G

Performance Measures

Regional Performance Measures

Introduction

This appendix highlights the performance of the MTP/SCS for 2045. The performance of the Revenue Constrained network also is compared to other network scenarios, such as 2015 Existing and 2045 No Build.

The performance of the 2045 Revenue Constrained Network compared to existing conditions (2015), 2020, 2035 and the 2045 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	2045 No Build	2045 MTP/SCS
Access and Mobility					
Work Trips Within 30 Minutes (percentage)					
Drive Alone	85.1%	85.1%	84.4%	84.8%	84.3%
Carpool	85.1%	85.1%	84.4%	84.8%	84.3%
Transit	58.1%	57.6%	60.6%	59.5%	60.8%
Population Within 30 Minutes of Parks (percentage)					
Drive Alone	98.3%	98.4%	98.4%	98.4%	98.4%
Bike	97.5%	97.5%	97.6%	97.7%	97.7%
Walk	90.1%	90.1%	90.3%	90.3%	90.3%
Population Within 30 Minutes of Healthcare (percentage)					
Drive Alone	97.7%	97.7%	97.8%	97.9%	97.9%
Bike	90.7%	90.5%	90.3%	90.3%	90.3%
Walk	70.0%	69.3%	67.7%	67.3%	67.3%
Daily Vehicle Delay Per Capita (minutes)	3.36	5.34	5.37	6.96	6.13
Commute Travel Time (minutes)	15.3	15.4	15.5	15.5	15.6
Economic Vitality					
Population Near High Quality Transit (percentage)	15.3%	15.4%	25.9%	14.7%	30.0%
Jobs Near High Quality Transit (percentage)	12.0%	12.0%	23.8%	11.8%	24.8%
Daily Truck Delay (hours)	3,772	6,404	6,746	9,611	8,218
Environment					
GHG Reductions (Percent reduction from 2005 baseline)[1]	N/A	3.02	6.63	N/A	N/A
Open Space Consumed (acres)[2,3]	N/A	N/A	133	N/A	293
Farmland Converted (acres)[2,3,4]	N/A	N/A	837	N/A	2,635
Healthy Communities					
Growth in Opportunity Areas (percentage)					
Monterey County	N/A	4.4%	22.8%	32.9%	32.3%
San Benito County	N/A	25.4%	22.2%	21.8%	21.8%
Santa Cruz County	N/A	-3.9%	5.2%	7.0%	7.0%
Alternative Transportation Trips (percentage)	15.1%	14.8%	14.9%	14.6%	14.7%
Population Near Bike Facilities (percentage)	N/A	N/A	N/A	N/A	86.9
Jobs Near Bike Facilities (percentage)	N/A	N/A	N/A	N/A	90.5
Peak Period Congested Vehicle Miles of Travel (miles)	552,221	707,987	729,353	875,310	797,962

Table G-1: Performance Measure Results (continued)

Regional Performance Measures	2015 Existing	2020 MTP/SCS	2035 MTP/SCS	2045 No Build	2045 MTP/SCS
Social Equity					
Distribution of MTP/SCS Investments (percentage)[5]					
Low income population	N/A	N/A	41.9%	N/A	81.7%
Non low income population	N/A	N/A	72.4%	N/A	83.6%
Minority population	N/A	N/A	41.9%	N/A	89.6%
Non minority population	N/A	N/A	72.7%	N/A	87.2%
Low mobility (zero car households and aged populations)	N/A	N/A	52.9%	N/A	71.5%
Low community engagement (linguistic isolation and education attainment)	N/A	N/A	32.6%	N/A	67.9%
Access to Transit within 1/2 mile (percentage)[6]					
Low income population	9.9%	10.0%	14.3%	9.9%	14.4%
Non low income population	2.3%	2.4%	6.1%	2.3%	6.9%
Minority population	16.7%	16.9%	19.9%	16.8%	19.9%
Non minority population	0.7%	0.7%	7.4%	0.7%	8.1%
Low mobility (zero car households and aged populations)	0.6%	0.6%	1.6%	0.6%	1.6%
Low community engagement (linguistic isolation and education attainment)	1.2%	1.2%	1.4%	1.3%	1.4%
System Preservation and Safety					
Maintain the Transportation System (percentage)	N/A	N/A	60.1%	N/A	59.7%
Fatalities and Injuries per 1,000 VMT	0.02	0.03	0.05	0.06	0.06
Annual Projected Bike/Pedestrian Fatalities and Injuries per 1,000 VMT	0.005	0.006	0.005	0.004	0.004

[1] Greenhouses gas reductions in 2020 are -3.0 percent per capita and a -6.6 percent per capita from 2005 levels.

[2] Rail projects are not reflected in the 2020, 2035 and 2045 MTP/SCS regionally significant project analysis, as rail lines are existing.

[3] 2045 No Build scenario has increased open space due to farmland conversion per the 2045 MTP/SCS typology as identified by the city and county jurisdictions in SOI's.

[4] Farmland analyzed is Prime, Unique, or Farmland of Statewide Importance as defined by Dept. of Conservation FMMP.

[5] Calculated based upon criteria on total investment of all modelable projects within 1/2 mile of U.S. Census Bureau defined tracts.
[6] 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.

Percent of Population That Are 30 Minutes or Less From a Park, By Mode

This performance measure was calculated using spatially referenced population data, provided by AMBAG's 2022 Regional Growth Forecast, and a point data set of federal, state, county, and local parks, validated from the California Protected Areas Database. 30 minutes travel time by mode (Drive Alone, Transit, Bike and Walk) were calculated by using average speed calculations for each mode. TAZ files from each scenario from the 2045 Regional Travel Demand Model (RTDM) were clipped by buffers to calculate the percent of population within the 30 minutes of parks buffer, for each mode.

Percent of Population That Are 30 Minutes or Less From Healthcare, By Mode

This performance measure was calculated using spatially referenced population data, provided by AMBAG's 2022 Regional Growth Forecast, and a point data set of all hospitals and community clinics in the AMBAG region, validated from employment data and Office of Statewide Health Planning and Development (OSHPD) data. . 30 minutes travel time by mode (Drive Alone, Transit, Bike and Walk) were calculated by using average speed calculations for each mode. TAZ files from each scenario from the 2045 Regional Travel Demand Model (RTDM) were clipped by buffers to calculate the percent of population within the 30 minutes of parks buffer, for each mode.

Average Daily Vehicle Delay Per Capita

This performance measure is an output of the Regional Travel Demand Model (RTDM). To calculate the daily vehicle delay per capita, vehicle hours of delay were totaled for all classes and divided by the total population for each year/scenario.

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 Population Within ½ Mile of a High Quality Transit Stop

This performance measure was calculated using GIS. It is the populations within a ½ mile of all high quality transit stops divided by the total population in the region. Populations are calculated by using population data at the traffic analysis zone (TAZ) spatial level. Spatially referenced population data for the year 2015 was provided by AMBAG's 2022 Regional Growth Forecast and aggregated to the respective TAZs. The percentage of populations 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 people within that TAZ. Those populations were then summed with all the rest of populations near an HQTS within the AMBAG region, using a ½ mile buffer in GIS. This process was conducted for each model year and scenario.

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 Employment Department Department (EDD), 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 an output of the Regional Travel Demand Model (RTDM), and is calculated by multiplying the daily total vehicle hour delay by total number of trucks as reported by the RTDM.

GHG Emissions

This performance measure reports the CO2 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 CO2 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.

Growth in Opportunity Areas

This performance measure was calculated using GIS. It shows the percent change in population within opportunity areas for each model scenario, compared to the baseline 2015. Population was calculated by using population data at the traffic analysis zone (TAZ) spatial level. Spatially referenced population data for each scenario year was provided by AMBAG's 2022 Regional Growth Forecast and aggregated to the respective TAZs. The percentage of the population within the opportunity area for each model year was estimated as an equivalent proportion of TAZ area within the opportunity area. Each model scenario's populations were then summed by county individually, and then summed regionally. The percent change for each model year was then calculated by subtracting model scenario data from the baseline 2015 data and dividing by base year data.

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.

Percent of Population Within ½ Mile of a Bike Facility

This performance measure was calculated using GIS, and compiled bike facility data, provided by San Benito County Council of Governments, Transportation Agency of Monterey County and Santa Cruz County Regional Transportation Commission. Population data was an output of the 2045 Regional Travel Demand Model. Total population was summed for the TAZs and then used to calculate the percent of TAZ's population within a half mile of all classes of bike I, II, III, and IV.

Percent of Jobs Within ½ Mile of a Bike Facility

This performance measure was calculated using GIS, and compiled bike facility data, provided by San Benito County Council of Governments, Transportation Agency of Monterey County and Santa Cruz County Regional Transportation Commission. Employment data was an output of the 2045 Regional Travel Demand Model. Total employment was summed for the TAZs and then used to calculate the percent of TAZ's employment total within a half mile of all classes of bike I, II, III, and IV.

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 ≥ 0.86 for functional class 2 and where volume/capacity ≥ 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 2015 5-Year American Community Survey (ACS) 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. This is the same definition used in the adopted 2040 MTP/SCS.

AMBAG chose to use 200% of the federal poverty level for 2015 as the definition for low income. This reflects the higher cost of living in the AMBAG region. For the purpose of this analysis, a tract was considered predominantly low income if greater than 33% of residing families earned less than 200% of the federal poverty level annually.

Defining Low Mobility (Aged Population, Zero-Car Households and Disability)
Population aged 65 and over that had income below the poverty level are considered low mobility. For this analysis, a tract was considered low mobility if 15% of the population aged 65 and over had income below the poverty level.

Households that have zero-vehicle ownership fall into the low mobility category. For this analysis, a tract was considered low mobility if 5% of the households in the tract have zero-car ownership. Census reports disabiliity in six categories: Hearing difficulty, vision difficulty, cognitive difficulty, ambulatory difficulty, self-care difficulty, and independent living difficulty. Tracts with 11.35 percent disabled population, or 20 percent above regional average, was selected.

Defining Low Community Engagement (Limited English Proficiency and Educational Attainment)
The definition of Limited English Proficiency (LEP) was considered households where English is not the primary language and English is not spoken "very well." A tract was considered to have low community engagement if 15% of the tract were households where English is not spoken "very well."

The definition of educational attainment was considered population over age 25 who have not earned a high school diploma. A tract was considered to have low community engagement if 15% of the tract is over the age of 25 without a high school diploma.

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 is the second Plan that montiors past injuries and fatalities, which allows AMBAG to 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, 2020.

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.

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 2015 and 2017 there were between 77 and 86 vehicular collision related fatalities in the region (see Figure G-1). In this same period the number of fatalities has increased between 7% and 16% per year, except 2016-17 when fatalities declined. During an average year regional transportation projects have not been able to reduce fatalities but, moving forward, safety related projects are expected to mediate the rate at which fatalities are increasing.

Table G-2: PM1 Safety System Performance Measures

PM 1 Safety Performance Measures	2013	2014	2015	2016	2017
Number of Fatalities					
AMBAG Region	54	61	77	86	85
5 Year Average	56.6	55.6	60.6	65.2	72.6
Rate of Fatalities per 100M VMT					
AMBAG Region	0.8	1.0	1.3	1.4	1.4
5 Year Average	0.9	0.9	1.0	1.1	1.2
Number of Serious Injuries					
AMBAG Region	262	281	310	314	336
5 Year Average	286.8	279.8	285.2	292.4	300.6
Rate of Serious Injuries per 100M VMT					
AMBAG Region	4.3	4.6	5.0	5.1	5.4
5 Year Average	4.6	4.5	4.7	4.7	4.9
Number of Non-Motorized Fatalities and Non-Motorized Severe Injuries					
AMBAG Region	85	90	73	101	102
5 Year Average	84.2	86.8	88	86.2	90.2

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 2017 the rate of fatalities per 100 million VMT, over the annual 5-year rolling average, increased between 5.9% and 11.8% per year (see Figure G-2). This indicates that during an average year regional transportation projects have not been able to reduce the rate of fatalities but safety projects are expected to reduce the pace at which the fatality rate is increasing.

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 2016 and 2020 the annual 5-year rolling average has increased between 1.5% and 14.1% (see Figure G-3). This indicates that historically the region has seen mild to moderately increasing vehicular related serious injury rates. Moving forward, regional transportation projects may contribute towards statewide serious injury reduction targets by reducing the rate of the increase.

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 2015 and 2018 the annual 5-year rolling average increased between 1.9% and 5.4% (see Figure G-4). This indicates that historically the region has seen moderately increasing vehicular related serious injury rates. Moving forward, regional transportation projects may contribute towards statewide serious injury reduction targets by reducing the rate of increase.

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 2016 and 2020 the annual 5-year rolling average has increased between 1.4% to 7% (see figure G-5). The fatality and serious injury number of incidents decreased between 2018-19 and stayed flat in 2020. If this trend continues, the rolling average rate may decrease in the near future which would contrinbute towards statewide targets.

Performance Management Rule 2 (PM 2):Bridge and Pavement Performance Measures Report

The following provides a system report for the pavement and bridge condition Performance Management (PM 2) targets: (1) Percentage of NHS pavement in "good" condition, (2) Percentage of NHS pavement in "poor" condition, (3) Percentage of NHS bridges in "good" condition, and (4) Percentage of NHS bridges in "poor" condition. The State has taken on the responsibility of collecting and reporting on pavement and bridge condition data and provides this information to MPOs for evaluation of progress on these measures. In general, the region has contrinbuted to achieving statewide bridge condition targets but not pavement condition targets. Future regional transportation projects will contrinbute towards pavement and bridge quality goals.

Pavement and Bridges in Good or Poor Condition

Most recently available data as of writing shows that AMBAG has 269 lane miles of roadway which is part of the NHS system. Lane miles are counted per lane. For example, one linear mile of two-lane NHS highway would count as two total lane miles. In the AMBAG region between 2017 and 2019 NHS pavement in good condition declined marginally from 7.7% to 7.5%. NHS pavement in poor condition went from 8.5% in 2017 to 13.9% in 2019. Between 2017 and 2020 bridges in good condition on the NHS went from 11.1% to 25.8%. Part of this increase in bridge condition was due to the replacement of the Pfeiffer Canyon Bridge which buckled and was condemned in the winter of 2017. In the same time period, bridges in poor condition increased from 0% to 37.5%. This decline in bridge condition was partially due to infrastructure damage from the 2020 fire season, including the CZU Lighting Complex Fire and the Carmel Fire.

Table G-3: Pavement Condition

|	Total Lane Miles	% of Lane Miles	2019 Pavement Condition			2017 Pavement Condition		
			Good	Fair	Poor	Good	Fair	Poor
AMBAG Region	269	0.6%	7.5%	78.6%	13.9%	7.7%	84.0%	8.3%

Table G-4: Bridge Condition

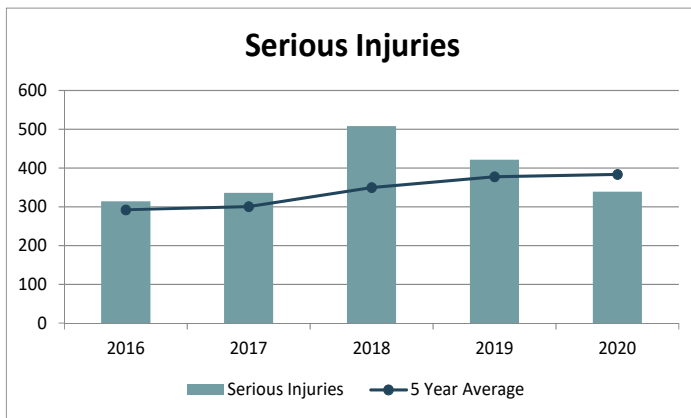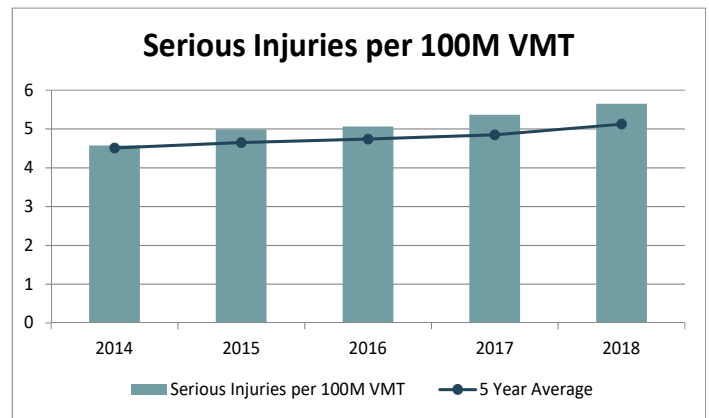|	Total Structures	Total Deck Area (Sq. Ft.)	Total % Deck Area	2020 NHS Bridge Condition			2017 NHS Bridge Condition		
				Good	Fair	Poor	Good	Fair	Poor
AMBAG Region	12	144,280	0.06%	25.8%	36.7%	37.5%	11.1%	88.9%	0.0%

Figure G-1: Fatalities
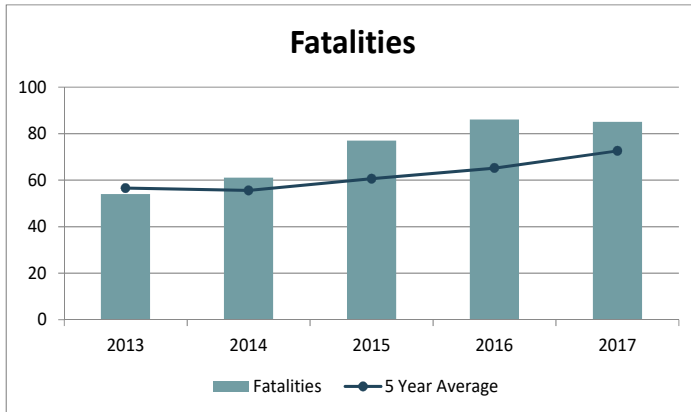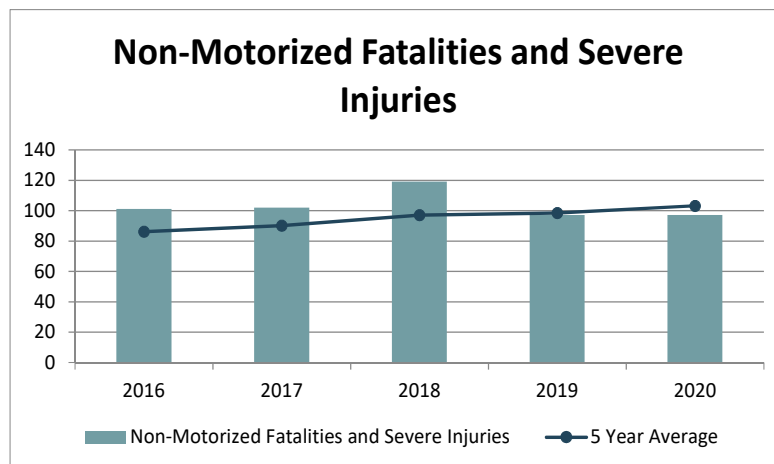

Figure G-2: Fatalities per (100 m) VMT
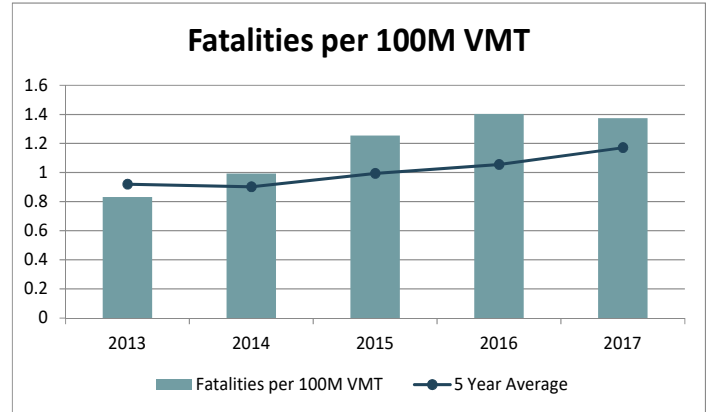
Figure G-3: Serious Injuries

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

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

Performance Management Rule 3 (PM 3): System Performance, Freight System, Congestion Mitigation and Air Quality Report

The following provides a system report for the system performance, freight system, congestion mitigation and air quality Performance Management (PM 3) target applicable to the AMBAG region: Percent of Reliable Person-Miles Traveled on the Non-Interstate NHS.

Percent of Reliable Person-Miles Travled on the Non-Interstate NHS

While the State sets targets for seven measures related to PM 3, only one target applies to the AMBAG region: Percent of reliable person miles traveled on the non-interstate NHS. This measure is a Level of Travel Time Reliability (LOTTR) metric and is required to be used by states and MPOs in assessing system performance. LOTTR is defined as the ratio of the longer travel times (80th percentile) to a "normal" travel time (50th percentile), using data from FHWA's National Performance Management Research Data Set (NPMRDS) or equivalent. Data are collected in 15-minute segments during all time periods between 6 a.m. and 8 p.m. local time. The measures are the percent of person-miles traveled on the relevant portion of the NHS that are reliable. Person-miles take into account the users of the NHS. AMBAG has exceeded the 4-year state travel time reliability goal since goals were set in 2018 with 80% or higher reliability scores. Future regional transportation projects are expected to contribute towards maintaining this high level of reliable person miles traveled.

Table G-5: Percent or Reliable Person Miles Traveled on Non-Interstate NHS

PM 3: Percent of Reliable Person-Miles Traveled on the Non-Interstate NHS					
	2016	2017	2018	2019	2020
AMBAG Region	73.6%	80.2%	80.6%	80.0%	93.3%

This Page Left Blank Intentionally.