine agencies collect vehicle hours of delay and eight agencies collect level of service (LOS) and V/C ratio.

The performance measures collected by the responding agencies are primarily based on vehicular metrics. Some collected performance measures are based on freight metrics, total person metrics or transit metrics. The agencies that collect freight performance measures (Ohio and New York) have formal definitions for mobility. No agencies formally measure total trip time outside of a travel demand model.

Performance Measures	Caltrans	Florida DOT	New York DOT	Oregon DOT	Texas DOT	Kentucky Trans. Cabinet	Virginia DOT	Washington DOT	Ohio DOT	Missouri DOT	New Mexico DOT	Delaware DOT	Metropolitan Trans. Commission	Miami-Dade MPO
V/C Ratio	X	X	X	X				X		X		X	X	
Level of Service	X		X			X	X	X	X	X			X	
Travel Time	X		X	X	X		X	X	X	X	X	X	X	
Travel Time Variability	X	X			X			X		X			X	
Average Speed		X		X			X		X	X			X	
Average Speed Variability				X										
Vehicle Miles Traveled	X	X	X	X		X	X	X	X	X	X	X	X	
Freight Vehicle Miles Traveled								X						
Person Miles Traveled	X	X										X	X	
Vehicle Hours Traveled	X			X				X		X		X	X	
Person Hours Traveled												X		
Freight Vehicle Hours Traveled														
Vehicle Hours of Delay	X	X	X	X			X	X	X		X	X		
Person Hours of Delay	X	X	X					X				X		
Freight Hours of Delay			X											
Total Trip Time													X	
Mode Split	X			X			X					X	X	
Average Vehicle Occupancy	X		X							X			X	
Transit Ridership					X				X	X	X		X	
Park-n-Ride Utilization									X	X			X	
Cyclist Volume														
Pedestrian Volume														

**Figure 1. Performance Measures**

While all agencies collect performance measure data, not many agencies reported that they have a formal method to track mobility performance over time. The data is conveyed in an annual report, but usually there is no benchmark level set for the performance measure to trigger looking into a mobility enhancement or congestion management project. The states that do have a benchmark for at least one performance measure are listed below:

- New York DOT – Delay is defined as travel speed less than 85% of the speed limit.
- Florida DOT – Person hours of delay should maintain or improve on the current rate of increase.
- Washington DOT – Freeway efficiency is based on travel speed.

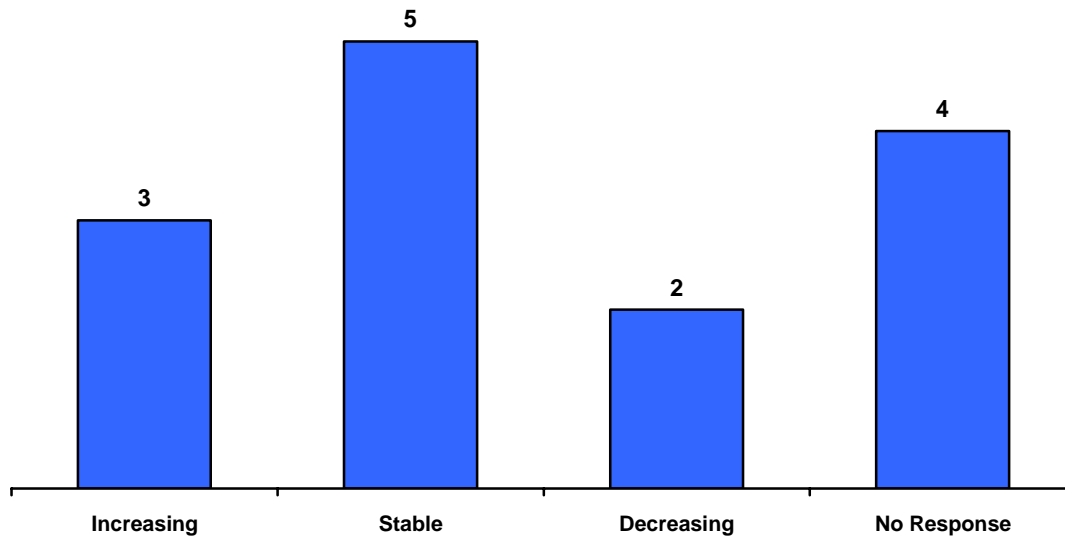
- Oregon DOT – Differing V/C thresholds based on urban or rural locations. Specific benchmarks can be found in *Policy 1F* of the *1999 Oregon Highway Plan*.
- Ohio DOT – V/C > 0.9 is defined as congested.

#### **4.2 MOBILITY FUNDING GENERAL TRENDS**

The responding agencies indicated that funding for mobility enhancements and congestion relief projects come from all levels of government funding. Federal funding, state funding and local agency funding are being used to finance these projects. Below is a list of funding sources that were reported to being used:

- Federal Funding Sources – Congestion Mitigation and Air Quality Improvement Programs (CMAQ), Surface Transportation Program (STP), National Highway System (NHS), Planning Grants from the Federal Transit Administration (FTA)
- State Funding Sources - State Revenue, State Bonds, Metropolitan Mobility Fund, Vehicle License Fees
- Local Funding Sources – Local Bonds

*Figure 2* displays the trend over the past five years about the amount of funding each agency has been allocating to mobility enhancement projects or congestion relief projects.



**Figure 2. Funding Allocation Trends**

Eight of the ten agencies reporting on funding trends over the past five years report that funding for mobility enhancements and congestion relief projects are stable or increasing. Two of the states, Washington and Ohio, reporting that funding is increasing over the past 5 years have policies in place to score mobility projects based on performance measures.

#### **4.3 RESOURCE ALLOCATION EFFECTIVENESS GENERAL RESULTS**

Few agencies are monitoring the outcome of individual mobility investments after the investments are completed. Three agencies that were interviewed have monitoring procedures for projects that are implemented. These agencies have only recently implemented their methodology in the past few years.

Caltrans reported that they are just starting to monitor the outcomes of corridor mobility projects and traffic signal projects. The New York DOT regularly monitors High Occupancy Vehicle (HOV) lane usage and park-and-ride usage, but does not monitor other mobility investment

projects. Washington DOT has just implemented a process where travel time and maximum throughput values are collected before and after implementation of mobility projects to assess the benefit of the project.

A few agencies have methodologies that rank or score mobility projects based on performance measures that are used in the resource allocation process. Some of these methodologies are formal, adopted policy for the agency and some methodologies are just data that usually asked for to include in the Benefit-to-Cost ratio analysis. Specific information was not collected regarding these methodologies during the on-line survey, but the agencies that indicated that they possessed a scoring methodology were contacted via phone to follow up and acquire more information. The results of the phone interviews are in the next section of this document.

The respondents to the on-line survey reported barriers to implementation of linking mobility performance measures to resource allocation. The most common barriers listed were:

- Causal relationship of data and field results
- Agreement on a common set of measures on projects involving multiple agencies
- Resource allocation is approved by the state legislature so the agency has little control over budget.
- Geographic complexities
- Staff time and resources

#### **4.4 SUMMARY OF INDIVIDUAL ON-LINE SURVEY RESPONSES**

The following summarizes important information acquired from each of the individual on-line survey responses.

### **Caltrans**

Caltrans collects several performance measures based on vehicle metrics, person metrics and mode share. These performance measures are primarily collected in urban areas and on specific corridors. Historically Caltrans has tracked mobility performance using the vehicle hours of delay metric, but it is in the process of changing to using travel times and travel time reliability to track mobility performance. In addition, Caltrans has started to monitor the outcome of completed mobility projects that include Corridor Mobility Improvement Account projects and traffic signal projects. The respondent noted that it is a high priority for agency leadership to link mobility performance measures to resource allocation. Based on the responses to on-line survey the project team decided to contact Caltrans for the follow-up phone interview.

### **Florida DOT**

Florida DOT collects several performance measures based on vehicle metrics and person metrics. Florida DOT has a benchmark for person hours of delay defined as maintain or improve the current rate of increase. Performance measures are collected and updated annually. Mobility is one of several factors included when determining project priorities.

### **New York State DOT**

New York DOT includes all modes of travel in its definition of mobility. New York DOT collects several performance measures based on vehicle metrics, freight vehicle metrics and person metrics. Delay is considered to be anything less than 85 percent of the posted speed limit. New York DOT does not typically measure the outcomes of mobility projects, but it does monitor park-and-ride usage and HOV lane usage. Each region within the agency is asked to estimate the reduction in vehicle hours of delay, person hours of delay and freight hours of delay for each proposed project. Based on the responses to on-line survey the project team decided to contact New York DOT for the follow-up phone interview.

### **Oregon DOT**

Oregon DOT collects several performance measures based on vehicle metrics. Oregon has a formal policy for setting benchmarks on V/C ratio and vehicle delay. The benchmark values differ based on roadway facility type and whether the roadway is located in an urban or rural setting. The benchmarks can be found in the *Oregon Highway Plan*. Based on the responses to on-line survey the project team decided to contact Oregon DOT for the follow-up phone interview.

### **Texas DOT**

Texas DOT collects travel time and travel time variability for its performance measures used to evaluate mobility. Currently, performance measures are tied to the Texas DOT budget, but not to mobility projects. The Texas Transportation Commission will soon vote on whether to use travel time index and congested peak travel time as the performance measures related to mobility. Based on the responses to on-line survey the project team decided to contact Texas DOT for the follow-up phone interview.

### **Kentucky Transportation Cabinet**

The Kentucky Transportation Cabinet uses level of service as a performance measure to evaluate mobility. Level of service is recorded at selected locations and updated periodically.

### **Virginia DOT**

Virginia DOT collects several performance measures based on vehicle metrics. Several of the performance measures are collected continuously. Before project estimates for performance measures are included in the criteria for decision making, but after project outcomes are not measured by Virginia DOT. Based on the responses to on-line survey the project team decided to contact Virginia DOT for the follow-up phone interview.



### **Washington DOT**

Washington DOT collects several performance measures based on vehicle metrics. The benchmark performance measure for mobility on freeways is travel speed. Washington DOT collects travel time data for 52 commute routes in the Seattle region and for 2 commute routes in Spokane. Washington DOT has just implemented a policy to monitor travel time and maximum throughput on highway segments for before and after project implementation to be able to quantify the results of a mobility enhancement project. Washington DOT's Annual Congestion Report includes this before and after analysis. Washington DOT has published the *WSDOT Mobility Project Prioritization Process* manual to help estimate a specific project's cost-efficiency for specific types of mobility projects. The manual can be found on-line at <http://www.wsdot.wa.gov/mapsdata/tdo/mobility.htm>.

Due to the public material already published on Washington DOT policy, the project team did not feel it was necessary to contact Washington DOT for the follow-up phone interview.

### **Ohio DOT**

Ohio DOT collects several performance measures based on vehicle metrics, freight metrics and person metrics. Ohio DOT has defined a congested roadway to have a V/C ratio of greater than 0.9. Annual traffic count data is used to update roadway capacities and calculate the V/C ratio. V/C ratio is used as one of the ranking criteria for identifying and selecting future projects. Based on the responses to on-line survey the project team decided to contact Ohio DOT for the follow-up phone interview.

### **Missouri DOT**

Missouri DOT collects several performance measures based on vehicle metrics and transit metrics. Performance measures from the data collection process can be found in the TRACKER document on the Missouri DOT website.

### **New Mexico DOT**

New Mexico DOT collects several performance measures based on vehicle metrics and transit metrics. Vehicle miles traveled is collected on an annual basis and compared to the 15 year history. New Mexico DOT does not monitor the outcome of its mobility projects.

### **Delaware DOT**

Delaware DOT collects travel time, VMT and transit ridership as performance measures. There is no current policy for tracking mobility performance over time.

### **Metropolitan Transportation Commission**

The Metropolitan Transportation Commission collects several performance measures based on vehicle metrics and person metrics. Performance measures are only collected on freeways. The MTC has a goal of reducing VMT per capita by 10 percent by 2035 and reduce delay per capita by 20 percent by 2035. The MTC does not currently monitor the outcome of projects, but congestion relief is a major factor in the B/C ratio used to identifying and selecting projects. Based on the responses to on-line survey the project team decided to contact the Metropolitan Transportation Commission for the follow-up phone interview.

### **Miami-Dade MPO**

The Miami-Dade MPO collects several performance measures based on vehicle metrics, person, metrics and transit metrics. There are no set benchmarks for the performance measures collected. Florida DOT and the city of Miami use V/C ratio as a benchmark to determine transportation/land use concurrency. Miami-Dade MPO stated that they do rank mobility projects using performance measures, but did not state how. Based on the responses to on-line survey the project team decided to contact Miami-Dade MPO for the follow-up phone interview.

## **5. TELEPHONE SURVEY RESULTS**

The purpose of this section is to summarize the results of the follow-up phone interview the research team had with agencies that responded to the on-line survey.

Seven agencies were contacted for phone interviews to gain a better understanding of their survey responses. The seven agencies were selected based on their survey responses regarding mobility performance tracking and policies relating to mobility performance and funding. The agencies contacted for further questioning included:

- Miami-Dade MPO
- New York State DOT
- Ohio DOT
- Caltrans
- Oregon DOT
- Texas DOT
- Virginia DOT

The survey response from the Washington DOT was also of interest; however this agency was not contacted for a phone interview because sufficient information was provided in the electronic survey. Interviews were completed with five of the seven agencies. The agencies that were not interviewed included the Texas DOT and Virginia DOT; these agencies were contacted several times, but were not responsive to messages left via voice mail.

Minnesota and Florida DOTs were also contacted via phone to request that they take the electronic survey. The Florida DOT completed the survey online. The Minnesota DOT was not responsive to messages left by the survey team.

## **5.1 PHONE INTERVIEW PROCESS**

The phone interviews usually lasted about 10 minutes. Following each interview, the notes taken during the interview were emailed to the interviewee for review and comment. Three of the five agencies made additions to the notes via this review process. After the comments were received, the notes were finalized and the interview responses compiled.

## **5.2 SUMMARY OF PHONE INTERVIEW RESPONSES**

A summary of the five interviews completed is provided in the paragraphs below. The summaries focus on the interviewees' comments in regard to:

- the primary performance measures used to track mobility,
- the utilization of performance measure data,
- the methods used to collect performance measure data, and
- the agency's funding policy.

The finalized notes from each telephone conversation are found in Appendix C of this report.

### **Miami-Dade MPO**

Larry Foutz was interviewed at the Miami-Dade MPO. Mr. Foutz indicated that Vehicle Miles Traveled (VMT) and Vehicle Hours Traveled (VHT) are used to track mobility performance. Mr. Foutz commented that these performance measures are not ideal because they do not allow the system to be monitored; they simply indicate that mobility is declining. A study is currently being completed to develop a set of sophisticated mobility performance measures for the Miami-Dade MPO. The study will address what each performance measure tracks and how it will be measured in the field. A copy of this study will be forwarded to Fehr and Peers when it is completed.

Trends in performance measures are evaluated every four years. Traffic volume counts on freeways are measured in the field; other performance measures are calculated using a model. Mr. Foutz indicated that funding is not currently tied to performance measures, but he would like to see it tied to performance measures in the future.

### **New York State DOT**

Joseph McClean was interviewed at the NY State DOT. Mr. McClean indicated that Vehicle Hours of Delay (VHD), Person Hours of Delay (PHD), and Truck Hours of Delay (THD) are the primary performance measures used to track mobility performance. Performance measures are tracked biannually and shared with the Executive Level, the Regional Offices, and the Legislature. The performance measure data is then used, at these levels, to develop goals for the state, which drive the development of the capital improvement program. In the shorter term, performance measures are tracked on a monthly basis and posted on a performance dashboard.

Performance measures are calculated using a model which utilizes hourly traffic count data from the field. Funding is allocated to each region in the state based on a formula which includes population, lane-miles of road, VMT, and performance measures for pavement, bridges, mobility and safety. Within each region, funds are allocated in order to meet performance measure-based regional goals. The goals include, for example, providing a certain percentage of good and excellent pavement and maintaining a certain level of mobility.

### **Ohio DOT**

Leonard Evans was interviewed at the Ohio DOT. Mr. Evans indicated that the Volume to Capacity Ratio (V/C) is the primary performance measure used to track mobility performance. A study was done several years ago which compared alternative mobility performance measures. The study determined that the V/C was the best performance measure, based on the availability of data and the ability for the performance measure to describe mobility performance. Ohio DOT tracks performance measures on an annual basis. The V/C is computed using the *Highway Capacity Manual 2000* methodology. Data for this calculation is obtained from the annual traffic count program and annual updates on roadway capacities.

The Ohio DOT does not have a set amount of funding dedicated to mobility enhancements. Funding decisions are made using the Ohio DOT *Track Process*. The *Track Process* uses several

factors, including the V/C, the safety record, and the economic development, to allocate funding for projects.

### **Caltrans**

John Wolf was interviewed at Caltrans. Mr. Wolf indicated that Travel Time is the primary performance measure used to track mobility. Performance measures are monitored on a yearly basis for the 20-30 major corridors in the state. Performance measure data is collected using inductive loops, magnetometers, and radar.

Funding decisions are made using a benefit-cost analysis, to determine which solution will be most cost-effective. Performance measures are used to quantify the benefits associated with a project (e.g., the reduction in vehicle miles traveled and greenhouse gas emissions). Mr. Wolf has found that, many times, the most cost-effective solution is to construct a Traffic Management Center or to install Intelligent Transportation Systems.

### **Oregon DOT**

Brian Gregor was interviewed at the Oregon DOT. Mr. Gregor indicated that the V/C and Vehicle Hours of Delay (VHD) are the primary performance measures used to track mobility performance. Mr. Gregor commented that the V/C and VHD do not adequately describe mobility performance. Oregon DOT would like to see Travel Time measured in the future, as well as another performance measure that measures mobility across modes.

VHD is measured annually. The V/C is measured as needed. The VHD is calculated using a model developed by the Texas Transportation Institute. A variety of methods are used to calculate V/C, including the Highway Capacity Manual methodology, travel demand models, and the Highway Economic Requirements System (HERS). The Oregon DOT does not set aside funds for mobility projects. Funding decisions for mobility are usually made by Metropolitan Planning Organizations in Oregon.

### **5.3 PHONE SURVEY FINDINGS**

The primary performance measures used to track mobility performance include VMT, the V/C ratio, travel time-based performance measures, and delay-based performance measures. These performance measures are generally tracked on an annual basis, except at the Miami-Dade MPO where performance measures are tracked every four years. All of the agencies interviewed, except Caltrans, calculate performance measures using a model or the *Highway Capacity Manual* methodology.

None of the agencies interviewed have a set amount of funding dedicated to mobility enhancements. Therefore, the idea of tying mobility funding to performance measures does not fit within the structure of their existing funding programs. At all agencies, mobility performance measures are one of many factors considered when making funding decisions.

## 6. RELEVANT FINDINGS

While researching the best practices, reviewing survey responses and conducting telephone interviews with selected agencies the research team determined that policies on tracking performance measures and allocating budgets based on performance measures have just begun to be established in the past five years. Because the process of allocating resources based on performance measures is so new, results demonstrating the effectiveness of these policies are not available.

Two state agencies have established a set policy for resource allocation on mobility projects based on performance measures. The Washington Department of Transportation has published the *WSDOT Mobility Project Prioritization Process* manual to help estimate a specific project's cost-efficiency. The manual includes estimations for specific mobility enhancement projects.

The Ohio Department of Transportation used volume-to-capacity (V/C) ratio as their benchmark performance measure. Ohio DOT performed a study to determine which performance measure would best fit their needs and what data was readily available and V/C ratio was determined to be the best fit for their needs. V/C ratio is one component of the cost-benefit equation Ohio DOT uses to prioritize mobility projects.

The Texas Department of Transportation reported on the on-line survey that in the autumn of 2008 the Texas Transportation Commission will vote on whether to use travel time index and congested peak travel time as the performance measures related to mobility.

Because a universal policy linking mobility funding to performance measures among the agencies surveyed and interviewed was not identified, the research team recommends the following process in determining a resource allocation policy suitable to the needs of the Colorado Department of Transportation. *Figure 3* is a flowchart that displays the steps to develop a policy regarding resource allocation.



### ***1. System Performance***

One or more benchmark performance measures need to be determined as the best measures of mobility in Colorado. Currently, V/C is used as the indicator of congestion. Based on the survey responses, agencies around the country set their mobility performance measure benchmarks on capacity-based performance measures (V/C ratio) or travel flow-based performance measures (travel time or travel speed).

Capacity-based performance measures rely on an estimated capacity being set for each lane of the roadway, but are easy to calculate and obtain data for. The performance measure needed to calculate V/C ratio is traffic volume data, which CDOT is collecting.

Travel flow-based performance measures calculate or represent the actual throughput of the roadway facility. These performance measures could help CDOT focus on maximizing throughput of existing corridors.

### ***2. Critical Deficiencies/Needs***

Once the system performance benchmark measures have been established, critical locations within the roadway network that have mobility issues will be identified. This list of critical locations can be updated annually based on data collection.

### ***3. Prioritization***

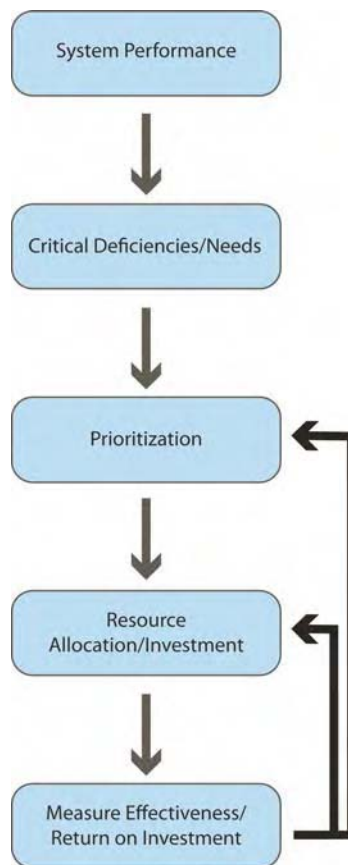
Colorado DOT will be able to prioritize the critical locations identified in the previous step based on the severity of the problem and the volume of vehicles or people being served at each location. As feedback on effectiveness is established, prioritization will incorporate relative effectiveness or return on investment findings.

#### ***4. Resource Allocation/Investment***

Based on the annual mobility enhancement budget, the highest priority mobility projects will be funded and constructed based on need.

#### ***5. Measure Effectiveness/Return on Investment***

It is important to conduct before/after studies at project implementation locations in order to quantify the return on investment for specific mobility enhancement projects. The findings from these studies, based on empirical data collected from performance measures, are critical to review in order to make better decisions about the prioritization list and resource funding.



**Figure 3. Resource Allocation Policy Flowchart**

Some further research topics related to the study, but did not fall within the scope of this work should include the following:

- What the best strategy for implementation of resource allocation for mobility projects is. Research should document whether there is a greater return on investment at the critical locations or at locations that are showing trends of becoming more congested.
- Research documenting which treatments have the most effective results in reducing congestion when implemented in a congested location. Treatments that should be evaluated include:
  - Incident Management
  - Variable Message Signage/ITS
  - High Occupancy Vehicle Lanes
  - Additional lanes
  - Ramp Metering

## **APPENDIX A – COVER LETTER**

## DEPARTMENT OF TRANSPORTATION

Division of Transportation Development  
4201 East Arkansas Ave  
Denver, Colorado 80222  
303-757-9525



March 31, 2008

Dear [Survey Recipient],

The Division of Transportation Development of the Colorado DOT (CDOT) is performing a research project to determine a good performance measure to drive both 1) the allocation of funding set aside for mobility improvements and 2) the amount of the total transportation budget going toward mobility improvements. Mobility improvements are not traditional roadway widening projects, but are other programs or projects that improve travel time, enhance travel choices or reduce congestion.

Policy makers want a measure that reflects travel time, delay of all transportation users and that is sensitive to all strategies used to reduce congestion.

The only mobility performance measure currently authorized for CDOT to denote congestion is volume to capacity (V/C) ratio. Currently, the V/C ratio is used to identify roadway segments with V/C ratio of .85 and above. Then, the vehicle-miles traveled (VMT) for those congested segments are used by the commission for allocation of the Congestion Relief program funds. Since this measure is not necessarily an accurate indicator of travel delay, the Division of Transportation Development would prefer to use other measures for resource allocation. A measure of person delay due to congestion that is acceptable to the Division provides a more effective way to measure the mobility performance of the transportation system.

As part of the project, we are conducting a survey of other state DOT and MPO staff to find out how this issue is addressed in your organization. We recognize that both your time and experience are valuable and would **greatly appreciate your participation in this survey** to help us understand how your transportation organization is approaching this issue. This survey should take approximately 10-15 minutes to complete.

The research is being conducted by the CDOT's Research Branch. The study manager is Rich Sarchet, CDOT Research. Jeremy R. Klop, Fehr & Peers, is supervising the research as the Principal Investigator. If you have any questions about the research, Mr. Klop can be contacted at [j.klop@fehrandpeers.com](mailto:j.klop@fehrandpeers.com) or 303.296.4300.

Thank you for your time.

Sincerely,

A handwritten signature in cursive script that reads "Jennifer Finch". The signature is written in black ink on a light blue background.

Jennifer Finch  
Director

## **APPENDIX B – ON-LINE SURVEY RESPONSES**

# **CDOT Mobility Study**

July 2008

Survey Responses



## Survey 4 – Kentucky Transportation Cabinet

**Respondent Type:** Normal Response

**Collector:** New Link (Web Link)

**Custom Value:** *empty*

**IP Address:** 162.114.40.32

**Response Started:** Tue, 7/15/08 4:19:41 AM

**Response Modified:** Tue, 7/15/08 4:35:55 AM

1. Please provide your name:

Jesse Mayes

2. Please provide the agency that you represent (required):

Kentucky Transportation Cabinet

3. Please provide your telephone number and e-mail address so we can contact you with follow-up questions:

502 564 7183

4. Does your agency have an official definition of mobility?

If yes, please provide the official agency definition - Level of Service

5. What performance measures are used in your agency to evaluate mobility? (check all that apply)

Level of Service

6. If the performance measure is used, is there a benchmark level set for compliance? If so, please describe the benchmarks your agency uses to measure any of the items in question 5:

No Response

7. Please check the applicable performance measures your agency collects in different area types:

<b>Urban</b>	<b>Rural</b>	<b>Corridor</b>	<b>Statewide (All Facilities)</b>	<b>Statewide (Average)</b>
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Volume to Capacity Ratio (V/C)

Level of Service

Travel Time

Travel Time Variability

Average Speed



Average Speed Variability

Vehicle Miles Traveled (VMT)      X      X      X      X      X

Freight Vehicle Miles Traveled (FVMT)

Person Miles Traveled (PMT)

Vehicle Hours Traveled (VHT)

Person Hours Traveled (PHT)

Freight Vehicle Hours Traveled (FHT)

Vehicle Hours Delay

Person Hours of Delay

Freight Hours of Delay

Total Trip Time

Mode Split/Mode Share

Average Vehicle Occupancy

Transit Ridership

Park-n-Ride Utilization

Cyclist Volumes

Pedestrian Volumes

*Comments:*

8. How does your agency track the changes in mobility performance over time?

LOS is recorded for selected locations. Not necessarily tracked with time.

9. If your agency measures total trip time, including factors such as walk or bicycle access, transfer time, or other measures, please describe that measure or procedure below:

NA

10. Please describe the funding sources and application of funds for programs related to mobility enhancements and/or congestion management/congestion relief in your agency:

No Response

11. Over the past five years, on average how much does your agency spend annually on mobility enhancements and/or congestion relief/congestion management?

No Response

12. Over the past five years, on average what percentage of your agency budget is spent annually on mobility enhancements and/or congestion relief/congestion management?

No Response

13. If your agency has other budget categories related to mobility enhancements and/or congestion relief/congestion management, please describe them in the space below:

No Response

14. Over the last 5 years, has funding for mobility enhancements and/or congestion relief/congestion management been increasing, stable, or decreasing in your agency?

No Response

15. Does your agency monitor the outcomes from mobility investments after implementation?

No Response

16. Does your agency rank or score mobility projects based on performance measures?

No Response

17. How high a priority is a link between mobility performance measures and resource allocation for your agency leadership?

No Response

18. How high a priority is a link between mobility performance measures and resource allocation for your agency staff?

No Response

19. How would you rate the effectiveness of your current procedures in linking mobility performance measures and resource allocation?

No Response

20. What are the biggest barriers to a more direct link between mobility performance measures and resource allocation in your agency?

No Response

## Survey 5 – Miami-Dade MPO

**Respondent Type:** Normal Response

**Collector:** New Link (Web Link)

**Custom Value:** *empty*

**IP Address:** 65.87.105.7

**Response Started:** Tue, 7/15/08 7:27:42 AM

**Response Modified:** Tue, 7/15/08 7:40:16 AM

1. Please provide your name:

Larry Foutz

2. Please provide the agency that you represent (required):

Miami Dade MPO

3. Please provide your telephone number and e-mail address so we can contact you with follow-up questions:

305.375.1522

4. Does your agency have an official definition of mobility?

No Response

5. What performance measures are used in your agency to evaluate mobility? (check all that apply)

Volume to Capacity Ratio (V/C)

Level of Service

Average Speed

Vehicle Miles Traveled (VMT)

Person Miles Traveled (PMT)

Vehicle Hours Traveled (VHT)

Total Trip Time

Mode Split/Mode Share

Average Vehicle Occupancy

Transit Ridership

Park-n-Ride Utilization

6. If the performance measure is used, is there a benchmark level set for compliance? If so, please describe the benchmarks your agency uses to measure any of the items in question 5:

The MPO only measures them on a regular basis. FDOT and the City of Miami both measure Volume to Capacity Ratios to determine land use/transportation concurrency.

7. Please check the applicable performance measures your agency collects in different area types:

	<b>Urban</b>	<b>Rural</b>	<b>Corridor</b>	<b>Statewide (All Facilities)</b>	<b>Statewide (Average)</b>
Volume to Capacity Ratio (V/C)			X		
Level of Service			X		
Travel Time			X		
Travel Time Variability					
Average Speed	X				
Average Speed Variability					
Vehicle Miles Traveled (VMT)	X				
Freight Vehicle Miles Traveled (FVMT)					
Person Miles Traveled (PMT)	X				
Vehicle Hours Traveled (VHT)	X				
Person Hours Traveled (PHT)					
Freight Vehicle Hours Traveled (FHT)					
Vehicle Hours Delay					
Person Hours of Delay					
Freight Hours of Delay					
Total Trip Time					
Mode Split/Mode Share	X				
Average Vehicle Occupancy	X				
Transit Ridership	X				

Park-n-Ride Utilization X

Cyclist Volumes

Pedestrian Volumes

*Comments:*

8. How does your agency track the changes in mobility performance over time?

We have established a methodology for each measure and how often it should be collected or calculated

9. If your agency measures total trip time, including factors such as walk or bicycle access, transfer time, or other measures, please describe that measure or procedure below:

Only through the model

10. Please describe the funding sources and application of funds for programs related to mobility enhancements and/or congestion management/congestion relief in your agency:

We are a planning agency

11. Over the past five years, on average how much does your agency spend annually on mobility enhancements and/or congestion relief/congestion management?

	<b>Less than 1 million (1)</b>	<b>1-5 million (2)</b>	<b>5-20 million (3)</b>	<b>20-50 million (4)</b>	<b>50-100 million (5)</b>	<b>100 million+ (6)</b>
Congestion Relief/Congestion Management	X					
Mobility Enhancements	X					

*Comments:*

12. Over the past five years, on average what percentage of your agency budget is spent annually on mobility enhancements and/or congestion relief/congestion management?

	<b>Less than 1% (1)</b>	<b>1-5% (2)</b>	<b>5-10% (3)</b>	<b>10-20% (4)</b>	<b>20-50% (5)</b>	<b>50% + (6)</b>
Congestion Relief/Congestion Management						
Mobility Enhancements						

*Comments:* The majority of our planning studies fall into one of those two categories

13. If your agency has other budget categories related to mobility enhancements and/or congestion relief/congestion management, please describe them in the space below:

No Response

14. Over the last 5 years, has funding for mobility enhancements and/or congestion relief/congestion management been increasing, stable, or decreasing in your agency?

Stable

15. Does your agency monitor the outcomes from mobility investments after implementation?

No

16. Does your agency rank or score mobility projects based on performance measures?

Yes

*Comment:* Within the development of the UPWP, the TIP and the LRTP.

17. How high a priority is a link between mobility performance measures and resource allocation for your agency leadership?

Somewhat Important

18. How high a priority is a link between mobility performance measures and resource allocation for your agency staff?

Somewhat Important

19. How would you rate the effectiveness of your current procedures in linking mobility performance measures and resource allocation?

Somewhat Important

20. What are the biggest barriers to a more direct link between mobility performance measures and resource allocation in your agency?

Getting all of the implementing agencies to agree on a common set of measures to compare their projects.

## Survey 7 – Missouri DOT

**Respondent Type:** Normal Response

**Collector:** New Link (Web Link)

**Custom Value:** *empty*

**IP Address:** 168.166.124.100

**Response Started:** Tue, 7/15/08 10:29:37 AM

**Response Modified:** Tue, 7/15/08 10:42:22 AM

1. Please provide your name:

Eric Curtit

2. Please provide the agency that you represent (required):

Missouri Department of Transportatation

3. Please provide your telephone number and e-mail address so we can contact you with follow-up questions:

573.751.6775 eric.curtit@modot.mo.gov

4. Does your agency have an official definition of mobility?

If yes, please provide the official agency definition - none

If no, please provide any operating definition of mobility - none

5. What performance measures are used in your agency to evaluate mobility? (check all that apply)

Level of Service

Travel Time

Travel Time Variability

Average Speed

Vehicle Miles Traveled (VMT)

Transit Ridership

Park-n-Ride Utilization

*Comment:* vehicle ownership, incident management,

6. If the performance measure is used, is there a benchmark level set for compliance? If so, please describe the benchmarks your agency uses to measure any of the items in question 5:

No Response

7. Please check the applicable performance measures your agency collects in different area types:

No Response

8. How does your agency track the changes in mobility performance over time?

No Response

9. If your agency measures total trip time, including factors such as walk or bicycle access, transfer time, or other measures, please describe that measure or procedure below:

No Response

10. Please describe the funding sources and application of funds for programs related to mobility enhancements and/or congestion management/congestion relief in your agency:

No Response

11. Over the past five years, on average how much does your agency spend annually on mobility enhancements and/or congestion relief/congestion management?

No Response

12. Over the past five years, on average what percentage of your agency budget is spent annually on mobility enhancements and/or congestion relief/congestion management?

No Response

13. If your agency has other budget categories related to mobility enhancements and/or congestion relief/congestion management, please describe them in the space below:

No Response

14. Over the last 5 years, has funding for mobility enhancements and/or congestion relief/congestion management been increasing, stable, or decreasing in your agency?

No Response

15. Does your agency monitor the outcomes from mobility investments after implementation?

No Response

16. Does your agency rank or score mobility projects based on performance measures?

No Response

17. How high a priority is a link between mobility performance measures and resource allocation for your agency leadership?

No Response



18. How high a priority is a link between mobility performance measures and resource allocation for your agency staff?

No Response

19. How would you rate the effectiveness of your current procedures in linking mobility performance measures and resource allocation?

No Response

20. What are the biggest barriers to a more direct link between mobility performance measures and resource allocation in your agency?

No Response

## Survey 8 – Caltrans

**Respondent Type:** Normal Response

**Collector:** New Link (Web Link)

**Custom Value:** *empty*

**IP Address:** 149.136.17.253

**Response Started:** Tue, 7/15/08 10:43:07 AM

**Response Modified:** Tue, 7/15/08 10:54:01 AM

1. Please provide your name:

No Response

2. Please provide the agency that you represent (required):

Caltrans

3. Please provide your telephone number and e-mail address so we can contact you with follow-up questions:

john.wolf@dot.ca.gov 916 654 2627

4. Does your agency have an official definition of mobility?

If no, please provide any operating definition of mobility - - MOBILITY -Maximize transportation system performance and accessibility.(This is a departmental goal)

5. What performance measures are used in your agency to evaluate mobility? (check all that apply)

Volume to Capacity Ratio (V/C)

Level of Service

Travel Time

Travel Time Variability

Vehicle Miles Traveled (VMT)

Person Miles Traveled (PMT)

Vehicle Hours Traveled (VHT)

Vehicle Hours Delay

Person Hours of Delay

Mode Split/Mode Share

Average Vehicle Occupancy

6. If the performance measure is used, is there a benchmark level set for compliance? If so, please describe the benchmarks your agency uses to measure any of the items in question 5:

No Response

7. Please check the applicable performance measures your agency collects in different area types:

	<b>Urban</b>	<b>Rural</b>	<b>Corridor</b>	<b>Statewide (All Facilities)</b>	<b>Statewide (Average)</b>
Volume to Capacity Ratio (V/C)	X		X		
Level of Service	X		X		
Travel Time	X		X		
Travel Time Variability	X		X		
Average Speed					
Average Speed Variability					
Vehicle Miles Traveled (VMT)	X		X	X	
Freight Vehicle Miles Traveled (FVMT)					
Person Miles Traveled (PMT)					
Vehicle Hours Traveled (VHT)					
Person Hours Traveled (PHT)					
Freight Vehicle Hours Traveled (FHT)					
Vehicle Hours Delay					
Person Hours of Delay					
Freight Hours of Delay					
Total Trip Time					
Mode Split/Mode Share	X		X		
Average Vehicle Occupancy	X		X		
Transit Ridership					

Park-n-Ride Utilization

Cyclist Volumes

Pedestrian Volumes

*Comments:*

8. How does your agency track the changes in mobility performance over time?

Traditionally vehicle hours of delay, currently changing to travel times and reliability

9. If your agency measures total trip time, including factors such as walk or bicycle access, transfer time, or other measures, please describe that measure or procedure below:

No Response

10. Please describe the funding sources and application of funds for programs related to mobility enhancements and/or congestion management/congestion relief in your agency:

Various federal, state and local/regional fund types

11. Over the past five years, on average how much does your agency spend annually on mobility enhancements and/or congestion relief/congestion management?

<b>Less than 1 million (1)</b>	<b>1-5 million (2)</b>	<b>5-20 million (3)</b>	<b>20-50 million (4)</b>	<b>50-100 million (5)</b>	<b>100 million+ (6)</b>
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Congestion Relief/Congestion Management

Mobility Enhancements

X

*Comments:*

12. Over the past five years, on average what percentage of your agency budget is spent annually on mobility enhancements and/or congestion relief/congestion management?

<b>Less than 1% (1)</b>	<b>1-5% (2)</b>	<b>5-10% (3)</b>	<b>10-20% (4)</b>	<b>20-50% (5)</b>	<b>50% + (6)</b>
-----------------------------	---------------------	----------------------	-----------------------	-----------------------	----------------------

Congestion Relief/Congestion Management

Mobility Enhancements

X

*Comments:*

13. If your agency has other budget categories related to mobility enhancements and/or congestion relief/congestion management, please describe them in the space below:

No Response

14. Over the last 5 years, has funding for mobility enhancements and/or congestion relief/congestion management been increasing, stable, or decreasing in your agency?

Stable

15. Does your agency monitor the outcomes from mobility investments after implementation?

No

*Comment:* We are starting with the recent bond funds particularly Corridor Mobility Improvement Account projects, but also local traffic signals and other

16. Does your agency rank or score mobility projects based on performance measures?

Yes

*Comment:* I-Bond, new effort SHOPP

17. How high a priority is a link between mobility performance measures and resource allocation for your agency leadership?

Extremely Important

18. How high a priority is a link between mobility performance measures and resource allocation for your agency staff?

Somewhat Important

19. How would you rate the effectiveness of your current procedures in linking mobility performance measures and resource allocation?

Neutral

20. What are the biggest barriers to a more direct link between mobility performance measures and resource allocation in your agency?

No Response

## Survey 9 – New York DOT

**Respondent Type:** Normal Response

**Collector:** New Link (Web Link)

**Custom Value:** *empty*

**IP Address:** 170.3.8.253

**Response Started:** Thu, 7/17/08 6:19:49 AM

**Response Modified:** Thu, 7/17/08 6:51:28 AM

1. Please provide your name:

Joseph McClean

2. Please provide the agency that you represent (required):

NY State Dept. of Transportation

3. Please provide your telephone number and e-mail address so we can contact you with follow-up questions:

518-457-8534 jmclean@dot.state.ny.us

4. Does your agency have an official definition of mobility?

If yes, please provide the official agency definition - To improve and enhance the movement of people and goods by addressing customers' expectations for network connectivity, accessibility, choice and congestion mitigation. This goal shall apply to all highway and non-highway modes including, but not limited to automobiles, trucks, public transportation, bicycle, pedestrian, ferries, canals, intercity bus, commuter rail, intercity passenger rail, rail freight, aviation and ports that benefit from programs directly administered or sponsored by NYSDOT.

5. What performance measures are used in your agency to evaluate mobility? (check all that apply)

Volume to Capacity Ratio (V/C)

Level of Service

Travel Time

Vehicle Miles Traveled (VMT)

Vehicle Hours Delay

Person Hours of Delay

Freight Hours of Delay

Average Vehicle Occupancy

6. If the performance measure is used, is there a benchmark level set for compliance? If so, please describe the benchmarks your agency uses to measure any of the items in question 5:

Delay is considered as anything less than 85% of the speedlimit. Note Because the V/C formula has no basis in truth (but is used in almost any formula used in the country--we try to calibrate this formula anywhere we have real travel speeds, by hour, by direction, by road segment. Thus we add a factor that will reduce the capacity of a road --so that the v/c formula gives us the proper amount of delay in those cases where the volume is low due to excessive amounts of delay (many of our NY metro area roads in the peak periods).

7. Please check the applicable performance measures your agency collects in different area types:

	<b>Urban</b>	<b>Rural</b>	<b>Corridor</b>	<b>Statewide (All Facilities)</b>	<b>Statewide (Average)</b>
Volume to Capacity Ratio (V/C)				X	
Level of Service					
Travel Time					
Travel Time Variability					
Average Speed					
Average Speed Variability					
Vehicle Miles Traveled (VMT)				X	
Freight Vehicle Miles Traveled (FVMT)					
Person Miles Traveled (PMT)					
Vehicle Hours Traveled (VHT)					
Person Hours Traveled (PHT)					
Freight Vehicle Hours Traveled (FHT)					
Vehicle Hours Delay				X	
Person Hours of Delay				X	
Freight Hours of Delay				X	
Total Trip Time					
Mode Split/Mode Share					

Average Vehicle Occupancy X

Transit Ridership

Park-n-Ride Utilization

Cyclist Volumes

Pedestrian Volumes

*Comments:*

8. How does your agency track the changes in mobility performance over time?

Our statewide congestion model is calibrated and run when requested by the Commissioner.

9. If your agency measures total trip time, including factors such as walk or bicycle access, transfer time, or other measures, please describe that measure or procedure below:

No Response

10. Please describe the funding sources and application of funds for programs related to mobility enhancements and/or congestion management/congestion relief in your agency:

any federal highway source money, state money, any FTA money.

11. Over the past five years, on average how much does your agency spend annually on mobility enhancements and/or congestion relief/congestion management?

	<b>Less than 1 million (1)</b>	<b>1-5 million (2)</b>	<b>5-20 million (3)</b>	<b>20-50 million (4)</b>	<b>50-100 million (5)</b>	<b>100 million+ (6)</b>
Congestion Relief/Congestion Management						X
Mobility Enhancements						X

*Comments:*

12. Over the past five years, on average what percentage of your agency budget is spent annually on mobility enhancements and/or congestion relief/congestion management?

	<b>Less than 1% (1)</b>	<b>1-5% (2)</b>	<b>5-10% (3)</b>	<b>10-20% (4)</b>	<b>20-50% (5)</b>	<b>50% + (6)</b>
Congestion Relief/Congestion Management					X	
Mobility Enhancements					X	



*Comments:*

13. If your agency has other budget categories related to mobility enhancements and/or congestion relief/congestion management, please describe them in the space below:

No Response

14. Over the last 5 years, has funding for mobility enhancements and/or congestion relief/congestion management been increasing, stable, or decreasing in your agency?

Stable

15. Does your agency monitor the outcomes from mobility investments after implementation?

Yes

*Comment:* Not typically, but park-and-ride lot usage is measured monthly, HOV Lane usage same, bridge volumes continuously measured (tolls), some travel speed work is done occasionally.

16. Does your agency rank or score mobility projects based on performance measures?

Yes

*Comment:* Regions are asked to estimate the reduction in VHD, PHD, and Truck Hours of Delay for each project being constructed with the goal of mobility.

17. How high a priority is a link between mobility performance measures and resource allocation for your agency leadership?

Somewhat Important

18. How high a priority is a link between mobility performance measures and resource allocation for your agency staff?

Somewhat Important

19. How would you rate the effectiveness of your current procedures in linking mobility performance measures and resource allocation?

Somewhat Important

20. What are the biggest barriers to a more direct link between mobility performance measures and resource allocation in your agency?

Lack of good post-implementation studies, need for economic development projects and for infrastructure projects. Difficulty in gaining a consensus among the public in developing mobility projects.

## Survey 11 – Metropolitan Transportation Commission

**Respondent Type:** Normal Response

**Collector:** New Link (Web Link)

**Custom Value:** *empty*

**IP Address:** 198.94.158.170

**Response Started:** Fri, 7/18/08 9:04:13 AM

**Response Modified:** Fri, 7/18/08 9:15:03 AM

1. Please provide your name:

Lisa Klein

2. Please provide the agency that you represent (required):

Metropolitan Transportation Commission

3. Please provide your telephone number and e-mail address so we can contact you with follow-up questions:

510.817.5832

4. Does your agency have an official definition of mobility?

No Response

5. What performance measures are used in your agency to evaluate mobility? (check all that apply)

Volume to Capacity Ratio (V/C)

Travel Time

Travel Time Variability

Vehicle Miles Traveled (VMT)

Person Miles Traveled (PMT)

Vehicle Hours Traveled (VHT)

Person Hours Traveled (PHT)

Vehicle Hours Delay

Person Hours of Delay

Mode Split/Mode Share

6. If the performance measure is used, is there a benchmark level set for compliance? If so, please describe the benchmarks your agency uses to measure any of the items in question 5:

We use these measures in our long range transportation plan. We have a stretch target to reduce VMT by 10% per capita by 2035 and reduce delay per capita by 20% by 2035. These are from state plans but are not requirements

7. Please check the applicable performance measures your agency collects in different area types:

	<b>Urban</b>	<b>Rural</b>	<b>Corridor</b>	<b>Statewide (All Facilities)</b>	<b>Statewide (Average)</b>
Volume to Capacity Ratio (V/C)					
Level of Service					
Travel Time					
Travel Time Variability					
Average Speed					
Average Speed Variability					
Vehicle Miles Traveled (VMT)					
Freight Vehicle Miles Traveled (FVMT)					
Person Miles Traveled (PMT)					
Vehicle Hours Traveled (VHT)					
Person Hours Traveled (PHT)					
Freight Vehicle Hours Traveled (FHT)					
Vehicle Hours Delay					X
Person Hours of Delay					
Freight Hours of Delay					
Total Trip Time					
Mode Split/Mode Share					
Average Vehicle Occupancy					
Transit Ridership					
Park-n-Ride Utilization					

Cyclist Volumes

Pedestrian Volumes

*Comments:*

8. How does your agency track the changes in mobility performance over time?

The only field data MTC collects is freeway delay. We assemble and annually report on a variety of the above indicators that are collected by other agencies (e.g., transit ridership, level of service on local roads)

9. If your agency measures total trip time, including factors such as walk or bicycle access, transfer time, or other measures, please describe that measure or procedure below:

No Response

10. Please describe the funding sources and application of funds for programs related to mobility enhancements and/or congestion management/congestion relief in your agency:

Presently we largely use state highway funding for most mobility and congestion relief projects. We use for CMAQ traveler information, incident management and ridesharing. A major proposal in the current long range plan update is to spend more CMAQ on ramp metering and fwy traffic mgmt systems, but this is not yet policy. We also have a dedicated source from veh license fees for incident mgmt.

11. Over the past five years, on average how much does your agency spend annually on mobility enhancements and/or congestion relief/congestion management?

No Response

12. Over the past five years, on average what percentage of your agency budget is spent annually on mobility enhancements and/or congestion relief/congestion management?

No Response

13. If your agency has other budget categories related to mobility enhancements and/or congestion relief/congestion management, please describe them in the space below:

No Response

14. Over the last 5 years, has funding for mobility enhancements and/or congestion relief/congestion management been increasing, stable, or decreasing in your agency?

Stable

15. Does your agency monitor the outcomes from mobility investments after implementation?

No

16. Does your agency rank or score mobility projects based on performance measures?

Yes

*Comment:* We do not score projects for programming. But in the current long range plan update, we have calculated the B/C of some 70 large projects. The dominant factor in B/C is congestion relief

17. How high a priority is a link between mobility performance measures and resource allocation for your agency leadership?

Somewhat Important

18. How high a priority is a link between mobility performance measures and resource allocation for your agency staff?

Neutral

19. How would you rate the effectiveness of your current procedures in linking mobility performance measures and resource allocation?

Neutral

20. What are the biggest barriers to a more direct link between mobility performance measures and resource allocation in your agency?

No Response

## Survey 12 – Texas DOT

**Respondent Type:** Normal Response

**Collector:** New Link (Web Link)

**Custom Value:** *empty*

**IP Address:** 144.45.4.27

**Response Started:** Fri, 7/25/08 11:04:42 AM

**Response Modified:** Tue, 7/29/08 1:02:40 PM

1. Please provide your name:

Chrisy Currier

2. Please provide the agency that you represent (required):

Texas Department of Transportation

3. Please provide your telephone number and e-mail address so we can contact you with follow-up questions:

512-416-2307, ccurri1@dot.state.tx.us

4. Does your agency have an official definition of mobility?

If no, please provide any operating definition of mobility - No. We have a technical definition for our planning division and use the TTI definition for mobility.

5. What performance measures are used in your agency to evaluate mobility? (check all that apply)

Travel Time

Travel Time Variability

6. If the performance measure is used, is there a benchmark level set for compliance? If so, please describe the benchmarks your agency uses to measure any of the items in question 5:

We are in the process of developing performance measures for our strategic plan. Currently, our performance measures are tied to our budget (but not mobility). The Texas Transportation Commission will soon (September?) vote on the following measures related to mobility: Travel Time Index and Congested Peak Travel Time

7. Please check the applicable performance measures your agency collects in different area types:

Urban	Rural	Corridor	Statewide (All Facilities)	Statewide (Average)
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Volume to Capacity Ratio (V/C)

Level of Service

Travel Time	X	X
Travel Time Variability	X	X
Average Speed		
Average Speed Variability		
Vehicle Miles Traveled (VMT)		
Freight Vehicle Miles Traveled (FVMT)		
Person Miles Traveled (PMT)		
Vehicle Hours Traveled (VHT)		
Person Hours Traveled (PHT)		
Freight Vehicle Hours Traveled (FHT)		
Vehicle Hours Delay		
Person Hours of Delay		
Freight Hours of Delay		
Total Trip Time		
Mode Split/Mode Share		
Average Vehicle Occupancy		
Transit Ridership		X
Park-n-Ride Utilization		
Cyclist Volumes		
Pedestrian Volumes		

*Comments:*

8. How does your agency track the changes in mobility performance over time?

Again, we do not currently track, but for the two measures mentioned, we use data collected by the TTI Urban Mobility Report.

9. If your agency measures total trip time, including factors such as walk or bicycle access, transfer time, or other measures, please describe that measure or procedure below:

N/A

10. Please describe the funding sources and application of funds for programs related to mobility enhancements and/or congestion management/congestion relief in your agency:

This would be better answered by someone from our planning division, but some sources are federal reimbursements, state highway fund and bond proceeds from the Texas Mobility Fund. Janie Temple Transportation Analysis Branch Manager TxDOT - Planning and Programming Division P - (512) 486-5107 jtempl1@dot.state.tx.us

11. Over the past five years, on average how much does your agency spend annually on mobility enhancements and/or congestion relief/congestion management?

	<b>Less than 1 million (1)</b>	<b>1-5 million (2)</b>	<b>5-20 million (3)</b>	<b>20-50 million (4)</b>	<b>50-100 million (5)</b>	<b>100 million+ (6)</b>
Congestion Relief/Congestion Management						X
Mobility Enhancements						X

*Comments:*

12. Over the past five years, on average what percentage of your agency budget is spent annually on mobility enhancements and/or congestion relief/congestion management?

	<b>Less than 1% (1)</b>	<b>1-5% (2)</b>	<b>5-10% (3)</b>	<b>10-20% (4)</b>	<b>20-50% (5)</b>	<b>50% + (6)</b>
Congestion Relief/Congestion Management					X	
Mobility Enhancements					X	

*Comments:*

13. If your agency has other budget categories related to mobility enhancements and/or congestion relief/congestion management, please describe them in the space below:

No Response

14. Over the last 5 years, has funding for mobility enhancements and/or congestion relief/congestion management been increasing, stable, or decreasing in your agency?

Decreasing

15. Does your agency monitor the outcomes from mobility investments after implementation?



No

16. Does your agency rank or score mobility projects based on performance measures?

No

17. How high a priority is a link between mobility performance measures and resource allocation for your agency leadership?

Neutral

18. How high a priority is a link between mobility performance measures and resource allocation for your agency staff?

Neutral

19. How would you rate the effectiveness of your current procedures in linking mobility performance measures and resource allocation?

Not at All

20. What are the biggest barriers to a more direct link between mobility performance measures and resource allocation in your agency?

Our resource allocation is approved by the legislature and we have little control over how much money is provided towards mobility. Currently, more of our money is going towards maintaining what we currently have, versus building new capacity to deal with mobility problems. I marked neutral for the questions above because we do not currently have accurate performance measures but we are trying to implement them in the next two years.

## Survey 13 – New Mexico DOT

**Respondent Type:** Normal Response

**Collector:** New Link (Web Link)

**Custom Value:** *empty*

**IP Address:** 164.64.74.45

**Response Started:** Tue, 7/29/08 2:32:39 PM

**Response Modified:** Wed, 7/30/08 3:17:33 PM

1. Please provide your name:

Patricia Oliver-Wright

2. Please provide the agency that you represent (required):

NMDOT

3. Please provide your telephone number and e-mail address so we can contact you with follow-up questions:

505-827-5562

4. Does your agency have an official definition of mobility?

No Response

5. What performance measures are used in your agency to evaluate mobility? (check all that apply)

Volume to Capacity Ratio (V/C)

Level of Service

Travel Time

Average Speed

Vehicle Miles Traveled (VMT)

Vehicle Hours Traveled (VHT)

Vehicle Hours Delay

Average Vehicle Occupancy

Transit Ridership

Park-n-Ride Utilization

6. If the performance measure is used, is there a benchmark level set for compliance? If so, please describe the benchmarks your agency uses to measure any of the items in question 5:

Benchmarks are from FHWA level of service requirements for projects-used in corridor studies

only.

7. Please check the applicable performance measures your agency collects in different area types:

	<b>Urban</b>	<b>Rural</b>	<b>Corridor</b>	<b>Statewide (All Facilities)</b>	<b>Statewide (Average)</b>
Volume to Capacity Ratio (V/C)			X		
Level of Service			X		
Travel Time					
Travel Time Variability					
Average Speed			X		
Average Speed Variability					
Vehicle Miles Traveled (VMT)					X
Freight Vehicle Miles Traveled (FVMT)					
Person Miles Traveled (PMT)					
Vehicle Hours Traveled (VHT)					
Person Hours Traveled (PHT)					
Freight Vehicle Hours Traveled (FHT)					
Vehicle Hours Delay			X		
Person Hours of Delay					
Freight Hours of Delay					
Total Trip Time					
Mode Split/Mode Share					
Average Vehicle Occupancy					
Transit Ridership				X	
Park-n-Ride Utilization				X	
Cyclist Volumes	X				
Pedestrian Volumes	X				

*Comments:*

8. How does your agency track the changes in mobility performance over time?

Vehicle miles traveled are analyzed on an annual basis and compared to the 15 year history. Planning has also been tracking the permanent traffic count locations to compare month to month variations in VMT with the increases in fuel costs.

9. If your agency measures total trip time, including factors such as walk or bicycle access, transfer time, or other measures, please describe that measure or procedure below:

No Response

10. Please describe the funding sources and application of funds for programs related to mobility enhancements and/or congestion management/congestion relief in your agency:

The Albuquerque MPO through the Mid Region Council of Governments develops a Congestion Management Plan using PL funds.

11. Over the past five years, on average how much does your agency spend annually on mobility enhancements and/or congestion relief/congestion management?

No Response

12. Over the past five years, on average what percentage of your agency budget is spent annually on mobility enhancements and/or congestion relief/congestion management?

No Response

13. If your agency has other budget categories related to mobility enhancements and/or congestion relief/congestion management, please describe them in the space below:

No Response

14. Over the last 5 years, has funding for mobility enhancements and/or congestion relief/congestion management been increasing, stable, or decreasing in your agency?

No Response

15. Does your agency monitor the outcomes from mobility investments after implementation?

No

16. Does your agency rank or score mobility projects based on performance measures?

No Response

17. How high a priority is a link between mobility performance measures and resource allocation for your agency leadership?

No Response

18. How high a priority is a link between mobility performance measures and resource allocation for your agency staff?

No Response

19. How would you rate the effectiveness of your current procedures in linking mobility performance measures and resource allocation?

No Response

20. What are the biggest barriers to a more direct link between mobility performance measures and resource allocation in your agency?

No Response

## Survey 14 – Delaware DOT

**Respondent Type:** Normal Response

**Collector:** New Link (Web Link)

**Custom Value:** *empty*

**IP Address:** 167.21.1.225

**Response Started:** Thu, 8/14/08 4:23:07 AM

**Response Modified:** Thu, 8/14/08 4:27:17 AM

1. Please provide your name:

Teresa Gardner

2. Please provide the agency that you represent (required):

DelDOT

3. Please provide your telephone number and e-mail address so we can contact you with follow-up questions:

302-760-2458 teresa.gardner@state.de.us

4. Does your agency have an official definition of mobility?

If yes, please provide the official agency definition - none

If no, please provide any operating definition of mobility - none

5. What performance measures are used in your agency to evaluate mobility? (check all that apply)

No Response

6. If the performance measure is used, is there a benchmark level set for compliance? If so, please describe the benchmarks your agency uses to measure any of the items in question 5:

No Response

7. Please check the applicable performance measures your agency collects in different area types:

	<b>Urban</b>	<b>Rural</b>	<b>Corridor</b>	<b>Statewide (All Facilities)</b>	<b>Statewide (Average)</b>
Volume to Capacity Ratio (V/C)					
Level of Service					
Travel Time	X		X		
Travel Time Variability					

Average Speed			
Average Speed Variability			
Vehicle Miles Traveled (VMT)	X	X	X
Freight Vehicle Miles Traveled (FVMT)			
Person Miles Traveled (PMT)			
Vehicle Hours Traveled (VHT)			
Person Hours Traveled (PHT)			
Freight Vehicle Hours Traveled (FHT)			
Vehicle Hours Delay			
Person Hours of Delay			
Freight Hours of Delay			
Total Trip Time			
Mode Split/Mode Share			
Average Vehicle Occupancy			
Transit Ridership	X		X
Park-n-Ride Utilization			
Cyclist Volumes			
Pedestrian Volumes			

*Comments:*

8. How does your agency track the changes in mobility performance over time?

We don't presently.

9. If your agency measures total trip time, including factors such as walk or bicycle access, transfer time, or other measures, please describe that measure or procedure below:

No Response

10. Please describe the funding sources and application of funds for programs related to mobility enhancements and/or congestion management/congestion relief in your agency:

State and Federal

11. Over the past five years, on average how much does your agency spend annually on mobility enhancements and/or congestion relief/congestion management?

	<b>Less than 1 million (1)</b>	<b>1-5 million (2)</b>	<b>5-20 million (3)</b>	<b>20-50 million (4)</b>	<b>50-100 million (5)</b>	<b>100 million+ (6)</b>
Congestion Relief/Congestion Management		X				
Mobility Enhancements		X				

*Comments:*

12. Over the past five years, on average what percentage of your agency budget is spent annually on mobility enhancements and/or congestion relief/congestion management?

	<b>Less than 1% (1)</b>	<b>1-5% (2)</b>	<b>5-10% (3)</b>	<b>10-20% (4)</b>	<b>20-50% (5)</b>	<b>50% + (6)</b>
Congestion Relief/Congestion Management					X	
Mobility Enhancements				X		

*Comments:*

13. If your agency has other budget categories related to mobility enhancements and/or congestion relief/congestion management, please describe them in the space below:

No Response

14. Over the last 5 years, has funding for mobility enhancements and/or congestion relief/congestion management been increasing, stable, or decreasing in your agency?

Decreasing

15. Does your agency monitor the outcomes from mobility investments after implementation?

No

16. Does your agency rank or score mobility projects based on performance measures?

No

17. How high a priority is a link between mobility performance measures and resource allocation for your agency leadership?



Neutral

18. How high a priority is a link between mobility performance measures and resource allocation for your agency staff?

Neutral

19. How would you rate the effectiveness of your current procedures in linking mobility performance measures and resource allocation?

Not at All

20. What are the biggest barriers to a more direct link between mobility performance measures and resource allocation in your agency?

No Response

# **CDOT Mobility Study**

April 2008

Survey Responses



## RESPONSE 7 - Washington DOT

**Respondent Type:** Normal Response

**Collector:** New Link (Web Link)

**Custom Value:** *empty*

**IP Address:** 164.110.157.70

**Response Started:** Wed, 4/2/08 10:53:00 AM

**Response Modified:** Wed, 4/2/08 11:03:18 AM

1. If your agency has a formal definition of mobility, please write that definition below:

From the Washington Transportation Plan 2007-2026: Mobility— Facilitate movement of people and goods to contribute to a strong economy and a better quality of life for citizens. WSDOT manages congestion relief using a three prong strategy: 1. Manage Demand, 2. Operate Efficiently, and 3. Add Capacity Strategically.

2. What performance measures are used in your agency to evaluate mobility? (check all that apply)

Travel Time

Travel Time Variability

Vehicle Miles Traveled (VMT)

Vehicle Hours Delay

*Comment:* Additional Measures: Lost Throughput Productivity (Vehicle Throughput), 95% Reliable Travel Times, Maximum Throughput Travel Time Index, Person Throughput (HOV), HOV Lane Reliability (HOV lane should maintain a speed of 45 mph or more 90% of the time), Before and After Analysis of Mobility Projects.

3. If the performance measure is used, is there a benchmark level set for compliance? If so, please describe the benchmarks your agency uses to measure any of the items in question 2:

WSDOT aims at providing and maintaining a system that yields the most productivity (or efficiency) versus providing a free flowing system where not as many vehicles are passing through a segment during peak travel periods. From the perspective of operating the highway system as efficiently as possible, speeds at which the most vehicles can move through a highway segment (maximum throughput) is the most meaningful basis of measurement for WSDOT's management needs. Maximum throughput is achieved when vehicles slow to a range between 42 and 51 MPH (70-85% of the posted speed of 60 MPH), which results in less space between vehicles than what is observed at posted speeds. WSDOT's Congestion Thresholds based on a posted speed of 60 MPH: 1. Posted Speed: 52 mph or above (85% of posted speed or higher); 2. Maximum Throughput: 42-51 MPH (70%-85% of posted speed); 3. Congestion: 35 - 41 mph (60-70% of posted speed); 4. Severe Congestion: 35 mph or below (Less than 60% of posted speed).

4. Please check the applicable performance measures your agency collects in different area types:

	<b>Urban (1)</b>	<b>Rural (2)</b>	<b>Corridor (3)</b>	<b>Statewide (All Facilities) (4)</b>	<b>Statewide (Average) (5)</b>	<b>N/A (0)</b>
Volume to Capacity Ratio (V/C)						
Level of Service						
Travel Time	X					
Travel Time Variability	X					
Average Speed						
Average Speed Variability						
Vehicle Miles Traveled (VMT)				X		
Freight Vehicle Miles Traveled (FVMT)						
Person Miles Traveled (PMT)						
Vehicle Hours Traveled (VHT)						
Person Hours Traveled (PHT)						
Freight Vehicle Hours Traveled (FHT)						
Vehicle Hours Delay				X		
Person Hours of Delay						
Freight Hours of Delay						

Total Trip Time

Mode Split/Mode  
Share

Average Vehicle  
Occupancy

Transit Ridership

Park-n-Ride  
Utilization

Cyclist Volumes

Pedestrian  
Volumes

*Comments:* Concerning the measures reported in the annual Congestion Report, data is analyzed to measure highway congestion on the 38 most congested commute routes in the Puget Sound region (urban) and two in Spokane (urban). Measures reported on include: Travel Times, 95% Reliable Travel Times, Percent of Days that Speeds Fall Below 35 mph (Severe Congestion), Maximum Throughput Travel Time Index (MT<sup>3</sup>I), Lost Throughput Productivity (Vehicle Throughput), Delay, Person Throughput (HOV Lane Performance), HOV Lane Reliability, and Before and After Analysis for Mobility Projects. WSDOT archives real-time data for 52 commute routes in the Puget Sound region and 2 in Spokane. In the Puget Sound region, data is collected from over 5,000 loop detectors embedded in the pavement of the 709 center lane miles.

5. How does your agency track the changes in mobility performance over time?

WSDOT's annual Congestion Report is part of the Gray Notebook-- the agency's comprehensive performance report. WSDOT archives real-time data for 52 commute routes in the Puget Sound region and 2 in Spokane. In the Puget Sound region, data is collected from over 5,000 loop detectors embedded in the pavement of the 709 center lane miles. For the annual Congestion Report, data is analyzed to measure highway congestion on the 38 most congested commute routes in the Puget Sound region and 2 in Spokane. Measures reported on include: Travel Times, 95% Reliable Travel Times, Percent of Days that Speeds Fall Below 35 mph (Severe Congestion), Maximum Throughput Travel Time Index (MT<sup>3</sup>I), Lost Throughput Productivity (Vehicle Throughput), Delay, Person Throughput (HOV Lane Performance), HOV Lane Reliability, and Before and After Analysis for Congestion Projects. Currently available data is typically compared to data from two years prior, for example the 2007 Congestion Report presented 2006 data as compared to 2004 data. The 2007 report can be found at: [http://www.wsdot.wa.gov/NR/rdonlyres/27821903-A307-4549-ADCA-8767BC451680/0/2007\\_Congestion\\_Report.pdf](http://www.wsdot.wa.gov/NR/rdonlyres/27821903-A307-4549-ADCA-8767BC451680/0/2007_Congestion_Report.pdf)

6. If your agency measures total trip time, including factors such as walk or bicycle access, transfer time, or other measures, please describe that measure or procedure below:

N/A

7. Please describe the funding sources and application of funds for programs related to mobility enhancements and/or congestion management/congestion relief in your agency:

WSDOT is using state funds from a 2003 and 2005 transportation revenue packages to fund its' mobility enhancements and congestion relief projects. WSDOT has no plans to use federal funds in the future for this type of work.

8. Over the past five years, on average how much does your agency spend annually on mobility enhancements and/or congestion relief/congestion management?

<b>Less than 1 million (1)</b>	<b>1-5 million (2)</b>	<b>5-20 million (3)</b>	<b>20-50 million (4)</b>	<b>50-100 million (5)</b>	<b>100 million+ (6)</b>
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Congestion Relief/Congestion Management

Mobility Enhancements X

*Comments:* The 2007-09 Biennial Transportation Capital Budget allocated approximately \$2.5 billion for mobility projects. Traffic Operations was allocated \$25 million from the Capital Budget and \$54 million from the Operating Budget for the 2007-09 Biennium. Public Transportation/CTR was allocated \$128 million in the 2007-09 Biennium.

9. Over the past five years, on average what percentage of your agency budget is spent annually on mobility enhancements and/or congestion relief/congestion management?

<b>Less than 1% (1)</b>	<b>1-5% (2)</b>	<b>5-10% (3)</b>	<b>10-20% (4)</b>	<b>20-50% (5)</b>	<b>50% + (6)</b>
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Congestion Relief/Congestion Management

Mobility Enhancements X

*Comments:* Roughly 50%+ for Capital Improvements for the 2007-09 Biennium; roughly 14% from the Operating Budget (2007-09 Biennium).

10. If your agency has other budget categories related to mobility enhancements and/or congestion relief/congestion management, please describe them in the space below:

Highway Traffic Operations; Public Transportation; Highway Improvements

11. Over the last 5 years, has funding for mobility enhancements and/or congestion relief/congestion management been increasing, stable, or decreasing in your agency?

Increasing

12. Does your agency monitor the outcomes from mobility investments after implementation? If so, briefly describe the process below or provide a link to more information:

WSDOT has just implemented a process to monitor the Before and After values of a) travel times and b) maximum throughput for each of its mobility/congestion relief projects. WSDOT's annual Congestion Report includes Before and After Analysis for selected mobility projects.

13. Does your agency rank or score mobility projects based on performance measures? If so, briefly describe the process below or provide a link to more information.

WSDOT uses Mobility Program Prioritization Process (MP3) which can be found here:  
<http://www.wsdot.wa.gov/mapsdata/tdo/mobility.htm>

14. How high a priority is a link between mobility performance measures and resource allocation for your agency leadership (one being the most important, five being the least important)?

**1 (1)      2 (2)      3 (3)      4 (4)      5 (5)**

Not at All  
Not Very Important  
Neutral  
Somewhat Important  
Extremely Important

X

*Comments:*

15. How high a priority is a link between mobility performance measures and resource allocation for your agency staff (one being the most important, five being the least important)?

**1 (1)      2 (2)      3 (3)      4 (4)      5 (5)**

Not at All  
Not Very Important  
Neutral  
Somewhat Important  
Extremely Important

X

*Comments:*

16. How would you rate the effectiveness of your current procedures in linking mobility performance measures and resource allocation (one being the most important, five being the least important)?

**1 (1)      2 (2)      3 (3)      4 (4)      5 (5)**

Not at All

Not Very Important

Neutral

Somewhat Important

Extremely Important X

*Comments:*

17. What are the biggest barriers to a more direct link between mobility performance measures and resource allocation in your agency?

Analysis limitations (causal relationships, cause and effect cannot be precisely measured for all deployed strategies); many variables impact mobility outside agency control; not enough system data outside the instrumented regions; funding shortages.



## RESPONSE 8 - Oregon DOT

**Respondent Type:** Normal Response

**Collector:** New Link (Web Link)

**Custom Value:** *empty*

**IP Address:** 167.131.0.194

**Response Started:** Thu, 4/3/08 8:13:47 AM

**Response Modified:** Thu, 4/3/08 12:52:43 PM

1. If your agency has a formal definition of mobility, please write that definition below:

The ability to move people and goods to destinations quickly. (from the 2006 Oregon Transportation Plan)

2. What performance measures are used in your agency to evaluate mobility? (check all that apply)

Volume to Capacity Ratio (V/C)

Travel Time

Average Speed

Average Speed Variability

Vehicle Miles Traveled (VMT)

Vehicle Hours Traveled (VHT)

Vehicle Hours Delay

Mode Split/Mode Share

*Comment:* Travel Cost Index, VMT per lane mile

3. If the performance measure is used, is there a benchmark level set for compliance? If so, please describe the benchmarks your agency uses to measure any of the items in question 2:

Benchmarks are only set for V/C and delay. The V/C standards are formalized in the 1999 Oregon Highway Plan. They are the standards for determining adequacy of state highways for supporting local land use changes. The delay measure (annual hours of delay per capita) is a benchmark that is reported for the metropolitan areas in the state. Other measures are used in various contexts, but have no defined benchmarks.

4. Please check the applicable performance measures your agency collects in different area types:

	<b>Urban (1)</b>	<b>Rural (2)</b>	<b>Corridor (3)</b>	<b>Statewide (All Facilities) (4)</b>	<b>Statewide (Average) (5)</b>	<b>N/A (0)</b>
Volume to Capacity Ratio (V/C)					X	

Level of Service		
Travel Time		X
Travel Time Variability		
Average Speed		X
Average Speed Variability	X	
Vehicle Miles Traveled (VMT)		X
Freight Vehicle Miles Traveled (FVMT)		
Person Miles Traveled (PMT)		
Vehicle Hours Traveled (VHT)		X
Person Hours Traveled (PHT)		
Freight Vehicle Hours Traveled (FHT)		
Vehicle Hours Delay		X
Person Hours of Delay		
Freight Hours of Delay		
Total Trip Time		
Mode Split/Mode Share	X	
Average Vehicle Occupancy		
Transit Ridership		
Park-n-Ride Utilization		
Cyclist Volumes		
Pedestrian Volumes		

*Comments:* I have checked "Other" for measures that are used in multiple contexts.

5. How does your agency track the changes in mobility performance over time?

We publish a state report "Statewide Congestion Overview for Oregon" about every 5 years which describes the statewide trends. We also report the time series data developed by the Urban Mobility Study and measures we derive from the study.

6. If your agency measures total trip time, including factors such as walk or bicycle access, transfer time, or other measures, please describe that measure or procedure below:

Our time measures that address all modes are estimated from travel models.

7. Please describe the funding sources and application of funds for programs related to mobility enhancements and/or congestion management/congestion relief in your agency:

No Response

8. Over the past five years, on average how much does your agency spend annually on mobility enhancements and/or congestion relief/congestion management?

No Response

9. Over the past five years, on average what percentage of your agency budget is spent annually on mobility enhancements and/or congestion relief/congestion management?

No Response

10. If your agency has other budget categories related to mobility enhancements and/or congestion relief/congestion management, please describe them in the space below:

No Response

11. Over the last 5 years, has funding for mobility enhancements and/or congestion relief/congestion management been increasing, stable, or decreasing in your agency?

No Response

12. Does your agency monitor the outcomes from mobility investments after implementation? If so, briefly describe the process below or provide a link to more information:

No Response

13. Does your agency rank or score mobility projects based on performance measures? If so, briefly describe the process below or provide a link to more information.

No Response

14. How high a priority is a link between mobility performance measures and resource allocation for your agency leadership (one being the most important, five being the least important)?

No Response

15. How high a priority is a link between mobility performance measures and resource allocation for your agency staff (one being the most important, five being the least important)?

No Response

16. How would you rate the effectiveness of your current procedures in linking mobility performance measures and resource allocation (one being the most important, five being the least important)?

No Response

17. What are the biggest barriers to a more direct link between mobility performance measures and resource allocation in your agency?

No Response

## RESPONSE 10 - Ohio DOT

**Respondent Type:** Normal Response

**Collector:** New Link (Web Link)

**Custom Value:** *empty*

**IP Address:** 156.63.133.8

**Response Started:** Fri, 4/25/08 5:50:41 AM

**Response Modified:** Fri, 4/25/08 7:28:39 AM

1. If your agency has a formal definition of mobility, please write that definition below:

Mobility is about movement - the ability to get from one place to another. For Ohio, the ideal rate of mobility is to be able to travel at the highest legal speed limit, unencumbered by delays due to traffic congestion, roadway geometries (curvatures and grades), and reduced speed zones. These high level facilities are typically in the form of Interstates and freeways. When making a trip, the amount of time it would take to travel the desired distance at 65 MPH is shown as 100 percent mobility. Any delays encountered such as other traffic, signals, or roadway characteristics would add time to the length of the trip and reduce the percentage of the trip that would be completed in the time it would take to arrive when traveling at a rate of 65 MPH.

2. What performance measures are used in your agency to evaluate mobility? (check all that apply)

Volume to Capacity Ratio (V/C)

Level of Service

Vehicle Miles Traveled (VMT)

Freight Vehicle Miles Traveled (FVMT)

Vehicle Hours Traveled (VHT)

Vehicle Hours Delay

Person Hours of Delay

3. If the performance measure is used, is there a benchmark level set for compliance? If so, please describe the benchmarks your agency uses to measure any of the items in question 2:

V/C < 0.9 = Not Congested

4. Please check the applicable performance measures your agency collects in different area types:

	<b>Urban (1)</b>	<b>Rural (2)</b>	<b>Corridor (3)</b>	<b>Statewide (All Facilities) (4)</b>	<b>Statewide (Average) (5)</b>	<b>N/A (0)</b>
Volume to Capacity Ratio (V/C)				X		
Level of Service				X		

Travel Time	
Travel Time Variability	
Average Speed	X
Average Speed Variability	
Vehicle Miles Traveled (VMT)	X
Freight Vehicle Miles Traveled (FVMT)	X
Person Miles Traveled (PMT)	
Vehicle Hours Traveled (VHT)	X
Person Hours Traveled (PHT)	
Freight Vehicle Hours Traveled (FHT)	
Vehicle Hours Delay	X
Person Hours of Delay	
Freight Hours of Delay	X
Total Trip Time	
Mode Split/Mode Share	
Average Vehicle Occupancy	
Transit Ridership	X
Park-n-Ride Utilization	
Cyclist Volumes	
Pedestrian Volumes	

*Comments:*

5. How does your agency track the changes in mobility performance over time?

Annual traffic count program and automatic traffic data recorders revise traffic volumes. Annual

roadway information updates revise roadway capacities. The annual statewide congestion analysis recomputes V/C for all roadway segments among interstates, US routes and state highways.

6. If your agency measures total trip time, including factors such as walk or bicycle access, transfer time, or other measures, please describe that measure or procedure below:

This has only been done as part of specialized surveys for traffic demand model updates.

7. Please describe the funding sources and application of funds for programs related to mobility enhancements and/or congestion management/congestion relief in your agency:

Primairly CMAQ

8. Over the past five years, on average how much does your agency spend annually on mobility enhancements and/or congestion relief/congestion management?

	<b>Less than 1 million (1)</b>	<b>1-5 million (2)</b>	<b>5-20 million (3)</b>	<b>20-50 million (4)</b>	<b>50-100 million (5)</b>	<b>100 million+ (6)</b>
Congestion Relief/Congestion Management			X			
Mobility Enhancements			X			

*Comments:*

9. Over the past five years, on average what percentage of your agency budget is spent annually on mobility enhancements and/or congestion relief/congestion management?

	<b>Less than 1% (1)</b>	<b>1-5% (2)</b>	<b>5-10% (3)</b>	<b>10-20% (4)</b>	<b>20-50% (5)</b>	<b>50% + (6)</b>
Congestion Relief/Congestion Management		X				
Mobility Enhancements		X				

*Comments:*

10. If your agency has other budget categories related to mobility enhancements and/or congestion relief/congestion management, please describe them in the space below:

ITS, Rideshare, Park N Ride, Freeway Service Patrols

11. Over the last 5 years, has funding for mobility enhancements and/or congestion relief/congestion management been increasing, stable, or decreasing in your agency?

Increasing

12. Does your agency monitor the outcomes from mobility investments after implementation? If so, briefly describe the process below or provide a link to more information:

No

13. Does your agency rank or score mobility projects based on performance measures? If so, briefly describe the process below or provide a link to more information.

V/C is used as one of the ranking criteria for identifying and selecting major new investments, safety improvements, ITS and freeway service patrol projects.

14. How high a priority is a link between mobility performance measures and resource allocation for your agency leadership (one being the most important, five being the least important)?

**1 (1)    2 (2)    3 (3)    4 (4)    5 (5)**

Not at All

Not Very Important

Neutral

Somewhat Important

X

Extremely Important

*Comments:*

15. How high a priority is a link between mobility performance measures and resource allocation for your agency staff (one being the most important, five being the least important)?

**1 (1)    2 (2)    3 (3)    4 (4)    5 (5)**

Not at All

Not Very Important

Neutral

Somewhat Important

X

Extremely Important

*Comments:*

16. How would you rate the effectiveness of your current procedures in linking mobility performance measures and resource allocation (one being the most important, five being the least important)?

**1 (1)    2 (2)    3 (3)    4 (4)    5 (5)**

Not at All



Not Very Important

Neutral

Somewhat Important

X

Extremely Important

*Comments:*

17. What are the biggest barriers to a more direct link between mobility performance measures and resource allocation in your agency?

Widespread availability of better data relating to travel time and user delay.

## Response 11 – Missouri DOT

**Respondent Type:** Normal Response

**Collector:** New Link (Web Link)

**Custom Value:** *empty*

**IP Address:** 168.166.124.100

**Response Started:** Wed, 4/30/08 8:26:32 AM

**Response Modified:** Wed, 4/30/08 8:39:08 AM

1. If your agency has a formal definition of mobility, please write that definition below:

No formal definition. For purposes of this survey, I have focused on uninterrupted traffic flow.

2. What performance measures are used in your agency to evaluate mobility? (check all that apply)

Volume to Capacity Ratio (V/C)

Level of Service

Travel Time

Travel Time Variability

Average Speed

Average Speed Variability

Vehicle Miles Traveled (VMT)

Freight Vehicle Miles Traveled (FVMT)

Average Vehicle Occupancy

Transit Ridership

Park-n-Ride Utilization

3. If the performance measure is used, is there a benchmark level set for compliance? If so, please describe the benchmarks your agency uses to measure any of the items in question 2:

No Response

4. Please check the applicable performance measures your agency collects in different area types:

	<b>Urban (1)</b>	<b>Rural (2)</b>	<b>Corridor (3)</b>	<b>Statewide (All Facilities) (4)</b>	<b>Statewide (Average) (5)</b>	<b>N/A (0)</b>
Volume to Capacity Ratio (V/C)				X		
Level of Service				X		

Travel Time	X		
Travel Time Variability	X		
Average Speed			X
Average Speed Variability	X		
Vehicle Miles Traveled (VMT)			X
Freight Vehicle Miles Traveled (FVMT)			X
Person Miles Traveled (PMT)			
Vehicle Hours Traveled (VHT)			
Person Hours Traveled (PHT)			
Freight Vehicle Hours Traveled (FHT)			
Vehicle Hours Delay			
Person Hours of Delay			
Freight Hours of Delay			
Total Trip Time			
Mode Split/Mode Share			
Average Vehicle Occupancy		X	
Transit Ridership			X
Park-n-Ride Utilization	X		
Cyclist Volumes			
Pedestrian Volumes			

*Comments:* All measures indicated as other collect, statewide, urban and rural.

5. How does your agency track the changes in mobility performance over time?

MoDOT tracks several measures related to uninterrupted traffic flow over time. These measures can be found in MoDOT's performance measurement document, TRACKER, located on our website at [www.modot.mo.gov](http://www.modot.mo.gov)

6. If your agency measures total trip time, including factors such as walk or bicycle access, transfer time, or other measures, please describe that measure or procedure below:

no

7. Please describe the funding sources and application of funds for programs related to mobility enhancements and/or congestion management/congestion relief in your agency:

Federal STP, state funds, local funds

8. Over the past five years, on average how much does your agency spend annually on mobility enhancements and/or congestion relief/congestion management?

	<b>Less than 1 million (1)</b>	<b>1-5 million (2)</b>	<b>5-20 million (3)</b>	<b>20-50 million (4)</b>	<b>50-100 million (5)</b>	<b>100 million+ (6)</b>
Congestion Relief/Congestion Management						
Mobility Enhancements			X			

*Comments:*

9. Over the past five years, on average what percentage of your agency budget is spent annually on mobility enhancements and/or congestion relief/congestion management?

	<b>Less than 1% (1)</b>	<b>1-5% (2)</b>	<b>5-10% (3)</b>	<b>10-20% (4)</b>	<b>20-50% (5)</b>	<b>50% + (6)</b>
Congestion Relief/Congestion Management						
Mobility Enhancements			X			

*Comments:*

10. If your agency has other budget categories related to mobility enhancements and/or congestion relief/congestion management, please describe them in the space below:

No Response

11. Over the last 5 years, has funding for mobility enhancements and/or congestion relief/congestion management been increasing, stable, or decreasing in your agency?

Stable

12. Does your agency monitor the outcomes from mobility investments after implementation? If so, briefly describe the process below or provide a link to more information:

MoDOT tracks several specific sights as found in its TRACKER performance document locate at: [www.modot.mo.gov](http://www.modot.mo.gov)

13. Does your agency rank or score mobility projects based on performance measures? If so, briefly describe the process below or provide a link to more information.

All projects are prioritized based on a variety of factors - including mobility and congestion sfactors such as v/c ratio, vmt...

14. How high a priority is a link between mobility performance measures and resource allocation for your agency leadership (one being the most important, five being the least important)?

**1 (1)      2 (2)      3 (3)      4 (4)      5 (5)**

Not at All

Not Very Important

Neutral

Somewhat Important

X

Extremely Important

*Comments:*

15. How high a priority is a link between mobility performance measures and resource allocation for your agency staff (one being the most important, five being the least important)?

**1 (1)      2 (2)      3 (3)      4 (4)      5 (5)**

Not at All

Not Very Important

Neutral

Somewhat Important

X

Extremely Important

*Comments:*

16. How would you rate the effectiveness of your current procedures in linking mobility performance measures and resource allocation (one being the most important, five being the least important)?

**1 (1)      2 (2)      3 (3)      4 (4)      5 (5)**

Not at All

Not Very Important

Neutral

X

Somewhat Important

Extremely Important

*Comments:*

17. What are the biggest barriers to a more direct link between mobility performance measures and resource allocation in your agency?

No Response

## RESPONSE 14 - Virginia DOT

**Respondent Type:** Normal Response

**Collector:** New Link (Web Link)

**Custom Value:** *empty*

**IP Address:** 198.176.41.2

**Response Started:** Fri, 5/9/08 11:19:06 AM

**Response Modified:** Fri, 5/9/08 12:28:57 PM

1. If your agency has a formal definition of mobility, please write that definition below:

Mobility, Connectivity, and Accessibility - To facilitate the easy movement of people and goods (Mobility), improve interconnectivity of regions and activity centers (Connectivity), and provide access to different modes of transportation (Accessibility).

2. What performance measures are used in your agency to evaluate mobility? (check all that apply)

Level of Service

Travel Time

Average Speed

Vehicle Miles Traveled (VMT)

Vehicle Hours Delay

Mode Split/Mode Share

*Comment:* Public Transportation Trips Per Capita, HOV use, % congested miles, Number of Enplanements at Air Carrier Airports, TEUs Shipped Through the Port of Virginia

3. If the performance measure is used, is there a benchmark level set for compliance? If so, please describe the benchmarks your agency uses to measure any of the items in question 2:

No Response

4. Please check the applicable performance measures your agency collects in different area types:

	<b>Urban (1)</b>	<b>Rural (2)</b>	<b>Corridor (3)</b>	<b>Statewide (All Facilities) (4)</b>	<b>Statewide (Average) (5)</b>	<b>N/A (0)</b>
Volume to Capacity Ratio (V/C)						
Level of Service				X		
Travel Time			X			
Travel Time Variability						

Average Speed		X
Average Speed Variability		X
Vehicle Miles Traveled (VMT)		X
Freight Vehicle Miles Traveled (FVMT)		
Person Miles Traveled (PMT)		
Vehicle Hours Traveled (VHT)		
Person Hours Traveled (PHT)		
Freight Vehicle Hours Traveled (FHT)		
Vehicle Hours Delay		X
Person Hours of Delay		
Freight Hours of Delay		
Total Trip Time		
Mode Split/Mode Share		X
Average Vehicle Occupancy		
Transit Ridership	X	
Park-n-Ride Utilization		
Cyclist Volumes		
Pedestrian Volumes		

*Comments:*

5. How does your agency track the changes in mobility performance over time?

Most noted above are from sensors in/along the road. They provide daily/continuous data. Transit ridership comes for another agency. I'm not sure how they collect that data

6. If your agency measures total trip time, including factors such as walk or bicycle access, transfer time, or other measures, please describe that measure or procedure below:



No Response

7. Please describe the funding sources and application of funds for programs related to mobility enhancements and/or congestion management/congestion relief in your agency:

Primarily State and federal construction funds. Federal includes CMAQ, NHS, STP and other types.

8. Over the past five years, on average how much does your agency spend annually on mobility enhancements and/or congestion relief/congestion management?

	<b>Less than 1 million (1)</b>	<b>1-5 million (2)</b>	<b>5-20 million (3)</b>	<b>20-50 million (4)</b>	<b>50-100 million (5)</b>	<b>100 million+ (6)</b>
Congestion Relief/Congestion Management				X		

Mobility Enhancements

*Comments:* I'm not actually sure. I'm not the right person to answer this

9. Over the past five years, on average what percentage of your agency budget is spent annually on mobility enhancements and/or congestion relief/congestion management?

	<b>Less than 1% (1)</b>	<b>1-5% (2)</b>	<b>5-10% (3)</b>	<b>10-20% (4)</b>	<b>20-50% (5)</b>	<b>50% + (6)</b>
Congestion Relief/Congestion Management		X				

Mobility Enhancements

*Comments:*

10. If your agency has other budget categories related to mobility enhancements and/or congestion relief/congestion management, please describe them in the space below:

No Response

11. Over the last 5 years, has funding for mobility enhancements and/or congestion relief/congestion management been increasing, stable, or decreasing in your agency?

Increasing

12. Does your agency monitor the outcomes from mobility investments after implementation? If so, briefly describe the process below or provide a link to more information:

Generally no.

13. Does your agency rank or score mobility projects based on performance measures? If so, briefly describe the process below or provide a link to more information.

Ex ante (before project) estimates are a part of the criteria used to select projects. Ex post outcomes are typically not measured and therefore do not influence project selection or improvement of predictive models.

14. How high a priority is a link between mobility performance measures and resource allocation for your agency leadership (one being the most important, five being the least important)?

**1 (1)      2 (2)      3 (3)      4 (4)      5 (5)**

Not at All

Not Very Important

Neutral

X

Somewhat Important

Extremely Important

*Comments:*

15. How high a priority is a link between mobility performance measures and resource allocation for your agency staff (one being the most important, five being the least important)?

**1 (1)      2 (2)      3 (3)      4 (4)      5 (5)**

Not at All

Not Very Important

Neutral

X

Somewhat Important

Extremely Important

*Comments:*

16. How would you rate the effectiveness of your current procedures in linking mobility performance measures and resource allocation (one being the most important, five being the least important)?

**1 (1)      2 (2)      3 (3)      4 (4)      5 (5)**

Not at All

Not Very Important

Neutral

X

Somewhat Important

Extremely Important

*Comments:*

17. What are the biggest barriers to a more direct link between mobility performance measures and resource allocation in your agency?

No Response

## Response 15 – Florida Department of Transportation

**Respondent Type:** Normal  
Response

**Collector:** New Link (Web  
Link)

**Custom Value:** *empty*

**IP Address:** 156.75.192.110

**Response Started:** Tue, 9/23/08  
12:04:31 PM

**Response Modified:** Tue, 9/23/08 12:24:39 PM

1. Please provide your name:

Gordon Morgan

2. Please provide the agency that you represent (required):

Florida Department of Transportation

3. Please provide your telephone number and e-mail address so we can contact you with follow-up questions:

850-414-4730,  
gordon.morgan@dot.state.fl.us

4. Does your agency have an official definition of mobility?

If yes, please provide the official  
agency definition

semi-official: "The Ease With Which  
People and Goods Move Throughout  
Their Community, State and World"

5. What performance measures are used in your agency to evaluate mobility? (check all that apply)

Level of Service

Travel Time Variability

Average Speed

Vehicle Miles Traveled (VMT)

Person Miles Traveled (PMT)

Vehicle Hours Delay

Person Hours of Delay

*Comment:* Truck Miles Traveled,

Vehicles/Lane Mile, %Miles

Congested, %VMT Congested,

Duration of Congestion

6. If the performance measure is used, is there a benchmark level set for compliance?

If so, please describe the benchmarks your agency uses to measure any of the items in question 5:

Person Hours of Delay: Maintain or  
improve the current rate of increase

7. Please check the applicable performance measures your agency collects in different area types:

	Urban	Rural	Corridor	Statewide (All Facilities)	Statewide (Average)
Volume to Capacity Ratio (V/C)			X		
Level of Service			X		
Travel Time					
Travel Time Variability					
Average Speed				X	
Average Speed Variability					
Vehicle Miles Traveled (VMT)				X	
Freight Vehicle Miles Traveled (FVMT)					
Person Miles Traveled (PMT)				X	
Vehicle Hours Traveled (VHT)					
Person Hours Traveled (PHT)					
Freight Vehicle Hours Traveled (FHT)					
Vehicle Hours Delay				X	
Person Hours of Delay				X	
Freight Hours of Delay					
Total Trip Time					
Mode Split/Mode Share					
Average Vehicle Occupancy					
Transit Ridership					
Park-n-Ride Utilization					
Cyclist Volumes					
Pedestrian Volumes					

*Comments:* Measures noted above under "Other" are estimated statewide (all facilities)

8. How does your agency track the changes in mobility performance over time?

Values are stored, and updated in new tables each year.

9. If your agency measures total trip time, including factors such as walk or bicycle access, transfer time, or other measures, please describe that measure or procedure below:

No Response

10. Please describe the funding sources and application of funds for programs related to mobility enhancements and/or congestion management/congestion relief in your agency:

I don't have any information about funding sources or spending for mobility and/or congestion. These are not maintained in separate categories.

11. Over the past five years, on average how much does your agency spend annually on mobility enhancements and/or congestion relief/congestion management?

No Response

12. Over the past five years, on average what percentage of your agency budget is spent annually on mobility enhancements and/or congestion relief/congestion management?

No Response

13. If your agency has other budget categories related to mobility enhancements and/or congestion relief/congestion management, please describe them in the space below:

No Response

14. Over the last 5 years, has funding for mobility enhancements and/or congestion relief/congestion management been increasing, stable, or decreasing in your agency?

No Response

15. Does your agency monitor the outcomes from mobility investments after implementation?

No Response

16. Does your agency rank or score mobility projects based on performance measures?

Yes

*Comment:* Partially...mobility is just one of several factors that are considered when determining project priorities.

17. How high a priority is a link between mobility performance measures and resource allocation for your agency leadership?

No Response

18. How high a priority is a link between mobility performance measures and resource allocation for your agency staff?

No Response

19. How would you rate the effectiveness of your current procedures in linking mobility performance measures and resource allocation?

No Response

20. What are the biggest barriers to a more direct link between mobility performance measures and resource allocation in your agency?

Mobility is just one of several factors that are considered when determining project priorities and resource allocation.

## **APPENDIX C – TELEPHONE INTERVIEW RESPONSES**





## CDOT Mobility Study Phone Interview Questions

DN07-0151

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**Contact: John Wolf**

**Agency: Caltrans**

**Phone: 916-654-2627**

### **Mobility Data Collection and Tracking**

Do you feel that with current data collection measures that your agency is able to track mobility performance over time?

Caltrans is just beginning to use travel time as the primary performance measure (PM) to track mobility performance.

Yes, travel time works well because it translates well to people.

- How are trends evaluated or how is the data used to track progress?

A performance metric report is published annually.

- If yes, what measures and policies does your agency have in place to track mobility performance?

The System Corridor Management Plan tracks the mobility performance on the 20-30 major corridors in the state. Data is collected and reported for each corridor.

- If no, what holds your agency back and what would you like to see be done?

### **Data Processing and Utility**

How are these measures collected and by who?

PMs are collected every half mile on urban freeways using inductive loops. Caltrans has just added 1000 stations of magnetometers and are currently adding radar.

Caltrans is looking toward using cell phones and bluetooth devices to gather speed data.

- Do you feel that these measures are effective in representing actual mobility performance?

Yes. Inductive loops are very accurate. Radar may be less accurate.

### **Linkages to Funding**

How are funding decisions regarding congestion management and mobility made in your agency?

Caltrans first tries to understand the existing operations on each corridor and why problems are occurring. Then they perform a benefit-cost analysis to determine which solutions will be most cost-effective. Many times, the most cost-effective solution will be to construct a Traffic Management Center or to install ITS.

- If your agency has a policy on or practice of directly tying mobility funding to performance measures collected in the field, please describe it?

PMs are used to quantify the benefits associated with a project. These benefits are then used in the benefit-cost analysis.

- What information is used in your decision making regarding funding?

The change in travel time, air quality, vehicle operating cost, and green house gas emissions associated with a project.

- How successful is your current policy?

The current policy is new; it is expected to be successful if funding decisions are made as described above.

- How is your agency looking into tying mobility funding to performance measures?

- What benefits/limitations can you see from tying mobility funding to performance measures?



## CDOT Mobility Study Phone Interview Questions

DN07-0151

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**Contact:** Larry Foutz

**Agency:** Miami Dade MPO

**Phone:** 305-375-1522

### **Mobility Data Collection and Tracking**

Do you feel that with current data collection measures that your agency is able to track mobility performance over time?

Currently vehicle miles traveled (VMT) and vehicle hours traveled are used to track mobility performance. These PMs don't allow the system to be monitored. They just indicate that mobility is declining. A study is currently being done to develop a set of sophisticated mobility PMs. The study will address what each PM tracks and how it will be measured in the field. Miami Dade MPO will forward a copy of the study when it is completed.

- How are trends evaluated or how is the data used to track progress?

Trends are evaluated as a part of each 4 year cycle of the Long Range Transportation Plan. In the future some performance measures will be calculated yearly.

- If yes, what measures and policies does your agency have in place to track mobility performance?
- If no, what holds your agency back and what would you like to see be done?

### **Data Processing and Utility**

How are these measures collected and by who?

Traffic volume counts on freeways are measured in the field. Other PMs are calculated using a model.

- Do you feel that these measures are effective in representing actual mobility performance?

The results from the model are not accurate because the model is constantly changing. Results from different years are not comparable.

### **Linkages to Funding**

How are funding decisions regarding congestion management and mobility made in your agency?

Funding decisions are made based on the availability of funds, the opportunities that arise, and the community support.

- If your agency has a policy on or practice of directly tying mobility funding to performance measures collected in the field, please describe it?

Funding is not tied to PMs, but it should be.

- What information is used in your decision making regarding funding?

The Strategic Intermodal Systems plan (SIS plan) is used to make funding decisions. The economic benefit and financial feasibility is also considered.

Projects are generally prioritized based on goals and objectives of the region. In addition, the Miami Dade MPO must meet the policies set by federal planning program.

- How successful is your current policy?

The current policy could be improved.

- How is your agency looking into tying mobility funding to performance measures?

Yes, Miami Dade is looking into tying mobility funding to PMs. PMs will be included in the new long range transportation plan

- What benefits/limitations can you see from tying mobility funding to performance measures?

PMs are another tool to make better decisions. The better information you can provide decision makers the better the decisions will be.



## CDOT Mobility Study Phone Interview Questions

DN07-0151

**Contact: Joseph McClean**

**Agency: New York State DOT**

**Phone: 518-457-8534**

### **Mobility Data Collection and Tracking**

Do you feel that with current data collection measures that your agency is able to track mobility performance over time?

Yes, we have used traditional data collection measures to produce our traditional congestion performance measures of Vehicle Hours Delay (VHD), Person Hours of Delay (PHD), and Truck Hours of Delay (THD). We have used these performance measures (PMs) for the past 20 years and find them suitable. We use the traditional hourly traffic count data, supplemented with hourly real traffic speed measurements to calibrate our analysis models. As we move to gathering real speeds via ITS collection methods we will be able to more accurately measure congestion. Mobility is made up of more than just congestion and NYS DOT has developed new measures for the past two analysis cycles. We have bike/pedestrian, ADA, transit, Green House Gas Reduction, energy, land-use planning and other mobility-related performance measures that we are tracking.

- How are trends evaluated or how is the data used to track progress?

Biannually we evaluate the PMs and track how each changes over time, Graphs of the trends over time in performance are shared with the Executive Level as well as with the Regional Offices and then shared with the Legislature. NYS has used Goal attainment as a driving force in developing the capital program for the past 20 years. In some of those years the Legislature has signed the goals into state law. On a shorter schedule, we track PMs on a monthly basis and post them on our performance dashboard.

- If yes, what measures and policies does your agency have in place to track mobility performance?

The entire transportation program is evaluated every other year and goal attainment is the driving force. Specific policies that are much more detailed than in the State Transportation Plan are contained in (this year): the March 2008 Multimodal Transportation Program Submission: 2009-2014, and the goals are more specifically described in the August 2008 "Program Update Guidance and Instructions 2008-2015". This year the Regions are not expected to develop VHD, PHD, THD estimates on their own (Main Office will continue to run the congestion model for all areas of the state). Regions will concentrate their mobility-related analysis on developing their compliance with ADA, land-use planning, energy, bike/pedestrian, CMAQ, and Green House Gas Reduction goals. Once these analyses become more routine, Regions will then have more time to use our state-wide congestion modeling tool (CNAM) for Regional analysis, however Main

Office continues to use this tool to duplicate any analysis that would be done at the Regional level.

- If no, what holds your agency back and what would you like to see be done?

### **Data Processing and Utility**

How are these measures collected and by who?

Congestion performance measures are not directly collected; they are calculated using pertinent data. Congestion data are analyzed and summarized within our Congestion Needs Analysis Model (CNAM). This model utilizes hourly traffic count data, which is collected on each road segment on both NYSDOT's and NYS Thruway Authority's route system. The model is also able to input real traffic speeds (by hour, by direction) which is the more accurate method of estimating recurring congestion. The model also estimates incident delay—using hourly traffic counts, accidents-per-million-vehicle-miles-traveled (on each highway segment), and national statistics on average lane blockage by type of incident, average time of accident clearance, and other data. The queue dissipation model then simulates each accident and adds up the resulting delay for the expected number and type of accidents for each highway segment.

Other mobility-measures are either directly collected or analyzed by planners in the Regional Offices, or Main Office groups assigned with those duties. For example Regional bike/pedestrian coordinators are present in each Regional Office and they track progress in those areas. Main Office bike/pedestrian coordinators summarize results and report the results.

- Do you feel that these measures are effective in representing actual mobility performance?

Yes, we have many measures that help guide the development of plans which aim to meet many mobility-related goals. We have seen great progress in some areas of mobility, including the use of new or expanded park-and-ride lots in concert with new express bus services to NYC, additional transit services, statewide use of traffic circles to smooth out traffic flow (with major safety benefits). The Regions track other mobility performance measures which are not required for program review, but are important at the project level, such as park-and-ride lot utilization rate, rideshare contacts and rideshare matches, transit ridership utilization, etc.

### **Linkages to Funding**

How are funding decisions regarding congestion management and mobility made in your agency?

Total highway funding is allocated to each region using a formula-based system. The factors in the formula include population, lanes-mile of road, vehicle-miles-traveled, and PMs for pavement, bridges, mobility and safety (somewhat similar to Federal allocation formulas).

Within the Region, regional staff decides how to spend funds allocated to the Regions in order to meet the PM-based Regional goals. The goals include, for example, providing a specified percentage good and excellent pavement, good and excellent bridges, and maintaining a certain level of mobility, compliance with bike/pedestrian goals, ADA goals, etc.

- If your agency has a policy on or practice of directly tying mobility funding to performance measures collected in the field, please describe it?

There is not a direct tie between PMs and mobility funding. However, Regional staff must decide how to spend their budget and meet as many PMs established by Main Office as they can given the overall funding level they are given. In cases where Regions do not meet the specified PM-based goals, they are asked to explain the reasons.

- What information is used in your decision making regarding funding?

Population, lane miles, vehicle miles travelled, and PMs for mobility, pavement, bridges, and safety.

- How successful is your current policy?

Successful, in that we believe the limited amount of money available is being spent efficiently--in terms of project mix among the modes and among the various types of treatments available.

- How is your agency looking into tying mobility funding to performance measures?

NYSDOT is moving toward using a dashboard system for PMs, and as conditions change executive management may decide to reshape policies in order to meet the goals or change goals.

- What benefits/limitations can you see from tying mobility funding to performance measures?

Limitations would include the difficulty of comparing mobility needs to bridge, pavement, safety, culvert, signing, and operational needs. Certain needs are difficult to monetize and therefore prioritize. Some needs are mandated by state and federal law. As far as within mobility there are similar issues (transit vs. ADA vs. bike/pedestrian vs. TDM vs. TSM). It is difficult to tie funding to the outcomes of these disparate programs within the mobility umbrella.



## CDOT Mobility Study Phone Interview Questions

DN07-0151

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**Contact: Leonard Evans**

**Agency: Ohio DOT**

**Phone: 614-466-8993**

### **Mobility Data Collection and Tracking**

Do you feel that with current data collection measures that your agency is able to track mobility performance over time?

The volume to capacity ratio (v/c) is the primary performance measure (PM) used to track mobility performance.

The v/c is one of many factors considered in project selection. Other factors include economic development and crash history.

A study was done a while back which compared alternative mobility PMs. The study determined that v/c was the best PM, based on the availability of data and the ability for the PM to describe mobility performance.

Yes, v/c adequately describes the mobility performance.

- How are trends evaluated or how is the data used to track progress?

The v/c, as well as several other PMs, has been tracked since the year 2000.

- If yes, what measures and policies does your agency have in place to track mobility performance?

Mobility performance is tracked annually. However, there is no policy for tracking mobility performance.

- If no, what holds your agency back and what would you like to see be done?



### **Data Processing and Utility**

How are these measures collected and by who?

Data is used from the annual traffic count program and annual updates on roadway capacities.

The v/c is computed using the HCM methodology. More information on v/c calculation is available on the Ohio DOT website.

- Do you feel that these measures are effective in representing actual mobility performance?

Yes. The v/c obtained using the HCM methodology is accurate and has been verified in the field.

### **Linkages to Funding**

How are funding decisions regarding congestion management and mobility made in your agency?

Funding decisions are made using the Ohio DOT *Track Process*. This process uses several factors, including v/c, economic development, and safety, to allocate funding for projects. More information on the *Track Process* is available on the Ohio DOT website.

TRAC website: <http://www.dot.state.oh.us/trac/Pages/Default.aspx>

TRAC policy and procedures:

<http://www.dot.state.oh.us/trac/Documents/2006%20TRAC%20Policy%20and%20Procedure.pdf>

- If your agency has a policy on or practice of directly tying mobility funding to performance measures collected in the field, please describe it?

Funding is not directly tied to the v/c; there are other factors considered as well. There is not a set amount of funding dedicated to mobility enhancements.

- What information is used in your decision making regarding funding?

Funding is mainly based on preservation of pavement and bridges. See the 2008 Business Plan on the Ohio DOT website for further information.

- How successful is your current policy?

It is successful. Utah has copied the funding policy used at Ohio DOT.

- How is your agency looking into tying mobility funding to performance measures?

No. It does not fit into the structure of the existing funding program.

- What benefits/limitations can you see from tying mobility funding to performance measures?

Other factors, such as gas prices, influence the VMT. Increases or decreases in the VMT cannot be directly controlled but directly affect the V/C calculations.



## CDOT Mobility Study Phone Interview Questions

DN07-0151

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**Contact: Brian Gregor**

**Agency: Oregon DOT**

**Phone: 503-986-4120**

### **Mobility Data Collection and Tracking**

Do you feel that with current data collection measures that your agency is able to track mobility performance over time?

The v/c and vehicle hours delay (VHD) are the primary performance measures (PMs) used to track mobility performance.

No, the v/c and VHD do not adequately describe mobility performance. Oregon DOT would like to see travel time measured, as well as another PM that measures mobility across modes.

- How are trends evaluated or how is the data used to track progress?

VHD is measured annually. The v/c is measured as needed.

- If yes, what measures and policies does your agency have in place to track mobility performance?

No policies are in place to track mobility performance.

- If no, what holds your agency back and what would you like to see be done?

There is not enough demand to track mobility performance.

### **Data Processing and Utility**

How are these measures collected and by who?

The VHD is calculated using a model developed by the Texas Transportation Institute.

A variety of methods are used to calculate v/c, including the Highway Capacity Manual methodology, travel demand models, and the Highway Economic Requirements System (HERS).

- Do you feel that these measures are effective in representing actual mobility performance?

The methods have limitations; for example, they don't adequately address delays at intersections or spillback of queues. Therefore, PM estimates may be inaccurate.

Oregon DOT has moved toward using micro simulation and dynamic assignment to measure PMs.

### **Linkages to Funding**

How are funding decisions regarding congestion management and mobility made in your agency?

Funds are not set aside for mobility projects. Funding decisions for mobility are usually made by Metropolitan Planning Organizations.

- If your agency has a policy on or practice of directly tying mobility funding to performance measures collected in the field, please describe it?

There is no policy or practice in place of tying mobility funding to PMs.

- What information is used in your decision making regarding funding?

The State Transportation Improvement Plan (STIP) lists criteria for evaluating projects. There are a number of criteria involved.

- How successful is your current policy?

Not qualified to say.

- How is your agency looking into tying mobility funding to performance measures?

Mobility funding will be driven by green house gas emissions and least-cost planning practices. Mobility PMs will be a factor, but not the central point for determining funding.

- What benefits/limitations can you see from tying mobility funding to performance measures?

The main limitations are:

The method used to obtain PM data must be accurate.

Mobility is not typically measured across modes.

Other factors, like accessibility, are also important in some areas.

Considering mobility alone could yield sub-optimal solutions.