



# Performance Measures

# Regional Performance Measures

## Introduction

This appendix highlights the performance of the MTP/SCS for 2040. The performance of the Revenue Constrained network also is compared to other network scenarios, such as 2015 Existing and 2040 No Build.

The performance of the 2040 Revenue Constrained Network compared to existing conditions (2015), 2020, 2035 and the 2040 No Build is shown in Table G-1. In addition, this appendix includes the methodology to estimate the performance measures.

**Table G-1: Performance Measure Results**

Regional Performance Measures	2015 Existing	2020 MTP/SCS	2035 MTP/SCS	2040 No Build	2040 MTP/SCS
<b>Access and Mobility</b>					
Work Trips Within 30 Minutes (percentage)					
Drive Alone	84.3%	84.5%	83.9%	83.9%	84.5%
Carpool	84.3%	84.5%	83.9%	83.9%	84.5%
Transit	13.0%	17.0%	15.2%	13.0%	15.8%
Commute Travel Time (minutes)	15.6	15.5	15.7	15.7	15.5
<b>Economic Vitality</b>					
Jobs Near High Quality Transit (percentage)	21.4%	21.2%	24.7%	20.6%	29.6%
Daily Truck Delay (hours)	2,799	3,567	6,236	7,778	7,432
<b>Environment</b>					
GHG Reductions (Percent reduction from 2005 baseline) <sup>1</sup>	N/A			N/A	-6.6%
Open Space Consumed (acres) <sup>2,3</sup>	N/A	7	55	0	11
Farmland Converted (acres) <sup>2,3,4</sup>	N/A	0	1,047	1,805	294
<b>Healthy Communities</b>					
Alternative Transportation Trips (percentage)	17.3%			18.1%	17.7%
Smog Forming Pollutants (TOG) (lbs/day) per capita	0.019			0.005	0.005
Peak Period Congested Vehicle Miles of Travel (miles)	499,064	641,372	968,326	1,259,191	1,118,524
<b>Social Equity</b>					
Distribution of MTP/SCS Investments (percentage) <sup>5</sup>					
Low income areas	N/A	83.2%	60.0%	N/A	95.8%
Non low income areas	N/A	16.8%	40.0%	N/A	4.2%
Minority areas	N/A	90.9%	63.4%	N/A	96.5%
Non minority areas	N/A	9.1%	27.6%	N/A	3.5%
Access to Transit within 1/2 mile (percentage) <sup>6</sup>					
Low income population	27.9%	28.1%	28.1%	27.9%	28.1%
Non low income population	11.2%	11.2%	11.2%	11.2%	11.2%
Minority population	32.1%	32.3%	32.3%	32.1%	32.3%
Non minority population	5.2%	5.0%	5.0%	5.2%	5.0%
<b>System Preservation and Safety</b>					
Maintain the Transportation System (percentage)	N/A	N/A	N/A	N/A	68.0%
Fatalities and Injuries per 1,000 VMT	0.09	N/A	N/A	0.07	0.07
Annual Projected Bike/Pedestrian Fatalities and Injuries per 1,000 VMT	0.02	N/A	N/A	0.02	0.02

<sup>1</sup>Greenhouses gas reductions in 2020 are -4.3 percent from 2005 levels.

<sup>2</sup>Rail projects are not reflected in the 2020, 2035 and 2040 MTP/SCS regionally significant project analysis, as rail lines are existing

<sup>3</sup>2040 No Build scenario has increased open space due to farmland conversion per the 2040 MTP/SCS typology as identified by the city and county jurisdictions in SOIs.

<sup>4</sup>Farmland analyzed is Prime, Unique, or Farmland of Statewide Importance as defined by Dept. of Conservation FMMP.

<sup>5</sup>Calculated based upon criteria on total investment of all modelable projects within 1/2 mile of U.S. Census Bureau defined tracts.

<sup>6</sup>Tracts defined per U.S. Census Bureau. Calculated based per criteria on total acreage and percentage of population within a 1/2 mile of transit.

## Methodology to Estimate Performance Measures

The methodology used to calculate the regional performance measures is detailed below. A variety of tools such as the Regional Travel Demand Model (RTDM), geographic information system (GIS), and EMFAC were used to estimate the performance measures.

### Percent of Work Trips That Are 30 Minutes or Less By Mode

This performance measure is calculated by using the Regional Travel Demand Model. It is the work trips that are 30 minutes or less and divided by total work trips by mode: drive alone, carpool and transit.

### Average Work Trip Travel Time

This performance measure is calculated by using outputs from the Regional Travel Demand Model. It is the work trip person hours of travel divided by total work trips (peak period).

### Percent of Jobs Within ½ Mile of a High Quality Transit Stop

This performance measure was calculated using GIS. It is the jobs within a ½ mile of all high quality transit stops divided by the total jobs in the region. Jobs are calculated by using employment data at the traffic analysis zone (TAZ) spatial level. Spatially referenced employment data for the year 2015 was provided by InfoUSA and aggregated to the respective TAZs. The percentage of employees within a ½ mile of a high quality transit stop (HQTS) was estimated as an equivalent proportion of TAZ area within a ½ mile of an HQTS. In other words, the percent area of an individual TAZ within a ½ of an HQTS was applied to the total number of employees within that TAZ. Those employees were then summed with all the rest of employees near an HQTS within the AMBAG region. This method assumes that employees are equally distributed throughout the TAZ. However, given that individual TAZs within urbanized areas (and therefore HQTS) are not spatially broad, the possibility of underestimating employment numbers near HQTS is low.

### Daily Truck Hours of Delay

This performance measure is calculated by multiplying the daily total vehicle hour delay by total number of trucks as reported by the Regional Travel Demand Model.

### GHG Emissions

This performance measure reports the CO<sub>2</sub> emissions for SB 375 vehicle types per capita based on outputs from the Regional Travel Demand Model and the California Air Resources Board's Emissions Factor (EMFAC) model. It is the daily pounds of CO<sub>2</sub> divided by total population as a percent reduction from the 2005 baseline.

### Impacts to Sensitive Habitat Areas & Open Space

This performance measure shows the total acreage of open space consumed by development. In that regard it considers impacts to sensitive habitat only as it pertains to destruction of that potential habitat for development. The performance measures do not include a separate analysis for sensitive habitat, however a detailed discussion of the impacts to sensitive habitat can be found in the Environmental Impact Report. Calculation of the acreage of open space consumed by each scenario was performed at the parcel level using GIS by examining the changes between existing and alternative land use types for each scenario. To estimate the amount of open space consumed under any given scenario, the sum was derived of all parcel areas which changed from open space (undeveloped land) to developed land.

### Farmland Preservation

Calculation of the acreage of agricultural land consumed by each scenario was performed using GIS at the parcel level by examining the changes between existing and alternative land use types for each scenario. To estimate the amount of farmland consumed under any given scenario, the sum was derived of all parcel areas which changed from "Important Farmland" (as defined by California Department of Conservation DOC. 2016A) to developed land.

### Alternative Transportation Trips

This performance measure is an output from the Regional Travel Demand Model. It is the total number of bike, walk and transit trips.

### Smog Forming Pollutants (Daily Tons)

This performance measure was calculated using vehicle miles traveled by speed as reported by the regional travel demand model. That output becomes an input in the California Air Resources Board's Emissions Factor (EMFAC) model. The output of EMFAC provides pollution in various categories. This performance measure is the daily short tons of total organic gases as reported from EMFAC.

### Congested Vehicle Miles of Travel

This performance measure uses the Regional Travel Demand Model. It is the total vehicle miles traveled at level of service, E and F (volume/capacity  $\geq$  0.86 for functional class 2 and where volume/capacity  $\geq$  0.90 for functional classes 3-7) divided by total vehicle miles traveled in the peak periods.

### Distribution of MTP/SCS Investments

This performance measure is calculated using GIS. It is the dollar value of MTP expenditures serving low income and minority communities divided by total MTP expenditures. Note: this indicator provides a snapshot of MTP expenditures by geographic area. Other factors such as proximity to impacts of transportation projects and services are not reflected in this indicator.

### Defining Disadvantaged Communities (Low Income and Minority)

The definition of minority individual was considered any non-white or mixed race person according to the 2010 Census data. Conversely, a non-minority individual was considered any white or non-Hispanic person. For the purposes of this analysis, a tract was considered to be predominantly minority if greater than 65% of the total population was non-white.

The definition of 'low-income' was considered a family whose annual income was less than \$75,000 per year. This definition was developed by adjusting

the national poverty level to a family of three living within the AMBAG region, as follows. The poverty level was adjusted based on housing prices within the AMBAG region relative to the national average home price. On average, the price of a home within the Monterey Bay Area is three times the national average price of a home. Therefore, the poverty level was adjusted by a multiplier of approximately three, as a general proxy for the higher cost-of-living. This threshold was subsequently multiplied by a factor of 1.5 to capture poverty as well as low income earning families (this multiplier is suggested in the DOT Circular FTA C 4703.1, pg17, note 2). Tract-level income census data for individuals is provided in bins of \$10,000 - \$15,000 increment income ranges. Therefore, low-income families were counted as those earning between \$0 and \$74,999 per year. For the purpose of this analysis, a tract was considered predominantly low-income if greater than 65% of residing families earned less than \$75,000 annually. This definition serves as the AMBAG regional disadvantaged communities definition.

### Equitable Transit Access

This performance measure was calculated using GIS. Existing and proposed transit were located based on information provided by RTPAs.

The percentage of the regionwide population of each sub-group who reside within a ½ mile of a current or proposed transit was calculated using available demographic data from American Community Survey. Income and minority data were available at the census tract spatial resolution. Race populations were quantified by the number of minority/non-minority individuals residing within a tract. Income information was quantified by the number of families (any two or more people living together related by marriage, birth, or adoption) with a combined income below predefined thresholds residing within a tract.

Since census tracts can span broad spatial distances relative to a ½ mile buffer, a method was needed to parse the sub-populations within large tracts. The percentage of families and individuals residing within a ½ radius of transit was estimated using

the ratio within the buffered ½ mile to the total number within each respective census tract. This method was found to be adequate for estimating the percentage of people within a ½ mile radius of transit given the lack of detailed and consistent parcel level data available for the region.

### Percent of Transportation Investments Towards Maintenance and Rehabilitation

This performance measure was calculated by taking the sum of maintenance and rehabilitation transportation investments divided by all transportation investments.

### Annual Projected Accidents

This performance measure evaluates the safety of the transportation system by using data on injuries and fatalities to calculate a per capita rate of injury or fatality. This is a particularly difficult measure to project because it assumes that fatalities and injuries are held constant for every vehicle mile traveled. However, by establishing it as a performance measure in the 2040 MTP/SCS this opens the door for AMBAG to monitor past injuries and fatalities and therefore monitor the effects of the Plan as it is implemented over the course of time. Data for accidents and fatalities obtained from the Statewide Integrated Traffic Records System (SWITRS) for the most recent years available, 2016.

## Performance Management Rule 1 (PM 1): Safety System Performance Measures Report

The Fixing America's Surface Transportation Act (FAST Act) requires that MPOs provide a system performance report in the Metropolitan Transportation Plan evaluating the condition and performance of the transportation system with respect to established state performance targets. The following provides a report on the five-year rolling averages for safety Performance Management (PM 1) Targets: (1) number of fatalities, (2) rate of fatalities per 100 million vehicle miles traveled (VMT), (3) number of serious injuries, (4) rate of serious injuries per 100 million VMT and (5) number of non-motorized fatalities and non-motorized serious injuries.

**Table G-2: PM1 Safety System Performance Measures**

PM 1 Safety System Performance Measures	2012	2013	2014	2015	2016
<b>Number of Fatalities</b>					
AMBAG Region	49	52	61	79	90
Monterey	28	32	31	50	55
San Benito	10	7	9	9	13
Santa Cruz	11	13	21	20	22
5 Year Average	70	64	57	56	61
<b>Rate of Fatalities per 100M VMT</b>					
AMBAG Region	291	310	362	464	529
Monterey	276	316	307	497	530
San Benito	712	491	660	594	839
Santa Cruz	210	248	390	365	433
5 Year Average	415	378	339	333	365
<b>Number of Serious Injuries</b>					
AMBAG Region	311	274	298	335	329
Monterey	140	127	148	136	171
San Benito	41	34	36	38	38
Santa Cruz	130	113	114	161	120
5 Year Average	320	306	296	292	302
<b>Rate of Serious Injuries per 100M VMT</b>					
AMBAG Region	1,850	1,631	1,770	1,966	1,935
Monterey	1,378	1,255	1,466	1,353	1,649
San Benito	2,919	2,382	2,640	2,508	2,453
Santa Cruz	2,477	2,152	2,119	2,939	2,362
5 Year Average	1,897	1,812	1,749	1,720	1,798
<b>Number of Non-Motorized Fatalities and Non-Motorized Severe Injuries</b>					
AMBAG Region	52	72	75	58	84
Monterey	27	37	41	27	41
San Benito	4	6	4	5	10
Santa Cruz	21	29	30	26	33
5 Year Average	26	36	38	29	42

### Number of Fatalities

Number of fatalities accounts for the number of motorized collision fatality victims in the AMBAG region. Multiple fatalities can result from each collision and this measure does not represent the number collisions throughout the region. Between 2014 and 2016 there were between 49 and 90 vehicular collision related fatalities in the region (see Figure G-1). In this same period the number of fatalities has increased between 3% and 12% per year. During an average year regional transportation projects have not contributed toward the statewide collision fatality reduction targets.

### Rate of Fatalities per 100M VMT

Rate of fatalities per 100M VMT accounts for the number of motorized collision fatality victims per 100 million vehicle miles travelled (VMT) in the AMBAG region. Multiple fatalities can result from each collision, this measure does not represent the rate of collisions in the area. Between 2014

and 2016 the rate of fatalities per 100 million VMT over the annual 5-year rolling average increased between 3.1% and 11.6% per year (see Figure G-2). This indicates that during an average year regional transportation projects have not contributed toward statewide collision fatality reduction targets.

### Number of Serious Injuries

Number of serious injuries accounts for the number of victims which were seriously injured as the result of motorized collisions in the AMBAG region. Multiple victims with serious injuries may result from each collision and this measure does not represent the number of collisions in the region. Between 2013 and 2016 the annual 5-year rolling average has increased or decreased between -5.9% and 3.5% with an average change of -1.2% year-to-year (see Figure G-3). This indicates that historically the region has seen declining or flat vehicular related serious injury rates due to regional projects. Moving forward, regional transportation projects may contribute towards statewide serious injury reduction targets.

### Rate of Serious Injuries per 100M VMT

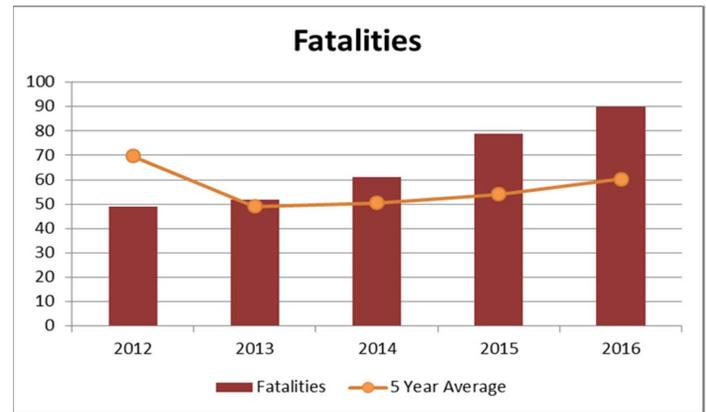
This measure accounts for the number of vehicular related serious injuries per 100 million vehicle miles travelled in the AMBAG region. Multiple serious injuries can result from each collision and this measure does not represent the number of collisions in the area. Between 2013 and 2016 the annual 5-year rolling average increased or decreased between -5.9% and 3.1% with an average change of -1.2% year-to-year (see Figure G-4). This indicates that historically the region has seen declining or flat vehicular related serious injury rates due to regional projects. Moving forward, regional transportation projects may contribute towards statewide serious injury reduction targets moving forward.

### Number of Non-Motorized Fatalities and Severe Injuries

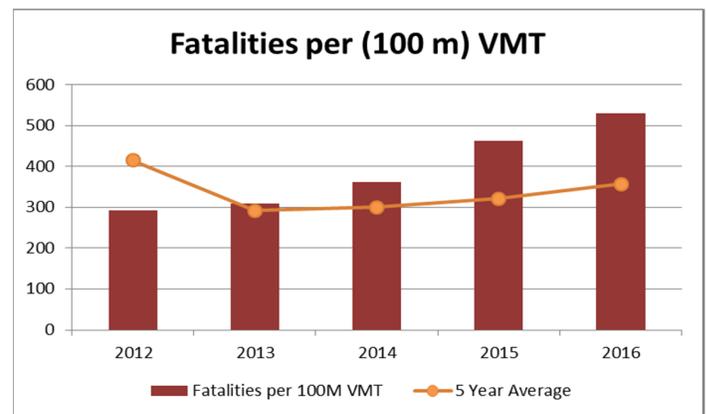
This measure accounts for the number of non-motorized vehicle related fatalities or injuries as the result of collisions in the AMBAG region, specifically bicyclists and pedestrians. Multiple victims may

result from each collision and this measure does not represent the number of collisions in the region. Between 2013 and 2016 the annual 5-year rolling average has increased or decreased between -13% to 19.2% with an average increase of 2.5% year-to-year (see figure G-5). This indicates that during an average year regional transportation projects have not contributed toward statewide targets to reduce non-motorized fatalities and severe injuries.

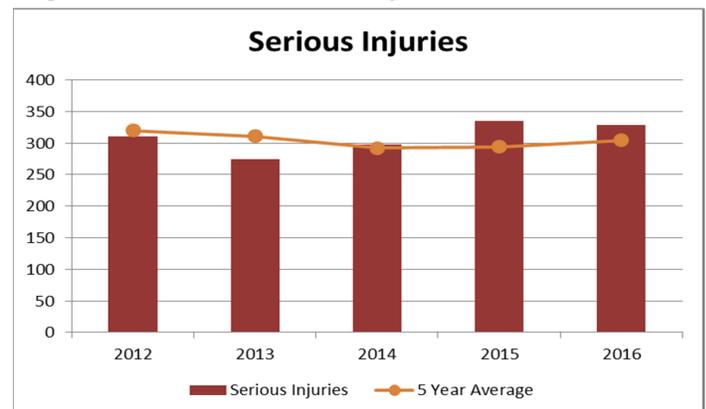
**Figure G-1: Fatalities**



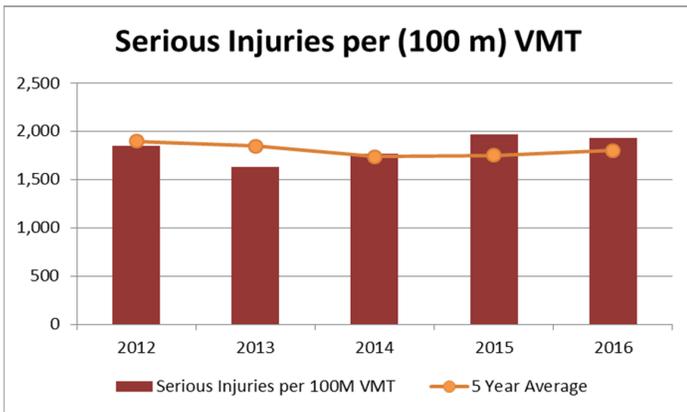
**Figure G-2: Fatalities per (100 m) VMT**



**Figure G-3: Serious Injuries**



**Figure G-4: Serious Injuries per (100 m) VMT**



**Figure G-5: Non-Motorized Fatalities and Severe Injuries**

