Appendix B

Air Quality Planning and Transportation Conformity

Appendix Contents

Air Quality Planning and Transportation Conformity

Background

The federal Clean Air Act (CAA) (42 U.S.C. §7401, et seq.), which was last amended in 1990, requires the United States Environmental Protection Agency (U.S. EPA) to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. Pursuant to California Health & Safety Code §39606, California has adopted state air quality standards that are more stringent than the NAAQS. Areas with levels that violate the standard for specified pollutants are designated as non-attainment areas.

The U.S. EPA requires that each state containing non-attainment areas develop plans to attain the NAAQS by a specified attainment deadline. The attainment plan is called the State Implementation Plan (SIP). The San Diego County Air Pollution Control District (APCD) prepares the San Diego portion of the California SIP. Once the standards are attained, further plans – called Maintenance Plans – are required to demonstrate continued maintenance of the NAAQS.

Pursuant to Section 176(c) of the federal CAA (42 USC §7506(c)), the San Diego Association of Governments (SANDAG) and the United States Department of Transportation (U.S. DOT) must make a determination that the Regional Transportation Plan (RTP) and the Regional Transportation Improvement Program (RTIP) conform to the SIP for air quality. Conformity to the SIP means that transportation activities will not create new air quality violations, worsen existing violations, or delay the attainment of the NAAQS. Regulations regarding conformity to the SIP are specific to the NAAQS. The RTP's impacts on California Ambient Air Quality Standards (CAAQS) are discussed and analyzed in the San Diego Forward: The Regional Plan environmental impact report, Section 4.3.

On April 15, 2004, the U.S. EPA designated the San Diego air basin as non-attainment for the 1997 Eight-Hour Ozone Standard. This designation took effect on June 15, 2004. However, several areas that are tribal lands in eastern San Diego County were excluded from the non-attainment designation.

The air basin initially was classified as a basic non-attainment area under Subpart 1 of the CAA, and the attainment date for the 1997 Eight-Hour Ozone Standard was set as June 15, 2009. In cooperation with SANDAG, the San Diego APCD developed an Eight-Hour Ozone Attainment Plan for the 1997 standard, which was submitted to the U.S. EPA on June 15, 2007. (The Regional Plan may be found at: sdapcd.org/planning/8-Hour-O3-Attain-Plan.pdf.) Emissions budgets set an upper limit which on-road mobile sources are permitted to emit. The budgets in the Eight-Hour Ozone Attainment Plan for San Diego County were found adequate for transportation conformity purposes by the U.S. EPA, effective June 9, 2008.

However, on April 27, 2012, in response to a court decision (*South Coast Air Quality Management District, et al., v. EPA*, 472 F.3d 882 (D.C. Cir. 2006) reh'g denied 489 F.3d 1245), the U.S. EPA ruled that the San Diego basic non-attainment area be reclassified as a Subpart 2, moderate non-attainment area, with an attainment deadline of June 15, 2010. This reclassification became effective on June 13, 2012. Air quality data for 2009, 2010, and 2011 demonstrated that the San Diego air basin attained the 1997 ozone standard; APCD prepared a Maintenance Plan, with a request for redesignation to attainment/maintenance. (The Maintenance Plan may be found at: sdapcd.org/planning/8_Hour_O3_Maint-Plan.pdf.) On December 6, 2012, the California Air Resources Board (ARB) approved the Redesignation Request and Maintenance Plan for the 1997 National Ozone Standard for San Diego County for submittal to the U.S. EPA as a SIP revision. Effective July 5, 2013, the U.S. EPA approved California's

request to redesignate the San Diego County ozone non-attainment area to attainment for the 1997 Eight-Hour Ozone Standard and the Maintenance Plan for continuing to attain this standard for ten years beyond redesignation.

On May 21, 2012, the U.S. EPA designated the San Diego air basin as a non-attainment area for the new 2008 Eight-Hour Ozone Standard and classified it as a marginal area with an attainment date of December 31, 2015. This designation became effective on July 20, 2012. SANDAG determined conformity to the new standard on May 24, 2013, using the model approved by the U.S. EPA to forecast regional emissions (EMFAC 2011). The U.S. DOT, in consultation with the U.S. EPA, made its conformity determination on June 28, 2013. (Letter may be found at: sandag.org/uploads/projectid/projectid_410_16214.pdf.) For this non-attainment designation, tribal areas that were previously excluded are now included as part of the San Diego region non-attainment designation.[1] In addition, the U.S. EPA final rule also provides for the revocation of the 1997 Eight-Hour Ozone NAAQS for transportation conformity purposes effective July 20, 2013. In a D.C. Circuit Court decision on December 23, 2014 (*NRDC v. EPA*, No. 12-1321) it was determined that the attainment date for marginal areas would be set for July 20, 2015.

The San Diego region also has been designated by the U.S. EPA as a federal maintenance area for the Carbon Monoxide (CO) standard. On November 8, 2004, ARB submitted the 2004 revision to the California SIP for CO to the U.S. EPA. Effective January 30, 2006, the U.S. EPA has approved this Maintenance Plan as a SIP revision.

Transportation Conformity: Modeling Procedures

Introduction

SANDAG has developed the Revenue Constrained Scenario for San Diego Forward: The Regional Plan (Regional Plan) which serves as the basis for the required air quality conformity analysis. Conformity of the 2014 RTIP Amendment No. 7 has been determined simultaneously for consistency purposes. Tables B.9 and B.11 include the conformity analysis for both the 2050 Revenue Constrained Regional Plan and the 2014 RTIP Amendment No. 7. The Regional Plan provides information on revenue assumptions and the Revenue Constrained Scenario (Chapter 3). In addition, this conformity determination fulfills the requirement of SB 375, which requires a Sustainable Communities Strategy that allows for compliance with Section 176 of the federal CAA. (California Government Code, Section 65080(b)(2)(B)(viii).)

Growth forecasts

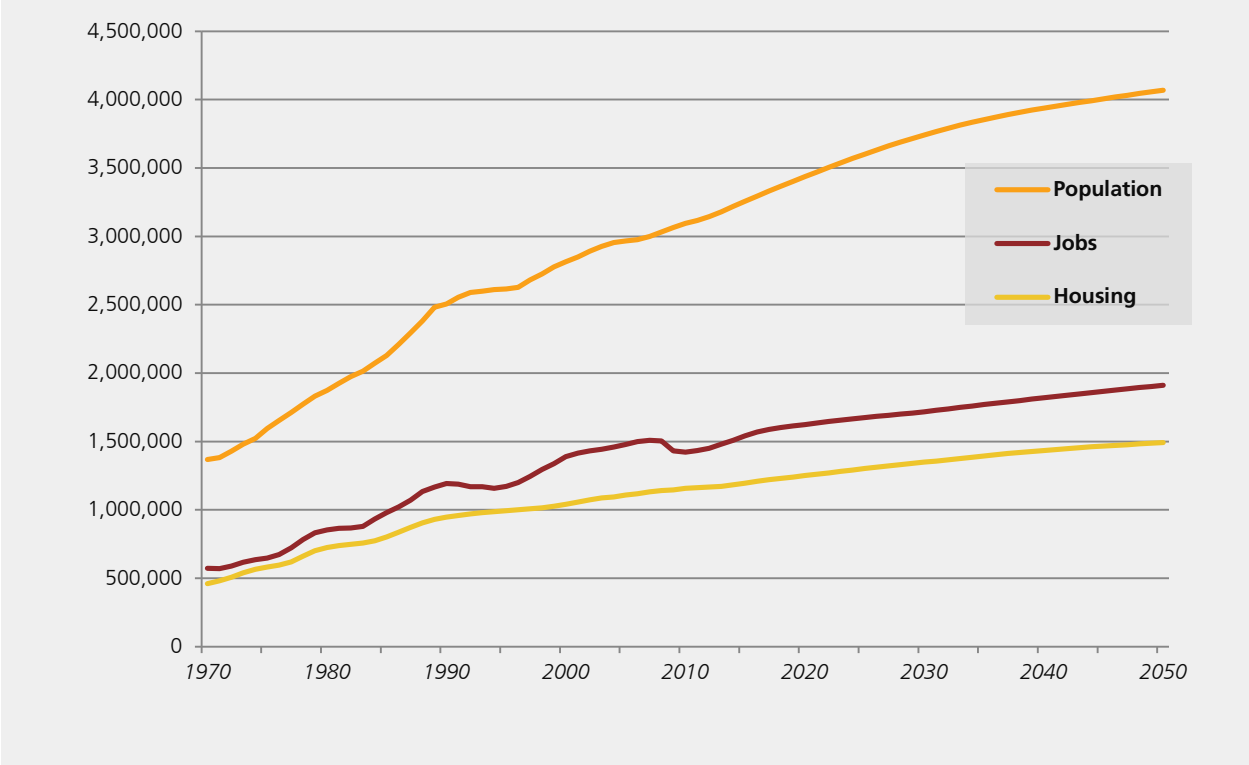
Every three to five years, SANDAG produces a long-range forecast of population, housing, and employment growth for the San Diego region. The most recent forecast is the Series 13, 2050 Regional Growth Forecast (accepted for planning purposes by the SANDAG Board on October 25, 2013), which was utilized in the development of the Regional Plan and the 2014 RTIP Amendment No. 7. (Item No. 8, sandag.org/uploads/meetingid/meetingid_3489_16764.pdf.)

The forecast process relies upon three integrated forecasting models. The first model, the Demographic and Economic Forecasting Model (DEFM), provides a detailed econometric and demographic forecast for the entire region. The second model, the Production, Exchange, Consumption, Allocation Model (PECAS), considers land economics and the potential for redevelopment in determining subregional allocation of employment and housing. The third model, the Urban Development Model (UDM), allocates the results of the first two models to Master Geographic Reference Areas (MGRA) based upon the current plans and policies of the jurisdictions. MGRAs are the base unit of geography for SANDAG subregional land use models. Similar in size to Census blocks or block groups, MGRAs are designed to nest within other administrative boundaries such as Census tracts, school districts, and jurisdictions among others, allowing MGRA-level forecast data to be aggregated up to larger areas.

On August 6, 2014, SANDAG consulted with the San Diego Region Conformity Working Group (CWG), comprised of representatives of SANDAG, Caltrans, SDAPCD, U.S. EPA, U.S. DOT, and ARB, on the use of the Series 2013, 2050 Regional Growth Forecast (2013) for the air quality conformity analysis of the Regional Plan and the 2014 RTIP Amendment No. 7 conformity redetermination. Previously, both the U.S. DOT and the U.S. EPA concurred that approved local land use plans should be used as input in the air quality conformity process and concurred that these plans have been appropriately incorporated into the Series 2013, 2050 Regional Growth Forecast. Figure B.1 and Table B.1 show the regional population, jobs, and housing growth forecast for the San Diego region through 2050.

Figure B.1

San Diego Regional Population, Jobs, and Housing Forecast



Source: Series 13, 2050 Regional Growth Forecast, SANDAG, October 2013

Table B.1

San Diego Regional Population and Employment Forecast

Series 2013, 2050 Regional Growth Forecast

Year	Population	Employment
2012	3,143,429	1,450,913
2020	3,435,713	1,624,124
2035	3,853,698	1,769,938
2050	4,068,759	1,911,405

Source: Series 13, 2050 Regional Growth Forecast, SANDAG, October 2013

The Series 13, 2050 Regional Growth Forecast is based largely upon the adopted general plans and community plans, and policies of the 18 cities and the County. Because many of the local general plans have horizon years of 2030 – 20 years before the 2050 Growth Forecast horizon year, the later part of the forecast was developed in collaboration with each of the local jurisdictions through an iterative process that allowed each city to provide their projections for

land uses in those later years. The planning assumptions used for the Regional Plan were less than five years old at the time the conformity analysis began. Federal RTP guidelines require that the Regional Plan cover a forecast period of a minimum of 20 years.

Transportation modeling

SANDAG uses a calibrated and validated activity-based model (ABM) to support the development of the Regional Plan.[2] An ABM simulates individual and household transportation decisions that comprise their daily travel itinerary. It predicts whether, where, when, and how people travel outside their home for activities such as work, school, shopping, healthcare, and recreation.

ABMs are becoming the standard travel demand modeling technology used by large Metropolitan Planning Organizations (MPOs), including the Southern California Association of Governments, and the Bay Area Metropolitan Transportation Commission. These models allow for a more nuanced analysis of complex policies and projects. The powerful analytic capabilities of an ABM are particularly helpful in evaluating social equity, carpooling, transit access, parking conditions, tolling, and pricing. Because an ABM tracks the characteristics of each person, the model can be used to analyze the travel patterns of a wide range of socio-economic groups. For example, a household with many members may be more likely to carpool, own multiple vehicles, and share shopping responsibilities.

ABM outputs are used as inputs for regional emissions forecasts. The estimates of regional transportation-related emissions analyses conducted for the Regional Plan meet the requirements established in the Transportation Conformity Regulation (40 CFR §93.122(b) and §93.122(c)). These requirements relate to the procedures to determine regional transportation-related emissions, including the use of network-based travel models, methods to estimate traffic speeds and delays, and the estimation of vehicle miles traveled (VMT).

The regionally significant projects, and the timing for when they are expected to be open to traffic in each analysis year, are documented in Tables B.13 - B.15. The design concept and scope of projects allows adequate model representation to determine intersections with regionally significant facilities, route options, travel times, transit ridership, and land use.

This document describes the key modeling units, ABM model flow, the San Diego residents travel module, highway and transit networks, data sources, and emissions modeling.

Key modeling units

An ABM simulates individual and household travel decisions through tours, that is, a journey that begins and ends at home. A tour includes a chain of trips (segments of travel with a given origin and destination). The advantage of modeling tours and trips hierarchy is to ensure spatial, temporal, and modal consistency and integrity across trips within a tour.

To simulate trips and tours made by individuals and households, the SANDAG ABM includes a total of eight person-types, shown in Table B.2. The person-types are mutually exclusive with respect to age, work status, and school status.

Table B.2
Person Types

Number	Person-Type	Age	Work Status	School Status
1	Full-time worker[3]	18+	Full-time	None
2	Part-time worker	18+	Part-time	None
3	College student	18+	Any	College+
4	Non-working adult	18 – 64	Unemployed	None
5	Non-working senior	65+	Unemployed	None
6	Driving age student	16 – 17	Any	Pre-college
7	Non-driving student	6 – 15	None	Pre-college
8	Pre-schooler	0 – 5	None	None

Further, workers are stratified by their occupation to take full advantage of information provided by the land use and demographic models. Table B.3 outlines the worker categories. These models are used to segment destination choice attractiveness for work location choice, based on the occupation of the worker.

Table B.3
Occupation Types

Number	Description
1	Management, Business, Science, and Arts
2	Services
3	Sales and Office
4	Natural Resources, Construction, and Maintenance
5	Production, Transportation, and Material Moving
6	Military

The SANDAG ABM assigns one of the activity types to each out-of-home location that a person travels to in the simulation, shown in Table B.4. The activity types are grouped according to whether the activity is mandatory, maintenance, or discretionary. The classification scheme of activities into the three categories helps differentiate the importance of the activities. Mandatory includes work and school activities. Maintenance includes household-related activity such as drop-off and pick-up of children, shopping, and medical appointments. Discretionary includes social and recreational activities. To determine which person-types can be used for generating each activity type, the model assigns eligibility requirements. For example, a full-time worker will generate mandatory work activities while a non-working adult, or senior, is eligible for non-mandatory activities. The classification scheme of each activity type reflects the relative importance or natural hierarchy of the activity, where work and school activities are typically the most inflexible in the person's daily travel itinerary.

Table B.4

Activity Types

Type	Purpose	Description	Classification	Eligibility
1	Work	Working at regular workplace or work-related activities outside the home	Mandatory	Workers and students
2	University	College+	Mandatory	Age 18+
3	High School	Grades 9-12	Mandatory	Age 14-17
4	Grade School	Grades K-8	Mandatory	Age 5-13
5	Escorting	Pick-up/drop-off passengers (auto trips only)	Maintenance	Age 16+
6	Shopping	Shopping away from home	Maintenance	5+ (if joint travel, all persons)
7	Other Maintenance	Personal business/services and medical appointments	Maintenance	5+ (if joint travel, all persons)
8	Social/Recreational	Recreation, visiting friends/family	Discretionary	5+ (if joint travel, all persons)
9	Eat Out	Eating outside of home	Discretionary	5+ (if joint travel, all persons)
10	Other Discretionary	Volunteer work, religious activities	Discretionary	5+ (if joint travel, all persons)

The SANDAG ABM models a full travel day of activity broken into one-half hour intervals. These one-half hour increments begin at 3 a.m. and end at 3 a.m. the next day, though the hours between 1 a.m. and 5 a.m. are aggregated to reduce computational burden. The ABM ensures temporal integrity so that no activities are scheduled with conflicting time windows, with the exception of short activities/tours that are completed within a one-half hour increment. The ABM assigns auto and transit traffic at five discrete time-of-day periods aggregated from the five half-hour intervals shown in Table B.5.

Table B.5

Time Periods for Level of Service Skims and Assignment

Number	Description	Begin Time	End Time
1	Early	3:00 a.m.	5:59 a.m.
2	A.M. Peak	6:00 a.m.	8:59 a.m.
3	Midday	9:00 a.m.	3:29 p.m.
4	P.M. Peak	3:30 p.m.	6:59 p.m.
5	Evening	7:00 p.m.	2:59 a.m.

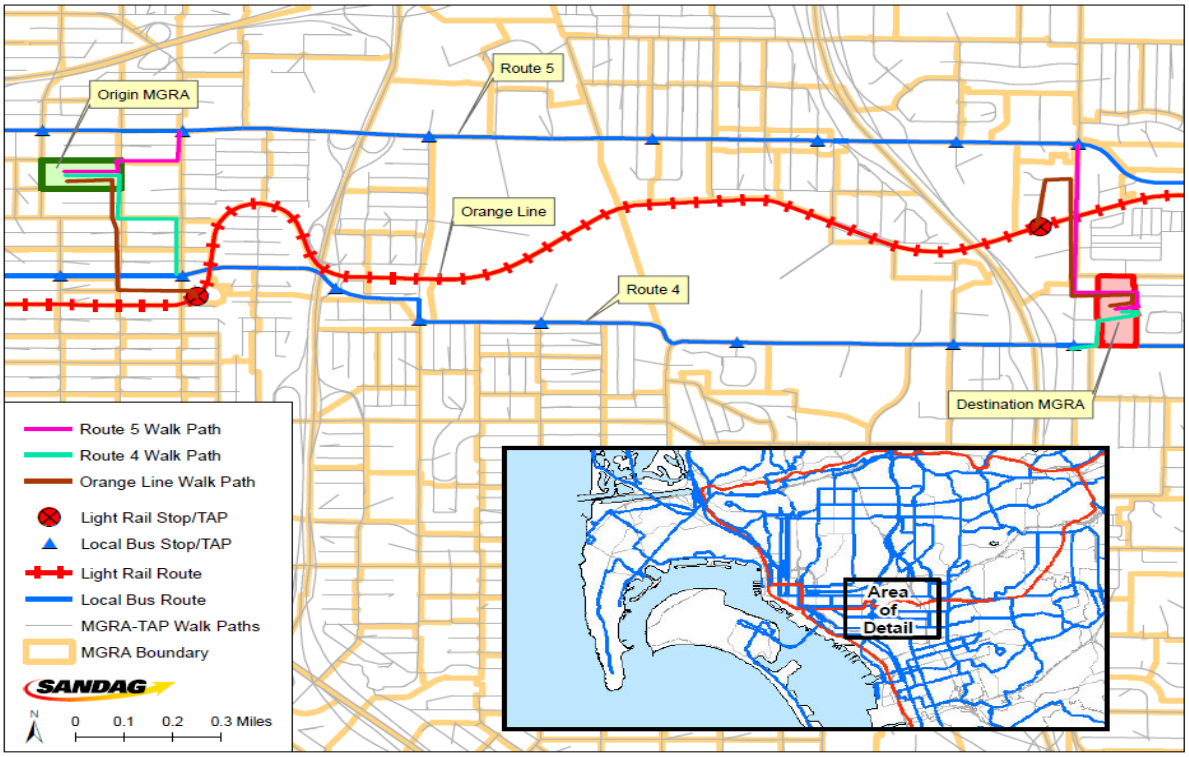
The SANDAG ABM uses three-tier zone systems shown in Table B.6: Zone System. The Master-Geographic Reference Area (MGRA) zone system is used for transit access and calculations, and location choice models; the Traffic Analysis

Zone (TAZ) system is used for highway path building and assignment; and the pseudo-TAZ called Transit Access Point (TAP) is used for transit path building and assignment. The 23,000 MGRAs are roughly equivalent to census block groups. The ABM uses generalized transit stops as TAPs, and relies on the traffic assignment software to generate TAP-TAP level of service (LOS) matrices (also known as "skims") such as in-vehicle time, first wait, transfer wait, and fare for transit calculation at the MGRA level. A custom-built software calculates walk access time from MGRA to TAP through paths from an all-street active transportation network including bike paths and walkways for non-motorized travel, and build paths following the Origin MGRA – Boarding TAP – Alighting TAP – Destination MGRA patterns. Figure B.2: Example MGRA - TAP Transit Accessibility shows a graphical depiction of MGRA-TAP transit paths. It displays potential walk paths from an origin MGRA through three potential boarding TAPs (two of which are local bus, and one of which is rail), with three potential alighting TAPs at the destination end.

Table B.6
Zone System

Zone System	Description	Number of Zones
MGRA	Master-Geographic Reference Area	23,000
TAZ	Traffic Analysis Zone	4,996
TAP	Transit Access Point	2,500

Figure B.2
Example MGRA – TAP Transit Accessibility



The ABM includes 26 modes available to residents, including auto by occupancy, toll/non-toll choice and lanes for high occupancy vehicle (HOV) or non-HOV, walk and bike modes, and walk and drive access to five different transit line-haul modes. Pay modes are those that involve paying a choice or "value" toll.

Table B.7 lists the trip modes defined in the SANDAG ABM.

To model transit flow, the ABM uses five transit line-haul modes: (1) Commuter Rail (COASTER), (2) Light Rail Transit (LRT) (including Trolley, SPRINTER, and Streetcar), (3) Bus *Rapid* Transit (BRT)/*Rapid* Bus, (4) Express Bus, and (5) Local Bus. The mode of access to transit includes walk, park & ride (PNR), and kiss & ride (KNR or drop-off).

Table B.7
Trip Modes

Number	Mode
1	Drive Alone (Non-Toll)
2	Drive Alone (Toll)
3	Share Ride 2 Person (Non-Toll, Non-HOV)
4	Share Ride 2 Person (Non-Toll, HOV)
5	Share Ride 2 Person (Toll, HOV)
6	Share Ride 3+ Person (Non-Toll, Non-HOV)
7	Share Ride 3+ Person (Non-Toll, HOV)
8	Share Ride 3+ Person (Toll, HOV)
9	Walk-Local Bus
10	Walk-Express Bus
11	Walk-BRT
12	Walk-Light Rail
13	Walk-Heavy Rail
14	PNR-Local Bus
15	PNR-Express Bus
16	PNR-Bus *Rapid* Transit (BRT)/*Rapid* Bus
17	PNR-Light Rail
18	PNR-Heavy Rail
19	KNR-Local Bus
20	KNR-Express Bus
21	KNR-BRT
22	KNR-Light Rail
23	KNR-Heavy Rail
24	Walk
25	Bike
26	School Bus (only available for school purpose)

ABM model flow

To simulate San Diego residents and non-residents travel, and freight travel, the SANDAG ABM includes several models and steps.

Figure B.3 outlines the overall flow of the SANDAG ABM. It starts with building highway and transit networks in the traffic assignment software followed by highway assignment to create congested highway and transit travel times. A parallel step is to create a year-specific active transportation network and generate walking accessibility measures between MGRAs, between MGRA and TAP, and bike accessibility measures between MGRAs and between TAZs. The congested highway and transit skims, and the walking and biking accessibility measures, are inputs to the simulated models. The congested highway skims are also inputs to the aggregate models. Once the simulated and aggregated models generate trips by residents or various travelers, the ABM aggregates the vehicle trips from MGRA to TAZ to TAZ matrices by time of day, by toll and non-toll, and by vehicle class, and assigns the vehicle trips to the highway network. The highway assignment generates the congested networks by time of day. The ABM then skims the congested networks to provide accessibility for the next iteration of the simulated and aggregated models. The process iterates three feedback loops. The last iteration assigns both highway and transit trips and creates skims for land use models. The outputs from the final step are used to generate input for EMFAC emissions modeling.

At the heart of the SANDAG ABM is the San Diego County residents' travel module. It simulates San Diegan's daily travel choices. In addition to the residents' travel, there are trips made by visitors, commercial vehicles, and freight transportation. A number of special travel models (commercial vehicle model, truck model, air passenger model, external trip model, visitor model, and crossborder model) account for these other sources of transportation demand. The models are run in parallel with the residents' travel module. Trips generated from the simulated and aggregate models are summed up to an auto trip matrix and transit trip matrix by time of day by mode, and assigned to highway and transit networks.

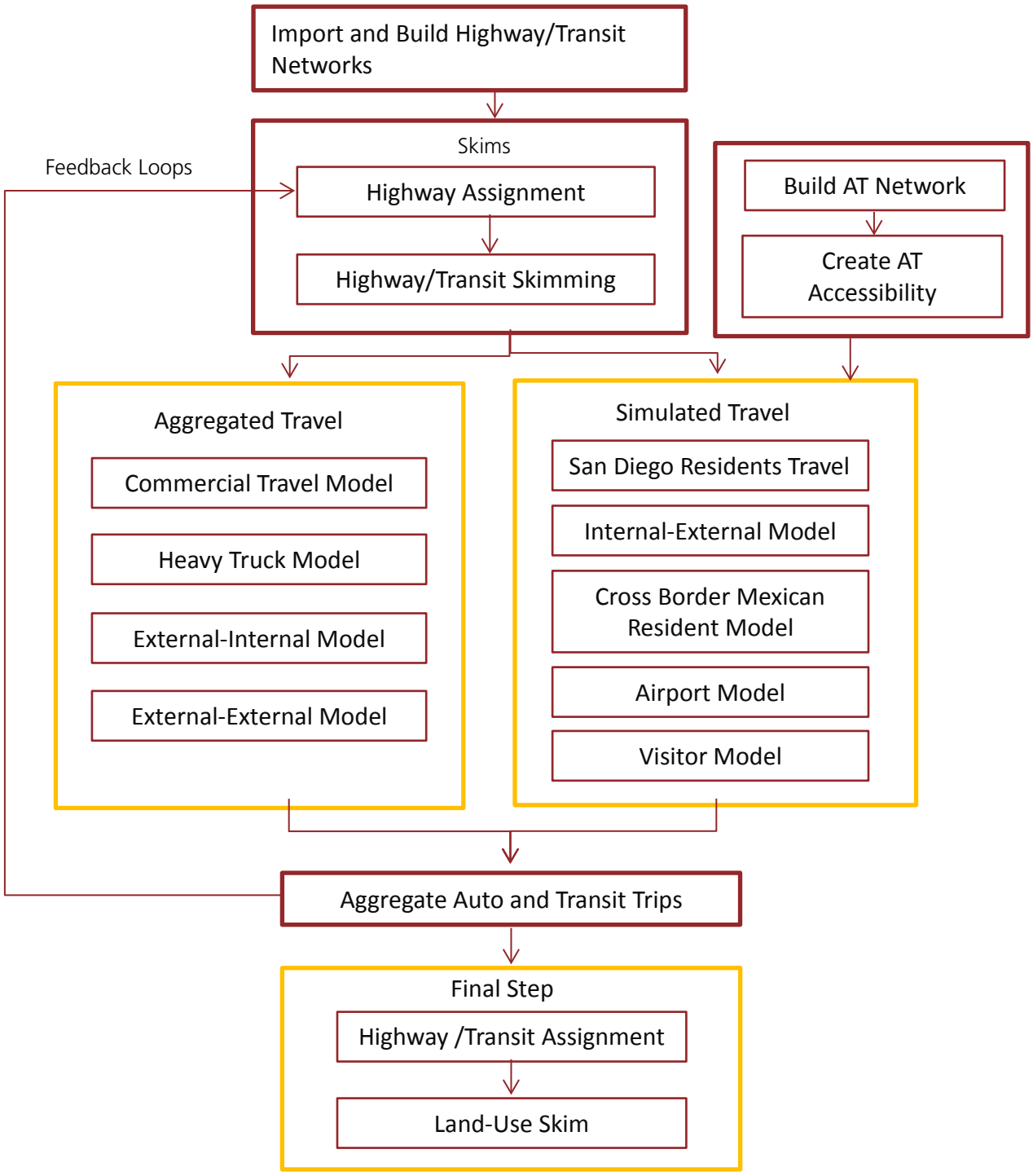
After network assignment, the EMFAC model is used to generate emissions summaries based on the inputs generated by the post processing of highway assignment outputs.

San Diego residents travel module

The San Diego residents' travel module is comprised of numerous interacting components called "sub-modules." It starts with generating a representative population for the San Diego region. Once a representative population is created, the model predicts long-term and medium-term decisions such as a choice of work or school location and a household's choice of number of cars to own. Next, each person's day is scheduled, taking into account the priority of various activities and interaction among the household members. Once all journeys to and from home have been scheduled, the model predicts specific travel details such as mode, the number of stops to make, where to stop, and when to depart from each stop to continue the tour. The final step of the ABM is traffic assignment where trips are summarized by traffic analysis zones and assigned to the transportation network.

Figure B.3

SANDAG ABM Flow Chart



The following section discusses the sub-modules, in the order that each sub-module is taken within the San Diego residents' travel module.

Step 1: Population synthesis (build a representative population that looks like San Diego)
The first step is to create a 'synthetic' population of San Diego County. A synthetic population is a table that has a record for every individual and household, with the individual's and the household's characteristics. For example, if there are 41,000 18-year-old males in the region in 2050, there would be approximately 41,000 records in the table for males age 18, with each record also having other characteristics such as school enrollment and labor force participation status. Taken as a whole, this synthetic population represents the decision-makers whose travel choices the model will simulate in later steps. For each simulation year, a full population is synthesized to match the forecasted socio-economic and housing characteristics of each part of the region at the zonal level. These forecasts, a key ABM input, come from the land use model. Synthesis works by replicating a sample of census records (each containing complete household and individual characteristics) and placing them around the region in such a way that the forecasted characteristics of each zone are matched.

Step 2: Work and school location (assign a work location to workers and a school location to students)
The second step predicts where each individual will go to work or school, if applicable. The work and school location sub-module simulates each worker's choice of work location, taking into account many factors, including ease-of-travel and the number of employees by occupation type in each location. The sub-module also simulates each student's choice of school, taking into account factors that include the distance from home to school, school enrollment, and district boundaries. The results from this step affect later travel choices significantly because of the prominent role that workplace and school usually play in the itinerary of workers and students.

Step 3: Determine certain mobility characteristics of individuals and households
This step predicts the number of automobiles each household owns, whether each household owns a toll transponder, and whether worker parking costs are employer-reimbursed. The sub-module assigns each household zero cars, one car, two cars, three cars, or 'four or more' cars, taking into account a number of criteria, including household size, income, number of drivers, and how easy it is to reach destinations from the household's place of residence. This step sets certain mobility characteristics that influence how people travel.

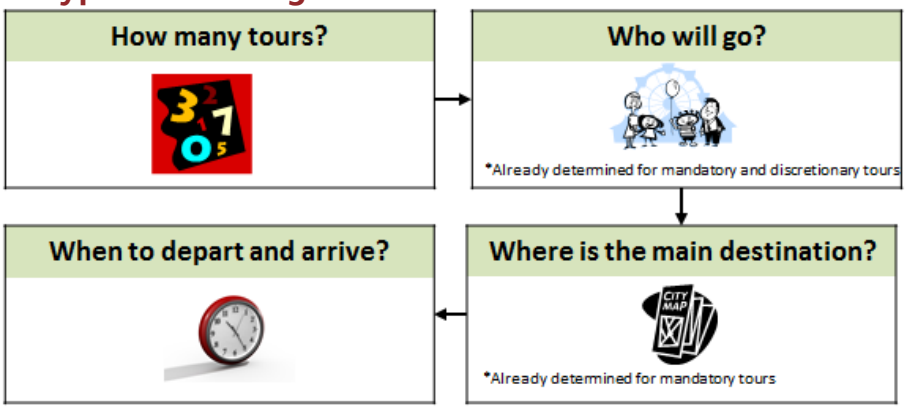
Step 4: Schedule the day
The fourth step begins by predicting a 'daily activity' pattern for each individual. A daily activity pattern is a theme that dictates an individual's schedule. A 'mandatory' pattern means that an individual travels to work and/or school, and then schedules other activities around work/school. An 'at-home' pattern means that an individual's daily schedule involves no travel in the region. A 'non-mandatory' pattern means that an individual's daily schedule involves traveling, but only to destinations other than work or school. The pattern-type of other household members influences an individual's daily pattern type. For example, if a child stays home from school, a working parent might be more likely to stay home from work as well.

Once the sub-module selects an individual's daily activity pattern, it schedules the tours that he or she will take. Recall that a tour is a journey that begins and ends at home, and it can include stops at other destinations on the way to or from the primary destination. The ABM deals with three main categories of tours: (1) mandatory tours, (2) joint tours, and (3) non-mandatory tours. Mandatory tours have work or school as the primary destination. Joint tours involve out-of-home activities that multiple members of a household partake in together. Non-mandatory tours involve purposes other than work or school that an individual undertakes independent of other members of his or her

household. The sub-module schedules each tour type by predicting how many tours of that type there are, who will participate in the tour, where the main destination is, and when to depart and arrive (see Figure B.4).

Figure B.4

Predicting Tour Type Scheduling Details

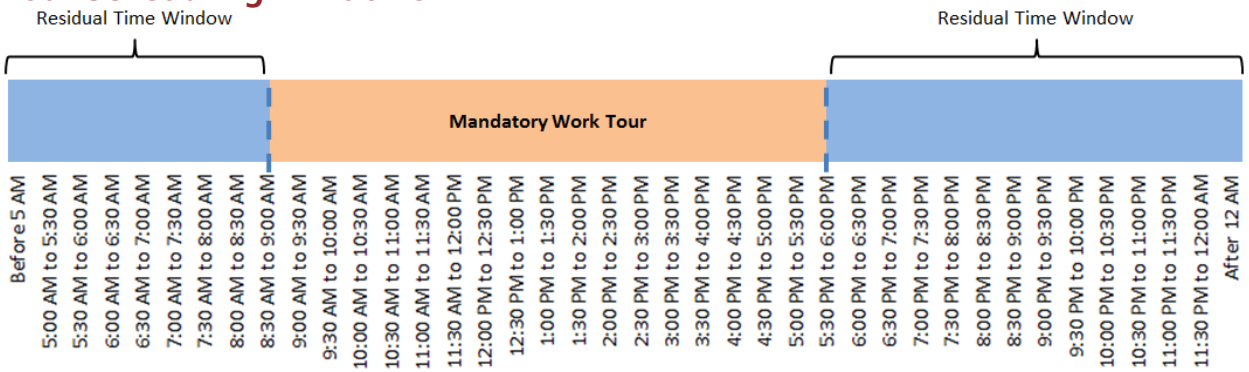


For individuals assigned a 'mandatory' activity pattern, the sub-module first assigns *the number* of work tours and/or school tours they will make. After the number of these mandatory tours has been determined, the sub-module selects the time of departure from and arrival back home for each tour.

After scheduling the mandatory tours, the sub-module calculates time remaining for other tours. Remaining intervals of time are called "residual time windows," and other tours can only be scheduled in these open slots (see Figure B.5 for an example) to guarantee temporal consistency.

Figure B.5

Tour Scheduling Windows



In time remaining after mandatory tours are scheduled, the sub-module determines the number of joint tours to be made for each household. It only schedules joint tours in the time windows that overlap *between individuals* after it accounts for mandatory activities. After the number and purpose of these joint tours has been determined, the sub-module decides which household members will participate in each joint tour and whether the joint tour must involve a combination of children and adults. The sub-module then chooses a specific destination for the tour and the specific times when tour participants will depart from and arrive back home together. Next, 'non-mandatory' tours are scheduled. For each household, the sub-module decides what other tours need to be made for the purpose of household 'maintenance' activities such as shopping. These tours are assigned to specific household members to carry out individually. For the person who is assigned each maintenance tour, the model selects a specific destination and schedules the tour to take place in a time window that mandatory tours and joint tours have left open. Finally, in what time remains, the model decides whether each individual will take non-mandatory 'discretionary' tours. These low-priority tours involve activities related to recreation, eating out, and social functions. Discretionary tours can only

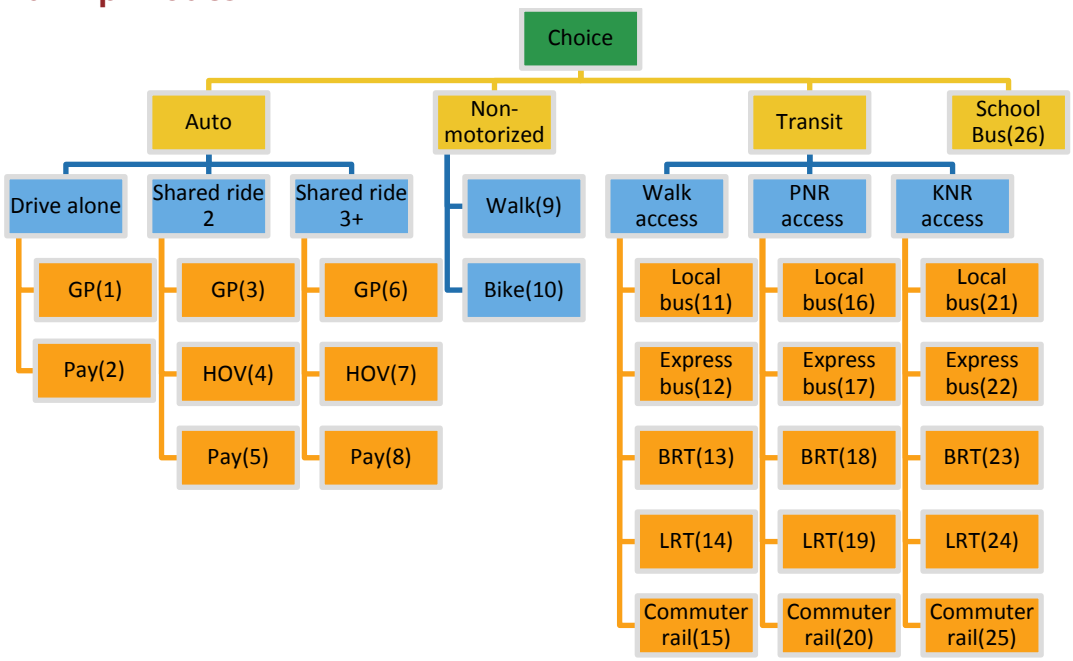
take place in time windows that remain after all other tours have been scheduled. The sub-module chooses a specific destination and departure/arrival combination for each discretionary tour a person makes.

Step 5: Make tour and trip-level decisions

The ABM then selects more detailed characteristics of each tour for every traveler. This step fills in travel details after the major aspects of the day have been scheduled. Tour characteristics that need to be determined include: primary mode of the tour, how many times to stop, where to stop, and when to depart from each stop to continue the tour. Figure B.6 includes the available modes and mode hierarchy. After tour characteristics are set, the sub-module determines the mode of each trip (conditional upon tour mode). Recall that trips are segments of tours that have a given origin and destination. If the trip mode involves an automobile and the destination is a parking-constrained area, then the model chooses a parking location for the traveler at the trip destination.

Figure B.6

Tour and Trip Modes[4]



Step 6: Aggregating and assigning auto and transit trips

The previous step provided travel details for each person down to the trip level. In this final step, the model sums all trips taken by individuals in San Diego County along with trips generated by other models that represent special categories of travel within the region that are not covered by the ABM. The model aggregates auto trips in TAZ to TAZ matrices by time of day and assigns trips to the highway network, and aggregates transit trips in TAP to TAP matrices by time of day and assigns to the transit network.

SANDAG loads traffic using the Multimodal Multiclass Assignment function of the traffic assignment software. Multiclass assignment allows SANDAG to assign the eight vehicle modes (drive alone non-toll, drive alone toll, share ride 2 non-toll non HOV, share ride 2 non-toll HOV, share ride 2 toll HOV, share ride 3+ non-toll non HOV, share ride 3+ non-toll HOV, and share ride 3+ toll HOV) plus the six truck toll, and non-toll by truck class modes (light-heavy duty non-toll/toll, medium-heavy duty non-toll/toll, and heavy-heavy duty non-toll/toll) in one combined procedure.

The highway assignment model works by finding roads that provide the shortest travel impedance between each zone pair. Trips between zone pairs are then accumulated on road segments making up minimum paths. Highway

impedances consider posted speed limits, signal delays, congestion delays, and costs. The model computes congestion delays for each segment based on the ratio of the traffic volume to roadway capacity. Motorists may choose different paths during peak hours, when congestion can be heavy, and off-peak hours, when roadways are typically free flowing. For this reason, traffic is assigned separately for five time periods (as defined in the Key Modeling Units section). Vehicle trip tables for each scenario reflect increased trip-making due to population growth and variations in travel patterns due to the alternative transportation facilities/networks proposed. Customized programs process outputs from highway assignment and generate total VMTs by vehicle class, and percentage of VMTs by speed bin and by vehicle class. This information is input to the EMFAC program to generate emissions summaries.

For transit assignment, traffic assignment software assigns TAP to TAP transit trips to the network. Altogether, 75 separate transit assignments are produced for five time periods: (1) walk, (2) park & ride, (3) kiss & ride, (4) auto access, and (5) line-haul modes. These individual assignments are summed to obtain total transit ridership forecasts.

Model inputs

The SANDAG ABM utilizes a variety of data as inputs. Besides the growth forecast inputs (used to provide existing and planned land use and demographic characteristics) there are three major inputs: (1) highway networks used to describe existing and planned roadway facilities, (2) transit networks used to describe existing and planned public transit service, and (3) an active transportation network used to describe non-motorized bicycle and pedestrian facilities.

The regionally significant projects, and the years they are expected to open to traffic for each analysis year, are documented in Tables B.13 - B.15. The design concept and scope of projects allow adequate model representation to determine intersections with regionally significant facilities, route options, travel times, transit ridership, and land use. The VMT for non-regionally significant federal projects is also accounted for in the regional emissions analysis.

Highway networks

The regional highway networks in the Regional Plan and 2014 RTIP Amendment No. 7 include all roads classified by local jurisdictions in their general plan circulation elements. These roads include freeways, expressways, and the Regional Arterial System (RAS). The RAS consists of all conventional state highways, prime arterials, and selected major streets. In addition, some local streets are included in the networks for connectivity between TAZs.

The route improvements and additions in the Regional Plan and 2014 RTIP Amendment No. 7 are developed to provide adequate travel service that is compatible with adopted regional policies for land use and population growth. All regionally significant projects are included in the quantitative emissions analysis. These include all state highways, all proposed national highway system routes, all regionally significant arterials, and all "other principal arterials" functionally classified by the Federal Highway Administration (FHWA). These include both federal and non-federal regionally significant projects.

The networks also account for programs intended to improve the operation of the highway system, including HOV lanes, Managed Lanes, and ramp metering. Existing and proposed toll facilities also are modeled to reflect time, cost, and capacity effects of these facilities. State Route (SR) 125 South, SR 11, SR 241, and additional lanes on Interstate 15 (I-15) north of SR 78, and additional lanes on I-5 north of Vandegrift Boulevard, are modeled toll facilities included in the Revenue Constrained Plan for the San Diego region.

In addition, several Managed/HOV lanes are included in the Revenue Constrained Plan (Table B.14). Facilities with proposed Managed Lanes include I-5, I-15, I-805, SR 52, SR 54, SR 78, SR 94, and SR 125. Managed Lanes are defined as reversible HOV routes and HOV routes with two or more lanes in the peak direction. Additionally, one-lane

HOV facilities that operate as two-person carpool lanes in the earlier years of the Regional Plan transition to Managed Lanes by 2035. It is assumed that the excess capacity not utilized by carpools and transit on these facilities would be managed so that single occupant vehicles could use these lanes under a pricing mechanism. Traffic flows would be managed so that the facility would operate at Level of Service (LOS) D or better.

SANDAG maintains a master transportation network from which a specific year network, between the years 2010 and 2050, can be built. For air quality conformity analyses of the Regional Plan and 2014 RTIP Amendment No. 7, SANDAG built and verified five highway networks (2015, 2025, 2035, 2040, and 2050) from the master transportation network.

A list of the major highway and near-term regional arterial projects included in the conformity analysis, along with information on phasing for their implementation, are included in Tables B.14 and B.15. Locally funded, regionally significant projects have also been or are included in the air quality conformity analysis. These projects are funded with *TransNet* Extension funds – a 40-year, half-cent local sales tax extension approved by voters in 2004 – that expires in 2048; and other local revenue sources.

Transit networks

SANDAG also maintains transit network datasets for existing and proposed transit systems. Most transit routes run over the same streets, freeways, HOV lanes, and ramps used in the highway networks. The only additional facilities that are added to the master transportation network for transit modeling purposes are:

- Rail lines used by commuter rail, Trolleys, Streetcars
- Streets used by buses that are not part of local general plan circulation elements

BRT service has stop spacing similar to commuter rail stations and operating characteristics midway between rail and bus service. BRT service is provided by advanced design buses operating on HOV lanes or Managed Lanes, some grade-separated transit ways, and surface streets with priority transit systems.

Bus speeds assumed in the transit networks are derived from modeled highway speeds and reflect the effects of congestion. Higher bus speeds may result for transit vehicles operating on highways with HOV lanes and HOV bypass lanes at ramp meters, compared to those routes that operate on highways where these facilities do not exist.

In addition to transit travel times, transit fares are required as input to the mode choice model. A customized procedure using the traffic assignment software replicates the San Diego region's fare policies for riders (seniors, disabled, students), which differ among :

- Local Buses, which collect a flat fare of between $1 and $2.50 (depending on the type of service)
- Trolleys, which charge $2.50 for all trips
- SPRINTER, which charges $2
- Commuter rail (COASTER), which has a zone-based fare of between $4 and $5.50
- Proposed regional BRT routes, which are assumed to charge $2.50 ($5 for *Rapid* BRT)
- Proposed *Rapid* Bus routes, which are assumed to charge $2.25

Fares are expressed in 2010 dollars and are assumed to remain constant in inflation-adjusted dollars over the forecast period.

Near-term transit route changes are drawn from the Coordinated Plan, which was produced in cooperation with the region's transit agencies. Longer range improvements are proposed as a part of the Regional Plan development and other transit corridor studies. In addition to federal and state-funded projects, locally-funded transit projects that are regionally significant have been included in the air quality conformity analysis of the Regional Plan and the 2014 RTIP Amendment No. 7. Once network coding is completed, the ABM is run for the applicable scenarios (2015, 2025, 2035, 2040, and 2050). There have been no transit fares or operating policy changes since the adoption of the 2050 RTP.

Active transportation networks

SANDAG maintains an all-street active transportation network including existing and planned bike projects to support bike project evaluation and impact analysis. Based on the proposed bike projects in the regional bikeway system developed through Riding to 2050 - San Diego Regional Bike Plan, SANDAG generates year-specific active transportation networks and uses these networks to create accessibility measures from MGRA to MGRA, and from TAZ to TAZ for walking and biking modes. These active transportation accessibility measures are inputs to the SANDAG ABM to simulate people's choice of travel mode and choice of bike routes.

The active transportation networks include five classification types for bike facilities in the regional bikeway system: (1) class I – bike path, (2) class II – bike lanes, (3) class III – bike routes, (4) bike boulevard, and (5) cycle track. Appendix U.16 includes detailed description of the bike facility classification system.

Data sources

Besides network inputs, SANDAG relies on several survey data to estimate and calibrate the model parameters. The most important survey data is household travel survey data. The latest household travel survey conducted for SANDAG was the 2006 Household Travel Behavior Survey (TBS06). Since 1966, consistent with the state of the practice for the California Household Travel Survey, and National Household Travel Survey, SANDAG and Caltrans conduct a comprehensive travel survey of San Diego county every ten years. TBS06 surveyed 3,651 households in San Diego County. The survey asked all household members to record all trips for a specified 24-hour weekday period using a specially designed travel log.

Additional data needed for the mode choice components of the ABM come from a transit on-board survey. The most recent SANDAG survey of this kind is the 2009 Transit On-Board Survey (OBS09). OBS09 collected data on transit trip purpose, origin and destination address, access and egress mode to and from transit stops, the on/off stop for surveyed transit routes, number of transit routes used, and demographic information. The total number of OBS09 survey records is 42,854.

Population synthesis requires two types of data: (1) individual household and person census records from San Diego County, and (2) aggregate data pertaining to the socio-demographic characteristics of each zone in the region. The first type of data is available from the Public Use Micro-data Sample (PUMS), a representative sample of complete household and person records that is released with the Census and American Communities Survey. The second type of data is from the census for the base-year and from land use forecasts for future years.

Table B.8 lists data sources mentioned above, along with other necessary sources of data. Modeling parking location choice, and employer-reimbursement of parking cost, depends on parking survey data collected from 2010 into early 2011 as well as a parking supply inventory. The transponder ownership sub-model requires data on transponder users. Data needed for model validation and calibration include traffic counts, transit-boarding data, Census Transportation Planning Package (CTPP) data, and Caltrans Performance Measurement System (PeMS) and Highway Performance Monitoring System (HPMS) data.

Table B.8
ABM Input Data

SANDAG Surveys	Outside Data Sources

• Household Travel Behavior Survey (2006)
• Interregional Travel Behavior Survey (2006)
• Transit On-Board Survey (2009)
• Parking Inventory Survey (2010)
• Parking Behavior Survey (2010)
• Border Crossing Survey (2011)
• Visitor Survey (2011)
• Special Events Survey (2011)
• Commercial Vehicles Survey (2011)
	• San Diego International Airport Air Passenger Survey
	• Traffic and Bicycle counts
	• Census data
	  ◦ Census Transportation Planning Package (CTPP)
	  ◦ Public Use Micro-data Sample (PUMS)
	• American Communities Survey (ACS)
	  ◦ Census Transportation Planning Package (CTPP)
	  ◦ Public Use Micro-data Sample (PUMS)
	• Transponder ownership data
	• Caltrans' Performance Measurement System (PeMS)
	• Caltrans' Highway Performance Monitoring System (HPMS)

Motor Vehicle Emissions Modeling

Emissions model

In September 2011, ARB released EMFAC 2011 and the U.S. EPA approved this emissions model for use in conformity determinations on March 6, 2013. EMFAC 2011 is an integrated model that combines emission rate data with vehicle activity to calculate regional emissions. EMFAC 2011 reflects ARB rulemakings for on-road diesel fleet rules, Pavley Clean Car Standards, and the Low Carbon Fuel Standard (LCFS). EMFAC 2011 is made up of three modules: (1) EMFAC 2011-SG (scenario air quality assessment), (2) EMFAC 2011-LDV (passenger vehicle emissions), and (3) EMFAC 2011-HD (diesel trucks and buses). As noted in ARB's EMFAC 2011 Technical Documentation, EMFAC 2011-SG takes the output from EMFAC 2011-LDV and EMFAC 2011-HD and applies scaling factors to estimate emissions consistent with regional VMT and speeds. Scaling factors are based on changes in total VMT, VMT distribution by vehicle class, and speed distribution. The SG module reports total emissions as tons per average weekday for each pollutant by vehicle class, and the total vehicle fleet for years between 1990 and 2035.

Using EMFAC 2011-SG, projections of daily regional emissions were prepared for reactive organic gases (ROG), nitrogen oxides (NOx), and CO.

The following process emissions are generated for each pollutant:

- All Pollutants – Running Exhaust, Idling Exhaust, Starting Exhaust, Total Exhaust
- ROG and total organic gasses – Diurnal Losses, Hot-Soak Losses, Running Losses, Resting Losses, Total Losses
- EMFAC 2011 models two fuels (gasoline and diesel) and 42 vehicle classes, including the following categories:
  - Passenger cars
  - Motorcycles
  - Motor homes
  - Light-duty trucks

- Medium-duty trucks
- Light-heavy duty trucks
- Medium-heavy duty trucks
- Heavy-heavy duty trucks
- School buses
- Urban buses
- Motor coaches
- Other bus types

The air quality analysis of the Regional Plan and 2014 RTIP Amendment No. 7 conformity redetermination was conducted using EMFAC 2011-SG.

On December 30, 2014, ARB released EMFAC 2014. EMFAC 2014 represents ARB's current understanding of motor vehicle travel activities and their associated emission levels. On May 15, 2015, ARB released an updated version, EMFAC 2014 v1.0.7; however, it has not yet been approved by U.S. EPA for use in conformity determinations. The draft conformity analysis also was performed with EMFAC2014 v1.0.7 and all projected emissions met the applicable SIP budgets.

The regional emissions projections for the Regional Plan and 2014 RTIP Amendment No. 7 were produced with EMFAC 2011 and are included in Tables B.9 and B.11.

Regional emissions forecasts

Regional travel demand forecasts were initiated in October 2014. Output from the SANDAG ABM was then processed to be useful for emissions modeling for the conformity determination of the Regional Plan and 2014 RTIP Amendment No. 7 conformity redetermination.

The analysis years were selected to comply with 40 CFR §93.106(a)(1) and §93.118(a) of the Transportation Conformity Regulations and the approved methodology for conducting the air quality conformity analyses for the Regional Plan and 2014 RTIP Amendment No. 7. According to these sections of the Conformity Regulation, the first horizon year (2015) must be within ten years from the base year used to validate the regional transportation model (2012), the last horizon year must be the last year of the transportation plan's forecast period (2050), and the horizon years may be no more than ten years apart (2025, 2035, and 2040). Federal RTP guidelines require that the Regional Plan cover a forecast period of a minimum of 20 years.

Eight-hour ozone standard

Effective April 4, 2013, the U.S. EPA found the Eight-Hour Ozone budgets included in the *Redesignation Request and Maintenance Plan for the 1997 National Ozone Standard for San Diego County* adequate for transportation conformity purposes. Beginning in October 2014, SANDAG prepared countywide forecasts of average weekday ROG and NOx emissions for 2015, 2020 (interpolated), 2025, 2035, 2040, and 2050. ROG and NOx emissions are based upon the summer season. ROG and NOx data for 2020 are included to demonstrate conformity to the budgets included in the Maintenance Plan.

CO standard

Beginning in October 2014, CO regional emissions were projected for 2015, 2018 (interpolated), 2025, 2035, 2040, and 2050. CO emissions are based upon the winter season. CO data for 2018 is included to demonstrate conformity to the budget included in the Maintenance Plan.

Emissions modeling results

An emissions budget is the part of the SIP that identifies emissions levels necessary for meeting emissions reduction milestones, attainment, or maintenance demonstrations. To determine conformity of the Regional Plan and the 2014 RTIP Amendment No. 7, the Regional Plan must comply with the emission analysis described in the Regional Emissions Forecast section. Table B.9 shows that the projected ROG and NOx emissions from the Regional Plan and 2014 RTIP Amendment No. 7 are below the ROG and NOx budgets and satisfy the requirements of 40 CFR §93.118(a). Air quality conformity ozone standards relate to ozone that occurs near ground level as a result of various human activities. At the ground level, ozone is formed by chemical reactions of "precursor" pollutants – oxides of nitrogen (NOx) and volatile organic compounds – also known as reactive organic gases (ROG).

Table B.9

San Diego Forward: The Regional Plan
Revenue Constrained Plan and 2014 RTIP Amendment No. 7 Air Quality Conformity Analysis for 2008 Eight-Hour Ozone Standard (EMFAC 2011)

Year	Average Weekday Vehicle Starts (1,000s)	Average Weekday Vehicle Miles (1,000s)	ROG		NOx	
			SIP Emissions Budget Tons/Day	ROG Emissions Tons/Day	SIP Emissions Budget Tons/Day	NOx Emissions Tons/Day
2015	13,311	78,631	53	21	98	38
2020	13,998	82,963	23	17	38	29
2025	14,664	87,295	21	14	30	20
2035	15,185	90,671	21	12	30	17
2040[(1)]	15,442	92,256	21	12	30	18
2050[(1)]	15,799	94,461	21	13	30	19

[(1)] The emissions data for 2040 and 2050 was prepared using 2035 emission factors, as emission factors for 2040 and 2050 are not available in EMFAC 2011. Also, adjustment factors are not available for 2035, 2040, and 2050. Modeled emission results for 2035, 2040, and 2050 likely are overestimated due to these two factors.

Note: Emission budgets from the Eight-Hour Ozone Attainment Plan for San Diego County, which were found adequate for transportation conformity purposes by the U.S. EPA effective June 9, 2008, are used for the 2015 analysis year. Emissions budgets from the *Redesignation Request and Maintenance Plan for the 1997 National Ozone Standard for San Diego County*, which were found adequate for transportation conformity purposes by the U.S. EPA, effective April 4, 2013, are used for all other analysis years. SANDAG utilizes the default EMFAC travel data for some vehicle classes such as school buses. The same ABM travel data was used for the analysis performed with EMFAC 2011 and 2014. Differences in the number of average weekday vehicle starts and vehicle miles traveled in the tables created with EMFAC 2011 and EMFAC 2014 are due to differences in the default assumptions included in EMFAC for the vehicle classifications where SANDAG utilizes the default data (school bus, other bus, motor coach, and all other bus).

Adjustment factors for ROG and NOx were provided by ARB to account for regulations and minor technical improvements not yet included in the California Emissions Forecasting System inventories at the time of EMFAC 2011 development. Table B.10 includes the adjustment factors by category and analysis year. Adjustment factors were

provided for the years 2015, 2020, and 2025. Factors for later years were not available from ARB and, therefore, the adjustment factors for 2025 were carried over into later years.

Table B.10
EMFAC 2011 Adjustment Factors

	ROG Adjustment Factor (tons/day)						NOx Adjustment Factor (tons/day)					
	2015	2020	2025	2035	2040	2050	2015	2020	2025	2035	2040	2050
AB 1493	0.12	0.22	0.35	0.35	0.35	0.35	0.01	0.01	0.02	0.02	0.02	0.02
Reformulated Gasoline	0.97	0.72	0.54	0.54	0.54	0.54	-	-	-	-	-	-
Smog Check	1.05	0.87	0.50	0.50	0.50	0.50	0.54	0.38	0.20	0.20	0.20	0.20
Advanced Clean Cars	0.04	0.21	0.39	0.39	0.39	0.39	0.08	0.24	0.94	0.94	0.94	0.94
Total*	2.17	2.03	1.78	1.78	1.78	1.78	0.63	0.63	1.16	1.16	1.16	1.16

* Totals represent unrounded adjustment factors.

Note: Adjustment factors were provided by ARB. The tons listed are subtracted from the EMFAC 2011 output of tons per day for ROG and NOx. Adjustment factors are not available for years 2035, 2040, and 2050 and, therefore, reflect 2025 adjustments for those years.

Table B.11 shows that projected CO emissions from the Regional Plan and 2014 RTIP Amendment No. 7 are below the 2003 CO budget of 730 tons per day and satisfy the requirements of 40 CFR §93.118(a).

Table B.11

San Diego Forward: The Regional Plan
Revenue Constrained Plan and 2014 RTIP Amendment No. 7 Air Quality Conformity Analysis for Carbon Monoxide Standard (EMFAC 2011)

Year	Average Weekday Vehicle Starts (1,000s)	Average Weekday Vehicle Miles (1,000s)	CO SIP Emissions Budget Tons/Day	CO Emissions Tons/Day
2015	13,311	78,631	730	223
2018	13,717	81,230	730	195
2025	14,664	87,295	730	131
2035	15,185	90,671	730	114
2040[(1)]	15,442	92,256	730	116
2050[(1)]	15,799	94,461	730	119

[(1)] The emissions data for 2040 and 2050 was prepared using 2035 emission factors, as emission factors for 2040 and 2050 are not available in EMFAC 2011. Modeled emission results for 2040 and 2050 likely are overestimated due to this factor.

Note: Emissions budgets for the San Diego region from 2004 Revision to California SIP for CO, Updated Maintenance Plan for Ten Federal Planning Areas (approved as SIP revision in January 2006). Emissions results do not reflect ARB adjustment factors. SANDAG utilizes the default EMFAC travel data for some vehicle classes such as school buses. The same ABM travel data was used for the analysis performed with EMFAC 2011 and 2014. Differences in the number of average weekday vehicle starts and vehicle miles traveled in the tables created with EMFAC 2011 and EMFAC 2014 are due to differences in the default assumptions included in EMFAC for the vehicle classifications where SANDAG utilizes the default data (school bus, other bus, motor coach, and all other bus).

Exempt projects

Section 93.126 of the Transportation Conformity Regulations exempts certain highway and transit projects from the requirement to determine conformity. The categories of exempt projects include safety, mass transit, air quality (ridesharing, bike, and pedestrian facilities), and other (such as planning studies).

Table B.12 illustrates the exempt projects considered in the Regional Plan and 2014 RTIP Amendment No. 7. This table shows short-term exempt projects. Additional unidentified projects could be funded with revenues expected to be available from the continuation of existing state and federal programs.

Table B.12

Exempt Projects

Bikeway, Rail Trail, and Pedestrian Projects

Project/Program Description	Project/Program Description
Bayshore Bikeway	Maple Street Pedestrian Plaza
Bay-to-Ranch Bikeway	Mid-County Bikeway
Border Access Bicycle Corridor	Mira Mesa Bicycle Corridor
Camp Pendleton Trail	Mission Valley – Chula Vista Bicycle Corridor
Carlsbad – San Marcos Bicycle Corridor	National City – Highland Avenue Community Corridor
Central Coast Bicycle Corridor	North Park – Centre City Bicycle Corridor
Chula Vista Greenbelt	Oceanside – Bicycle Master Plan
City Heights – Old Town Bicycle Corridor	Otay Mesa Port of Entry Pedestrian/Bicycle Facilities
Clairemont – Centre City Bicycle Corridor	Park Boulevard Bicycle Connector
Coastal Rail Trail	Poway Bicycle Loop
East County Northern Bicycle Loop	San Diego Regional Bicycle Plan
East County Southern Bicycle Loop	San Diego River Multi-Use Bicycle and Pedestrian Path
El Camino Real Bicycle Corridor	San Luis Rey River Trail
Encinitas – San Marcos Bicycle Corridor	Santee – El Cajon Bicycle Corridor
Escondido Creek Bike Path Bridge and Bikeway	SR 52 Bikeway
Gilman Bicycle Connector	SR 56 Bikeway
Hillcrest – El Cajon Bicycle Corridor	SR 56/Black Mountain Road Bikeway Interchange
Imperial Beach Bicycle Connector	SR 125 Bicycle Corridor
Inland Rail Trail	SR 905 Bicycle Corridor
Interstate 8 Bicycle Corridor	Sweetwater River Trail
SR 15 Bikeway	Tecate International Border Crossing Pedestrian Facilities
Interstate 805 Bicycle Corridor	Ted Williams Parkway Pedestrian Bridge at Shoal Creek
Kearny Mesa – Beaches Bicycle Corridor	Third Avenue Bicycle and Pedestrian Access

Table B.12 (continued)

Exempt Projects

Bikeway, Rail Trail, and Pedestrian Projects

Project/Program Description	Project/Program Description
Kensington – Balboa Park Bicycle Corridor	Vista Way Bicycle Connector
	West Bernardo Bike Path
Bridge Rehabilitation/Preservation/Retrofit	Traveler Information Program
Collision Reduction	Bus on Shoulder Service
Emergency Response	Compass Card
Hazard Elimination/Safe Routes to School	FasTrak®
Highway Maintenance	Freeway Service Patrol
Safety Improvement Program	Vehicle Automation
Roadway/Roadside Preservation	Regional Vanpool Program
Smart Growth Incentive Program	Multimodal Integration and Performance-Based Management
Safe Routes to Transit	Arterial, Freeway, and Transit Management
Safe Routes to School	Intelligent Transportation System for Transit
Transit Terminals	ITS Operations
Airport Intermodal Transit Center/Terminal	Joint Transportation Operations Center
San Ysidro Intermodal Transit Center/Terminal	Trolley Fiber Communication Network
	Electronic Payment Systems and Universal Transportation Account
	Various Traffic Signal Optimization/Prioritization
	Transit Infrastructure Electrification
	Employer Services and Outreach
	Commuter Services and Bike Program
	Mobility Hubs
	Active Traffic and Demand Management
	Shared Mobility Services

Implementation of Transportation Control Measures

There are four federally-approved Transportation Control Measures (TCMs) that must be implemented in San Diego, which the SIP refers to as transportation tactics. They include: (1) ridesharing, (2) transit improvements, (3) traffic flow improvements, and (4) bike facilities and programs.

These TCMs were established in the 1982 SIP, which identified general objectives and implementing actions for each tactic. The TCMs have been fully implemented. Ridesharing, transit, biking, and traffic flow improvements continue to be funded, although the level of implementation established in the SIP has been surpassed. Information regarding transit projects can be seen in Table B.13, and Appendix A. More detailed information regarding ridesharing and traffic flow improvements is included in Appendix E and information regarding bike facilities and programs is included in Appendix A.

Interagency Consultation Process and Public Input

The consultation process followed to prepare the Air Quality Conformity Analysis for the Regional Plan and 2014 RTIP Amendment No. 7 complies with the San Diego Transportation Conformity Procedures adopted in July 1998. In turn, these procedures comply with federal requirements under 40 CFR §93.106(a)(1). Interagency consultation involves SANDAG (as the MPO for San Diego County), the APCD, Caltrans, ARB, U.S. DOT, and U.S. EPA.

Consultation is a three-tier process that:

- Formulates and reviews drafts through a conformity working group
- Provides local agencies and the public with opportunities for input through existing regional advisory committees and workshops
- Seeks comments from affected federal and state agencies through participation in the development of draft documents and circulation of supporting materials prior to formal adoption

SANDAG consulted on the development of the Air Quality Conformity Analysis of the Regional Plan and 2014 RTIP Amendment No. 7 at public meetings of the San Diego Region CWG, the Transportation Committee, and Board of Directors, as follows:

- On September 5, 2012, SANDAG staff presented information on the agencywide Public Participation Plan (PPP), which serves as an umbrella document for all planning efforts conducted by the agency for discussion. Staff also presented information on Regional Plan draft work program, schedule, and Public Involvement Plan (PIP) for discussion.
- On December 5, 2012, SANDAG staff held a discussion with the CWG on the draft PPP update, which was accepted by the SANDAG Board of Directors at the October 26, 2012, meeting and released for a 45-day public comment period.
- On February 6, 2013, SANDAG staff held a discussion with the CWG on the draft PIP, which was released for public review and comment on January 7, 2013, for a 30-day review period.
- On December 4, 2013, SANDAG staff presented information on the Regional Plan schedule, 2050 regional growth forecast, and transportation modeling for discussion.
- On August 6, 2014, SANDAG staff presented the schedule and updates for the preparation of the Regional Plan and its air quality conformity analysis. Staff presented information on the Series 13 2050 Regional Growth Forecast, 2050 Revenue Forecast, and latest emissions model and emissions budgets.

- On September 12, 2014, the SANDAG Board of Directors selected the Revenue Constrained Transportation Scenario for use in developing the Draft Regional Plan. SANDAG staff initiated the air quality conformity modeling for the Draft Regional Plan in September 2014.
- On October 1, 2014, SANDAG staff presented further information about the criteria and procedures to be followed for the conformity analysis. Staff presented information on the schedule, transportation modeling, latest emissions model and emissions budgets, TCMs, and public involvement and outreach. Staff confirmed that a redetermination of conformity would be done for the 2014 RTIP Amendment No. 7, in conjunction with the Regional Plan for consistency purposes.
- On October 3, 2014, SANDAG staff distributed the draft list of capacity increasing and non-capacity increasing projects to be included in the draft 2014 RTIP Amendment No. 7 for interagency consultation.
- On November 14, 2014, SANDAG released the draft air quality conformity analysis of the Regional Plan and 2014 RTIP Amendment No. 7 to the CWG for a 30-day review-and-comment period. The draft air quality analysis was discussed at the December 3, 2014, meeting of the CWG.
- On January 30, 2015, SANDAG released the revised draft air quality conformity analysis of the Regional Plan and 2014 RTIP Amendment No. 7, which incorporates emissions analysis utilizing the EMFAC 2014 model, to the CWG for a 30-day review-and-comment period. The draft air quality analysis was discussed at the February 4, 2015, meeting of the CWG.
- On April 24, 2015, the SANDAG Board of Directors released the Draft Regional Plan and the 2014 RTIP Amendment No. 7 and its conformity analysis for public review and comment.
- On May 21, 2015, the draft Regional Plan EIR was released for a 55-day public comment period. The comment period for the Draft Regional Plan and its conformity analysis, and draft EIR closed on July 15, 2015.
- Two public hearings were held on the draft Regional Plan and its conformity determination and the 2014 RTIP Amendment No. 7 conformity determination on June 12, 2015, and June 18, 2015.
- Based on comments received from the public and member agencies, refinements were made to the final Regional Plan network. The air quality conformity analysis was released to the CWG and the public on August 19, 2015. The comment period closed on September 25, 2015. The emissions analysis was conducted using the EMFAC2011 and EMFAC2014 v.1.0.7 models.
- Members of the public are able to provide comments at meetings of the CWG, the Transportation Committee, and the SANDAG Board of Directors.

Table B.13

Revenue Constrained Scenario Transit Services

Conformity Analysis Year	Service	Route	Description	Capital Cost ($2014); millions	Capital Cost ($YOE); millions
2025	COASTER	398	Double tracking (20-minute peak frequencies and 120-minute off-peak frequencies and station/platform at Del Mar Fairgrounds)	$445	$445
2025	SPRINTER	399	SPRINTER efficiency improvements (20-minute frequencies by 2025); double tracking Oceanside to Escondido for 10-minute frequencies and six rail grade separations at El Camino Real, Melrose Dr, Vista Village Dr/ Main St, North Dr, Civic Center, Auto Pkwy and Mission Ave	$946	$1339
2025	Trolley	510	Mid-Coast Trolley Extension	$1,753	$1,753
2025	*Rapid*	2	North Park to downtown San Diego via 30th St	$39	$52
2025	*Rapid*	10	La Mesa to Ocean Beach via Mid-City, Hillcrest, Old Town	$87	$117
2025	*Rapid*	120	Kearny Mesa to downtown via Mission Valley	$78	$104
2025	*Rapid*	SR 163 DARs	Kearny Mesa to downtown via SR 163. Stations at Sharp/Children's Hospital, University Ave, and Fashion Valley Transit Center	$150	$196
2025	*Rapid*	550	SDSU to Palomar Station via East San Diego, Southeast San Diego, National City	$59	$78
2025	*Rapid*	225	South Bay *Rapid* (Otay Mesa to downtown) and Otay Mesa ITC (formerly Route 628)	$206	$206
2025	*Rapid*	709	H St Trolley Station to Millennia via H St Corridor, Southwestern College	$37	$49
2025	*Rapid*	905	Extension of Iris Trolley Station to Otay Mesa Port of Entry (POE) route with new service to Otay Mesa East POE and Imperial Beach	$2	$2
2025	Streetcar	554	Hillcrest/Balboa Park/downtown San Diego Loop[1]	$29	$38
2025	Airport Express	--	Airport Express Routes[2]	$52	$62
2025	Shuttle	448/449	San Marcos Shuttle[3]	$0	$0
2025	Transit Lanes	SR 15 from I-805 to I-8	Transit Lane improvement for routes 235, 280/290, 653, and Airport Express Route to Tijuana International Airport. Existing facility at 8F, with improvement of 8F+2TL	$56	$56

Table B.13 (continued)

Revenue Constrained Scenario Transit Services

Conformity Analysis Year	Service	Route	Description	Capital Cost ($2014); millions	Capital Cost ($YOE); millions
2025			Local Bus Routes - 15 minutes in key corridors	--	--
2035	COASTER	398	Double tracking (20-minute peak frequencies and 60-minute off-peak frequencies, grade separations at Leucadia Blvd, stations/platforms at Convention Center/Gaslamp Quarter, and extension to Camp Pendleton)	$900	$1,357
2035	Trolley	510	Phase I - Blue Line Frequency Enhancements and rail grade separations at 28th St, 32nd St, E St, H St, Palomar St, and Blue/Orange Track Connection at 12th/Imperial	$205	$292
2035	Trolley	520	Orange Line Frequency Enhancements and four rail grade separations at Euclid Ave, Broadway/Lemon Grove Ave, Allison Ave/University Ave, Severin Dr	$267	$402
2035	Trolley	561	UTC to COASTER Connection (extension of Route 510)	$343	$602
2035	Trolley	562	Phase I - San Ysidro to Kearny Mesa via Chula Vista via Highland Ave/4th Ave, National City, Southeast San Diego, Mid-City, and Mission Valley	$2,333	$4,028
2035	*Rapid*	11	Spring Valley to SDSU via Southeast San Diego, downtown, Hillcrest, Mid-City	$113	$173
2035	*Rapid*	28	Point Loma to Kearny Mesa via Old Town, Linda Vista	$49	$76
2035	*Rapid*	30	Old Town to Sorrento Mesa via Pacific Beach, La Jolla, UTC	$105	$161
2035	*Rapid*	41	Fashion Valley to UTC/UC San Diego via Linda Vista and Clairemont	$55	$96
2035	*Rapid*	90	El Cajon Transit Center to San Diego International Airport ITC via SR 94, City College (peak only)	$20	$27
2035	*Rapid*	473	Phase I – Solana Beach to UTC/UC San Diego via Hwy 101 Coastal Communities, Carmel Valley	$43	$66
2035	*Rapid*	635	Eastlake to Palomar Trolley via Main St Corridor	$56	$98

Table B.13 (continued)

Revenue Constrained Scenario Transit Services

Conformity Analysis Year	Service	Route	Description	Capital Cost ($2014); millions	Capital Cost ($YOE); millions
2035	*Rapid*	638	Iris Trolley Station to Otay Mesa via Otay, Airway Dr, SR 905 Corridor	$38	$67
2035	*Rapid*	640A/640B	Route 640A: I-5 - San Ysidro to Old Town Transit Center via City College 640B: I-5 Iris Trolley/Palomar to Kearny Mesa via Chula Vista, National City and City College	$153	$206
2035	*Rapid*	688/689/690	Route 688: San Ysidro to Sorrento Mesa via I-805/I-15/SR-52 Corridors (Peak Only) Route 689: Otay Mesa Port of Entry (POE) to UTC/Torrey Pines via Otay Ranch/ Millennia, I-805 Corridor (Peak Only) Route 690: Mid-City to Sorrento Mesa via I-805 Corridor (Peak Only)	$458	$653
2035	*Rapid*	910	Coronado to Downtown via Coronado Bridge	$26	$39
2035	Streetcar	553	Downtown San Diego: Little Italy to East Village[1]	$14	$21
2035	Streetcar	555	30th St to Downtown San Diego via North Park/Golden Hill[1]	$26	$45
2035			Local Bus Routes - 10 minutes in key corridors	--	--
2040	SPRINTER	588	SPRINTER Express	$244	$492
2040	Trolley	510	Phase II - Blue Line rail grade separations at Taylor St and Ash St	$226	$449
2040	Trolley	563	Pacific Beach to Balboa and Grossmont to Kearny Mesa	$610	$1,229
2040	*Rapid*	103	Solana Beach to Sabre Springs *Rapid* station via Carmel Valley	$67	$135
2040	*Rapid*	440	Carlsbad to Escondido Transit Center via Palomar Airport Rd	$51	$104
2040	*Rapid*	473	Phase II - Oceanside to Solana Beach via Hwy 101 Coastal Communities	$87	$176
2040	*Rapid*	477	Camp Pendleton to Carlsbad Village via College Blvd, Plaza Camino Real	$80	$161
2040	*Rapid*	235	Temecula (peak only) Extension of Escondido to Downtown *Rapid* (formerly Route 610)	$98	$198

Table B.13 (continued)

Revenue Constrained Scenario Transit Services

Conformity Analysis Year	Service	Route	Description	Capital Cost ($2014); millions	Capital Cost ($YOE); millions
2040	*Rapid*	636	SDSU to Spring Valley via East San Diego, Lemon Grove, Skyline	$39	$79
2040	*Rapid*	637	North Park to 32nd St Trolley Station via Golden Hill	$33	$66
2040	*Rapid*	650	Chula Vista to Palomar Airport Rd Business Park via I-805/I-5 (peak only)	$82	$166
2040	*Rapid*	653	Mid-City to Palomar Airport Rd via Kearny Mesa/I-805/I-5	$10	$21
2040	Streetcar	565	Mission Beach to La Jolla via Pacific Beach	$25	$50
2050	COASTER	398	COASTER double tracking (completes double tracking; includes Del Mar Tunnel) and grade separations	$1,365	$3,372
2050	SPRINTER	399	Branch Extension to Westfield North County	$176	$437
2050	Trolley	530	Green Line Frequency Enhancements	$0	$0
2050	Trolley	560	SDSU to Downtown via El Cajon Blvd/Mid-City (transition of Mid-City *Rapid* to Trolley)	$2,390	$5,005
2050	Trolley	562	Phase II - Kearny Mesa to Carmel Valley	$633	$1,443
2050	Trolley	563	Phase II - Balboa to Kearny Mesa	$689	$1,708
2050	*Rapid*	471	Downtown Escondido to East Escondido	$32	$80
2050	*Rapid*	474	Oceanside to Vista via Mission Ave/Santa Fe Rd Corridor	$50	$127
2050	*Rapid*	870	El Cajon to UTC via Santee, SR 52, I-805	$7	$17
2050	*Rapid*	890	El Cajon to Sorrento Mesa via SR 52, Kearny Mesa	$12	$29

Notes: [1] Streetcar cost is representative of 10 percent of the total capital cost.
[2] Implementation of these services is dependent upon funding from aviation and other private sources.
[3] Capital cost to be funded by the City of San Marcos.

Table B.14

Revenue Constrained Scenario Managed Lane and Highway Project List

Conformity Analysis Year	Freeway	From	To	Existing	With Improvements	Capital Cost ($2014); millions	Capital Cost ($YOE); millions
Managed Lanes / Toll Lanes							
2025	I-5	La Jolla Village Dr	I-5/805 Merge	8F/14F	8F/14F+2ML	$206	$249
2025	I-5	SR 78	Vandegrift Blvd	8F	8F+2ML	$76	$100
2025	I-5	Manchester Ave	SR 78	8F	8F+2ML	$701	$789
2025	SR 11 /Otay Mesa East Port of Entry (POE)	SR 125	Mexico	--	4T + POE	$832	$876
2025	I-15	I-8	SR 163	8F	8F+2ML	$56	$73
2025	SR 78	I-5	College Blvd	6F	6F+2ML	$227	$299
2025	SR 78	Twin Oaks	I-15	6F	6F+2ML	$177	$232
2025	SR 94	I-5	I-805	8F	8F+2ML	$535	$703
2025	SR 241	Orange County	I-5	--	4T	$416	$503
2025	I-805	SR 52	Carroll Canyon Rd	8F	8F+2ML	$255	$255
2025	I-805	SR 94	SR 15	8F	8F+2ML	$172	$226
2035	I-5	I-5/I-805 Merge	SR 56	8F/14F +2ML	8F/14F+4ML	$91	$137
2035	I-5	Manchester Ave	SR 78	8F+2ML	8F+4ML	$1,076	$1,863
2035	I-5	SR 905	SR 54	8F	8F +2ML	$308	$416
2035	I-5	SR 54	SR 15	8F	10F+2ML	$343	$464
2035	I-5	SR 56	Manchester Ave	8F+2ML	8F+4ML	$455	$686
2035	SR 15	SR 94	I-805	6F	6F+2ML	$30	$52

Table B.14 (continued)

Revenue Constrained Scenario Managed Lane and Highway Project List

Conformity Analysis Year	Freeway	From	To	Existing	With Improvements	Capital Cost ($2014); millions	Capital Cost ($YOE); millions
Managed Lanes / Toll Lanes (continued)							
2035	SR 78	College Blvd	Twin Oaks	6F	6F+2ML	$788	$1,189
2035	SR 241	Orange County	I-5	4T	6T	$63	$95
2035	I-805	SR 52	Carroll Canyon Rd	8F+2ML	8F+4ML	$394	$562
2035	I-805	SR 54	SR 94	8F +2ML	8F+4ML	$704	$1,096
2035	I-805	SR 163	SR 52	8F	8F+2ML	$229	$346
2035	I-805	SR 905	Palomar St	8F	8F+2ML	$343	$595
2040	I-5	SR 78	Vandegrift Blvd	8F+2ML	8F+4ML	$606	$1,205
2040	SR 52	I-805	I-15	6F	6F+2ML	$91	$181
2040	SR 125	SR 94	I-8	8F	8F+2ML	$66	$131
2040	I-805	SR 15	SR 163	8F/10F	8F/10F+4ML	$1,152	$2,292
2040	I-805	SR 94	SR 15	8F+2ML	8F+4ML	$61	$121
2040	I-805	SR 163	SR 52	8F+2ML	8F+4ML	$322	$640
2050	I-5	I-8	La Jolla Village Dr	8F/10F	8F/10F+2ML	$556	$1,378
2050	I-5	Vandegrift Blvd	Orange County	8F	8F+4T	$1,812	$4,496
2050	I-15	SR 78	Riverside County	8F	8F+4T	$1,029	$2,554
2050	I-15	Viaduct		8F	8F+2ML	$842	$2,092
2050	SR 15	I-5	SR 94	6F	8F+2ML	$136	$338
2050	SR 52	I-15	SR 125	4F/6F	4F/6F+2ML R)	$298	$662
2050	SR 54	I-5	SR 125	6F	6F+2ML	$111	$276
2050	SR 94	I-805	SR 125	8F	8F+2ML	$369	$775
2050	SR 125	SR 54	SR 94	6F	6F+2ML	$76	$188
2050	SR 125	SR 94	I-8	8F+2ML	10F+2ML	$227	$564

Table B.14 (continued)

Revenue Constrained Scenario Managed Lane and Highway Project List

Conformity Analysis Year	Freeway	From	To	Existing	With Improvements	Capital Cost ($2014); millions	Capital Cost ($YOE); millions
Highway Projects							
2025	SR 67	Mapleview St	Gold Bar Ln	2C	4C	$60	$79
2025	SR 76	Mission	I-15	2C	4C	$305	$305
2035	SR 52	Mast Blvd	SR 125	4F	6F	$76	$131
2040	SR 67	Gold Bar Ln	Scripps Poway	2C/4C	4C	$180	$357
2040	SR 94	SR 125	Avocado Blvd	4F	6F	$111	$221
2050	I-8	2nd St	Los Coches	4F/6F	6F	$35	$88
2050	SR 52	I-5	I-805	4F	6F	$111	$276
2050	SR 56	I-5	I-15	4F	6F	$141	$351
2050	SR 94	Avocado Blvd	Jamacha	4C	6C	$91	$225
2050	SR 94	Jamacha	Steele Canyon Rd	2C/4C	4C	$40	$100
2050	SR 125	San Miguel Rd	SR 54	4F	8F	$177	$438
2050	SR 125	SR 905	San Miguel Rd	4T	8F	$323	$661
2050	SR 67	Scripps Poway	Dye Rd	2C/4C	4C	$396	$982
Operational Projects							
2040	SR 76	I-15	Couser Canyon	2C/4C	4C/6C+ Operational	$131	$261
2050	I-5	I-15	I-8	8F	8F+ Operational	$1,177	$2,919
2050	I-8	I-5	SR 125	8F/10F	8F/10F+ Operational	$667	$1,654

Conformity Analysis Year	Freeway	From	To	Capital Cost ($2014); millions	Capital Cost ($YOE): millions
Managed Lanes Connectors					
2025	I-5	SR 78	South to East & West to North, North to East & West to South	$253	$332
2025	I-5	I-805	North to North & South to South	$51	$66
2025	I-15	SR 78	East to South & North to West	$106	$139
2025	SR 15	I-805	North to North & South to South	$81	$106

Table B.14 (continued)

Revenue Constrained Scenario Managed Lane and Highway Project List

Conformity Analysis Year	Freeway	From	To	Capital Cost ($2014); millions	Capital Cost ($YOE): millions
Managed Lanes Connectors (continued)					
2025	I-805	SR 94	North to West & East to South	$101	$133
2035	SR 15	SR 94	South to West & East to North	$71	$122
2040	I-805	SR 52	West to North & South to East	$91	$181
2050	I-15	SR 52	West to North & South to East	$130	$326
Freeway Connectors					
2025	I-5	SR 78	South to East & West to South	$273	$358
2025	SR 11/SR 905	SR 125	EB SR 905 and WB SR 11 to NB SR 125, NB SR 905 to NB SR 125	$26	$28
2025	SR 11/SR 905	SR 125	SB 125 to WB SR 905, SB SR 125 to EB SR 11, SB SR 125 to SB SR 905	$74	$90
2025	SR 94	SR 125	South to East	$69	$88
2035	I-5	SR 56	West to North & South to East	$273	$411
2035	SR 94	SR 125	West to North	$81	$122
2050	I-15	SR 56	North to West	$101	$265

Table B.15

Revenue Constrained Scenario: Arterial Projects

Conformity Analysis Year	SANDAG ID	Lead Agency	Project Title	Project Description
2015	CB04A	Carlsbad	El Camino Real Widening - Tamarack Ave to Chestnut Ave	In Carlsbad, widen El Camino Real to prime arterial standards with three travel lanes, bike lanes, and sidewalks in each direction including intersection improvements at Tamarack Avenue and Chestnut Avenue
2015	CHV08	Chula Vista	Willow St Bridge Project - Bonita Rd to Sweetwater Rd	Replace 2-lane bridge with 4-lane bridge (Phase I)
2015	SD32	San Diego	Carroll Canyon Rd	Carroll Canyon Road from Scranton Road to I-805: extend Carroll Canyon under I-805 including improvements to on/off ramps
2025	CB04B	Carlsbad	El Camino Real and Cannon Rd	In Carlsbad, along the eastside of El Camino Real just south of Cannon Road, widen to prime arterial standards with three through lanes, a right turn lane, and a sidewalk approaching the intersection
2025	CB04C	Carlsbad	El Camino Real - Lisa St to Crestview Dr	In Carlsbad, along the west side of El Camino Real, roadway widening to provide three southbound through lanes, curb, gutter, and sidewalk per prime arterial standards
2025	CB12	Carlsbad	College Blvd Reach A - Badger Ln to Cannon Rd	In Carlsbad, from Badger Lane to Cannon Road, construct a new segment of College Boulevard to provide 4-lane roadway with raised median, bike lanes, and sidewalks/trails in accordance with major arterial standards
2025	CB13	Carlsbad	Poinsettia Ln Reach E - Cassia Dr to Skimmer Ct	In Carlsbad, from Cassia Drive to Skimmer Court, construct a new 4-lane roadway with median, bike lanes, and sidewalks/trails to major arterial standards
2025	CB22	Carlsbad	Avenida Encinas, widen from Palomar Airport Rd to EWPCF	In Carlsbad, Avenida Encinas from Palomar Airport Road southerly to existing improvements adjacent to the Embarcadero Lane, roadway widening to secondary arterial standards
2025	CB30	Carlsbad	El Camino Real – El Camino Real to Tamarack Ave	In Carlsbad, at the intersection of El Camino Real and Tamarack Avenue, construct a second left turn lane from El Camino Real to westbound Tamarack

Table B.15 (continued)

Revenue Constrained Scenario: Arterial Projects

Conformity Analysis Year	SANDAG ID	Lead Agency	Project Title	Project Description
2025	CB31	Carlsbad	El Camino Real – La Costa Ave to Arenal Rd	In Carlsbad, along El Camino Real from 700 feet north of La Costa Avenue to Arenal Road, widening along the southbound side of the roadway to provide three travel lanes and a bike lane in accordance with prime arterial standards
2025	CB32	Carlsbad	El Camino Real Widening - Cassia to Camino Vida Roble	In Carlsbad, widen El Camino Real from 900 feet north of Cassia Road to Camino Vida Roble, along the northbound side of the roadway to provide three travel lanes and a bike lane in accordance with prime arterial standards
2025	CB34	Carlsbad	Palomar Airport Rd - Palomar Airport Rd to Paseo Del Norte	In Carlsbad, widening along eastbound Palomar Airport Road to provide a dedicated right turn lane to southbound Paseo Del Norte
2025	CB35	Carlsbad	Palomar Airport Rd - Palomar Airport Rd to Paseo Del Norte	In Carlsbad, lengthen the left turn pocket along eastbound Palomar Airport Road to northbound Paseo Del Norte
2025	CB38	Carlsbad	El Camino Real – Cannon Rd to Tamarack Ave	El Camino Real from Cannon Road to Tamarack, widen along both sides of El Camino Real from Cannon Road to Tamarack Avenue excluding the limits of project CB04C, to provide a raised median, three travel lanes, bike lane, curb, gutter, and walkway along both sides per prime arterial standards, and a new traffic signal at Lisa Street
2025	CHV08	Chula Vista	Willow St Bridge Project - Bonita Rd to Sweetwater Rd	Replace 2-lane bridge with 4-lane bridge (Phase II)
2025	CHV69	Chula Vista	Heritage Rd Bridge	Heritage Road from Main Street/Nirvana Avenue to Entertainment Circle, widen and lengthen bridge over Otay River from 4-lane to 6-lane bridge that accommodates shoulders, sidewalk, and medial; project is on Heritage Road from the intersection of Main Street and Nirvana Avenue to Entertainment Circle

Table B.15 (continued)

Revenue Constrained Scenario: Arterial Projects

Conformity Analysis Year	SANDAG ID	Lead Agency	Project Title	Project Description
2025	CNTY14	San Diego County	South Santa Fe Ave North - Montgomery Dr to South of Woodland Dr	Vista City limits to 700 feet south of Woodland, reconstruct and widen from 2 to 4 lanes including bicycle lane; more detail in 2014 RTIP Project List
2025	CNTY14A	San Diego County	South Santa Fe Ave South	South Santa Fe from 700 feet south of Woodland Drive to Smilax Road, widening of South Santa Fe Avenue to a 5-lane major road with a center left turn lane, curb, gutter, sidewalk, bike lanes, and drainage improvements from 700 feet south of Woodland Drive to Smilax Road
2025	CNTY21	San Diego County	Bradley Ave Overpass at SR 67	Widen Bradley Avenue from Magnolia Avenue to Mollison Avenue; widen from 2 lanes to 4 lanes plus sidewalks. Replace 2-lane bridge over SR 67 with a 6-lane bridge which accommodates turn pockets.
2025	CNTY24	San Diego County	Cole Grade Rd	Cole Grade Road from north of Horse Creek Trail to south of Pauma Heights Road, widen to accommodate 14-foot traffic lane in both directions, 12-foot center 2-way left turn, 6-foot bike lane and 10-foot pathway
2025	CNTY34	San Diego County	Dye Rd Extension	Dye Road to San Vicente Road - in Ramona, study, design, and construct a 2-lane community collector road with intermittent turn lanes, bike lanes, curb, gutter, and pathway/walkway
2025	CNTY35	San Diego County	Ramona St Extension	From Boundary Avenue to Warnock Drive - in the community of Ramona, construct new road extension, 2 lanes with intermittent turn lanes, bike lanes, and walkway/pathway
2025	CNTY36	San Diego County	San Vicente Rd Improvements	From Warnock Drive to Wildcat Canyon Road - in Ramona, design and reconstruct road improvements, including 2-lane community collector road with intermittent turn lanes, bike lanes, asphalt concrete dike, and pathway/walkway

Table B.15 (continued)

Revenue Constrained Scenario: Arterial Projects

Conformity Analysis Year	SANDAG ID	Lead Agency	Project Title	Project Description
2025	CNTY39	San Diego County	Bear Valley Pkwy North	From San Pasqual Valley Road to Boyle Avenue - widen from 2 to 4 lanes, with a center median, a bike lane and shoulder in each direction of travel
2025	CNTY82	San Diego County	Alpine Blvd Streetscape Improvements	From Tavern Road to South Grade Road – in unincorporated community of Alpine, widen from 2-lane to 3-lane roadway including a median turn-lane with bicycle, parking, and pedestrian improvements
2025	CNTY83	San Diego County	SR67/Highland/Dye Intersection	From SR 67 to 1,000 feet SE of SR 67 – in Ramona, intersection widening (double left turn lanes on Dye/Highland and double through lanes with dedicated right turn lanes on SR 67), signal modification with bicycle and pedestrian improvements, and associated improvements
2025	CNTY88	San Diego County	Ashwood Street Corridor Improvements – Mapleview to Willow	Ashwood Street/Wildcat Canyon Road from Mapleview Street to 1100 feet north of Willow Road in Lakeside- traffic signal improvements at Mapleview and Ashwood; traffic signal installation at Willow and Ashwood/Wildcat Canyon; and the addition of turn lanes, addition of a passing lane in a non-urbanized area, bike lanes, and pedestrian facilities
2025	ESC02A	Escondido	East Valley/Valley Center	Widen roadway from 4 to 6 lanes with raised medians and left turn pockets; modify signal at Lake Wohlford and Valley Center Road; widen bridge over Escondido Creek
2025	ESC04	Escondido	Citracado Pkwy II	West Valley to Harmony Grove, widen from 2 to 4 lanes with raised medians; construct bridge over Escondido Creek
2025	ESC06	Escondido	El Norte Pkwy Bridge at Escondido Creek - Kaile Ln to Key Lime Way	Construct missing 2-lane bridge at Escondido Creek

Table B.15 (continued)

Revenue Constrained Scenario: Arterial Projects

Conformity Analysis Year	SANDAG ID	Lead Agency	Project Title	Project Description
2025	ESC08	Escondido	Felicita Ave/Juniper St - from Escondido Blvd to Juniper St and from Juniper St to Chestnut St	Widen from 2 to 4 lanes with left turn pockets, raised medians on Felicita; new traffic signals at Juniper and Chestnut, Juniper, and 13th Avenue, Juniper and 15th Avenue; modify traffic signal at Juniper and Felicita
2025	ESC09	Escondido	Ninth Ave – La Terraza Blvd to Spruce St	Widen from 2 to 4 lanes with raised median and modify traffic signals at Ninth Avenue and Tulip Street - design phase
2025	ESC24	Escondido	Centre City Pkwy	Mission Road to SR 78, widen 4 lanes to 6 lanes with intersection improvements
2025	LG13	Lemon Grove	Lemon Grove Ave Realignment Project	Lemon Grove Avenue at SR 94 - a key project in the redevelopment of the city's downtown Village Specific Plan, this project will realign Lemon Grove Avenue at SR 94 adding traffic lanes and improving access to and from SR 94, reducing motorist delays and emissions
2025	NC01	National City	Plaza Blvd Widening	Plaza Boulevard from Highland Avenue to Euclid Avenue, widen from 2 to 3 lanes including a new traffic lane in each direction, new sidewalks, sidewalk widening, traffic signal upgrades, and interconnection at Plaza Boulevard
2025	O06	Oceanside	Melrose Dr Extension	Melrose Drive from North Santa Fe Avenue to Spur Avenue - in Oceanside, future construction of Melrose Drive; 4-lane arterial highway with medians, sidewalks, and bike lanes between North Santa Fe Avenue and Spur Avenue
2025	O22	Oceanside	College Blvd - Vista Way to Old Grove Rd	In Oceanside, widen from the existing 4 lanes to 6 lanes with bike lanes and raised median
2025	SD34	San Diego	El Camino Real	In San Diego on El Camino Real from San Dieguito Road to Via de la Valle, reconstruct and widen from 2 to 4 lanes and extend transition lane and additional grading to avoid biological impacts (CIP 52-479.0)
2025	SD70	San Diego	West Mission Bay Dr Bridge	In San Diego, replace bridge and increase from 4- to 6-lane bridge including Class II bike lane (52-643/S00871)

Table B.15 (continued)

Revenue Constrained Scenario: Arterial Projects

Conformity Analysis Year	SANDAG ID	Lead Agency	Project Title	Project Description
2025	SD83	San Diego	SR 163/Friars Rd Interchange Modification	Friars Road from Avenida de las Tiendas to Mission Center Road, widen and improve Friars Road and overcrossing; reconstruct interchange including improvements to ramp intersections (Phase I). Construct new connector roadways and structures (Phase II). Construct auxiliary lanes along northbound and southbound SR 163 (Phase III).
2025	SD90	San Diego	SR 163/Clairemont Mesa Blvd Interchange	From Kearny Villa Road to Kearny Mesa - in San Diego, widen from 4- to 6-lane prime arterial; Phase II of the project - west ramps
2025	SD102A	San Diego	Otay Truck Route Widening	On Otay Truck Route in San Diego from Drucker Lane to La Media, add one lane (total 3 lanes) for trucks; from Britannia to La Media, add one lane for trucks and one lane for emergency vehicles (border patrol/fire department access); along Britannia from Britannia Court to the Otay Truck Route - add one lane for trucks
2025	SD103	San Diego	I-5/Genesee Ave Interchange	In San Diego, replace Genesee Avenue over-crossing from 4-lane bridge with 6-lane bridge; construct auxiliary lanes and replace Voigt Drive bridge; add additional lane at on/off ramp to Sorrento Valley Road; add one carpool lane and one general purpose lane to on-ramp from Sorrento Valley Road to southbound I-5; install ramp meters at on-ramp and construct a southbound auxiliary lane between Sorrento Valley Road and Genesee Avenue
2025	SD189	San Diego	Sea World Dr Widening and I-5 Interchange Improvements	In San Diego, replace existing 4-lane bridge with an 8-lane bridge with new on/off ramps; widen approachways to add right turn lanes to improve access to Interstate 5 (CIP 52-706.0)

Table B.15 (continued)

Revenue Constrained Scenario: Arterial Projects

Conformity Analysis Year	SANDAG ID	Lead Agency	Project Title	Project Description
2025	SD190	San Diego	Palm Ave/I-805 Interchange	Improvements to the Palm Avenue Bridge over I-805; including repairs to the bridge approaches; a new Project Study Report (PSR) and Preliminary Environmental Assessment Report (PEAR). Phase II of the project will include widening of the bridge, realignment of existing ramps, possible addition of northbound looping entrance ramp, restriping of traffic lanes, and signal modifications.
2025	SM19	San Marcos	Grand Ave Bridge and Street Improvements	From Discovery Street to San Marcos Boulevard, construct 4-lane arterial bridge and a 6-lane arterial street from Craven to Grand Avenue
2025	SM22	San Marcos	South Santa Fe - Bosstick to Smilax	From Bosstick to Smilax, realign and signalize the South Santa Fe/Smilax intersection (Phase I)
2025	SM24	San Marcos	Woodland Pkwy Interchange Improvements	From La Moree Road to Rancheros Drive, modify existing ramps at Woodland Parkway and Barham Drive; widen and realign SR 78 undercrossing and associated work
2025	SM31	San Marcos	Discovery St Improvements	From Via Vera Cruz to Bent Avenue/Craven Road, widen roadway to 4-lane secondary arterial
2025	SM32	San Marcos	Via Vera Cruz Bridge and Street Improvements	From San Marcos Boulevard to Discovery Street, widen to 4-lane secondary arterial and construct a bridge at San Marcos Creek
2025	SM42	San Marcos	Street Improvements: Discovery St - Craven Rd to West of Twin Oaks Valley Rd	In the City of San Marcos, on Discovery Street from Craven Road to west of Twin Oaks Valley Road, construct approximately 5,100 lineal feet of a new 6-lane roadway
2025	SM43	San Marcos	Street Improvements and Widening on Barham Dr	Twin Oaks Valley Road to La Moree Road in the City of San Marcos, on Barham Drive between Twin Oaks Valley Road and La Moree Road, widen and reconstruct the north side of Barham Drive to a 6-lane prime arterial and associated work

Table B.15 (continued)

Revenue Constrained Scenario: Arterial Projects

Conformity Analysis Year	SANDAG ID	Lead Agency	Project Title	Project Description
2025	SM48	San Marcos	Creekside Dr	Construct approximately 3,000 feet of a 2-lane collector road from Via Vera Cruz to Grand Avenue in the City of San Marcos. The road will include two 12-foot lanes, diagonal parking on the north side, and parallel parking on the south side. In addition, the project also will include a 10-foot bike trail meandering along the south side.
2025	SM55	San Marcos	Borden Rd Widening and Improvements	Borden Road from Vineyard to Richland, widening of Borden Road will add an additional roadway capacity to accommodate increase in traffic volumes
2035	SD81	San Diego	Genesee Ave - Nobel Dr to SR 52	In San Diego, future widening to 6-lane major street north of Decoro Street and to a 6-lane primary arterial south of Decoro Street and included Class II bicycle lanes (CIP 52-458.0)
2035	SD190	San Diego	Palm Avenue/Interstate I-805 Interchange	Phase III will provide the ultimate build-out of the project which will incorporate improvements of Phase II plus the northbound and southbound entrance ramps (CIP 52-640.0)
2035	SM10	San Marcos	SR 78/Smilax	Construct new interchange at Smilax Road interchange and SR 78 improvements

* The arterials listed in this table reflect locally initiated projects that were submitted by local jurisdictions in the 2014 Regional Transportation Improvement Program.

Endnotes

1 One small portion of tribal land (approximately 119 acres) of the Pechanga Band of Luiseño Indians purchased within the north portion of San Diego County was excluded from the San Diego region 2008 Eight-Hour Ozone Standard non-attainment designation. All other tribal lands within San Diego County were included in the designation.

2 Appendix T: SANDAG Travel Demand Model and Forecasting Documentation includes additional detail regarding the overall model structure.

3 Full-time employment is defined in the SANDAG 2006 household survey as at least 30 hours/week. Part-time is less than 30 hours/week on a regular basis.

4 GP: general purpose lanes of a freeway.