

## Smart Mobility Preliminary Investigation

*Requested by*

Christine Ratekin, Caltrans Division of Transportation Planning

*Prepared by*

Kendra K. Levine, Institute of Transportation Studies Library at UC Berkeley

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*Abstract: This investigation is a follow up on the Smart Mobility Preliminary Investigation that focuses on practitioner accounts of implementing and using sustainability tools. A survey of ten questions was prepared and sent to 30 transportation professionals from transportation agencies throughout California and around the United States. Responses covered a range of tools and experiences in different phases of development. Respondents were all involved in transportation planning.*

### Executive Summary

#### Background

Caltrans' Smart Mobility Framework<sup>1</sup> is a sustainable transportation tool used to guide the planning process and assess performance of transportation systems. The framework focuses on factors related to mobility, geography, the environment, society, economics, and safety. As a follow up to the Smart Mobility Preliminary Investigation<sup>2</sup>, a questionnaire was developed to gather a better idea of how effective Smart Mobility tools have been implemented in California and around the United States. The questions focused on how sustainable transportation programs are defined and developed, how sustainability tools have been used, performance measures and evaluation of sustainability programs, the role of asset management, and how these programs are communicated with the public.

#### Summary of Findings

Of the more than 30 individuals solicited to answer the questionnaire, six agencies responded. They were: SANDAG, SLOCOG, Florida DOT, Maryland DOT, New York State DOT, and Oregon DOT.<sup>3</sup> The answers reflected the diverse nature of these sustainability tools, as they are largely context specific as related to the needs and situation of the each agency and their region. The most consistent trait was that those who responded were involved with transportation planning, perhaps because these tools are mostly used for planning purposes. The objectives of the tools are also largely consistent: Improve the planning and coordination of transportation in a comprehensive way that considers infrastructure, safety, mobility, reliability, economic factors, and health and social factors. Implementation of these programs is ongoing, with different agencies at different levels of development and deployment. Interagency coordination seems to be a critical component for a successful implementation. Performance measures varied somewhat from tool to tool, as would be expected, though they largely focused on easily measurable

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<sup>1</sup> *Smart Mobility Framework*: <http://www.dot.ca.gov/hq/tpp/offices/ocp/smf.html>

<sup>2</sup> *Smart Mobility: A Survey of Current Practice and Related Research* (April 2012) [http://www.dot.ca.gov/research/researchreports/preliminary\\_investigations/docs/smart\\_mobility\\_preliminary\\_investigation\\_4-25-12.pdf](http://www.dot.ca.gov/research/researchreports/preliminary_investigations/docs/smart_mobility_preliminary_investigation_4-25-12.pdf)

<sup>3</sup> See Appendix C.

things, such as volume and through-put, ridership, or incidents. Relying on easily collected or existing data was favored because it uses an existing resource, eliminating potential barriers. The largest inconsistency among the respondents was whether or not their tools encompass asset management. Some agencies, such as NYSDOT, treated asset management as one of the core functions of their sustainability tool, whilst others, like SLOCOG, did not account for asset management within their tool at all. Public involvement and outreach were part of all of the tools that had already been implemented.

### **SLOCOG - Smart Mobility Performance Indicators**

SLOCOG began reporting transportation performance as a result of the 1994 Regional Transportation Plan, and have since integrated the Smart Mobility Performance Indicators, though the process is continually evolving. Additional measures included are requirements of the Sustainable Community Strategies from SB 375. The tools have had some success in providing feedback on how the planning process is working, though they do not reflect the full success of adopted plans. They have shown though, that as the efficiency and practicality of transit services increased, so did ridership. There also appears to be a causal relationship between outreach about alternative modes, such as bicycling and walking, and their market share. Asset management is not under the purview of this group, as that is the responsibility of the transit providers. Performance metrics are presented to the public through regular reports and public meetings.

### **SANDAG - 2050 Regional Transportation Plan and its Sustainable Communities Strategy**

SANDAG has been using a number of sustainability tools for their planning and operations, most notably the 2050 Regional Transportation Plan and its Sustainable Communities Strategy (RTP/SCS). While planning and implementation varied depending on the tool, guidelines, visualization tools, and consistent monitoring were throughout this phase to ensure that the projects and their impacts related to sustainability. The objectives and scope of RTP/SCS were developed with partner agencies at the decision-making level, and then refined with involvement from related groups at the local level. Coordination and communication was also critical during implementation of the tools, so that all of the stakeholders are aware and involved. SANDAG relies on a team-oriented approach to achieve their long range goals. Their performance measures focus on the six policy goals: System Preservation and Safety, Mobility, Reliability, Prosperous Economy, Healthy Environment, and Social Equity. There is also a focus on system-wide VMT, average work trip travel speed, pollutants for vehicle types, total bike and walk trips, and the benefit/cost implications. They have faced challenges with the development of non-model methods to test their assumptions. For asset management, SANDAG partners with their regional partners, such as the California Transportation Commission (CTC), Caltrans, and transit operating agencies. SANDAG established a Public Participation Plan (PPP) to provide a framework for public involvement across the agency, as well as the establishment of Public Involvement Plans (PIPs) for specific projects.

### **Florida DOT - Mobility Performance Measures**

Currently the Florida DOT does not use sustainability tools, though they do employ a comprehensive multimodal mobility performance measure program that they have been using for more than a decade. The measures are used primarily for transportation planning, though they are also used for operations and project administration and decision making to a lesser degree. FDOT's Policy Planning Office is the lead on the agency's planning program and outreach, and

they largely rely on their own data for the process. There is no mention of asset management.

### **Maryland DOT - Model of Sustainability and Integrated Corridors (MOSAIC)**

Maryland's MOSAIC planning calculator allows planners to "quantify sustainability data and compare alternative scenarios to make more informed decisions at the corridor level for transportation planning purposes." The tool focuses on six sustainability factors: mobility, safety, socioeconomics, energy and environment, natural resources, and project costs. MOSAIC offers a data driven approach, that can enable more informed decision making and adaptability as conditions change. All data will be made readily available to stakeholders. The tool does not address asset management and is intended for internal decision making only, so there is no public involvement component.

### **New York State DOT - GreenLITES**

New York State DOT (NYSDOT) uses a suite of tools as part of their GreenLITES program<sup>4</sup> that cover project solicitation, capital projects, operations, and project design. NYSDOT's sustainability program aims to balance the state's transportation needs with an obligation to its citizens to protect and preserve natural resources. Adoption of the tools in the planning process has been challenging because it is currently voluntary for MPOs, though once a project is selected and incorporated into a capital program, tool use is mandated. In developing the tools, they learned a number of lessons, such as "tools do not need to be perfect", "vet tools with other," and "make tools flexible so people will want to use them." Performance measures are currently under development, and they are using NCHRP Report 708 for guidance<sup>5</sup>. They plan to base the performance measures on data that NYSDOT already has or might easily be obtained. Asset management is very much part of the GreenLITES program, as "preservation first" is one of the central tenants. Public involvement is carried out through publishing research, news, and guidelines on the web.

### **Oregon DOT - Sustainability Plan and Least Cost Planning**

The Oregon DOT (ODOT) has established a Sustainability Program<sup>6</sup> to coordinate the agency's overall sustainability efforts. They are also developing a Least Cost Planning (LCP) tool and program that is not actually intended to be a sustainability tool, though it has several sustainable components.<sup>7</sup> They plan to implement the tool in 2013. The tool is designed to be flexible, allowing for different levels of data to be used. When implemented, LCP will offer better analysis of impacts during the transportation planning process across a number of indicators. LCP does not directly address asset management, though there are many linkages between their Sustainability Program and their development of their asset management program. Public involvement has not been part of the LCP program yet, but there has been significant outreach to stakeholders, such as agencies and planners, involved in the planning process.

## **Gaps in Findings**

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<sup>4</sup> *GreenLITES*, New York State DOT, <https://www.dot.ny.gov/programs/greenlites>

<sup>5</sup> *A Guidebook for Sustainability Performance Measurement for Transportation Agencies*, NCHRP Report 708 (2012)  
[http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp\\_rpt\\_708.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_708.pdf)

<sup>6</sup> *Sustainability Program*, Oregon DOT, <http://www.oregon.gov/odot/sus/pages/index.aspx>

<sup>7</sup> *Least Cost Planning (LCP)*, Oregon DOT, <http://www.oregon.gov/ODOT/TD/TP/pages/lcp.aspx>

Given the limited number of responses, it is impossible to say whether or not this is an accurate reflection of the usage of smart mobility tools. The low response rate from California in particular makes it difficult to gauge the efficacy and implementation of the SMF. While there are some broad generalities that can be derived from the responses, such as the basic categories covered by sustainability tools, a wider sampling would make other commonalities more apparent.

### **Next Steps**

Follow up with those who didn't respond, especially those from California agencies, to gather more experiences with using Smart Mobility tools. A number of the respondents explicitly declined to participate because they did not feel that they had enough experience or expertise with smart mobility tools. Perhaps a less formal setting, such as an informational interview, could be used to capture experiences from practitioners who did not feel that they were qualified to answer, though they could most likely provide valuable insight. Further inquiries to gather more detailed accounts could also be beneficial. While the survey tried to establish an overview of the implementation, administration, and development of these tools and programs, further contact to learn about specifics, such as how interagency coordination was conducted and the process to determine performance measures, could provide a fuller understanding how these tools are being used in the field.

## **Survey Methods**

### **Questions**

With direction and feedback from the panel, a 10 questionnaire was developed.<sup>8</sup> The questions were designed to capture the many interests of the panel. The questions were intended to be rather open ended, so that a wide range of practitioners and tools could be captured without prescribing an inherent bias for any particular mode or area of transportation. The questions flow in a natural progression of engagement and interest of the panel. The initial questions establish some background information on the respondent, such as what sustainability tools they may use and which areas of transportation are they involved with. Then the survey asks broadly about the objectives, development and implementation of sustainability programs, such as the Smart Mobility Framework. The next set of questions focus on performance measures; how they are defined and measurable impacts they might show. There is also a question that focuses on how areas may be defined by different levels of development and how those difference may be addressed by the sustainability tools. The survey concludes with questions about the role of asset management in the sustainability tools and allowances made for public involvement.

For the most part, those who responded appeared to understand the questions and provide the relevant information. Only the Puget Sound Regional Council declined to respond on the ground that they felt their Transportation 2040 (T2040) Plan<sup>9</sup> and its related performance measures are still under development. While the questions were broad enough to gather reflections and experiences from transportation professionals working directly with sustainability tools, those involved with the development of sustainability tools, such as FHWA Invest or Greenroads, did

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<sup>8</sup> See Appendix A.

<sup>9</sup> *The Adopted Transportation 2040 Plan*, Puget Sound Regional Council, <http://www.psrc.org/transportation/t2040/t2040-pubs/final-draft-transportation-2040/>

not feel that they were appropriate to respond themselves. The questions are very focused on metrics and outcomes, with some concern for programmatic planning and coordination of these sustainability tools. While the insights and experiences of those involved with the development and planning of these sustainability tools is valuable, the focus and the scope as laid out by the panel was more interested in outcomes.

### **Dissemination**

The questions were sent to the list of 30 contacts approved by the panel.<sup>10</sup> The questions were presented in an online form using Google Forms<sup>11</sup> so that the answers would be collected in a central location. There were some technical issues with the form, as some responses did not fully register and were just blank entries. Some agencies also had issues accessing the form, most likely due to network security concerns at their workplace. For those who could not access the form, the questions were sent to them as a Word document. While using an online form is preferable for the promised ease of use for the respondents and the ability to collect and store answers in one location, the technical and usability issues cannot be ignored. Perhaps as a result of the questionnaire soliciting relatively comprehensive and lengthy replies, the questions presented in a Word document is more usable for respondents. Those who used the form to reply had to submit their answers in one session, while those who used the Word document could work on their replies over a period of time and have more control over the presentation and formatting of their answers. For future iterations, other solutions should be investigated.

The largest issue with disseminating the survey was receiving responses. Aside from the aforementioned issues of those contacted who did not feel qualified to respond, the lack of responses was the biggest problem. From the first wave of solicitation there were very few responses. Some of the people contacted having recently moved on to other positions and other organizations as well as a few with incorrect addresses. Follow up communication yielded a few more responses, or other names of people to contact who might be more appropriate, but for the most part the response rate was very low. The technical issues mentioned before might have been partly to blame, but the length and depth of the survey could also be a factor. While the survey was intentionally limited to 10 questions so that it would not take too much time for people to respond, given current workloads for many transportation professionals it may still have been an issue. More direct follow up is likely required or a different, less formal approach may work.

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<sup>10</sup> See Appendix B.

<sup>11</sup> <https://docs.google.com/spreadsheets/viewform?formkey=dFU4OTIJZlpiRjBvOEhFMmxJbU4xMmc6MQ#gid=0>

## **Appendix A: Survey Questions**

1. Do you currently use any sustainability tools for transportation planning and operations? If you do, please list them.
2. What areas of transportation are you involved with?
3. What are the objectives of your sustainable transportation program? How did you determine the scope of your program? What was process used to develop the tool or program?
4. Describe your experience using these tools.
5. How would you describe the implementation process of these tools?
6. What are your performance measures and how do you define them for these areas?
  1. Volume and vehicle/person through-put
  2. Multimodal mobility
  3. Health and safety
  4. Environmental factors
  5. Economic Factors
7. Have you seen measurable effects in relation to:
  1. Volume and vehicle/person through-put
  2. Multimodal mobility
  3. Health and safety
  4. Environmental factors
  5. Economic Factors
  6. Any other significant effects
8. How do you account for areas with different levels of development (urban vs. rural, distressed vs. vibrant, redevelopment districts vs. greenfields, etc)? Do these relate to the Place Types of the SMF? Do you have different metrics for evaluation? Different tools?
9. How do you account for asset management in your sustainability program?
10. How do you communicate your objectives and performance with the public? Is public involvement part of your program?

## **Appendix B: Contacts**

Aaron Nousaine, [anousaine@ambag.org](mailto:anousaine@ambag.org)  
Kenneth Kirkey, [KKirkey@mtc.ca.gov](mailto:KKirkey@mtc.ca.gov)  
Doug Johnson, [djohnson@mtc.ca.gov](mailto:djohnson@mtc.ca.gov)  
Dave Vautin, [dvautin@mtc.ca.gov](mailto:dvautin@mtc.ca.gov)  
Ivan Garcia, [igarcia@bcag.org](mailto:igarcia@bcag.org)  
Kacey Lizon, [klizon@sacog.org](mailto:klizon@sacog.org)  
Greg Chew, [gchew@sacog.org](mailto:gchew@sacog.org)  
Carolina Gregor, [cgr@sandag.org](mailto:cgr@sandag.org)  
Scott Strelecki, [Scott.Strelecki@sandag.org](mailto:Scott.Strelecki@sandag.org) \*  
Marjie Kirn, [marjie.kirn@mcagov.org](mailto:marjie.kirn@mcagov.org)  
Marco Anderson, [anderson@scag.ca.gov](mailto:anderson@scag.ca.gov)  
Steve Devencenzi, [sdevencenzi@slocog.org](mailto:sdevencenzi@slocog.org) \*  
Ben Bakkenta, [bbakkenta@psrc.org](mailto:bbakkenta@psrc.org)  
Peter Hurley, [peter.t.hurley@portlandoregon.gov](mailto:peter.t.hurley@portlandoregon.gov)  
Karena Pshnik, [info@scrtc.org](mailto:info@scrtc.org)  
Ginger Dykar, [gdykaar@scrtc.org](mailto:gdykaar@scrtc.org)  
John Fortmann, [john.fortmann@illinois.gov](mailto:john.fortmann@illinois.gov)  
Lei Zhang, [lei@umd.edu](mailto:lei@umd.edu)  
Matthew Garbark, [mgarbark@mdot.state.md.us](mailto:mgarbark@mdot.state.md.us)  
Eric Beckett, [ebeckett@sha.state.md.us](mailto:ebeckett@sha.state.md.us) \*  
Subrat Mahapatra, [smahapatra@sha.state.md.us](mailto:smahapatra@sha.state.md.us)  
Paul Krekeler, [pkrekeler@dot.state.ny.us](mailto:pkrekeler@dot.state.ny.us) \*  
Craig Weiland, [craig@greenroads.org](mailto:craig@greenroads.org)  
Lyn Cornell, [Linda.S.CORNELL@odot.state.or.us](mailto:Linda.S.CORNELL@odot.state.or.us)  
Jeff Davis, [jeff.davis@doa.ri.gov](mailto:jeff.davis@doa.ri.gov)  
Harrison Rue, [hrue@icfi.com](mailto:hrue@icfi.com)  
Tara Ramani, [T-Ramani@ttimail.tamu.edu](mailto:T-Ramani@ttimail.tamu.edu)  
Houssam A Toutanji, [toutanji@eng.uah.edu](mailto:toutanji@eng.uah.edu)  
Jeralee Anderson, [jeralee@greenroads.org](mailto:jeralee@greenroads.org)  
Samuel Seskin, [sam.seskin@ch2m.com](mailto:sam.seskin@ch2m.com)  
Leigh B. Lane, [lblane@ncsu.edu](mailto:lblane@ncsu.edu)  
Walt Thomas, [wthomas@ncsu.edu](mailto:wthomas@ncsu.edu)  
Robert Maestre, [Robert.A.MAESTRE@odot.state.or.us](mailto:Robert.A.MAESTRE@odot.state.or.us)  
Lucia Ramirez, [Lucia.L.RAMIREZ@odot.state.or.us](mailto:Lucia.L.RAMIREZ@odot.state.or.us) \*  
Katarina Cvetkovic, [kcvetkovic@tac-atc.ca](mailto:kcvetkovic@tac-atc.ca)  
John H. Taylor, [john.taylor@dot.state.fl.us](mailto:john.taylor@dot.state.fl.us)  
Douglas McLeod, [Douglas.McLeod@dot.state.fl.us](mailto:Douglas.McLeod@dot.state.fl.us) \*  
Tina Hatcher, [tina.hatcher@dot.state.fl.us](mailto:tina.hatcher@dot.state.fl.us)  
Eric Sundquist, [erics@cows.org](mailto:erics@cows.org)  
Susan Shaheen, [sashaheen@tsrc.berkeley.edu](mailto:sashaheen@tsrc.berkeley.edu)

\* responded to the survey .

## **Appendx C: Survey Responses**

### **SLOCOG - Smart Mobility Performance Indicators**

Steve Devencenzi, [sdevencenzi@slocog.org](mailto:sdevencenzi@slocog.org)

**Do you currently use any sustainability tools for transportation planning and operations? If you do, please list them.**

SLOCOG began reporting the performance of the transportation system with the development of the 1994 Regional Transportation Plan. This plan included a range of performance indicators used to evaluate progress towards accomplishing adopted goals, objectives and policies. Subsequently, these performance indicators were expanded to address smart growth and sustainable development. The performance monitoring process is continually evolving and maturing as new tools and better data become available.

**What areas of transportation are you involved with?**

Transportation planning , Project coordination, Project administration, Public involvement

**What are the objectives of your sustainable transportation program? How did you determine the scope of your program? What was process used to develop the tool or program?**

To produce a planning guide that formally integrates smart growth concepts into the transportation planning process. Integration of the Smart Mobility Performance Indicators required reconsideration of how the previously developed performance measures could be applied to address these concepts. Current indicators that have been used to evaluate the effectiveness of the basic transportation planning and programming process are the following:

- Vehicle Miles of Travel (VMT)
- State Highway Traffic and LOS
- State Highway Accident Rates
- Traffic on Major Local Roads
- Local Street and Road Conditions
- Transit Services and Riders
- Park-and-Ride Lot Use and Number
- Airline Service and Passengers
- Passenger Rail Service and Riders
- Bicycle Facilities, Injuries and Fatalities
- Pedestrian Facilities, Injuries and Fatalities
- Means of Travel to Work
- Travel Time to Work
- Average Vehicle Occupancy (AVO)
- Rideshare Program Activities

Additional measures have been developed to address a wider range of considerations that will need to be included in the Sustainable Community Strategies required by SB 375. These include land use and development considerations to measure the progress made in the region's Preliminary SCS

- Acres of Land Developed
- Acres of Land Preserved
- Building Permits Issued
- Building Type and Density
- Jobs, Housing and Population in Urban and Target Development Area

### **Describe your experience using these tools.**

These indicators do not provide a perfect perspective on the relative success of adopted plans, programs or projects as many different factors can affect expected outcomes positively or negatively, however they provide a reasonably accurate view of how well our planning process is working, subject to continual review, adjustment and refinement.

- a. Greater emphasis on integrated multimodal system development
- b. Greater sensitivity to 'efficiencies';
- c. More tracking of performance
- e. Higher participation in bike-rideshare efforts
- f. More 'economically-driven' decisions - due to recessionary environment - are having something of a 'sustainability' effect as greater efficiencies are sought

### **How would you describe the implementation process of these tools?**

Over the years, the region's transportation system has operated very efficiently and effectively given its unique socio-economic, demographic and geographic characteristics. Over the past twenty years the surface transportation system has been minimally expanded while low-density land development patterns, population, growth and changing socio-demographic conditions has resulted in increasing traffic levels and congestion. For most of the past 20 years, vehicle miles of travel (VMT) in the region have increased at a faster rate than the region's population. At the same time, as a result of many years of effort to expand the availability, efficiency and practicality of public transit services, there has been a significant increase in transit ridership. Additionally, as a result of expanded public outreach about the value of alternative modes of travel, and an expansion in alternative transportation improvements, the number of people bicycling and walking to work has almost doubled over prior years.

### **What are your performance measures and how do you define them for these areas?**

1. **Volume and vehicle/person through-put**
2. **Multimodal mobility**
3. **Health and safety**
4. **Environmental factors**
5. **Economic Factors**
  - Vehicle Miles of Travel (VMT)
  - State Highway Traffic and LOS
  - State Highway Accident Rates
  - Traffic on Major Local Roads
  - Local Street and Road Conditions
  - Transit Services and Riders
  - Park-and-Ride Lot Use and Number
  - Airline Service and Passengers
  - Passenger Rail Service and Riders
  - Bicycle Facilities, Injuries and Fatalities
  - Pedestrian Facilities, Injuries and Fatalities
  - Means of Travel to Work
  - Travel Time to Work

- Average Vehicle Occupancy (AVO)
- Rideshare Program Activities

**Have you seen measurable effects in relation to:**

1. **Volume and vehicle/person through-put**
2. **Multimodal mobility**
3. **Health and safety**
4. **Environmental factors**
5. **Economic Factors**
6. **Any other significant effects**

Yes - but it is not clear how much is recession-higher fuel cost oriented (probably most) and how much is due to any overt activity related to the improved mobility (if any)

**How do you account for areas with different levels of development (urban vs. rural, distressed vs. vibrant, redevelopment districts vs. greenfields, etc)? Do these relate to the Place Types of the SMF? Do you have different metrics for evaluation? Different tools?**

Not yet - but most activity in our region is on the low end of the scale

**How do you account for asset management in your sustainability program?**

We do not manage the 'assets' that is the domain of the transit providers/agencies

**How do you communicate your objectives and performance with the public? Is public involvement part of your program?**

Metrics are used to show "How we are doing" - mostly through SLOCOG Board meetings and reports such as our annual Performance Monitoring report and other various summaries of activity. and in various public presentations

**SANDAG - 2050 Regional Transportation Plan and its Sustainable Communities Strategy**

Scott Strelecki, [Scott.Strelecki@sandag.org](mailto:Scott.Strelecki@sandag.org)

**Do you currently use any sustainability tools for transportation planning and operations?**

**If you do, please list them.**

Yes we have sustainability tools for transportation planning and operations. These include, among others:

- 2050 Regional Transportation Plan and its Sustainable Communities Strategy (RTP/SCS)
- 2012 Regional Transportation Improvement Program (RTIP)
- Regional Comprehensive Plan (RCP)
- RCP Performance Monitoring
- Transportation Enhancement Activities Program
- Smart Growth Concept Map (SGCM)
- TransNet Smart Growth Incentive Program
- Smart Growth Tool Box
- Smart Growth Visualization Tools and Photo Library
- Smart Growth Design Guidelines
- Parking Strategies for Smart Growth
- Trip Generation for Smart Growth

- TransNet Environmental Mitigation Program (EMP)
- Active Transportation Grant Program
- Healthy Communities Campaign
- State of the Commute Report
- Intergovernmental Review
- I-Commute programs including carpool, vanpool, schoolpool, transit and bike to work programs, and telework
- Roadside assistance program
- Senior and student discounts for transit passes
- The Coordinated Public Transit – Human Services Transportation Plan (Coordinated Plan) and Short Range Transit Plan (SRTP)
- 5-1-1 Information Traveler System
- Electric Vehicle Charging Stations

Planning for implementation is dependent upon the tool. Both the 2050 RTP/SCS and RCP provide a vision and framework for the future long-range activities, including development of sustainable transportation projects and programs for the region. For direct incentivized programs, evaluation criteria are used to allow for a competitive process among local jurisdictions. Awarded funds are used for near-term local projects. Additionally, guidelines and visualization tools are provided for use during development stages of transportation projects, whether for planning-level or design needs. Monitoring reports provide periodic updates of information to determine how indicators reflect sustainable policy goals and objectives. And intergovernmental review provides the opportunity to work with transportation partner agencies and local jurisdictions during the review of local project developments. Our input is collectively used to provide feedback as project impacts relate to regional sustainable plans and programs.

**What areas of transportation are you involved with?**

Transportation planning , Project coordination, Project administration, Public involvement, Performance monitoring

**What are the objectives of your sustainable transportation program? How did you determine the scope of your program? What was process used to develop the tool or program?**

The objectives of sustainable transportation for SANDAG are to provide a vision and framework for future sustainable development of transportation projects and programs within the region, to meet the greenhouse gas (GHG) emission reduction targets set for the San Diego region by the California Air Resources Board, and to provide viable and equitable transportation options for people that need to make trips in the region, especially by focusing on multi-modal transportation options. The established policy goals and assessments from the 2050 RTP/SCS and RCP have developed this vision through collaboration with transportation partner agencies, local jurisdictions, and other stakeholders and the public incorporating an extensive update process. Other sustainable transportation tools have been developed in a similar fashion as with long-range plans. Policies and frameworks are determined at the decision-making level and scope of work, tasks, and work products are refined through transportation partner agency, local jurisdiction, and stakeholder and public input and engagement. These plans and programs provide a variety of benefits and services to the region independently, and are bundled within the

regional long-range plans and programs.

**Describe your experience using these tools.**

I primarily have experience with the 2050 RTP/SCS and RCP, 2012 RTIP, monitoring programs, and intergovernmental review process. At the regional planning level sustainable transportation planning and operations are very well incorporated within plans and programs. Multimodal transportation concepts with focuses on active transportation (bike, pedestrian, safe routes to school, safe routes to transit), transportation demand management (TDM) (vanpools, carpools, bike lockers), and transportation systems management (TSM) (arterial and transit management, ITS, freeway service patrol, operational improvements) are included extensively.

Projects are coordinated for the region via major highway and transit capital, highway and transit operational, active transportation, incentivized programs, TDM, and TSM projects; and are distinguished between the long-term phasing schedule and short-term capital improvement program, 2012 RTIP. Sustainable transportation planning resources are used extensively throughout project administration including planning level corridor study projects and other planning-type projects. Resources include the Smart Growth Concept Map, Smart Growth Design Guidelines, and 2050 RTP/SCS and RCP long-range adopted plans.

Public involvement as a major component of all of the planning and program development is coordinated with sustainable transportation tools. Many public participants are knowledgeable of the sustainable resources and provide feedback and input to specific methods and practices during a variety of planning project processes. SANDAG attempts to promote the value of such resources for the public to consider and to engage the public with innovative sustainable concepts and strategies.

Ultimately, the policy advisory committees involved with the infrastructure decision making also play a crucial role in developing and monitoring sustainable transportation tools and resources. There is excellent coordination and a solid understanding of how sustainable transportation resources and practices relate to all projects, plans, and programs brought before these committees for information, discussion, input, acceptance, and adoption.

**How would you describe the implementation process of these tools?**

As mentioned previously, the implementation process consistently involves the coordination between public advisory committees, transportation partner agencies, local jurisdictions, and other stakeholders and the public. Long-range planning efforts including the 2050 RTP/SCS are refined and updated consistently and adjustments are made with respect to sustainability goals and objectives. The long-range planning process provides ample opportunities to revisit and adjust policy goals and objectives, as well as to refine methods and analysis.

SANDAG utilizes most if not all of the agency's resources for the development of long-range plans. SANDAG involves affected agencies in the various planning and implementation efforts from the beginning, such as on project teams, on working groups, and through discussions with policymakers and decision-makers. SANDAG leverages a wide array of expertise and a team-oriented approach to provide an effective standard to achieve agency goals and needs.

**What are your performance measures and how do you define them for these areas?**

1. **Volume and vehicle/person through-put**
2. **Multimodal mobility**
3. **Health and safety**
4. **Environmental factors**
5. **Economic Factors**

Our performance measures are used as a tool to identify and develop a fiscally constrained transportation network scenario for the RTP. Performance measures are grouped within the 2050 RTP/SCS six policy goals (System Preservation and Safety, Mobility, Reliability, Prosperous Economy, Healthy Environment, and Social Equity). Please refer to Technical Appendix 3 for a comprehensive list of all existing performance measures.

- Volume and vehicle/person through-put: Systemwide vehicle miles traveled (VMT) for all vehicle types and transit passenger miles, congested VMT travel for autos/transit, and vehicle delay
- Multimodal mobility: Average work trip travel speed, work and higher education trips accessible in 30 minutes in peak periods, and non-work related trips accessible in 15 minutes, all by mode (drive alone, carpool, and transit).
- Health and safety: Smog-forming pollutants for vehicle types, total bike and walk trips, work trip and non-work trip mode share, projected number of vehicle and bicycle/pedestrian injury/fatal collisions
- Environmental factors: Acres of constrained lands consumed for transit and highway infrastructure and CO2 emissions for all vehicle types
- Economic factors: Benefit/cost, job impacts, gross regional product impacts, and payroll impacts

The objective to determine success includes comparing the performance of the transportation network scenario alternatives against one another within the context of the policy goals. Data is typically displayed at the regional level and to a lesser extent, the corridor level for long-range regional planning activities. Data is also available at the local jurisdiction level. We will consider additional levels of analysis when we incorporate the activity-based model (ABM) for our next plan update.

Challenges have involved developing non-model methods to use for performance measures and using off-model assumptions to calculate modeled data into measures. These steps tend to potentially complicate the process by adding additional factoring and assumptions to the equation. Additional challenges have included the provision of so much data that interpretation becomes difficult and cumbersome.

**Have you seen measurable effects in relation to:**

1. **Volume and vehicle/person through-put**
2. **Multimodal mobility**
3. **Health and safety**

4. **Environmental factors**
5. **Economic Factors**
6. **Any other significant effects**

For the most recently adopted 2050 RTP/SCS, when comparing different transportation network alternatives for future years, there were measurable effects between all categories of performance measures. There were also measurable effects between the Plan's baseline and future preferred network scenario. The effects varied depending on the performance measures. One variable constraint in the mix is the amount of discretionary funds available for the region to use based on revenue sources for the fiscally constrained scenario. Because the amount of discretionary funds was low (approximately three percent of the funding pool), some of the performance measures did not display significant differences between scenarios.

**How do you account for areas with different levels of development (urban vs. rural, distressed vs. vibrant, redevelopment districts vs. greenfields, etc)? Do these relate to the Place Types of the SMF? Do you have different metrics for evaluation? Different tools?**

SANDAG working with local jurisdictions has developed the SGCM, which shows locally-identified locations where higher-density housing and employment, mixed use, and compact development in proximity to transit are planned or can be planned in the future, resulting in more sustainable development. Smart growth incentive programs and design guidelines are used to provide resources for local agency planning and project developments to occur as effectively as possible within the urban portion of the region. The SGCM provides a geographical representation for the optimal placing for future development and redevelopment, based on land use capacities. Many of the sustainable tools listed above provide resources for future development within urban, redevelopment, and infill locations.

Additionally, the TransNet EMP provides resources to facilitate the implementation of habitat programs in the region including the Multiple Species Conservation Program (MSCP) and the Multiple Habitat Conservation Program (MHCP). This program helps maintain open space and protected habitats throughout the region.

From a planning-level performance measure perspective, metrics for evaluation remain consistent whether considering regional or corridor areas. Some of the metrics for evaluation criteria for projects related to incentive programs provide additional metrics for more local near-term projects.

**How do you account for asset management in your sustainability program?**

SANDAG, through its long-range planning efforts and most recently adopted 2050 RTP/SCS develops sustainable policy goals for regional plans and programs. These long-range plans provide an output of regional transportation projects including capital and operational improvements. SANDAG partners with the asset management of regional transportation infrastructure with the California Transportation Commission (CTC), California Department of Transportation, Caltrans, and transit operating agencies.

Additionally, SANDAG, through the TransNet EMP and SR 125 Toll Road (South Bay Expressway), provide sustainable asset management directly by managing funding allocation for habitat acquisition, management, and monitoring activities, and operating the South Bay Expressway to provide mobility and congestion relief to the South Bay area and San Diego regional highway network.

**How do you communicate your objectives and performance with the public? Is public involvement part of your program?**

SANDAG provides communication of objectives and performance with the public in a variety of ways. SANDAG has established a Public Participation Plan (PPP) for the agency. This plan provides a framework for the public participation process. Additionally, Public Involvement Plans (PIPs) are developed for specific projects to establish a public participation process workflow.

SANDAG provides resources and works with partner agencies, local jurisdictions, community based organizations, business districts, and many other stakeholders to engage with communities and the public. SANDAG holds workshops, attends local meetings at city and community levels, provides presentations to many groups and organizations, and provides numerous opportunities through SANDAG working group and committee meetings, policy advisory committee meetings, Board of Director meetings, and meetings for stakeholders and the public to provide feedback and input.

For example, the goal of the Community-Based Outreach Mini-Grant program was to engage and encourage diverse, inclusive, and active public participation from stakeholders in specific communities who traditionally were not involved in regional public policy planning; these stakeholders included low-income households, seniors, minorities, people with disabilities, and other groups.

SANDAG additionally provides Internet-based surveys and social media engagement.

**Florida DOT - Mobility Performance Measures**

Douglas McLeod, [Douglas.McLeod@dot.state.fl.us](mailto:Douglas.McLeod@dot.state.fl.us)

**Do you currently use any sustainability tools for transportation planning and operations? If you do, please list them.**

Not as such; not under that name (although of interest to many FDOT folks, “smart mobility” and “sustainability tools” are not commonly used terms here); FDOT does have one of the most comprehensive multimodal mobility performance measure programs in the nation. FDOT has been reporting system mobility measures for over 10 years.

**What areas of transportation are you involved with?**

Transportation planning, Mobility performance measures and highway capacity / level of service analyses

**What are the objectives of your sustainable transportation program? How did you determine the scope of your program? What was process used to develop the tool or program?**

N/A

**Describe your experience using these tools.**

(not the tools, but the mobility measures)

- a Transportation planning substantially used
- b Transportation operations somewhat used
- c Project coordination
- d Project administration somewhat used
- e Public involvement
- f Infrastructure decision making somewhat used

**How would you describe the implementation process of these tools?**

N/A

**What are your (mobility) performance measures and how do you define them for these areas?**

- 1. Volume and vehicle/person through-put**
- 2. Multimodal mobility**
- 3. Health and safety**
- 4. Environmental factors**
- 5. Economic Factors**

(FDOT's Safety Office deals with these measures; used in our planning and programming efforts)  
(See attached sheets.)<sup>12</sup>

**What are your objectives to determine success and does that depend on the objective?**

FDOT's Policy Planning Office deals with FDOT's goals and objectives used in our planning and programming efforts. **At what level is data readily available (city/county/region)?**

Availability of data and information varies substantially but are generally available at the county and higher aggregated levels. **What have been challenges to using data and metrics from other sources?;** FDOT generally relies on its own data

**Have you seen measurable effects in relation to:**

- 1. Volume and vehicle/person through-put** FDOT has a good prioritization process addressing needs
- 2. Multimodal mobility** FDOT puts a great deal of resources for pedestrian and bicycle accommodations in highway projects
- 3. Health and safety** (FDOT's Safety Office deals with these measures; used in our planning and programming efforts)

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<sup>12</sup> See Appendix D.

4. **Environmental factors** (FDOT's Policy Planning Office deals with these measures; used in our planning and programming efforts)
5. **Economic Factors** (FDOT's Policy Planning Office deals with these measures; used in our planning and programming efforts)
6. **Any other significant effects**

**How do you account for areas with different levels of development (urban vs. rural, distressed vs. vibrant, redevelopment districts vs. greenfields, etc)?** FDOT has different highway level of service standards and measurement criteria for rural, urban and urbanized areas. **Do these relate to the Place Types of the SMF? Do you have different metrics for evaluation? Different tools?** Same tools.

**How do you account for asset management in your sustainability program?**

N/A

**How do you communicate your objectives and performance with the public? Is public involvement part of your program?**

At a systems level FDOT's Policy Planning Office deals with the Department's goals and objectives.

#### **Maryland DOT - Model of Sustainability and Integrated Corridors (MOSAIC)**

Eric Beckett, [ebeckett@sha.state.md.us](mailto:ebeckett@sha.state.md.us)

**Do you currently use any sustainability tools for transportation planning and operations? If you do, please list them.**

The Model of Sustainability and Integrated Corridors, known as MOSAIC, is a new planning calculator that will allow planners to quantify sustainability data and compare alternative scenarios to make more informed decisions at the corridor level for transportation planning purposes. The tool will help SHA to move more quickly along the project development path by providing clear and succinct assessments of the relative environmental, mobility, safety, and economic impacts of project options being considered at a low cost.

The tool compares project scenarios according to six sustainability factors: mobility, safety, socioeconomics, energy and environment, natural resources, and project costs. Each factor includes multiple performance measures, totaling more than thirty measures overall. MOSAIC then produces a score for each alternative and ranks its performance in relation to the various factors.

**What areas of transportation are you involved with?**

Transportation planning, Project coordination, Public Involvement

**What are the objectives of your sustainable transportation program? How did you determine the scope of your program? What was process used to develop the tool or program?**

The goal of the project is to provide a tool to analyze and compare different highway improvements. The results will feed into our unconstrained long range plan, The Highway Needs Inventory. The final results will allow SHA to save time and money by eliminating

options that may not be feasible early in the process. In the last few years, there have been numerous legislative changes and well as a recession that have limited the resources for new projects. This required SHA to really take a good data-driven approach to what projects are beneficial to the environment, the economy, safety and mobility to strategically invest our limited resources.

A partnership with the University of Maryland was formed to assist with the development of the MOSAIC model.

**Describe your experience using these tools.**

The tool will help SHA to move more quickly along the project development path by providing clear and succinct assessments of the relative environmental, mobility, safety, and economic impacts of project options being considered at a low cost.

The tool will help SHA to move more quickly along the project development path by providing clear and succinct assessments of the relative environmental, mobility, safety, and economic impacts of project options being considered at a low cost. Alternatives that are not feasible from an environmental, mobility or safety perspective can be eliminated early in the process.

**How would you describe the implementation process of these tools?**

The first phase of the MOSAIC tool is complete and had two improvement scenarios, add a general purpose lane and convert existing intersections to grade-separated interchanges. The second phase, which is nearing completion, incorporates additional improvement options including multi-modal improvements. SHA is also in the process of converting the existing spreadsheet model to the eGIS system to assist with data inputs. The final phase will be the calibration which should begin early 2013. After completing this final phase, we will be ready to share with other Maryland agencies and continue to make improvements to the model.

**What are your performance measures and how do you define them for these areas?**

1. **Volume and vehicle/person through-put**
2. **Multimodal mobility**
3. **Health and safety**
4. **Environmental factors**
5. **Economic Factors**

The MOSAIC tool combines numerous performance measures into a combined score for each of the six areas of sustainability: mobility, safety, socioeconomics, energy and environment, natural resources, and project costs. The model then allows the user to select how each of the six categories should be weighted. Depending on the weights the composite score for each of the improvement options changes. The data used by the model is readily available from a variety of sources within SHA and other state agencies.

**Have you seen measurable effects in relation to:**

1. **Volume and vehicle/person through-put**
2. **Multimodal mobility**
3. **Health and safety**

4. **Environmental factors**
5. **Economic Factors**
6. **Any other significant effects**

**How do you account for areas with different levels of development (urban vs. rural, distressed vs. vibrant, redevelopment districts vs. greenfields, etc)? Do these relate to the Place Types of the SMF? Do you have different metrics for evaluation? Different tools?**

The MOSAIC tool takes inputs including existing and future land-use as well as census data as part of the calculations. The density of housing and commercial space plays a role in the mode choice components of the tool.

**How do you account for asset management in your sustainability program?**

The MOSAIC tool does not deal with asset management. The SHA has other programs and efforts in regards to asset management.

**How do you communicate your objectives and performance with the public? Is public involvement part of your program?**

At this point, the MOSAIC tool is for internal SHA use only. The public involvement would still be a key component of any feasibility or project planning project that would move beyond the pre-planning stage.

#### **New York State DOT - GreenLITES**

Paul Krekeler, [pkrekeler@dot.state.ny.us](mailto:pkrekeler@dot.state.ny.us)

**Do you currently use any sustainability tools for transportation planning and operations? If you do, please list them.**

NYSDOT uses a variety of Department developed sustainability tools for transportation planning, operations and design. They are:

GreenLITES Project Solicitation Tool: This tool is used by NYSDOT and MPO's to evaluate/select projects to be included in the TIP/STIP.

GreenLITES RISE (Regional Infrastructure Sustainable Elements) Table: This tool is used by NYSDOT regions to identify, plan and prioritize regional capital program projects as they relate to sustainability goals and objectives.

GreenLITES Operations spreadsheet: This tool is used by NYSDOT Operations to plan, budget and prioritize maintenance work.

GreenLITES Project Design: This tool is used during project design to include as many sustainable elements as practicable into individual projects.

All these tools and tool guidance is located on the Departments Sustainability web page at: <https://www.dot.ny.gov/programs/greenlites>

The first tool developed was the GreenLITES Project Design tool. This tool was developed by a commissioner directed interdisciplinary team made up of engineers, landscape architects,

environmental specialists and other transportation specialists. Team members reached out to various program areas to develop the tool. Before implementation, the tool was vetted through, universities, consultants, professional organizations, other transportation partners, and an Engineering Instruction review process and finally issued through a NYSDOT Engineering Bulletin. Other tools and sustainability guidance and policy (vision, mission, definitions, strategies, etc.) were developed following similar processes.

**What areas of transportation are you involved with?**

Transportation planning

**What are the objectives of your sustainable transportation program? How did you determine the scope of your program? What was process used to develop the tool or program?**

NYSDOT's sustainability program goals and objectives are based on the below Department sustainability vision, mission, definition and strategies.

NYSDOT Sustainability Vision:

Exemplify how transportation supports a sustainable society.

NYSDOT Sustainability Mission:

To fully integrate sustainability into the Department's decisions and practices in planning, designing, constructing, maintaining and operating New York State's transportation system. NYSDOT will also model and advance sustainability in managing its internal resources.

NYSDOT Sustainability Definition:

A sustainable society manages resources in a way that fulfills the social (community), economic and environmental needs of the present without compromising the needs and opportunities of future generations.

NYSDOT Sustainability Concepts:

A transportation system which supports a sustainable society is one that:

1. Allows individual and societal transportation needs to be met in a manner consistent with human and ecosystem health with equity within and between generations.
2. Is safe, affordable, accessible, operates efficiently, offers choice of transport mode, and supports a vibrant economy.
3. Protects and preserves the environment by limiting transportation emissions and wastes, minimizes the consumption of resources and enhances the existing environment as practicable.

Over-arching Sustainability Strategies:

NYSDOT will advance sustainability by following these strategies:

- Develop, advocate and advance Department sustainability goals, objectives and strategies through interaction with Main Office and Regional employees, program areas, workgroups and external stakeholders.
- Incorporate sustainability concepts into the Department's procedures, investments, policies, manuals, specifications, programs, projects and practices.
- Use the Sustainability Steering Committee [Comprehensive Program Team] as a feedback loop so that constructive participation is vetted through Executive Management.
- Develop and use sustainability measures and indicators to better manage NYSDOTs internal resources and programs.
- Facilitate partnerships through sharing of ideas and best practices.
- Evaluate the costs and benefits (societal, environmental, and economic) of transportation investments over life-cycles as well as fiscal cycles.

The New York State Department of Transportation (NYSDOT) is committed to improving the quality of our transportation infrastructure in ways that minimize impacts to the environment, including the depletion of irreplaceable resources. To recognize transportation project designs, operations and maintenance practices that incorporate a high level of environmental sustainability, NYSDOT implemented the GreenLITES (Leadership In Transportation Environmental Sustainability) program, a transportation and environmental sustainability rating program.

As we improve safety and mobility in New York State, transportation sustainability at NYSDOT is a philosophy that ensures we:

- Protect and enhance the environment.
- Conserve energy and natural resources.
- Preserve or enhance the historic, scenic, and aesthetic project setting characteristics.
- Encourage public involvement in the transportation planning process.
- Integrate smart growth and other sound land-use practices.
- Encourage new and innovative approaches to sustainable design, and how we operate and maintain our facilities.

These concepts are not new to the Department, which has been following many of these practices in one form or another for a number of years. NYSDOT developed the GreenLITES Design certification program to better integrate these principles by:

- Recognizing and increasing the awareness of the sustainable methods and practices we already incorporate into our project designs and daily operations.
- Expanding the use of these and other innovative alternatives which will contribute to improving transportation sustainability.

NYSDOT also understands sustainability is about balancing what is beneficial to people, while considering what is economically sound, and environmentally compatible. This may or may not necessarily increase costs. However, where costs are increased, it may be warranted when all external costs are considered.

The GreenLITES program started with the project design program, a self-certification program that distinguishes transportation projects and operations based on the extent to which they incorporate sustainable choices. This is primarily an internal management program for NYSDOT to measure our performance, recognize good practices, and identify where we need to improve. It also provides the Department with a way to demonstrate to the public how we are advancing sustainable practices. NYSDOT project designs and operations are evaluated for sustainable practices and based on the total credits received; an appropriate certification level is assigned. The rating system recognizes varying certification levels, with the highest level going to designs and operational groups that clearly advance the state of sustainable transportation solutions.

As stated before, tools and policies were developed by commissioner directed interdisciplinary teams made up of engineers, landscape architects, environmental specialists and other transportation specialists. Team members reached out to various program areas to develop tools, guidance, vision, mission, definitions, strategies, etc. Before implementation, the initial tool was vetted through, universities, consultants, professional organizations, other transportation partners, and an Engineering Instruction review process and finally issued through a NYSDOT Engineering Bulletin. Other tools and guidance evolved as a result of increased interest and the success of the GreenLITES Project Design Program.

### **Describe your experience using these tools.**

Tool use in transportation planning and project selection is challenging because the use of the tool is voluntary by MPO's. However, once projects are selected and incorporated into a capital program, tool use - especially in Project Design and Operations - is well developed where tools are mandated to be used. In project design, there are many examples where the public knows about and participates with the department in developing project sustainability goals. The tool helps frame project goals, incorporates sustainable design elements, ensures sustainability elements are constructed, engages the public, publicly rewards exemplary projects, and provides a feedback loop for updating and incorporating sustainable practices in the future.

### **How would you describe the implementation process of these tools?**

Implementation for the initial tool followed standard department guidance issuance through the Engineering Bulletin process. Other tools and guidance were issued in a less formal way because they became "add-ons" to an existing policy/procedure. In rolling out these tools we learned:

- Tools do not need to be perfect. Better to get something out there for people to use, get them thinking, get feedback and modify/improve the tool as you go along.
- The development of one tool (GreenLITES Project Design) led to developing other tools for other program areas (Operations, Planning, Program Update).

- Vet tools with others – universities, professional organizations, other transportation partners, FHWA, etc.
- Make tools flexible so people will want to use them. It is easier to get people to use a tool if they see benefit rather than just more bureaucracy.
- Share tools with others. By placing our tools on the internet for others to review and use we have received valuable comments and have modified the tool where appropriate.
- It is a challenge to get outside agencies to use the tools if it is not mandated or linked to funding. However, we do not advocate making all tool use mandatory.

**What are your performance measures and how do you define them for these areas?**

1. **Volume and vehicle/person through-put**
2. **Multimodal mobility**
3. **Health and safety**
4. **Environmental factors**
5. **Economic Factors**

NYSDOT is in the process of developing specific sustainability performance measures. As we bring sustainability into the capital program and asset management process, we recognize we need measures to indicate how successful our efforts are in addressing sustainability. The NCHRP guidebook for sustainability performance measurement (NCHRP Report 708, 2012) has been a useful tool in identifying practical measures; it provides a much needed methodology and comprehensive list for developing sustainability performance measures. NYSDOT has completed an initial screening of measures with consideration given to data that is currently available as well as the outcomes we are trying to measure.

NYSDOT is now developing a table to link our sustainability vision to our actions. As envisioned, this table will include goals, objectives and measures, and provide a template to identify sustainability current states, desired future states and plans for accomplishing desired outcomes in all three sustainability realms, tying them to program priorities. This will provide us with a tool to monitor the implementation of our capital program for consistency with sustainability considerations using performance metrics. An important process goal is to keep the measures simple and based on data that NYSDOT either, already has, will have soon, or might be easily obtained. This will help NYSDOT focus on long term sustainability goals from a more holistic perspective and across program areas using the triple bottom line realms of economy, environment and communities."

**Have you seen measurable effects in relation to:**

1. **Volume and vehicle/person through-put**
2. **Multimodal mobility**
3. **Health and safety**
4. **Environmental factors**

## 5. Economic Factors

### 6. Any other significant effects

NYSDOT is still in the process of developing metrics to measure specific desired results. However, In Design, a tangible program success can be seen in how GreenLITES helped advance a much debated project in the New York metropolitan area. In this example, a major, high profile, sensitive, complex, and until GreenLITES was used, slowly moving project is now being progressed more readily. This is because the stakeholders, the affected communities and NYSDOT used GreenLITES to agree on the project's objectives and that the project will attain an Evergreen certification.

### **How do you account for areas with different levels of development (urban vs. rural, distressed vs. vibrant, redevelopment districts vs. greenfields, etc)? Do these relate to the Place Types of the SMF? Do you have different metrics for evaluation? Different tools?**

The Department's capital program update guidance states "To address the needs of system users and society, NYSDOT will consider an individual project in the context of how it contributes to or improves the larger transportation system." To accomplish this, the Department's asset management process integrates data collection and a comprehensive analysis through the use of various Department asset management tools and techniques. Bridge and Pavement data are initially analyzed in separate bridge and pavement indexes which consider asset condition, capital need, facility importance, potential risks, detour distance, AADT, ride quality, surface ratings, road classification and funding. These and other data/criteria are used to determine which projects are initially funded under the "preservation first" portion of the capital program.

Projects considered "beyond preservation" projects begin with an analysis of asset condition and also factor in the asset context within the transportation system. NYSDOT uses bridge and pavement beyond preservation forms and considers, not only condition, but also additional factors such as if an asset is located on a priority corridor (corridors exist in diverse areas with different levels of development and quality of life conditions). The form also considers other sustainability criteria such as critical access (lack of redundancy), access to important facilities such as businesses, hospitals, universities; mobility considerations, and freight access. There is also an additional Beyond Preservation Project Justification form that gets completed. This form categorizes projects as either system renewal or modernization and evaluates projects based on critical linkages (corridors), and how project measures are being used to preserve, enhance or support economic competitiveness, community viability and environmental conditions. The form and process also looks at how the project contributes to multi-modal improvements, economic competitiveness, community viability, connectivity, completeness of public transportation systems, and safety.

In addition, all NYSDOT transportation infrastructure projects must comply with the New York State Smart Growth Infrastructure Policy Act which requires NYSDOT to formally evaluate a project's consistency with ten defined smart growth criteria.

### **How do you account for asset management in your sustainability program?**

Sustainability is very much incorporated into the asset management program. The Department established a Comprehensive Program Team (CPT) to develop guidance, direction and oversight measures to preserve, operate and manage the transportation assets of the state. The team includes the Chairs of each of the Department's asset management teams (pavement, bridge, safety, sustainability and modal), as well as high level regional representatives. Sustainability is one of the asset management groups whose team leaders are at the table for discussion and decisions. NYSDOT has established both a statewide sustainability team and sustainability asset teams and leaders within each of its 11 regions. The sustainability teams develop sustainability guidance for consideration in projects and programs, and provides input to the CPT on sustainability asset related issues.

The CPT has developed these "Forward Four" guiding principles for making asset management decisions:

- Preservation First
- System Not Projects
- Optimize Return on Investment
- Make it Sustainable

In addition, a two category, 5 tiered hierarchy of priorities has been established to prioritize making investment and project selection decisions. It is:

- Preservation
  - o Demand response – safety of the system
  - o Preservation – corrective and preventative maintenance
  - o Enhance safety – systematic improvements and spot location corrections
- Beyond Preservation
  - o System Renewal – system critical bridge replacements/major rehabilitation and pavement rehabilitation/reconstructions
  - o Modernization- system expansion, added capacity, major widening, and additional of lanes, rest areas, new or other facilities.

A special Beyond Preservation tool/spreadsheet is used to select both system renewal and modernization projects. These tools include sustainability considerations.

**How do you communicate your objectives and performance with the public? Is public involvement part of your program?**

Sustainability objectives and performance is communicated with the public through our web page, press releases, during project scoping, and as part of the Capital Program Planning outreach process. Public involvement is very much a part of the way NYSDOT does business.

**Oregon DOT - Sustainability Plan and Least Cost Planning**

Lucia Ramirez, [Lucia.L.RAMIREZ@odot.state.or.us](mailto:Lucia.L.RAMIREZ@odot.state.or.us)

**Do you currently use any sustainability tools for transportation planning and operations? If you do, please list them.**

We are developing and experimenting with sustainability tools and building sustainability into our programs. ODOT is developing a sustainability plan for the agency and our system overall (<http://www.oregon.gov/ODOT/SUS/Pages/index.aspx>). Some of our MPO's are involved in greenhouse gas reduction planning, particularly Portland Metro and another is set to begin experimenting with a triple bottom line approach (Lane Council of Governments).

We are also developing the least cost planning process and tool (<http://www.oregon.gov/ODOT/TD/TP/pages/lcp.aspx>). This is actually intended to be broader than a sustainability tool, but it contains various sustainability measures within it and is consistent with other sustainability efforts. Development of least cost planning was directed by our legislature in 2009 in order to look fairly at a wide range of transportation investment options including system and demand management techniques along with capacity building. The purpose is to help identify the most cost-effective options in terms of goals (not necessarily just the least cost). We are set to begin testing our LCP process and tool next year. After testing and adjusting as needed, then we expect to make it available for others to use. We do not expect to require use of LCP and we do not have formal implementation plans. We have been conducting periodic outreach to interested groups including planners and other stakeholders. We expect to provide opportunities to learn about LCP to better position others to take advantage of it in the future.

**What areas of transportation are you involved with?**

Transportation policy and criteria for transportation project/investment selection (e.g. the Statewide Transportation Improvement Program).

**What are the objectives of your sustainable transportation program? How did you determine the scope of your program? What was process used to develop the tool?**

The objectives for LCP are to develop a “process of comparing direct and indirect costs of demand and supply options to meet transportation goals, policies or both, where the intent of the process is to identify the most cost-effective mix of options” (Oregon Revised Statutes 184.653). We want to ensure that LCP can analyze all kinds of transportation investments and compare them against goals to find the most cost-effective options. We also want to ensure that this process is as transparent as possible and produces helpful information for making transportation planning decisions.

We began LCP development with a Request for Information from the consultant community about what they would include in such an analysis process and how they might develop it. Our first task after the RFI was to have a paper researched and written regarding similar recent efforts (“History and Application of Least Cost Planning for Transportation from the Mid-1990’s”). Our scope was built from information from the RFI responses, what was learned from the discussion paper, and from internal stakeholder discussions. In our process, we began broadly and got more and more specific throughout our development process. We engaged our STIP Stakeholder Committee ([http://www.oregon.gov/ODOT/TD/TP/pages/stip\\_ssc.aspx](http://www.oregon.gov/ODOT/TD/TP/pages/stip_ssc.aspx)) as our project steering committee and worked with them to determine what kinds of things should be included in LCP analysis. We used several staff and technical work groups with consultant assistance to determine what information is available and what indicators are best to include in our project that reflect the steering committee’s direction.

**Describe your experience using these tools.**

We do not yet have experience using our new LCP process and tool. We expect to learn much next year as we try it out and learn how and when it works best and how stakeholders respond. We expect LCP to provide a way to more thoroughly analyze costs and benefits and further impacts of transportation investment decisions and provide a way to look at these systematically and enable documentation of factors that go into transportation planning decisions.

**How would you describe the implementation process of these tools?**

We have not yet implemented LCP; we will learn more in our testing phase next year. Interagency cooperation will be essential for testing and for future use of LCP.

**What are your performance measures and how do you define them for these areas?**

1. **Volume and vehicle/person through-put**
2. **Multimodal mobility**
3. **Health and safety**
4. **Environmental factors**
5. **Economic Factors**

The measures or “specific indicators” that we have selected for LCP are available on our project page (direct link: <http://www.oregon.gov/ODOT/TD/TP/docs/lcp/indicatorlist.pdf>). A lot of research and thought of multiple experts in each field went into these, as shown in the memos from the Indicator Development Teams for each category on ODOT’s LCP project page. They were selected to represent important aspects of their categories, be able to be expressed as monetary values whenever possible, and ensure that the same impacts are not being counted multiple times within LCP analysis.

Our goal is to produce a process and tool that can be used as part of the established transportation planning process to better analyze impacts on nine categories of transportation system performance to assist decision-making and to improve the transparency of those decisions. Our testing process will enable us to understand how well our products meet these objectives.

Our tool is designed to be flexible to enable varying levels of hard data input. Since many of the indicators rely on mode use data and modeling to be used in their most robust form, it is likely that only the largest MPO can use the most robust version of the tool. For smaller MPOs with less extensive modeling capability and other cities and jurisdictions outside the Portland MPO, the same indicators can be used within the tool in a less robust form.

When all data is available, most of the indicators within LCP can be included in the monetary benefit-cost analysis. There is a secondary analysis system alongside BCA within the tool that we call MODA for Multi-Objective Decision Analysis. It allows quantitative or qualitative data or information to be rated on a 1-10 scale, such as no impact (0) to extensive impact (10). This information is then consolidated and a total MODA score for a bundle of possible investments is produced, using the individual indicator scores and an important step of stakeholders’ assigning weights to the various MODA indicators. Where less data is available, more indicators can move over into the MODA side of the tool for valuable, but less robust analysis within LCP.

**Have you seen measurable effects in relation to:**

1. **Volume and vehicle/person through-put**
2. **Multimodal mobility**
3. **Health and safety**
4. **Environmental factors**
5. **Economic Factors**
6. **Any other significant effects**

We have not yet implemented LCP.

**How do you account for areas with different levels of development (urban vs. rural, distressed vs. vibrant, redevelopment districts vs. greenfields, etc)? Do these relate to the Place Types of the SMF? Do you have different metrics for evaluation? Different tools?**

LCP is currently being designed for a region-wide planning analysis such as a regional transportation system plan or perhaps a significant corridor or larger city transportation system plan. We will want to see if it can also be adapted for use at a statewide level for policy level analysis and in the future we will want to see if parts of it can be applied at the project level. The indicators will capture multiple types of impacts and some of these issues should be reflected in the scoring of them. Equity has been a significant factor we have considered throughout development of LCP and indicators are specifically dedicated to equity.

**How do you account for asset management in your sustainability program?**

Asset management is not directly linked to LCP, though we have an active and developing asset management program at ODOT and there are links between the asset management program and the agency sustainability program. LCP is related to many of these and we make an effort to be mindful of linkages and complement efforts as much as possible.

**How do you communicate your objectives and performance with the public? Is public involvement part of your program?**

Direct public involvement has not been a part of LCP development so far. However, we have used a wide ranging committee of stakeholders (STIP Stakeholders) as our project steering committee and we have made presentations to many stakeholder groups and provided a public website. We have also reported back to the legislature on our progress, as they initiated this project. In the future, because LCP is designed to be part of the transportation planning process and that is done with extensive public involvement in Oregon, public involvement will be an important aspect of LCP use in the future. Our testing process next year will help illuminate how that may work and help identify what any pitfalls in communication may be.

## Appendix D: Florida DOT Attachment

10/4/12

### **Mobility Performance Measures Definitions**

**Accessibility** (a dimension of mobility) – conceptually the ease in engaging in activities – mobility performance measure typically associated with this mobility dimension are

Time to reach a destination

Modal choices

Connectivity

**Automobile** (auto) – a travel mode that includes all motor vehicle traffic using a roadway except transit buses (includes such vehicles as trucks, recreational vehicles, motor cycles and tour buses) (HCM definition)

**Bottleneck** – a segment of a transportation network that experiences significant operational problems such as oversaturated congestion

**Bus** – a transit mode operated by rubber tired vehicles that follow fixed routes and schedules along roadways

**Capacity** (auto) – the maximum number of vehicles that reasonably can be expected to traverse a point or a uniform section of roadway during a given time period under prevailing conditions

**Congestion** (congested conditions) (auto) – a condition in which traffic demand is sufficient to cause the LOS to be at or below FDOT’s LOS standard (note: congestion is not necessarily related to speed or delay)

Adjectives describing the severity of congestion are:

Heavy

Oversaturated

Adjectives describing the types of congestion are:

Non-recurring

Recurring

**Container** – a large, standard sized metal box into which cargo is packed for shipment

**Corridor** (auto) – (1) a set of essentially interrelated, parallel transportation facilities for moving people and goods between two points; (2) a geographic area used for the movement of people and goods

**Delay** (auto) – (1) additional travel time beyond some norm (e.g., one letter grade above FDOT’s LOS standard) experienced by a traveler; (2) any additional travel time experienced by a traveler

**Demand** – the number of persons or vehicles desiring to use a mode or facility

**Demand to capacity ratio** – see volume to capacity ratio

**Enplanements** – passenger boardings at airports

**Facility** (auto) – a length of roadway composed of points and segments

**Freight** – any commodity being transported

**Heavy congestion** (auto) - a situation in which traffic demand is sufficient to cause the level of service to be below FDOT's LOS standard

**Heavy vehicle** (auto) – a vehicle with more than four wheels touching the pavement during normal operation

**Highway** – a general term for denoting a public way for purposes of vehicular and people travel, including the entire area with the right-of-way

**Highway modes** – automobile, bicycle, bus, pedestrian

**Indicator** (mobility performance measure) – a mobility performance measure which primarily shows a trend over time and is not used to achieve a goal or objective or used in a decision making process

**Intermodal** – related to the connection between two or more modes of transportation

**Level of service (LOS)** – a quantitative stratification of the quality of service to a typical traveler of a service or facility into six letter grade levels, with “A” describing the highest quality and “F” describing the lowest quality

**Mobility** – the movement of people and goods

**Mobility performance measure** – (1) a metric which quantitatively tells us something about mobility; (2) a mobility metric directly tied to achieving a goal or objective or used in a decision making process

**Mode** – a means of moving people or goods

**Motor carrier** – A firm engaged in providing commercial motor freight or long distance trucking

**Multimodal** – more than one travel mode potentially including the four highway modes (auto, bicycle, bus, pedestrian), aviation, rail, seaports, and transit

**Non-recurring congestion** (auto) – congestion caused by unexpected disruptions or other events, particularly lane blocking incidents

**Oversaturated congestion** (auto) – a condition in which traffic demand exceeds the capacity

**Passengers** (aviation, rail, seaport) – People in a vehicle making use of a mode

**Performance measure** – a metric composed of a number and a unit of measure

**Quality** (a dimension of mobility) - conceptually how well people or goods are being transported – mobility performance measures typically associated with this mobility dimension are

Average travel speed

Travel time reliability

Vehicle delay

Level of service

**Quality of service** – a user based perception of how well a service or facility is operating

**Quantity** (a dimension of mobility) - conceptually the number of people or goods being transported – mobility performance measures typically associated with this mobility dimension are

Person trips  
Person miles traveled  
Vehicle miles travel  
Truck miles traveled  
Tonnage

**Reliability** – see travel time reliability

**Recurring congestion** (auto) – the routine presence of large numbers of vehicles on a facility

**Strategic Intermodal System** – Florida’s transportation system comprised of facilities and services of statewide and interregional significance, including appropriate components of all modes

**System** – a combination of facilities or services forming a network or being selected for analysis

**Transit** – a travel mode in which vehicles (including busses, streetcars, and street-running light rail) stop at regular intervals along the roadway to pick up and drop off passengers

**Travel time** – the total time spent from one point to another

**Travel time reliability** – (1) the percent of trips that succeed in accordance with a predetermined performance standard for time or speed; (2) the variability of travel times that occur on a facility or a trip over a period of time

**Travel time variability** – see travel time reliability

**Truck** – a heavy vehicle engaged primarily in the transport of goods and materials (notes, [1] trucks are included in the definition of HCM definition of automobile, [2] commonly within FDOT use of the term “truck” for traffic purposes is more accurately termed “heavy vehicle”)

**Twenty-foot equivalent unit** – the eight-foot by eight-foot by twenty-foot intermodal container used as a basic measure used for container cargo

**Utilization** (a dimension of mobility) - conceptually how efficiently the system being used—mobility performance measure typically associated with this mobility dimension are

Volume to capacity ratios  
Percent miles heavily congested  
Percent travel heavily congested

**Vehicle** – a motorized mode of transportation

**Vehicle miles traveled** (auto) – the total number of miles traveled by vehicles using a highway system

**Volume to capacity ratio** – the ratio of demand to capacity