STATEWIDE PERFORMANCE MONITORING INDICATORS FOR TRANSPORTATION PLANNING

FINAL REPORT

June 28, 2013

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STATEWIDE PERFORMANCE MONITORING INDICATORS

EXECUTIVE SUMMARY

Introduction and Background

In 2011, the San Diego Association of Governments (SANDAG) received grant funding from the Strategic Growth Council (SGC) to support its sustainable communities planning efforts. One of the goals of the grant is to collaborate with other California Metropolitan Planning Organizations (MPOs) and state agencies on common statewide transportation indicators related to Senate Bill 375 (SB 375) (Steinberg, 2008) implementation.

The stated purpose of this effort was to develop a common standardized set of up to ten transportation performance monitoring indicators that would be used by California MPOs and state agencies, such as the California Air Resources Board (CARB), California Transportation Commission, Caltrans, and other state agencies. Other state agencies that participated in this project include the California Department of Housing and Community Development (HCD), the California Department of Public Health, the Governor's Office of Planning and Research (OPR), and the SGC.

To facilitate the development of a statewide performance monitoring framework, SANDAG sought input from the MPO/State Agency SB 375 Implementation Working Group. Additionally, a Technical Group comprised of MPO and state agency technical staff was created to identify possible indicators and methodologies, and viable data sources that would allow for progress to be measured using observable data.

While performance measures rely mostly on modeled or forecasted data, performance monitoring indicators rely directly on observed data. MPOs use travel demand models or Geographic Information System (GIS) analyses to forecast performance measures. Ideally monitoring indicators would be considered together and be consistent with modeling performance measures. Currently, not all MPOs prepare monitoring reports using observed data on a regular basis.

Proposed Performance Monitoring Indicators

The Technical Group conducted a review of more than 200 performance measures and indicators used by MPOs and state agencies. The group identified those most commonly used, which could be monitored using statewide and regional data sources. The Technical Group developed a list of nine performance monitoring indicators, as shown in Table 1, and methodologies. These indicators account for the diversity of California in terms of smaller and larger regions, more rural and more urban regions; utilize available statewide data sources; and are consistent with SB 375 and the performance goals established in Moving Ahead for Progress in the 21st Century Act (MAP-21).

The proposed list of indicators incorporates transportation indicators that relate to public health, shown in Table 1 with asterisks, which compare closely with similar indicators included in the draft core list of indicators developed for the Healthy Communities Data and Indicators Project by the California Department of Public Health. They include miles traveled, mode share, fatalities/injuries, transit access, change in agricultural land, and CO_2 emissions.

Similarly, in addition to the proposed economic vitality indicators, the infrastructure indicators (State of Good Repair of transportation infrastructure) and the system reliability indicator also interrelate with economic vitality. Other relevant transportation monitoring indicators that require data sources that are not currently available at a statewide level have been identified as part of this effort, including those that could be monitored further for communities of concern (Table 2).

Table 1: Proposed Performance Monitoring Indicators

ID	Inventory Ref. (Appendix B)	MAP-21 Category	Statewide Performance Monitoring Observed Data	Performance Measure (Model Based)	Referenced In
		Congestion Reduction			
1	A-8 / A-1	VMT a. VMT per capita*	√	√	SB 375 & MAP-21
		b. Percent of Congested Freeway/ Highway Vehicle Miles **[PeMS]**	√	√	SB 375 & MAP-21
2	A-16/A-18	Mode Share (Travel to work)*	√	√	SB 375 & MAP-21
		Infrastructure Condition			
3	-	State of Good Repair a. Highways b. Local Streets c. Highway Bridges d. Transit Assets	√		MAP-21
		System Reliability			
4	A-65	Freeway/Highway Buffer Index **[PeMS]**	√	√	MAP-21
		Safety			
5	A-39	Fatalities/Serious Injuries a. Fatalities/Serious Injuries per capita* b. Fatalities/Serious Injuries per VMT*	√	√	MAP-21
		Economic Vitality			
6	C-33	Transit Accessibility (Housing and jobs within 0.5 miles of transit stops with frequent transit service)*	√	√	SB 375
7	A-84	Travel Time to Jobs	√	√	SB 375 & MAP-21
		Environmental Sustainability			
8	B-1/B-5	Change in Agricultural Land*	√	√	SB 375
9	E-5	CO_2 Emissions Reduction per capita (modeled data)*		√	SB 375 & MAP-21
	*	Indicator relates to Public Health	**[PeMS]**	Indicator for MPOs that have access to PeMS data	

Indicators to Consider for Future Development

The Technical Group identified a number of indicators to be considered in future monitoring efforts, once necessary data sources are available. These potential future indicators are listed in Table 2 and would provide a more comprehensive view of the intersection of transportation and public health and environmental justice issues. Another indicator that could inform environmental justice is residential and employment densities by new growth areas. Proposed safety and environmental sustainability indicators included in Table 1 also could be further evaluated as environmental justice indicators.

In addition to the Economic Vitality indicators included in Table 2, the following indicators were proposed for future consideration:

- Labor market access (measured by population within 40-minute drive time)
- Delivery market access (measured by employment within a 3-hour drive time)
- Access to transportation hubs (e.g., maritime port, rail intermodal loading facility, freight airport measured in drive time)
- Change in employment
- Change in personal income

Also, gross regional product and unemployment rate were discussed as possible indicators; however, the Technical Group felt these indicators were too broad within the set of transportation-specific indicators. The On the Map website (http://onthemap.ces.census.gov) could also be explored.

Table 2: Proposed Performance Monitoring Indicators for Future Consideration

ID	Inventory Ref. (Appendix B)	MAP-21 Category
		Congestion Reduction
1	**A-1**	Congested Arterial VMT
2	**A-8**	Bike and Walk Miles Traveled
3	**A-16/A-18**	Non-Work Mode Share
		System Reliability
4	**A-65**	Transit/Rail travel time reliability
		Economic Vitality
5	**B-25**	Residential and employment densities (new growth) - (by Environmental Justice (EJ) and Non-EJ areas)
6	**C-33**	Housing/Transportation Affordability Index

Discussions regarding Future Implementation

The nine proposed indicators identified by the Technical Group support the goals of SB 375 and MAP-21, and incorporate available statewide data sources. However, throughout the indicator development effort, data availability has been an area of concern. Some MPOs are concerned about the lack of available current data and the cost to acquire data. For example, proposed indicators that rely on PeMS data will not be able to be monitored by all MPOs.

In addition, while the proposed indicators can be utilized as a monitoring tool, it should also be noted that regional performance within these categories is influenced by state and national policies, funding availability, and other factors outside of the MPO sphere of influence.

The MPO/State Agency SB 375 Implementation Working Group recommended that the Technical Group be reconvened prior to application of the proposed indicators to have further discussion regarding these concerns, and that the calculation of each indicator be pre-tested and validated.

To follow up on future possible implementation options, the SGC could reach out to MPOs and state agencies to understand potential concerns related to future implementation of common statewide monitoring indicators. Further discussion is needed to continue addressing variations among diverse California regions, the need for flexibility in future performance monitoring which could include both quantitative and qualitative assessments, and data availability.

STATEWIDE PERFORMANCE MONITORING INDICATORS

Introduction

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The stated purpose of this effort was to develop a common standardized set of up to ten transportation performance monitoring indicators that would be used by California MPOs and state agencies, such as the California Air Resources Board (CARB), California Transportation Commission, the California Department of Transportation (Caltrans), and other state agencies. Other state agencies that participated in this project include the California Department of Housing and Community Development (HCD), the California Department of Public Health, the Governor's Office of Planning and Research (OPR), and the SGC.

While performance measures rely mostly on modeled or forecasted data, performance monitoring indicators rely directly on observed data. MPOs use travel demand models or Geographic Information System (GIS) analyses to forecast performance measures. Ideally monitoring indicators would be considered together and be consistent with modeling performance measures. It is important to note that, currently, not all MPOs prepare monitoring reports using observed data on a regular basis.

The framework to conduct this work was based upon a tiered system of performance metrics dealing with both federal and state regulations, with consideration of new and emerging measures included in recent Regional Transportation Plans (RTPs) and Sustainable Communities Strategies (SCS).

To facilitate the development of a statewide performance monitoring framework, SANDAG sought input from the MPO/State Agency SB 375 Implementation Working Group. Additionally, a Technical Group comprised of MPO and state agency technical staff was created to identify possible indicators and methodologies, and viable data sources that would allow for progress to be measured using observable data.

This work builds upon the draft inventory of MPO indicators/performance measures prepared for the scoping process for the 2013 California Regional Progress Report, a comprehensive effort that catalogued dozens on transportation and other indicators. However, this project focused on identifying a small set of transportation performance monitoring indicators related to SB 375, respecting the diversity of California regions, which could be monitored using mostly statewide data sources. In addition, the emerging area of transportation and public health was a focus of discussion and several indicators that consider the intersection of transportation and public health were identified. The importance of indicators to monitor data for low income and minority populations also was discussed and, due to limitations in data availability, they were identified in a list for future monitoring.

This report documents general research regarding statewide and MPO performance monitoring efforts and presents a summary of existing indicators used by these agencies. A list of indicators and methodologies developed by the MPO/State Agency SB 375 Implementation Working Group and Technical Group are included, as well as potential future indicators.

Summary of Scope and Process

The proposed approach to conduct this project and the scope of work were presented at the MPO/State Agency SB 375 Implementation Working Group on February 19, 2013. Key tasks included the review of existing indicators from MPOs, several state agencies and research reports, development of up to ten common performance monitoring indicators that could be used to track SB 375 and Senate Bill 391 (SB 391) (DeSaulnier, 2013) implementation across California regions, definition of the indicators, and identification of methodologies and data sources. The scope of work is included in Appendix A.

The MPO/State Agency SB 375 Implementation Working Group and Technical Group helped to guide the development of the performance indicators and its methodologies. The Technical Group held four meetings via conference call and webinar from March through June of 2013.

An initial list of draft indicators was presented for input at the April 23, 2013, MPO/State Agency SB 375 Implementation Working Group and the proposed list of indicators, methodologies, and data sources were presented on June 18, 2013.

In addition, SANDAG staff requested input on this project at presentations made at the California Association of Councils of Government (CALCOG) Regional Leadership Forum held in Monterey in April 2013, and at the CALCOG Council of Governments Directors Association of California meeting in May 2013.

Statewide Performance Monitoring Indicators

In order to focus the research and determine the best approach for building a statewide performance monitoring framework, a summary of current indicator practices was developed. Multiple MPOs and state agencies have incorporated a monitoring component within their long-range plans providing observed trends in unison with forecasted projections and plan comparisons. The framework for this effort builds upon the current state of the practice in California and incorporates other academic research. Provisions of federal and state legislation related to performance measurement and monitoring, such as Moving Ahead for Progress in the 21st Century Act (MAP-21) and SB 375 also were considered throughout the process.

SB 375 stipulates that transportation planning agencies maintain compliance with a set of guidelines for development of regional transportation plans and travel demand models. This bill requires MPOs to adopt a SCS as part of its RTP (or a separate alternative planning strategy). All transportation planning agencies are required to direct plan development towards inclusion of mass transportation, highway, railroad, maritime, bicycle, pedestrian, goods movement, and aviation facilities/services into its transportation plans. Transportation planning agencies with populations larger than 200,000 persons may quantify a set of indicators including measures of mobility and traffic congestion, road and bridge maintenance and rehabilitation needs, means of

travel by mode type, safety and security by mode type, and equity and accessibility, using existing sources of information.

Summary of Existing MPO and State Agency Performance Monitoring Indicators

As stated previously, this effort built upon the comprehensive draft inventory of MPO indicators/performance measures develop for the SGC as part of the 2013 California Regional Progress Report. Using information gathered by researching all 18 California MPOs, similarities and differences among performance monitoring strategies were identified. These strategies can be grouped into five main areas of focus: transportation, land use, economic competitiveness and opportunity, resource efficiency and conservation, and environment/public health.

The majority of the indicators that MPOs use fall within the transportation and land use categories. The other indicators focus on accessibility to affordable housing, economic competitiveness within the region, air quality/emissions throughout the region, and areas dealing with public health.

The number of monitoring indicators used by the MPOs ranges from three to 54. The differences in the number of indicators most likely have to do with differing approaches of being more detailed, keeping it simple, or the availability/applicability of the indicators in various regions. Out of the 18 MPOs in California, ten MPOs had documented performance monitoring indicators. All MPOs utilize performance measures. A listing of the specific indicators can be seen in the inventory of MPO RTP/SCS indicators/performance indicators/documents/agency reports (Appendix B).

Similarities among indicators mostly include transportation-oriented indicators, including total vehicle miles traveled (VMT) per capita, mode share for all trips or commuting trips, percent of trips taken by alternative forms of transportation, annual number of fatalities/injuries, roadway level of service (LOS) by segment, travel time to job centers, average work trip/commute length in minutes by mode, agricultural land conserved, land consumption, acres consumed due to new development, jobs-housing balance - changes in ratio within 4-mile radius of employments centers, gross regional product, population, jobs within 0.25 miles of bus stops with frequent and reliable transit service possibly by income level, percent of increase in affordable and workforce housing within 0.25 miles of bus stops with frequent and reliable transit service, percent of habitat and land cover impacted, and non-attainment pollutants and carbon dioxide (CO_2).

Indicator areas that are addressed by fewer MPOs include water use and consumption, resource efficiency and conservation, environment and public health, as well as equity-related indicators. There is considerable interest in including public health indicators in regional plan development and also inclusion of more social equity related monitoring efforts. Regional variations occur mostly among different sized regions. Larger and more urban MPOs typically seem to focus their indicator development around transit ridership, density, and economic factors. Smaller and more rural MPOs also keep track of those issues, but many indicators are agriculturally based and deal with open space and natural habitat conservation.

Summary of Existing Performance Indicator Efforts and Reports

California Department of Public Health - Healthy Community Indicators Report (2012)

The goal of the Healthy Communities Indicator (HCI) Report is to enhance public health by providing data, a standardized set of statistical measures, and tools that a broad array of sectors can use for planning healthy communities and evaluating the impact of plans, projects, policy, and environmental changes on community health.

The HCI framework identifies 20 key elements of a healthy community, broken down into in five main categories: (1) meets basic needs of housing, transportation, nutrition, health care, livable communities, physical activity; (2) environmental quality and sustainability; (3) adequate levels of economic and social development; (4) health and social equity; and (5) supportive social relationships.

The main tasks of the HCI Report framework are to identify a standardized set of indicators that define a healthy community; identify methods to develop indicators at different regional scales; develop and distribute technical documentation for local, county, regional, and state stakeholders to produce indicators; and to develop a multi-agency plan for centralized data collection, analysis, and reporting of indicators.

Indicators within the category of environmental quality and sustainability appear to have the greatest continuity with measures included in other ongoing performance measurement and monitoring efforts at the MPO and state levels. Indicators within this category monitor Greenhouse Gas (GHG) emissions, air quality issues, water consumption, and access to parks/open spaces. Other indicators relating to healthy communities that could be included in a statewide standardized indicator set fall within the "meets basic needs" category for transportation, accessibility, housing, or health/social equity. Specific indicators that stood out and relate to SB 375 include: (1) percent of population located less than 0.5 miles of a regional bus/rail/ferry and less than 0.25 miles of a local bus/light rail; (2) percent of residents within 0.5 miles of park, beach, open space, or coastline; (3) annual per capita GHG emissions; (4) number and rate of collisions by severity and mode of transport; and (5) miles traveled per capita by mode (car, public transit, walk/bike).

Other unique indicators included are: (1) percent of households within 0.5 miles of a full-service grocery store, fresh produce market, or store with fresh produce; (2) average daily water use per capita; (3) percent of electricity from renewable sources; (4) five-year change in the number of households by income and race/ethnicity (neighborhood change or gentrification); and (5) percent of households in overcrowded and severely overcrowded conditions. From a social equity and public health standpoint, this document is a good source of information for indicator development.

Moving Ahead for Progress in the 21st Century Act

In summer 2012, new federal legislation was signed into law for funding transportation programs and supporting metropolitan and state transportation planning processes. MAP-21 establishes national performance goals for federal highway programs. The goals are safety, infrastructure condition, congestion reduction, system reliability, freight movement and economic vitality, environmental sustainability, and reduced project delivery delays. The United States Department of

Transportation (US DOT) will establish performance measures in consultation with states and MPOs. In turn, states and MPOs will establish performance targets in support of those measures.

MAP-21 applies to the indicators effort through the sections pertaining to performance measurement, target-setting, and monitoring requirements for the National Highway Performance Program, Metropolitan Transportation Planning, and Statewide Transportation Planning. The legislation details the requirements that states must abide by in order to receive funding for various infrastructure improvements annually. The MAP-21 legislation does not provide specific performance monitoring indicators, but rather guidelines for compliance to the federal standards. These guidelines/criteria are established by the Secretary for the evaluation of the new performance-based planning processes. The process will consider whether states developed appropriate performance targets and made progress toward achieving the targets. Five years after enactment of MAP-21, Congress will be provided with reports evaluating and detailing the overall effectiveness of the performance-based planning process regarding each state and each MPO.

States and MPOs will report to US DOT on progress in achieving targets. If a state's report shows inadequate progress in some areas, the state must undertake corrective actions by documenting in its next report the actions it will take to achieve the targets, prepare an annual implementation plan, or be required to spend a specified portion of its funds on maintaining minimum standards for interstate pavement and National Highway System bridge conditions until the minimum standard is exceeded.

The timeline and process for setting the performance measures occurs at the federal, state, and local levels. At the federal level, it is required that the US DOT provide and establish such measures within 18 months of enactment (by April 1, 2014), and prohibits US DOT from establishing additional performance measures. This part of the MAP-21 effort and timeline partially aligned with this statewide performance monitoring effort.

At the state level, performance targets in support of measures at the federal level are required to be set within one year of the US DOT final rule on performance measures. The next part of the process is to try to ensure consistency throughout each state by coordinating with various MPOs when setting performance targets for the area represented by that MPO. This part of the process, which requires MPOs to set targets, is scheduled to be completed within 180 days of the states setting of performance targets.

2010 California Regional Progress Report and Draft Inventory of MPO Indicators/ Performance Measures prepared for the Scoping Process for the 2013 California Regional Progress Report

The 2010 California Regional Progress Report (2010 Progress Report) reflects California's focus towards sustainability as a way in which future economic and quality of life goals can be met. The 2010 Progress Report was guided by the SGC and Caltrans in an effort to organize state activities and resources around planning and development of sustainable communities and regions.

The 2010 Progress Report documents 20 cohesive and location-oriented indicators, which standardize and measure the progress of various regions throughout the state by moving towards more sustainability-oriented project development. The indicator information provided in the 2010 Progress Report show data and information relating to important issues and trends that affect

the future of communities, regions, or the state. The aim of the indicator report is to be used as a governance tool and to help measure and report on progress, guide decision making, and hold organizations and agencies accountable for improving outcomes related to transportation.

The areas of focus for indicators and progress monitoring are efficient transportation and land use, economic competitiveness and opportunity, environmental health, and resource efficiency and conservation.

The SGC has initiated the scoping process to identify priority policy issues and indicators to be included in the 2013 California Regional Progress Report. The inventory of MPO indicators/performance measures is under development by Applied Development Economics, Inc., in consultation with the SGC, California MPOs, state agencies, and other stakeholders. The draft inventory report includes indicators and performance measures in use by MPOs for its RTPs as well as initial findings and recommendations based on consultation with MPOs.

The draft indicator inventory provides a comprehensive look at each of the MPO's indicator sets, as well as information related to the methodology and data sources for the indicators. The inventory matrix included in the report is a vital tool to visualize areas of commonality and variation among MPOs.

The indicators that stand out the most in terms of commonality and relation to SB 375 are in the categories of: congestion/VMT reduction, mode share/trips, safety, alternative transportation, transportation system investment/service, travel time/costs, jobs, and air quality/emissions. Some of these indicators are reduced VMT, decreased fuel consumption, and increased access to transit. Other indicator categories, which show less similarity, include agricultural land/open space, development/land use, jobs/housing development, housing affordability, energy use/consumption, land conservation, water consumption, and public health.

California Interregional Blueprint Interim Report (2012)

The California Interregional Blueprint (CIB) is a state-level transportation blueprint that combines statewide transportation goals with regional transportation and land use plans to produce a unified multimodal transportation strategy. The CIB integrates proposed interregional highway, transit, intercity passenger rail, high-speed rail, freight movement, aviation, and other transportation system and strategic plans into a common framework for analysis. This strategic framework provides the basis for the California Transportation Plan (CTP), which is the State's long range plan.

The CIB Interim Report is one element of the larger CIB effort. The CIB responds to SB 391, which requires Caltrans to prepare a new CTP by December 2015, which identifies the statewide integrated multimodal transportation system needed to achieve GHG emission reduction goals.

The CIB Interim Report provides an overview of MPO RTPs and SCS-related efforts, including regional planning activities, planned initiatives and investments, and primary interregional transportation issues addressed in the plans. It also discusses the potential influences of these SCSs on the statewide transportation system. The regional efforts are grouped into nine areas of the State: the San Diego Region, the Southern California Region, the Sacramento Region, the San Francisco Bay Area Region, the San Joaquin Valley Region, the Central Coast Region, the Lake Tahoe Region, the Northern Sacramento Valley Region, and the North State Region.

The CIB Interim Report provides a structure for the development of the CTP 2040. It acknowledges MPOs progress on performance measurement and monitoring and the Smart Mobility Performance Measures developed as part of the 2010 Caltrans Smart Mobility Report, but does not provide specific performance monitoring indicators. The upcoming development of the CTP 2040 will be able to draw on the first round of RTPs/SCS developed by the 18 MPOs. Analysis tools, such as the California Statewide Travel Demand Model, will be available to assess interregional travel patterns, GHG emissions, and statewide transportation performance.

National Cooperative Highway Research Program Report 708: A Guidebook for Sustainability Performance Measurement for Transportation Agencies (2011)

The National Cooperative Highway Research Program (NCHRP) Report was developed by the Transportation Research Board in 2011. This document serves as a detailed guide for transportation agencies and state transportation departments to measure the sustainability of networks, systems, facilities, projects, and activities. It describes the underlying principles of sustainability as they apply to transportation agencies. The guide helps supports agency decision-making processes at various management levels, enables agencies to develop appropriate sustainability goals, objectives, and associated performance measures; and assists in the determination of methods for conducting performance measurement and monitoring as well as describes computation methods for these measures and possible data sources.

The fundamental components of the sustainability performance measurement framework include understanding sustainability; developing goals, objectives, and performance measures; implementing performance measures; refining the framework; and applying continuous feedback.

This document is focused toward performance measures and not specifically on performance monitoring strategies (performance measures apply more directly to modeled data, while performance monitoring applies directly to observed data). The report also provides an appendix documenting an extensive list of objectives and performance measures for each focus area that can be used to achieve each recommended goal. Some transportation-related performance measures that could be considered for monitoring purposes include: (1) change in the number of jobs within reasonable travel time (by mode) for region's population; (2) change in travel time (by mode) to schools, health services, grocery stores, civic and public spaces, recreation; (3) change in LOS for disadvantaged and non-disadvantaged neighborhoods; (4) change in trips, vehicle trips, VMT, percent non-driver, tons of emissions per day due to program; and (5) change in the number and severity of crashes by mode type.

2011 Statewide Transportation System Needs Assessment (2011 Needs Assessment)

The California 2011 Needs Assessment updated a previous assessment conducted in 1999. The overall goal of the 2011 Needs Assessment is to develop a coordinated list of transportation projects and programs and to identify related funding requirements that will allow local, state, and regional transportation agencies to present a consistent message when communicating statewide needs for the preservation, expansion, maintenance, and operations of the state's transportation system. The report focuses on statewide transportation system needs from 2011 to 2020.

An assessment of California's transportation system needs is provided, as well as the resources required to meet these needs. The document also describes the possible outcomes that would result

if these transportation system improvements were implemented. This information is presented by using a set of 12 performance measures within the framework of the Smart Mobility 2010 goals. Some performance measures listed that relate to SB 375 include: (1) change in average per-trip travel time; (2) system-wide VMT per capita; (3) equitable distribution of access and mobility with comparison of outcomes for Low-Income and Minority (LIM) and non-LIM communities; (4) number of injuries and fatalities per capita from all collisions (including bicycle and pedestrian); and (5) percent of total trips per capita taken by biking or walking.

Smart Mobility 2010

The Smart Mobility 2010 document is an effort conducted by Caltrans, in partnership with the United States Environmental Protection Agency, OPR, and HCD. It is designed as a planning guide that further integrates smart growth concepts into transportation projects in California.

The intent of the document is to develop a planning framework that helps guide and assess how plans, programs, and projects meet the definition of smart mobility. The goal is to ensure applicability of the framework for Caltrans as well as for partner agencies. Ideally, the framework can be applied to various levels of plans, programs, or projects in all parts of the state.

The Smart Mobility document envisions a transformed state transportation planning program. It is provided as a form of continued support for developing a statewide interregional, multi-modal blueprint to be known as the CIB. It will enhance the scope of the existing CTP by analyzing the benefits of multi-modal, interregional projects on the transportation system. It will also serve to expand the understanding of the interactions between land use and transportation investments in meeting critical strategic growth and sustainability goals. The ultimate benefit of this effort will be stronger partnerships with regional and local agencies as well as better data development for improved decision-making at the state, regional, and local level.

The six Smart Mobility Principles are location efficiency, reliable mobility, health and safety, environmental stewardship, social equity, and robust economy. These guiding principles are the foundation for much of what California transportation agencies aim to build for the future of the state. Most of the topics explained in this document relate to performance measures and not directly to performance monitoring and the development of indicators. Specific performance measures listed that relate to SB 375 and may be of interest for monitoring purposes include: (1) percentage of trips within a corridor or region occurring by bus, rail, or by other form of high-occupancy vehicle; (2) number of households within a 30-minute transit ride of major employment center, within a 20-minute auto ride of employment, and within walking distance of schools; (3) collision rate and severity by travel mode and facility, compared to statewide averages for each user group and facility type; (4) percentage of trips within a corridor or region occurring by walking or cycling; and (5) comparative travel times and costs by income groups and by minority and non-minority groups for work/school and other trips.

Recommendations of the Regional Targets Advisory Committee Pursuant to SB 375: A Report to the CARB (2009)

SB 375 required CARB to create the Regional Targets Advisory Committee (RTAC) to recommend factors to be considered and methodologies to be used by CARB when setting GHG emission reduction targets for passenger vehicles and light trucks for 2020 and 2035. The RTAC

recommendations detailed in this report emphasize the need for CARB to track, on a long-term basis, the land use and transportation changes resulting from SB 375 implementation to ensure they help the state meet its overall GHG reduction goals. Recommendations include the development of a standardized set of performance indicators as part of a monitoring system to track regional performance.

The report describes what a monitoring program is and it details the expectations for monitoring indicators and the data collection process. It recommends that CARB work with MPOs to identify a list of performance indicators. The set of performance indicators should represent the best way for measuring the impacts of land use, transportation, pricing, transportation demand/system management, and other policies. A limited number of performance indicators should be selected to measure different impacts, be easily understood by policy makers and the public, and be able to rely on readily available and reliable data.

Assessment categories for the data/monitoring programs are provided based on the adequacy of the information available to perform monitoring. Other sample indicators are grouped into the following policy categories: (1) statewide funding indicators, (2) land use, (3) transportation, (4) pricing, and (5) transportation demand and system management. The RTAC discussed tracking both VMT and fuel usage data as important ways to verifying GHG emission reductions. CARB is required to update the regional targets every eight years, or every four years if significant changes to other GHG reduction measures would affect regional emission levels.

Governor's OPR Environmental Goals and Policy Report (2003, Update in process)

The 2003 update of the Environmental Goals and Policy Report (EGPR) is being prepared by the Governor's OPR. The EGPR will provide an overview of the state's environmental goals and steps to achieve these goals. It also will develop a framework of metrics and indicators to help track progress toward reaching the goals. The Governor's OPR has been working on sustainability indicator efforts through workshops with state agencies, academic groups, public health departments, and community-based organizations.

Proposed Performance Monitoring Indicators, Methodologies, and Data Sources

Proposed Performance Monitoring Indicators

The Technical Group conducted a review of more than 200 performance measures and indicators used by MPOs and state agencies. The group identified those most commonly used, which could be monitored using statewide and regional data sources. The Technical Group developed a list of nine indicators and methodologies, which account for the diversity of California in terms of smaller and larger regions; more rural and more urban regions; utilize available statewide data sources; and are consistent with SB 375 and the performance goals established in MAP-21.

The majority of the proposed nine indicators are currently being used by some MPOs as either performance indicators or modeled performance measures, as shown in the MPO Indicator Inventory Matrix provided in Appendix B. The proposed indicators that are not currently being utilized as indicators/measures include: State of Good Repair for Highways and Highway bridges, the Freeway/Highway Buffer Index, and Fatalities/Serious Injuries per Capita (most MPOs use a

per-VMT metric). To ensure consistency with MAP-21, the proposed list of common indicators was categorized following the MAP-21 goal areas, as shown in Table 1.

The proposed list of indicators incorporates transportation indicators that relate to public health, shown in Table 1 with asterisks, which compare closely with similar indicators included in the draft core list of indicators developed for the Healthy Communities Data and Indicators Project by the California Department of Public Health. They include miles traveled, mode share, fatalities/injuries, transit access, change in agricultural land, and CO_2 emissions.

Similarly, in addition to the proposed economic vitality indicators, the infrastructure indicators (State of Good Repair of transportation infrastructure) and the system reliability indicator also interrelate with economic vitality.

Other relevant transportation monitoring indicators that require data sources which are not currently available at a statewide level have been identified as part of this effort, including those that could be monitored further for communities of concern (see Table 2).

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2	**A-16/A-18**	Mode Share (Travel to work)*	√	√	SB 375 & MAP-21
		Infrastructure Condition			
3	**-**	State of Good Repair a. Highways b. Local Streets c. Highway Bridges d. Transit Assets	√		MAP-21
		System Reliability			
4	**A-65**	Freeway/Highway Buffer Index **[PeMS]**	√	√	MAP-21
		Safety			
5	**A-39**	Fatalities/Serious Injuries a. Fatalities/Serious Injuries per capita* b. Fatalities/Serious Injuries per VMT*	√	√	MAP-21
		Economic Vitality			
6	**C-33**	Transit Accessibility (Housing and jobs within 0.5 miles of transit stops with frequent transit service)*	√	√	SB 375
7	**A-84**	Travel Time to Jobs	√	√	SB 375 & MAP-21
		Environmental Sustainability			
8	**B-1/B-5**	Change in Agricultural Land*	√	√	SB 375
9	**E-5**	CO_2 Emissions Reduction per capita (modeled data)*		√	SB 375 & MAP-21
	*	Indicator relates to Public Health	**[PeMS]**	Indicator for MPOs that have access to PeMS data	

Summary of Methodologies and Data Sources

This section describes methodologies for monitoring the proposed indicators.

Congestion Reduction

1. Vehicle Miles Traveled (VMT)

   a. VMT per Capita: This indicator represents the total sum of vehicles on roadway segments or systems on a daily basis and multiplied by the length of roadway segment or the entire system. The VMT is divided by total population to obtain VMT per capita.

      VMT per Capita = Total MPO VMT / (MPO Total Population – Total Incarcerated and state special care facilities populations)

      Data Sources: Caltrans Highway Performance Monitoring System (HPMS). Data is based on a sampling approach, in which a sample of roadways of different types are counted, and statistically expanded to estimate total VMT in different areas within the state. The HPMS database keeps track of all federally classified public roadways and the mileage for rural and urban areas. The arterial and collector road systems are then statistically sampled to estimate the current needs and future performance of the system. The functional classifications for the HPMS are interstate, other freeways and expressways, other principal arterials, minor arterials, major collectors, minor collectors, and locals. Caltrans reports daily VMT by county. The HPMS data is updated on an annual basis.

      The population used as the denominator for this indicator will take into account the removal of total incarcerated and state special care facilities populations. The data source for this aspect of the indicator methodology is the California Department of Corrections, the United States Census Bureau, the Department of Finance, and the State Division of Hospitals.

   b. Percent of Congested Freeway/Highway VMT: This indicator represents congested freeway/highway VMT by monitoring and calculating the percent of VMT at or below 35 miles per hour.

      Percent of Congested Freeway/Highway VMT = Total MPO VMT at and below 35 miles per hour / Total MPO VMT[1]

      Data Sources: Caltrans Performance Measurement System (PeMS). Currently PeMS collects, processes, stores and makes available data from nine Caltrans Districts (D3, D4, D5, D6, D7, D8, D10, D11, and D12). These Districts cover the major metropolitan areas in California. The districts that do not collect PeMS data at all are D1, D2, and D9. District 2 includes the Shasta Regional Transportation Agency and Districts 1 and 9 cover non-MPO, rural RTPA areas.

[1] This equation also can be used to calculate congested VMT for a specific corridor or route.

Overall there are 19 counties without any real-time detectors. These include from Caltrans District 1; Del Norte, Humboldt, Mendocino, and Lake Counties; from District 2; Siskiyou, Modoc, Tehama, Trinity, Lassen, Plumas, and Shasta Counties; and from District 9; Mono and Inyo Counties. Other counties without PeMS detectors in other Caltrans Districts are Alpine, Colusa, Glenn, Imperial, Kings, Modoc, and Tulare Counties.

The other 39 counties have at least some detection. However, in some counties data is very limited. The counties with limited data availability are Amador, Butte, Calaveras, El Dorado, Madera, Mariposa, Napa, San Benito, Sierra, Sutter, Tuolumne, and Yuba.

The primary function of PeMS is to process traffic detector data by receiving measurements of flow and occupancy from 37,000 individual freeway lane detectors. This information is taken every 30 seconds and aggregated to represent the LOS for the freeway system.

To report on an annual basis, 52 individual weeks of data would need to be extracted. In the future, Caltrans may be able to update its web-based reporting system capabilities to show total annual data.

PeMS data can be used for monitoring congested highway/freeway VMT by using the speed bins in PeMS. As described above, a limitation of this data source is that information is only available for some MPOs.

2. Mode Share (Travel to Work): This indicator measures the usual means of transportation to work by various modes of transportation as a percent of trips for each mode.

   Data sources: The American Community Survey (ACS) reports actual trends for travel to work as a percentage and as a total number estimate. Mode share categories are drive alone, carpool, public transportation, walk, bicycle, motorcycle, taxi, and worked at home. The ACS is updated every five years for populations less than 20,000, every three years for smaller populations (between 20,000 and 65,000), and every year for larger populations (65,000+). For areas with smaller populations bicycle data from the ACS is combined into a category which includes taxicabs, motorcycles, bicycle, and other means. However, other ACS products could be used to report the bicycle mode data at the county level for smaller areas (B08301 file).

Infrastructure Condition

3. State of Good Repair: Indicators in this category measure the conditions of highways, local streets and roads, bridges, and transit assets.

   a. Pavement condition for highways: this indicator measures the percent of distressed lane miles for the state highway system.

      Data Source: Caltrans conducts the Pavement Condition Survey of the State Highway System annually and reports pavement condition by lane miles and percent of distressed pavement. Distressed pavement includes major and minor structural distress and poor ride quality. Data by county is available from Caltrans.

   b. Pavement condition for local streets and roads: the Pavement Condition Index (PCI) can be used as a metric for distressed lane miles on local streets and roads.

The process for calculating the PCI involves dividing the total pavement section into sample units, selecting certain sample units for testing using an industry standard. This method produces the PCI, which is a way of calculating the distressed quantities and the distressed densities for each tested unit. These values are used to determine a deduct value and this deduct value is subtracted from 100 to give the PCI value. A PCI value below 80 falls in the "at risk" or "poor" categories.

Data Source: The California Statewide Local Streets and Roads Needs Assessment reports on the condition of local streets and roads by county using the PCI, which is calculated on a scale of 0 (failed) to 100 (excellent). This is weighted by the pavement area, which means that longer roads have more weight than shorter roads when calculating the average PCI. The report is updated every two years. Pavement monitoring systems currently in place that help manage PCI rankings are StreetSaver and Micropavers.

c. Percent of highway bridge lane miles in need of replacement or rehabilitation: percent of bridge lane miles with a Sufficiency Rating (SR) of 80 or below.

Caltrans monitors bridge conditions at the state and local level through its Local Highway Bridge Program: Local Bridge Inventory. Local bridge data is monitored based upon a few different rating systems. The most relevant rating system for this effort is the Bridge SR, which is a Federal Highway Administration (FHWA) bridge rating. Only structures that carry highway traffic have a SR. The SR is calculated based upon four elements of the rating process: the structural/safety adequacy of the bridge, the serviceability and function of the bridge, how essential the bridge is for public use, and special considerations. Highway bridges considered structurally deficient or functionally obsolete and with a SR of 80 or less are proposed to be used for the selection list. Those bridges appearing on the list with a SR of less than 50.0 would be eligible for replacement or rehabilitation while those with a SR of 80.0 or less would be eligible for rehabilitation.

Step 1 – Calculate Individual Weighted Bridge SR: Lane miles = [(bridge length in feet)/ 5280 feet) * the number of lanes on bridge * bridge SR rating]

Step 2 – SR rating per Bridge Lane Mile (County) = ∑ of all Bridge SR Lane Miles within the County (Individual Bridge lane miles * Individual Bridge SR rating) / Total Lane Miles for the County

Data Source: Local Highway Bridge Program: Local Bridge Inventory.

d. Transit asset condition: Percent of transit assets that have surpassed the FTA useful life period.

Transit asset conditions can be monitored by using FTA's "Minimum Useful Life" criteria to determine how much Federal interest remains in an asset. This is based upon FTA's Useful Life Policy, which states that the useful life in years refers to total time in revenue transit service, not time spent stockpiled or otherwise unavailable for regular transit use. Minimum useful life of rail rolling stock is 25 years. Minimum useful life for buses, vans, and trolleys is determined by years of service or accumulation of miles, whichever comes

first. Large, heavy-duty transit buses, including over the road buses, should be replaced after at least 12 years of service or an accumulation of at least 500,000 miles. Small size, heavy-duty transit buses should be replaced after about at least ten years of service. These fleet ages will be the determining factor in establishing an average fleet age threshold.

To monitor transit asset condition, MPOs would aggregate the average fleet age data for operators within their region from the National Transit Database. This information would then be used to calculate the percent of transit assets with average fleet ages over the specific threshold.

Transit Asset Condition = Number of transit assets within the MPO region that have surpassed the FTA useful life period (mode specific)/ Total regional transit asset (mode specific).

Data Source: The National Transit Database (NTD) from the Federal Transit Administration (FTA), which collects statistics from local transit agencies.

System Reliability

4. Freeway/Highway Travel Time Reliability: Buffer Index

This performance measure compares high-delay days to those with an average delay. The most effective method of measuring travel time reliability at the MPO level would be to use the Buffer Index (BI). The BI is a metric utilized by the FHWA as part of the Strategic Highway Research Program.

The BI represents the extra time cushion that most travelers add to their average travel time when planning trips to ensure on-time arrival. This extra time is added to account for any unexpected delay. The BI is expressed as a percentage, and its value increases as reliability gets worse. The BI is computed as the difference between the 95th percentile travel time and median travel time, divided by the median travel time. The BI uses a 95th percentile travel time to represent a near-worst case travel time. It can be expressed as a percentage or in minutes and shown to represent the extra time a traveler should allow to arrive on-time for 95 percent of all trips. This is conducted for highway segments using PeMS data or other highway monitoring loop detector programs.

This indicator initially would be calculated only for freeway/highway corridors with Congestion System Management Plans (CSMP). In the future, this indicator could be expanded to include additional routes that have PeMS monitored data to overtime, develop a regional index.

One way to extrapolate this information to the county/regional level would be to take the average BI for all highway/freeway segments monitored in the region and show the information based upon average trip time length. The lower the BI, the better a region is performing. This indicator would involve significant PeMS data analysis at the MPO level.

Data for this indicator can be accessed on the PeMS website and database. From the PeMS web-based system, agencies can extract specific corridor level or route level information that

details the buffer index along that segment. Agencies could select their own routes for monitoring the BI from the overall list available in PeMS. It is possible to run a Buffer Time Index report on an annual basis.

This indicator would only apply to those MPOs that have available PeMS data.

Freeway/Highway Buffer Index = Sum of each individual route Buffer Index for the MPO / the total number of routes selected for the MPO = the average annual Buffer Index

Data Source: PeMS.

Safety

5. Fatalities/Serious Injuries: This indicator measures annual fatal/serious injury causing collisions. It will be calculated on a per 100,000,000 VMT and per capita basis.

   This indicator supports MAP-21 requirements of states to select and implement projects that will contribute to a reduction in fatalities and serious injuries, consistent with their state safety performance targets.

   a. Fatalities or Serious Injuries per Capita = Total MPO Fatalities or Serious Injuries / (MPO Total Population – Total Incarcerated and state special care facilities populations)

   b. Fatalities or Serious Injuries per 100,000,000 VMT = Total MPO Fatalities or Serious Injuries/ (Total MPO VMT / 100,000,000)

   Data Source: California Highway Patrol Statewide Integrated Traffic Records System (SWITRS). SWITRS is a database that serves as a means to collect and process data gathered from a collision scene. This data system is updated annually and is available by either county or city. The population will be calculated in a similar manner as for VMT per capita.

Economic Vitality

The Technical Group discussed several possible indicators to address economic vitality, as described in the section below titled Indicators to Consider for Future Development. In addition, the two proposed indicators shown below can be regarded as contributing toward economic vitality.

6. Transit Accessibility (Housing and jobs within 0.5 miles of transit stops with frequent transit service): The indicator measures homes and jobs within 0.5 miles of transit stops that have frequent transit service, which is defined as service intervals no longer that 15 minutes during peak commute hours for urban areas and service intervals of no longer than one hour during peak commute hours for rural areas. It could be measured by using GIS tools to apply a buffer or 0.5 miles radius from the transit stop to housing units and employment data layers.

   The CTPP can produce a locally based GIS transit data layer that agencies would use in order to calculate the number of households and jobs within a designated 0.5 mile buffer of transit stops.

This composite measure should be tested separately for both variables (housing and jobs) to evaluate a possible weighting mechanism or whether homes and jobs accessibility should be reported individually.

Data Sources: 2010 Census Data and ACS data used in the Census Transportation Planning Package (CTPP). The CTPP is a tabulation of the ACS data compiled for the transportation community. The CTPP is a three-part package containing residence data summarizing worker and household characteristics, place of work data summarizing worker characteristics, and commuting flow data for geographies containing 20,000+ populations and is reported on a biennial basis. A locally produced GIS transit data layer would be necessary for monitoring this indicator. Additional data sources include the Bureau of Labor Statistics as well as local jurisdiction GIS data.

7. Travel Time to Jobs: Mean travel time to work (minutes).

   Data Sources: The ACS provides data on travel times to work and updates the information every three years for smaller populations and every year for larger populations. The information is available at the county level.

Environmental Sustainability

8. Change in Agricultural Land: This indicator measures the amount of acres changed from agricultural to urban use in acres.

   Data Sources: This data is reported by the California Department of Conservation in the Farmland Field Report and online database of the Farmland Mapping and Monitoring Program. This information is available on a biennial basis by county.

9. CO_2 Emissions Reduction: Percent CO_2 emissions reduction per capita.

   Assembly Bill 32 (Nunez, 2006) defines GHGs as including the following gases: CO_2, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexaflouride. As part of SB 375 implementation, CARB provided MPOs with regional GHG emission reduction targets for automobiles and light trucks expressed in percent reduction of CO_2 per capita from a base year of 2005. Targets were established for 2020 and 2035. Fuel consumption, carbon content of vehicle fuels, vehicle fuel efficiency, and congested VMT have been identified as factors for reducing GHG from transportation.

   An estimate of CO_2 per capita will be calculated by running the most recent version of the EMFAC model and dividing by the regional population. This indicator will not be able to be monitored using an observed data source but instead it relies on model estimates.

   Data Source: EMission FACtors (EMFAC) 2011, (or most recent version of EMFAC model)

Indicators to Consider for Future Development

The Technical Group has identified a number of indicators to be considered in future monitoring efforts, once necessary data sources are available. These potential future indicators are listed in Table 2. The list of indicators includes the monitoring of non-motorized modes of travel, non-work

mode share, transit reliability, residential and employment densities, as well as the housing/affordability index. These indicators would provide a more comprehensive view of the intersection of transportation and public health and environmental justice issues. Another indicator that could inform environmental justice is residential and employment densities by new growth areas. Proposed safety and environmental sustainability indicators included in Table 1 also could be further evaluated as environmental justice indicators.

In addition to the Economic Vitality indicators included in Table 2, the following indicators were proposed for future consideration:

- Labor market access (measured by population within 40-minute drive time)
- Delivery market access (measured by employment within a 3-hour drive time)
- Access to transportation hubs (e.g., maritime port, rail intermodal loading facility, freight airport measured in drive time)
- Change in employment
- Change in personal income

Also, gross regional product and unemployment rate were discussed as possible indicators; however, the Technical Group felt these indicators were too broad within the set of transportation-specific indicators. The On the Map website (http://onthemap.ces.census.gov) from the U.S. Census Bureau could also be explored.

Table 2: Proposed Performance Monitoring Indicators for Future Consideration

ID	Inventory Ref. (Appendix B)	MAP-21 Category
		Congestion Reduction
1	**A-1**	Congested Arterial VMT
2	**A-8**	Bike and Walk Miles Traveled
3	**A-16/A-18**	Non-Work Mode Share
		System Reliability
4	**A-65**	Transit/Rail travel time reliability
		Economic Vitality
5	**B-25**	Residential and employment densities (new growth) - by Environmental Justice (EJ) and Non-EJ areas
6	**C-33**	Housing/Transportation Affordability Index

1. Congested arterial VMT was considered for incorporation into the list of proposed monitoring indicators; however, the best data source for determining vehicle congested miles is PeMS, which currently collects data for freeways and highways only.

2. Inclusion of bike and walk miles traveled was considered. Bike and walk miles traveled data is collected through the National Household Travel Survey; however, this data variable is currently only updated every seven years.

3. Non-work mode share information data also is relevant. Currently, mode share data is only available for work-related trips from the ACS.

4. Information relating to system reliability is only available for freeways and highways through Caltrans PeMs data. No statewide data sources are available to monitor transit and rail travel time reliability. Percent on time data by type of service is monitored for specific transit corridors.

5. The Technical Group was unable to determine an available accurate data source for monitoring residential and employment densities.

6. The housing/transportation affordability index currently was developed by the Center for Neighborhood Technology. Currently, due to data limitations, there is not complete coverage of all California counties in the index.

Discussions regarding Future Implementation

The nine proposed indicators identified by the Technical Group support the goals of SB 375 and MAP-21, and incorporate available statewide data sources. However, throughout the indicator development effort, data availability has been an area of concern. Some MPOs are concerned about the lack of available current data and the cost to acquire data. For example, proposed indicators that rely on PeMS data will not be able to be monitored by all MPOs.

In addition, while the proposed indicators can be utilized as a monitoring tool, it should also be noted that regional performance within these categories is influenced by state and national policies, funding availability, and other factors outside of the MPO sphere of influence.

At the June 18 meeting of the MPO/State Agency SB 375 Implementation Working Group, it was recommended that the Technical Group be reconvened prior to application of the proposed indicators to have further discussion regarding these concerns, and that the calculation of each indicator be pre-tested and validated.

To follow up on future possible implementation options, the SGC could reach out to MPOs and state agencies to understand potential concerns related to future implementation of common statewide monitoring indicators. Further discussion is needed to continue addressing variations among diverse California regions, the need for flexibility in future performance monitoring which could include both quantitative and qualitative assessments, and data availability.

Background

In 2011, SANDAG received grant funding from the Strategic Growth Council (SGC) to support SANDAG's sustainable communities planning efforts. One of the goals of the grant funding is to collaborate with other California Metropolitan Planning Organizations (MPOs) and state agencies on common statewide transportation related indicators. These regional indicators would relate to SB 375 implementation by MPOs.

The proposed framework and approach for developing this set of performance monitoring indicators is outlined below. All work must be completed by June 30, 2013. Included is a summary of the scheduled task completion periods and tentative meeting dates.

Framework and Approach

The goal of this plan is to develop a standardized common set of performance monitoring indicators that would be used by all MPOs and state agencies. The proposed framework is based upon a tiered system of performance metrics dealing with both federal and state regulations, with consideration of new and emerging measures included in recent Regional Transportation Plans and Sustainable Communities Strategies.

SANDAG will compile general research regarding current statewide and MPO performance monitoring efforts and will coordinate with technical staff at the various agencies to identify methodologies and determine viable data sources. Through this research, SANDAG, in collaboration with other California MPOs and state agencies, will develop a proposed set of performance indicators to be utilized by all participants.

Deliverables and Proposed Schedule

ID	Date	Deliverables	Meeting Type
1	2/19/13	General framework overview and draft project schedule	MPO/State Agency Planning Working Group meeting
2	3/19/13	Discussion of project framework and overall schedule. Review of MPO and statewide agency monitoring efforts.	Conference call with technical group
3	4/9/13	Discussion of technical memo describing proposed indicators	Conference call with technical group
4	4/23/13	Draft research paper and proposed indicators	MPO/State Agency Planning Working Group meeting
5	5/6/13	Analysis and discussion of draft proposed indicators along with the development of methodologies and identification of data sources	Conference call with technical group
6	6/3/13	Discussion and refinement of indicators and outline of performance monitoring indicators report	Webinar with technical group
7	6/18/13	Final proposed indicators and data sources and draft report	MPO/State Agency Planning Working Group meeting
8	6/30/13	Final Performance Monitoring Indicators Report	---

Scope of Work

1. Propose a project management framework that includes involvement from SANDAG and other stakeholders referred to in Task 3.

   Deliverable: SANDAG staff will prepare a draft approach and schedule detailing the basic process for this project. This will include initial schedule, framework, and deliverables.

2. Review existing indicators from SANDAG and other California MPOs and, at a minimum, review the following reports on performance indicators: NCHRP Report 708: A Guidebook for Sustainability Performance Measurement for Transportation Agencies, Caltrans Smart Mobility 2010, CTC 2011 Statewide Transportation System Needs Assessment, Caltrans/SGC California Regional Progress Report (2007 and updates), Inventory of RTP/SCS indicators/performance measures prepared for the 2013 California Regional Progress Report Scoping Process, OPR Environmental Goals and Policy Report (as available), Recommendations of the Regional Targets Advisory Committee (RTAC) Pursuant to Senate Bill 375: A Report to the California Air Resources Board (2009), the California Interregional Blueprint Interim Report (2012), and the California Department of Public Health Healthy Community Indicators Report (2012). In addition, SANDAG will review and summarize requirements of MAP-21 (P.L. 112-141) pertaining to performance measurement, target-setting and monitoring requirements for the National Highway Performance Program (ref. 23 USC 119(e)(2)), Metropolitan Transportation Planning (23 USC 134(h)(2) and 49 USC 5303(h)(2)), and Statewide Transportation Planning (23 USC 135(d)(2) and 49 USC 5304 (d)(2)).

   Deliverable: Technical memo documenting current MPO performance monitoring practices based on SANDAG research and previous SGC research.

3. Through the MPO/State Agency Planning Working Group and conference calls with technical staff, coordinate with the CTC, other MPOs, CARB, Caltrans, OPR, SGC, CALCOG, and other statewide entities on potential statewide indicators as related to SB 375. In conjunction with these entities, propose a recommended set of up to ten (10) common statewide indicators that could be used to track SB 375 and SB 391 implementation across California regions. The proposed measures should be consistent with the national goals and performance requirements set forth in MAP-21 and Caltrans Smart Mobility 2010, coordinated with the 2013 California Regional Progress Report Scoping Process, and informed by the review of the reports referenced in Task 2 above.

   Deliverables: Contact list for technical group. Draft list of up to ten common statewide indicators.

4. Define the indicators, refine the methodology for collecting and reporting data on the selected set of indicators, and share that information with the other MPOs. Work to achieve consensus among the other MPOs and other public agencies as appropriate on the definition and measurement of the indicators.

   Deliverables: Technical memo documenting proposed definitions for set of proposed indicators, data sources and methodology for collecting and reporting data. SANDAG will document technical staff comments and revise technical memo to be shared with the MPO/State Agency Planning Working Group on SB 375 Implementation.

5. Prepare draft and final reports containing the recommended set of statewide indicators for use by California MPOs, the definition and data collection and reporting methodologies for the statewide indicators, and a high-level Executive Summary summarizing the most relevant outcomes of this planning process.

   Deliverables: Draft report for review by the technical group and MPO/State Agency Planning Working Group on SB 375 Implementation. The report will include a summary of background research, methodologies, data sources, a standardized list of indicators, recommendations for improvement of existing practices, and an overview of the proposed tiered process between federal and state entities regarding the set of indicators. Also, a final report will be submitted addressing comments from the draft report.

Inventory of MPO RTP/SCS Indicators/Performance Indicators Documents/Agency Reports (June 2013)

ID	Transportation Indicators/Performance Measures	Metropolitan Planning Organizations (MPO)																				Other State Agency Reports and Idicator Documents										
		MTC (ABAG)	SACOG	SANDAG	SCAG	AMBAG	BUTTE CAG	SBCAG	SHASTA RTA	SLO COG	TAHOE MPO	FRESNO COG	KERN COG	KINGS CAG	MADERA CTC	MERCED CAG	SJ COG	STAN COG	TULARE CAG	SJV BLUEPRINT	CDPH HCI	MAP-21	CRPR Inventory	CIB	NCHRP	CTC STNA	2010 CRP Report	CalTran SM	RTAC Recommend	OPR EGPR	OSP CalTrans PM
	I. Congestion/Delay/Vehicle Miles Traveled																															
A-1	Congested VMT - total, per capita, by source - total, per capita, per job, for household-generated travel		■			■	■		■			■						■					■									
A-2	Congested VMT, percent of total auto/transit travel in congested conditions (peak/all day)											■											■									
A-3	Congestion, average level in hours												■	■			■	■					■									
A-4	Person delay by facility type (mixed flow, HOV, arterials), per capita in minutes				■							■											■									
A-5	Traffic volumes									■	■												■									
A-6	Truck delay by facility type (highway arterials)				■																		■									
A-7	Vehicle delay, daily, per capita				■		■		■								■						■									
A-8	Vehicle miles traveled per capita (VMT)*, Total VMT, per capita or per job (percent change)	■	■	■	■		■	■	■	■	■	■					■				■		■		■	■	■		■			
A-9	VMT - commute VMT, per worker & household-generated, by community type and regional		■																				■									
A-10	VMT - commute share of household-generated VMT		■																				■									
A-11	VMT - weekday household-generated VMT, per capita by community type, by TPA		■																				■									
A-12	VMT - weekday VMT, total and average annual growth		■																				■									
A-13	VMT - weekday VMT, by source and total, by source per capita/per job		■																				■									
A-13.1	VMT - daily vehicle miles of delay																															■
	II. Mode Share/Trips																															
A-14	Bike and walk mode share in EJ and non-EJ areas		■																				■									
A-15	Bike and walk trips to total trips (percent), total	■		■			■	■	■	■						■		■					■			■		■				
A-16	Mode share - all trips (percent trips auto, transit, bike, walk) (percent total alternative), daily	■						■	■	■						■	■				■		■						■			
A-17	Mode share - non-commute		■									■											■									
A-18	Mode share - work trips/commute (peak periods): drive alone, carpool, transit, bike/walk		■	■				■	■	■		■				■					■		■									
A-19	Mode share - workers (percent trips auto, transit, bike, walk)							■	■	■						■							■									
A-20	Mode share - to commercial and recreation sites										■												■									
A-21	Mode share - within, to and from the Region										■												■									
A-22	Peak highway trips									■			■	■									■									
A-23	Peak period trips (percent) within 1/2 mile of transit stop			■												■							■									
A-24	Peak transit trips									■			■	■									■									
A-25	Transit mode share, Environmental justice (EJ) and non-EJ areas		■																				■									
A-26	Trips by transit, walk, bike, per capita, weekday, by community type, by TPA		■									■				■							■			■		■				
A-27	Trips, daily (percent) within 1/2 mile of transit stop			■												■							■									
A-28	Vehicle occupancy, average (AVO)									■													■									
A-29	Vehicle trips x occupancy rate, peak, daily average								■														■									
A-30	Vehicle trips, average peak period, average daily								■	■													■									
A-31	Work trip travel speed (MPH) (average) by mode (drive alone, carpool, transit)			■								■											■									
A-32	Total interregional passenger miles traveled.			■																												
A-33	Average weekday freeway travel per capita			■																												
A-33.1	Mode share - sinle occupancy vehicle as a percentage																															■
	III. Safety																															
A-34	Accident rates, percent reduction		■					■															■									
A-35	Bicycle and Pedestrian Collisions			■						■	■												■									
A-36	Bicycle fatalities, injuries			■	■				■	■													■									
A-37	Collision/accident rates by severity, by mode																						■					■				
A-38	Collisions per VMT, total vehicle collisions				■				■	■	■						■						■									
A-39	Fatalities/injuries, all collisions per VMT/accident statistics, annual av. daily traffic, reductions	■		■	■	■	■		■	■			■	■	■			■	■		■		■		■	■					■
A-40	Fatalities per passenger miles, by transit mode share						■		■	■													■									
A-41	Household growth (percent new) in areas with historically high fatal or severe injury collisions	■																					■									
A-42	Pedestrian facilities, injuries, and fatalities			■						■													■									
A-43	Property damage per VMT								■														■									
	IV. Transit/Bicycle/Pedestrian (Alternative)																															
A-44	Bicycle route mileage by county, increases in miles, ratio of completed network		■						■								■						■									
A-45	Bike routes per 100,000 population		■							■													■									
A-46	Farebox revenues as percent of operating costs (farebox recovery rate)		■							■													■									
A-47	Park-and-ride lot use and number									■							■						■									
A-48	Transit assets, (reductions), share of assets exceeding their useful life	■																					■									
A-49	Transit fares, average cost (RTAC)								■	■													■									
A-50	Transit passengers, per vehicle revenue mile						■																■									
A-51	Transit vehicle - weekday service hours, per day by transit type (increases)		■			■			■	■							■						■									
A-52	Transit/urban passenger rail ridership, service		■		■			■		■						■	■						■									
A-53	Weekday boardings per service hours		■							■		■											■									
A-54	Weekday passenger boardings		■						■	■													■									
	V. Transportation System Investment/Preservation/Service/Fuel Use																															
A-55	Distressed lane miles, (total and percent), by jurisdiction	■				■	■																■									
A-56	Expenditures vs. passenger miles traveled - highway, transit, EJ/non-EJ												■										■									
A-57	Investment in active transportation (percent of total plan)											■											■									
A-58	Investment, per passenger mile traveled, av. daily; balanced; comparison by type, EJ areas								■	■		■	■		■			■	■				■									
A-59	Investment to serve major employment areas												■		■				■				■									
A-60	Maintenance dollars per lane mile (percent change)								■				■										■									
A-61	Pavement Condition Index, local roads	■																					■									
A-62	Person miles of travel compared to percent of transportation investments, EJ/non-EJ TAZ											■											■									
A-63	Project maintenance funded over time														■				■				■									
A-64	Quality of service, change in average trip delay on roadway projects inside EJ/non-EJ TAZ										■	■											■									
A-65	Roadway level of service (LOS)/VMT; by segment, operating LOS D , E or worse (EJ/non-EJ areas)							■	■	■		■			■		■	■	■				■		■							
A-66	Roadway utilization/optimal use, return on investment (ROI) on transportation investments		■												■				■				■									
A-67	***Vehicle fuel consumption*, per capita, total***							■															■				■					
A-68	Travel Demand Management (employer-based trip reduction, commute connection programs)																■						■									
A-69	Freight tonnage and value imported/exported at regional gateways, by mode			■		■																										
A-70	Percent of trans investments towards maintenance/rehab and operation improvements			■																												
A-70.1	Pavement condition - Percent of distressed lane miles																	■														■
	VI. Travel Distance/Times/Costs																															
A-71	Commute hours, weekday, by mode		■									■											■									
A-72	Commuter savings, money, (net)							■															■									
A-73	Commuter savings, time (net)							■															■									
A-74	Costs of driving, daily (RTAC)																															

Appendix B

Inventory of MPO RTP/SCS Indicators/Performance Indicators Documents/Agency Reports (June 2013)

ID	Transportation Indicators/Performance Measures	Metropolitan Planning Organizations (MPO)																			Other State Agency Reports and Idicator Documents										
		MTC (ABAG)	SACOG	SANDAG	SCAG	AMBAG	BUTTE CAG	SBCAG	SHASTA RTA	SLO COG	TAHOE MPO	FRESNO COG	KERN COG	KINGS CAG	MADERA CTC	MERCED CAG	SJ COG	STAN COG	TULARE CAG	SJV BLUEPRINT	CDPH HCI	MAP-21	CRPR Inventory	CIB	NCHRP	CTC STNA	2010 CRP Report	CalTran SM	RTAC Recommend	OPR EGPR	OSP CalTrans PM
A-75	Time to destinations															■			■				■								
A-76	Time to transportation system														■	■			■				■								
A-77	Travel distance, all trips, work and non-work (average) (miles)				■			■	■	■		■						■					■								
A-78	Travel on regional road network that is delayed, percent of daily travel															■							■								
A-79	Travel time distribution for transit, SOV, & HOV, for work and non-work trips				■							■											■								
A-80	Travel time, overall (average)							■										■					■								
A-81	Travel time, non-peak period (average), non-work trip (average)	■			■				■							■							■			■					
A-82	Travel time, peak period trip (average) , by mode for EJ and non-EJ a.m./p.m., TAZ						■		■	■		■	■										■								
A-83	Travel time and travel distance savings (distribution)				■																		■					■			
A-84	Travel time to job centers - work trip (average min.), commute length (distribution), (mode)	■		■	■	■		■		■		■	■		■								■		■			■			
A-85	Trip delay time in hours (average)					■			■				■										■								
A-86	Trip time (average) for low-income and minority communities							■								■							■								
A-87	Work trips less than three miles (percent of total)				■							■											■								
A-88	Annual transit passenger miles per capita			■																											

**** 2010 California Regional Progress Report Indicator***

Sources: MPO Regional Transportation Plans, Metropolitan Transportation Plans, Sustainable Communities Strategies, MPO communications (see Appendices C & D for sources)

Appendix B

Inventory of MPO RTP/SCS Indicators/Performance Measures (June 2013)

ID	Land Use Indicators/Performance Measures	Metropolitan Planning Organizations (MPO)																					Other State Agency Reports and Idicator Documents										
		MTC (ABAG)	SACOG	SANDAG	SCAG	AMBAG	BUTTE CAG	SBCAG	SHASTA RTA	SLO COG	TAHOE MPO	FRESNO COG	KERN COG	KINGS CAG	MADERA CTC	MERCED CAG	SJCOG	STAN COG	TULARE CAG	SJV BLUEPRINT	CDPH HCI	MAP-21	CRPR Inventory	CIB	NCHRP	CTC STNA	2010 CRP Report	CalTran SM	RTAC Recommend	OPR EGPR		
	I. Ag Land/Open Space Conversion/Use																																
B-1	Agriculture (ag) land conserved, prime farmlands avoided		■			■	■	■	■	■					■								■										
B-2	Ag land and open space retained (percent) per year in incorporated and unincorporated areas							■		■													■										
B-3	Ag lands acres directly impacted by transportation improvements														■	■							■										
B-4	***Conversion of ag lands to urban & built-up uses** *		■		■																■		■				■						
B-5	Farmland acres developed - total and per capita/important farmland consumed due to new growth		■						■	■		■											■										
B-6	Farmland, acres of impact from growth and transportation projects, by type of farmland		■																				■										
B-7	Household growth (percent new) in areas with prime farmland or critical habitat	■										■											■										
B-8	Williamson Act contract acres impacted (percent)		■							■													■										
B-9	Habitat conserved within designated preserve areas			■																			■										
	II. Compact-Infill Development/Density/Land Use																																
B-9	Compact development: growth in population compared with acres developed		■							■		■											■										
B-10	Commercial core areas (share) meeting pedestrian and transit-oriented development design standards										■												■										
B-11	Constrained lands (gross acres) consumed for transit and highway infrastructure			■																			■										
B-12	Development (percent occurring) within Butte Regional Conservation Plan-urban permit areas						■																■										
B-13	Dwelling units per acre									■													■										
B-14	Household growth (percent new) in areas with existing housing densities above 6 units/acre	■																					■										
B-15	Household growth (percent new) in areas considered walkable	■																					■										
B-16	Household growth (percent of new) in areas with highest access to frequent transit	■			■				■														■										
B-17	Household growth (percent new) in areas with lowest current VMT per capita	■																					■										
B-18	Households and employment, share of region's growth, within 1/2 mile of bus rapid transit/quality transit in TPA		■									■											■										
B-19	Land consumption, acres consumed due to new development				■					■		■			■	■		■					■										
B-20	Land urbanized (acres), development, per capita (acres), developed acres by community type		■				■			■								■					■										
B-21	Land use mix by community type (percent of new development-infill redevelopment, greenfield) (RTAC)		■						■	■													■										
B-22	Non-agricultural development within the urban footprint	■	■							■													■										
B-23	Population (percent of EJ area and non-EJ area) in community types and TPAs																						■										
B-24	Residential density (average) by community type, for new growth (RTAC)		■							■		■						■					■										
B-25	Residential + employment densities (average) (RTAC)								■	■													■										
B-26	Street pattern in different community types (change in)		■																				■										
B-27	Transit areas, high quality, households & employment share of growth				■																		■										
B-28	Zoning capacity (new) less than or equal to du/acre within 1/4 mile of frequent and reliable transit corridor							■		■													■										
	III. Housing Development																																
B-29	Housing growth, (percent new), by community type, in areas with existing job densities above 5 jobs per acre	■	■																				■										
B-30	Housing growth, (new) within 1/2 miles of transit stops, quality transit		■									■											■										
B-31	Housing product mix by community type, (growth), change in mix		■						■														■										
B-32	Housing product mix in EJ and non-EJ areas by community type, change, new mix in TPAs		■															■					■										
B-33	Housing type, by percent											■						■					■										
B-34	Housing units (percent) expected to be constructed in 200-year flood plain		■																				■										
B-35	Housing unit capacity (percent new) accommodated by infill development							■	■									■					■										
	IV. Jobs/Housing Balance																																
B-36	Jobs-Housing balance - changes in ratio,within 4-mile radius of employments centers (RTAC)		■					■										■			■		■										
	V. Urban Greening																																
B-37	***Urban greening** *								■														■				■						

*** 2010 California Regional Progress Report Indicator**

Sources: MPO Regional Transportation Plans, Metropolitan Transportation Plans, Sustainable Communities Strategies, MPO communications (see Appendices C & D for sources)

Appendix B

Inventory of MPO RTP/SCS Indicators/Performance Measures (June 2013)

ID	Economic Competitiveness & Opportunity Indicators/Performance Measures	Metropolitan Planning Organizations (MPO)																				Other State Agency Reports and Idicator Documents										
		MTC (ABAG)	SACOG	SANDAG	SCAG	AMBAG	BUTTE CAG	SBCAG	SHASTA RTA	SLO COG	TAHOE MPO	FRESNO COG	KERN COG	KINGS CAG	MADERA CTC	MERCED CAG	SJCOG	STAN COG	TULARE CAG	SJV BLUEPRINT	CDPH HCI	MAP-21	CRPR Inventory	CIB	NCHRP	CTC STNA	2010 CRP Report	CalTran SM	RTAC Recommend	OPR EGPR	
	I. Economically Disadvantaged/Gentrification/Reinvestment																															
C-1	Gentrification and displacement				■																■		■									
C-2	Higher density low income housing, percent						■																■									
C-3	Household growth (percent new) in areas with a mean school API less than 800	■																					■									
C-4	Household growth (percent new) in areas with highest violent crime rates	■																					■									
C-5	Household growth (percent new) in census tracts that are majority rental	■																					■									
C-6	Housing growth (percent new) in areas with high poverty concentration	■																					■									
C-7	Housing growth (percent new) in areas that are majority people of color	■																					■									
C-8	Housing growth through reinvestment		■																				■									
	II. Jobs (Employment)/Economy/Productivity																															
C-9	***Green employment & establishments****																										■					
C-10	Gross regional product (GRP) (net contribution to, increase)	■			■	■																	■			■						
C-11	***Job growth* (overall),*** job growth by community type, in different community types by sector																						■			■	■					
C-12	Job growth through reinvestment		■																				■									
C-13	Jobs (additional) supported by improving competitiveness				■																		■									
C-14	Jobs (additional) supported by transportation investment				■																		■									
C-15	Net commuter savings (time)							■	■														■									
C-16	Net commuter savings (money)							■	■														■									
C-17	***Wage growth****																										■					
C-18	Per capita income in region			■																												
C-19	Retail gasoline sales per capita by County (millions of gallons)			■																												
	III. Housing/Jobs/Transportation Accessibility (Including EJ)																															
C-20	Accessibility w/in 30 mins by car to jobs, retail jobs, medical jobs, higher education, and park acres from EJ & non-EJ areas		■															■					■									
C-21	Dwelling units (share) with access to transit, bike and pedestrian facilities										■												■			■						
C-22	Dwelling units within 1/2 mile of quality transit (in TPA) by county (TPA = Transit Priority Area)		■		■				■														■									
C-23	Employees within 1/2 mile of quality transit (in TPA) by county		■		■																		■					■				
C-24	Homes (percent) within 1/2 mile of transit stop (fixed route/express), & for low-income/minority communities of concern			■						■							■	■					■									
C-25	Housing near public transit (less than 1/2 mile and more than 1/2 mile)			■						■													■									
C-26	Housing units within distance of transit service (RTAC)									■													■									
C-27	Jobs (total) within 30-minute drive by community type		■																				■									
C-28	Jobs, higher education, parks (percent) accessible within 30 minutes by transit vs. car from EJ and non-EJ areas		■							■											■		■									
C-29	Low income population (percent) within 1/4 mile of transit route						■																■									
C-30	Minority Population (percent) within 1/4 mile of transit route						■			■													■									
C-31	Non-work trips (percent) accessible w/in 15 minutes by mode (drive alone, carpool, transit)			■	■							■											■									
C-32	Population (percent) within 2 miles of state highway						■			■													■									
C-33	Population, jobs (% inc. low income & minority) w/in 1/4 mile of bus stops w/ frequent/reliable transit service		■			■	■	■	■	■					■		■						■			■	■					
C-34	Proximity to transit by community type, increases in daily transit vehicle service hours in EJ areas		■																				■									
C-35	Recreation sites (share) with access to transit, bike and pedestrian facilities										■												■									
C-36	Work trips (percent) accessible w/in 30 minutes during peak periods by mode: all, low income, minority comm. of concern			■	■							■											■									
C-37	Number of total jobs per capita in region			■																												
	IV. Housing Affordability																															
C-38	Affordable and workforce housing units (new) by affordability level							■		■													■									
C-39	Affordable and workforce housing (percent increase in) near jobs							■		■													■									
C-40	Affordable and workforce housing (percent increase in) near transit							■		■													■									
C-41	Affordable and workforce housing (new) within 1/4 mile of bus stops with frequent and reliable transit corridor							■		■						■							■									
C-42	***Housing affordability for renters & owners (housing costs 30% or more of income)****, median income											■						■					■				■					
C-43	Housing affordability relative to local wages (jobs/housing fit) (RTAC)																				■											
C-44	Housing (percent new) where more than 8% of housing stock is deed-restricted affordable housing	■																					■									
C-45	Residents' (low/lower-middle income) household income share consumed by transportation & housing	■																					■									

*** 2010 California Regional Progress Report Indicator**

Sources: MPO Regional Transportation Plans, Metropolitan Transportation Plans, Sustainable Communities Strategies, MPO communications (see Appendices C & D for sources)

Appendix B

Inventory of MPO RTP/SCS Indicators/ Performance Measures (June 2013)

ID	Resource Efficiency & Conservation Indicators/Performance Measures	Metropolitan Planning Organizations (MPO)																			Other State Agency Reports and Idicator Documents									
		MTC (ABAG)	SACOG	SANDAG	SCAG	AMBAG	BUTTE CAG	SBCAG	SHASTA RTA	SLO COG	TAHOE MPO	FRESNO COG	KERN COG	KINGS CAG	MADERA CTC	MERCED CAG	SJ COG	STAN COG	TULARE CAG	SJV BLUEPRINT	CDPH HCI	MAP-21	CRPR Inventory	CIB	NCHRP	CTC STNA	2010 CRP Report	CalTran SM	RTAC Recommend	OPR EGPR
	I. ENERGY USE/CONSUMPTION																													
D-1	***Energy use per capita ****				■																		■				■			
D-2	***Natural gas use per capita ****																						■				■			
	II. HABITAT/ LAND CONSERVATION																													
D-3	Biologically sensitive lands avoided (acres)						■			■													■							
D-4	Habitat and land cover impacted (percent)		■			■			■	■													■							
D-5	Habitat lands conserved			■						■													■							
D-6	Impervious surfaces, total acres, built from new growth											■											■							
D-7	Resource areas (CNDBB, critical habitat, vernal pools & wetlands, etc.), total acres											■											■							
D-8	Vernal pool acres developed		■																				■							
D-9	Wildland habitat/land cover, by type, acres of impact from growth & trans. projects		■							■													■							
	III. WATER USE/CONSUMPTION																													
D-10	***Urban water use per capita ****				■				■	■											■		■				■			
D-11	Water consumption, daily, by new housing development											■											■							

*** 2010 California Regional Progress Report Indicator**

Sources: MPO Regional Transportation Plans, Metropolitan Transportation Plans, Sustainable Communities Strategies, MPO communications (see Appendics C & D for sources)

Appendix B

Inventory of MPO RTP/SCS Indicators/ Performance Measures (June 2013)

ID	Environment & Public Health Indicators/Performance Measures	Metropolitan Planning Organizations (MPO)																				Other State Agency Reports and Idicator Documents									
		MTC (ABAG)	SACOG	SANDAG	SCAG	AMBAG	BUTTE CAG	SBCAG	SHASTA RTA	SLO COG	TAHOE MPO	FRESNO COG	KERN COG	KINGS CAG	MADERA CTC	MERCED CAG	SJ COG	STAN COG	TULARE CAG	SJV BLUEPRINT		CDPH HCI	MAP-21	CRPR Inventory	CIB	NCHRP	CTC STNA	2010 CRP Report	CalTran SM	RTAC Recommend	OPR EGPR	
	I. AIR QUALITY/EMISSIONS																														
E-1	***Air quality (PM 2.5) ****	■			■										■		■	■				■		■				■				
E-2	Air quality (tons per day of regulated pollutants/emissions) (percent reductions)														■	■	■		■					■								
E-3	Air quality conformity, non-attainment pollutants				■		■		■						■	■	■							■								
E-4	Carbon dioxide (CO2), tons per capita (percent reductions)	■		■	■					■	■				■	■	■	■						■								
E-5	CO2 emissions from cars and light duty trucks, per capita (percent reductions)	■			■										■		■							■								
E-6	CO2 emissions from all vehicle types, daily pounds per capita			■						■							■							■								
E-7	Coarse particulate matter (PM10), tons of emissions (percent reductions)	■				■									■		■							■								
E-8	Criteria pollutant and greenhouse gas emissions (CO2, NOx, PM2.5, PM10, and VOC), per capita				■			■				■					■	■						■			■					
E-9	Greenhouse gas emission reductions, daily pounds per capita, by sector (percent change)		■			■					■	■						■				■		■			■			■		
E-10	Greenhouse gas emissions from autos/light trucks, per capita							■	■								■							■								
E-11	NOx/PM by air basin (percent change)												■											■								
E-12	Particulate emission reductions (greater) in highly impacted areas	■																						■								
E-13	Pollutants, smog-forming, for all vehicle types, daily pounds per capita			■																				■								
E-14	Population or new housing (percent) within 500 ft. or 1000 ft. of freeway/high-volume roadway		■		■							■												■								
E-15	Population (percent) in EJ & non-EJ areas within 500 ft. freeway/high-volume roadway		■		■																			■								
E-16	Reduction costs per unit, VMT & GHG							■																■								
	II. PUBLIC HEALTH																														
E-17	***Asthma ****																											■			
E-18	***Overweight & obesity ****																											■			
E-19	Premature deaths from exposure to fine particulate emissions	■																						■							
E-20	Time walking or biking, per person (average daily)	■																						■							
	III. WATER QUALITY																														
E-21	Water quality - EIR water quality analysis (percent of population impacted)															■								■							

*** 2010 California Regional Progress Report Indicator**

Sources: MPO Regional Transportation Plans, Metropolitan Transportation Plans, Sustainable Communities Strategies, MPO communications (see Appendices C & D for sources)