Appendix B

Air Quality Planning and Transportation Conformity

Appendix Contents

Air Quality Planning and Transportation Conformity

Executive Summary

The San Diego Association of Governments (SANDAG), as the region's Metropolitan Planning Organization (MPO), must make a transportation air quality conformity determination for regional transportation plans (RTPs) and regional transportation improvement programs (RTIPs). The purpose of transportation conformity is to ensure that federally funded or approved activities are consistent with the State Implementation Plan (SIP). This ensures that no transportation activities will cause or contribute to new air quality violations, worsen existing violations, or delay the attainment of any relevant National Ambient Air Quality Standards (NAAQS). This report documents a demonstration of conformity for the 2008 and 2015 Ozone NAAQS for San Diego Forward: The 2019 Federal Regional Transportation Plan (2019 Federal RTP) and the 2018 Regional Transportation Improvement Program (2018 RTIP), as amended.

Background

The federal Clean Air Act (CAA), 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. 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 nonattainment areas.

The U.S. EPA requires that each state containing nonattainment areas develop plans to attain the NAAQS by a specified attainment deadline. These attainment plans are called State Implementation Plans (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.

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 national ambient air quality standards. The SANDAG conformity determinations are guided by U.S. EPA's Transportation Conformity rule (40 CFR 93.100 et seq.).

2008 Ozone Standard

On May 21, 2012, the U.S. EPA designated the San Diego air basin as a nonattainment area for the 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 demonstrated conformity of the 2011 Regional Plan and 2012 RTIP to the 2008 ozone standard on May 24, 2013, using the applicable model approved by the U.S. EPA to forecast regional emissions (EMFAC2011). The U.S. DOT, in consultation with the U.S. EPA, made its conformity determination on June 28, 2013.

Effective June 3, 2016, the U.S. EPA determined that 11 areas, including the San Diego air basin, failed to attain the 2008 ozone NAAQS by the applicable attainment date of July 20, 2015, and thus were reclassified by operation of law as Moderate for the 2008 ozone NAAQS (81 FR 26697). States containing these new Moderate areas were required to submit SIP revisions that met the statutory and regulatory requirements that apply to 2008 ozone nonattainment areas classified as Moderate by January 1, 2017. The APCD submitted a SIP revision addressing

Moderate area requirements to the Air Resources Board (ARB) on December 27, 2016. Effective December 4, 2017, the U.S. EPA found the motor vehicle emissions budgets for the Reasonable Further Progress milestone year of 2017 from the *2008 Eight-Hour Ozone Attainment Plan for San Diego County* adequate for transportation conformity purposes for the 2008 ozone NAAQS.

On August 23, 2019, U.S. EPA published a final rule in the Federal Register reclassifying the San Diego air basin by operation of law from a Moderate nonattainment area for the 2008 ozone NAAQS to Serious effective September 23, 2019 (84 FR 44238). This rulemaking changes the 2008 ozone NAAQS attainment deadline to July 20, 2021, with an attainment year of 2020.

2015 Ozone Standard

On October 26, 2015, the U.S. EPA announced a revised ozone standard, referred to as the 2015 Ozone standard (80 FR 65292). The new standard revised the allowable ozone level to 0.070 parts per million (ppm). The 2015 ozone standard became effective on December 28, 2015. On June 4, 2018, U.S. EPA published a final rule that designated the San Diego air basin as nonattainment, with a classification of Moderate, for the 2015 ozone NAAQS with an attainment deadline of August 3, 2024, and an attainment year of 2023 (83 FR 25776, effective August 3, 2018).

On May 24, 2019, the SANDAG Board of Directors (Board) adopted the 2015 Ozone National Ambient Air Quality Standard Conformity Demonstration for San Diego Forward: The Regional Plan (2015 Regional Plan) and the 2018 RTIP. The conformity demonstration found the 2015 Regional Plan and 2018 RTIP, as amended, in conformity with the requirements of the federal Clean Air Act and applicable SIP. The U.S. DOT, in consultation with U.S. EPA, made its conformity determination on June 21, 2019, indicating that all air quality conformity requirements have been met, including those for the 2015 ozone standard.

Carbon Monoxide Standard

The San Diego region had 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, which extended the maintenance plan demonstration to 2018. Effective January 30, 2006, the U.S. EPA approved this maintenance plan as a SIP revision. On March 21, 2018, the U.S. EPA documented in a letter that transportation conformity requirements for CO would cease to apply after June 1, 2018. Therefore, this appendix does not include a CO conformity analysis.

Conformity Determinations for 2015 Regional Plan, 2014 RTIP, and 2018 RTIP

On October 9, 2015, SANDAG made a conformity demonstration for the 2015 Regional Plan, which serves as the RTP. The U.S. DOT issued its conformity finding for the 2015 Regional Plan and the 2014 RTIP through Amendment No. 8 on December 2, 2015. On September 28, 2018, the Board adopted the Final 2018 RTIP and its conformity demonstration and redemonstration of conformity of the 2015 Regional Plan. The U.S. DOT, in consultation with the U.S. EPA, made its conformity determination for the 2018 RTIP on December 17, 2018. Conformity of the 2015 Regional Plan expires on December 2, 2019.

Transportation Conformity: Modeling Procedures

Growth Forecasts

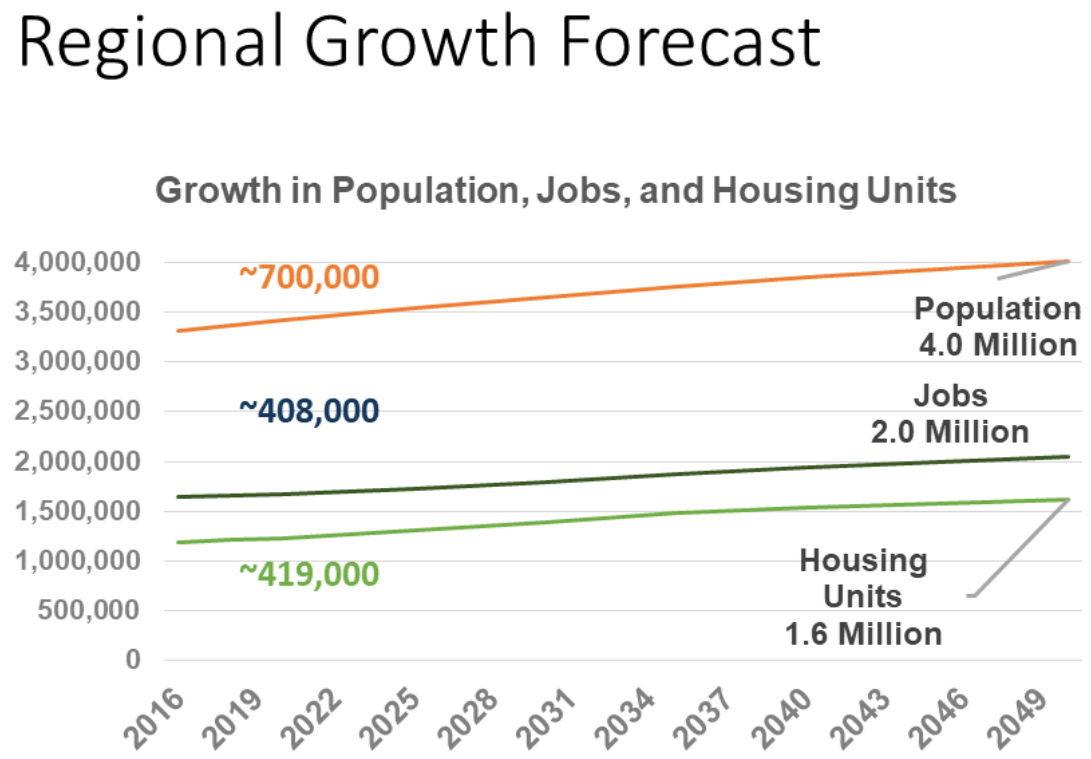
Every three to five years, SANDAG produces a long-range forecast of population, housing, and employment growth for the San Diego region. On May 25, 2018, the Board approved the assumptions for the Series 14, 2050 Regional Growth Forecast, which were used in development of the 2019 Federal RTP.

The forecast process relies upon an integrated forecasting model. The first element is the San Diego Demographic and Economic model (SanDE), which provides a detailed socioeconomic forecast for the region. Next, the regionwide data are allocated to the parcel level based upon the current plans and policies of the jurisdictions. The parcel-level forecast data can be aggregated up to larger sub-regional areas of interest.

On April 3, 2019, SANDAG consulted with the San Diego Region Conformity Working Group (CWG) on the use of the Series 14, 2050 Regional Growth Forecast for the air quality conformity analysis of the 2019 Federal RTP and 2018 RTIP, as amended. Previously, both the U.S. DOT and the U.S. EPA concurred that approved plans should be used as input in the air quality conformity process. 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 14 Version 17, 2050 Regional Growth Forecast, SANDAG

Table B.1
San Diego Regional Population and Employment Forecast

Year	Population	Employment
2016	3,316,187	1,643,741
2025	3,545,073	1,723,744
2035	3,753,630	1,870,403
2050	4,011,145	2,051,357

Source: Series 14 Version 17, 2050 Regional Growth Forecast, SANDAG

The Series 14, 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 Series 14 forecast thus represents in compliance with 40 CFR 93.110(a), the "latest planning assumptions" in force at the time this conformity analysis began.

Transportation Modeling

SANDAG uses an updated activity-based model (ABM) that incorporates the latest planning assumptions at the time the conformity analysis began per 40 CFR 93.110 to support the development of the RTP1F[1] and its conformity demonstration. 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.

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 socioeconomic 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 2019 Federal RTP and 2018 RTIP, as amended, conformity analysis 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.11 through B.13. The design concept and scope of projects allow adequate model representation to determine interactions with regionally significant facilities, route options, travel times, transit ridership, and land use.

Since the 2015 Regional Plan, SANDAG has enhanced the ABM to address the following aspects. The ABM has been updated based on 2016/2017 household travel survey data and 2015 transit on-board survey data, and the base-year of the model was updated to 2016. Several changes and enhancements were also made to the travel model system, including:

- Conversion of the commercial transportation modeling package from TransCAD to EMME2F[2]
- Implementation of a new model that explicitly models "partially joint" travel episodes, specifically the drop-off and pick-up of children at school by parents
- Incorporation of recently completed work to implement Strategic Highway Research Program recommendations regarding improving the sensitivity of travel models to pricing and reliability3F[3]
- Update of the algorithm used to find transit paths
- Update of volume-delay function parameters based upon an analysis of INRIX travel-time data
- Replacement of an asserted, aggregate commercial vehicle model with a disaggregate commercial vehicle model developed several years ago but not previously integrated with the San Diego travel model system4F[4]
- Update of the heavy truck model, which models internal–external truck flows, to incorporate the latest Freight Analysis Framework (FAF4) data and projections
- Implementation of an airport ground access model for the Cross-Border Express (CBX) facility serving Tijuana International Airport
- Update of models to better match "big data" for special travel destinations including beaches, parks, hospitals, and shopping malls
- Incorporation of a new population synthesizer developed by SANDAG

The new model system is referred to as ABM2. The document uses ABM2 to refer to the latest model used for the 2019 Federal RTP.

This appendix describes the key modeling units, ABM2 model flow, the San Diego residents travel module, highway, transit and active transportation 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 ABM2 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[5]	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 ABM2 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	Maintenance	Age 16+
6	Shopping	(auto trips only)	Maintenance	5+ (if joint travel, all persons)
7	Other Maintenance	Shopping away from home	Maintenance	5+ (if joint travel, all persons)
8	Social/ Recreational	Personal business/services and medical appointments	Discretionary	5+ (if joint travel, all persons)
9	Eat Out	Recreation, visiting friends/family	Discretionary	5+ (if joint travel, all persons)
10	Other Discretionary	Eating outside of home	Discretionary	5+ (if joint travel, all persons)

The SANDAG ABM2 models a full travel day of activity broken into half-hour intervals. These 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 ABM2 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 half-hour increment. The ABM2 assigns auto and transit traffic at five discrete time-of-day periods aggregated from the half-hour intervals shown in Table B.5.

Table B.5
Time Periods for Level of Service Skims and Assignment

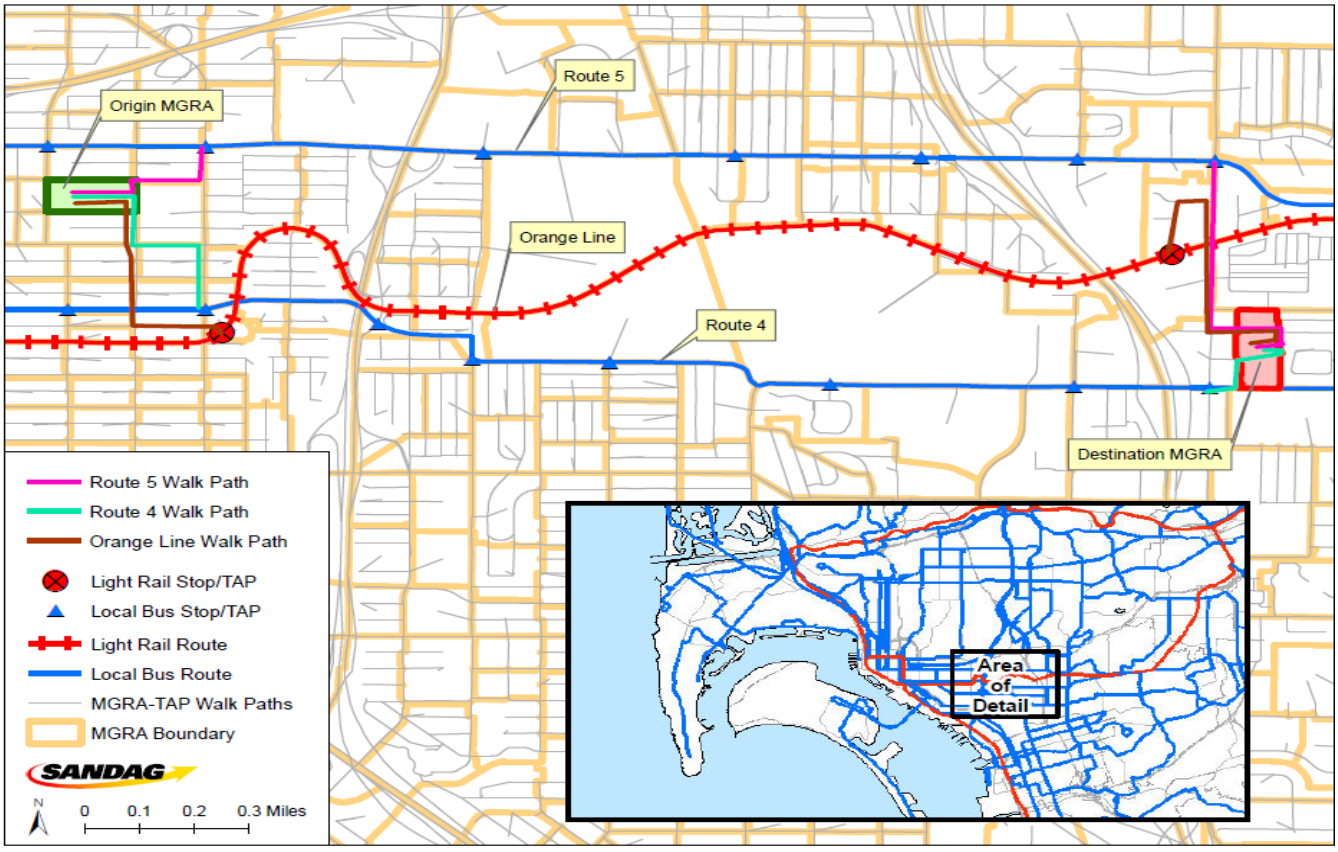
Number	Description	Begin Time	End Time
1	Early	3 a.m.	5:59 a.m.
2	A.M. Peak	6 a.m.	8:59 a.m.
3	Midday	9 a.m.	3:29 p.m.
4	P.M. Peak	3:30 p.m.	6:59 p.m.
5	Evening	7 p.m.	2:59 a.m.

The SANDAG ABM2 uses three-tier zone systems, as shown in Table B.6. The Master-Geographic Reference Area (MGRA) zone system is used for transit access, 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 ABM2 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 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 Master-Geographic Reference Area – Transit Access Point Transit Accessibility



The ABM2 includes 18 modes available to residents, including auto by occupancy, toll/non-toll choice, walk and bike modes, and walk and drive access to local, premium, or local and premium transit modes. Pay modes are those that involve paying a choice or "value" toll. Table B.7 lists the trip modes defined in the SANDAG ABM2.

To model transit flow, the ABM2 uses five transit line-haul modes: (1) Commuter Rail (COASTER); (2) Light Rail Transit (LRT) (including Trolley, SPRINTER, and Streetcar); (3) Bus *Rapid* Transit (*Rapid)/Rapid* Bus; (4) Express Bus; and (5) Local Bus. The first four modes are premium transit modes. 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 Eligible)
3	Share Ride 2 Person (Non-Toll)
4	Share Ride 2 Person (Toll Eligible)
5	Share Ride 3+ Person (Non-Toll)
6	Share Ride 3+ Person (Toll Eligible)
7	Walk – Local Bus Only
8	Walk – Premium Transit Only
9	Walk – Local Bus and Premium Transit
10	PNR – Local Bus Only
11	PNR – Premium Transit Only
12	PNR – Local Bus and Premium Transit
13	KNR – Local Bus Only
14	KNR – Premium Transit Only
15	KNR – Local Bus and Premium Transit
16	Walk
17	Bike
18	School Bus (only available for school purpose)

ABM2 Model Flow

To simulate how San Diego residents, non-residents, and freight travel, the SANDAG ABM 2 includes several models and steps.

Figure B.3 outlines the overall flow of the SANDAG ABM2. It starts with building highway and transit networks in the traffic assignment software, followed by traffic 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 ABM2 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 traffic 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 ABM2 is the San Diego County residents' travel module. It simulates San Diegans' 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 cross-border 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.

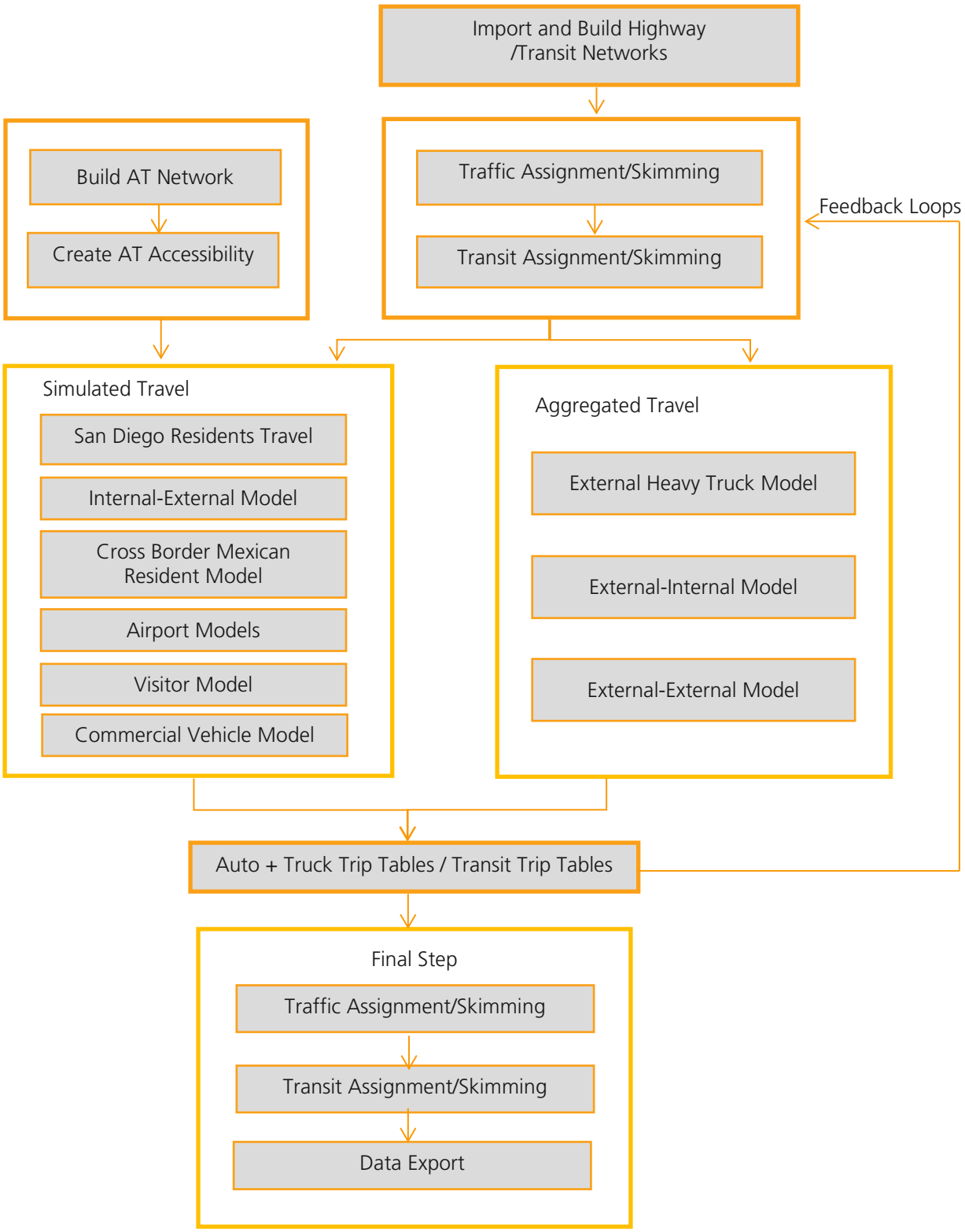
After network assignment, the EMFAC model is used to generate emissions summaries based on the inputs generated by the post-processing of traffic assignment outputs.

San Diego Residents Travel Module

The San Diego residents' travel module comprises 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 ABM2 is traffic assignment where trips are summarized by traffic analysis zones and assigned to the transportation network.

Figure B.3

SANDAG ABM2 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 socioeconomic and housing characteristics of each part of the region at the zonal level. These forecasts, a key ABM2 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.

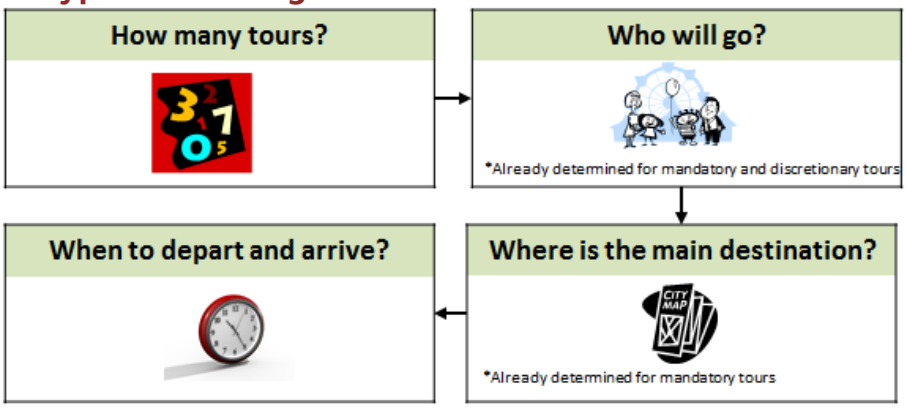
Step 4: Schedule the day

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 ABM2 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

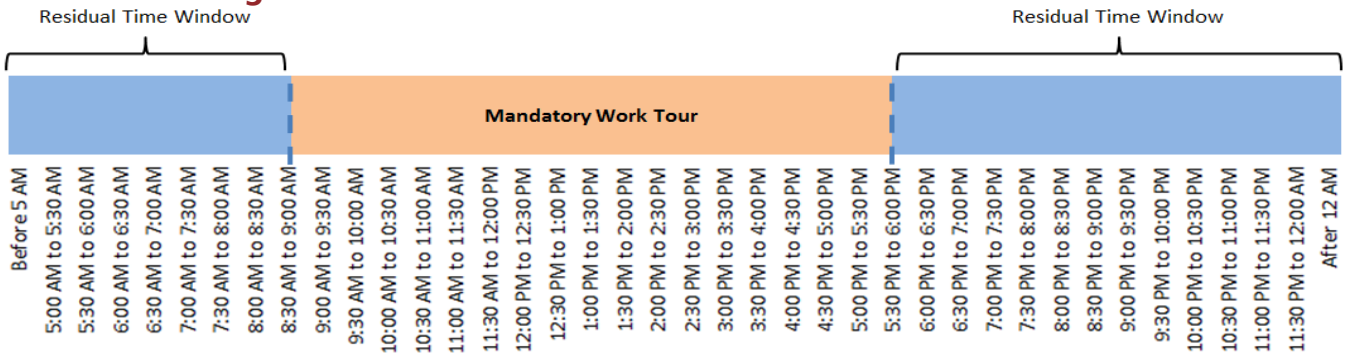


For individuals assigned a "mandatory" activity pattern, the sub-module first assigns the number of work tours and/or school tours they will make. After the number of these mandatory tours has been determined, the sub-module selects the time of departure from and arrival back home for each tour.

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



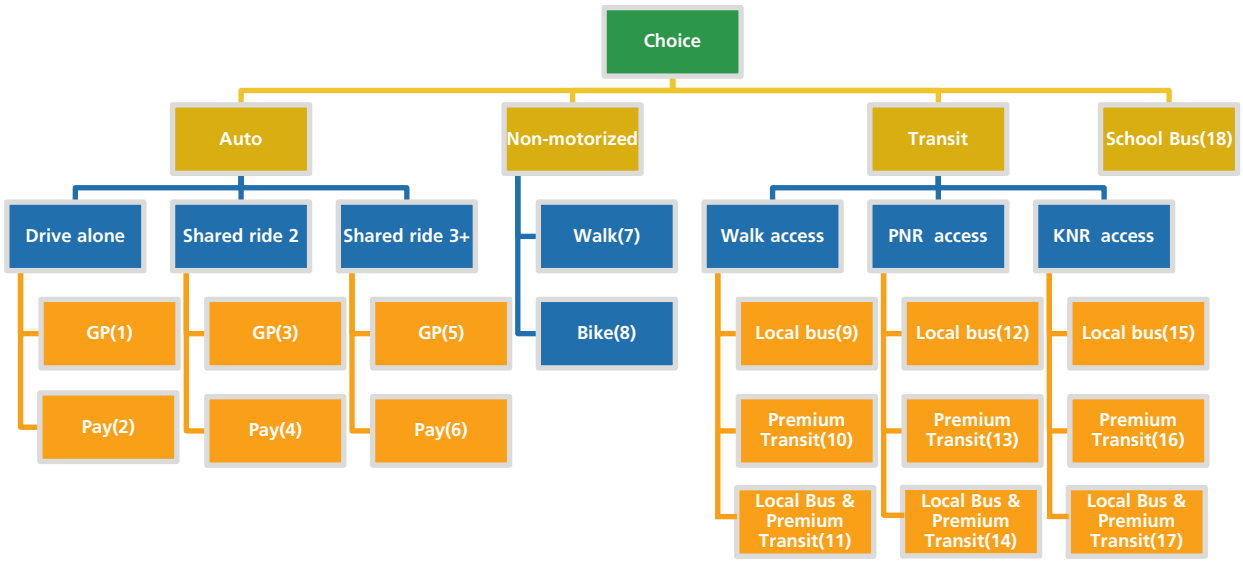
In time remaining after mandatory tours are scheduled, the sub-module determines the number of joint tours to be made for each household. It only schedules joint tours in the time windows that overlap between individuals after it accounts for mandatory activities. After the number and purpose of these 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 ABM2 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



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 ABM2. 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 six vehicle modes (drive alone non-toll; drive alone toll eligible; share ride 2 non-toll; share ride 2 toll eligible; share ride 3+ non-toll; and share ride 3+ toll eligible) 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) from truck model and commercial vehicle model in one combined procedure.

The traffic 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 traffic 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, 45 separate transit assignments are produced for five time periods: (1) walk; (2) Park & Ride; (3) kiss & ride; and (4) three transit modes. These individual assignments are summed to obtain total transit ridership forecasts.

Model Inputs

The SANDAG ABM2 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.11 through B.13. 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 2019 Federal RTP 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 2019 Federal RTP and 2018 RTIP, as amended, 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. 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, 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/High Occupancy Vehicle (HOV) lanes are included in the Revenue Constrained 2019 Federal RTP (Table B.11, located at the end of this appendix). Facilities with proposed Managed Lanes include Interstate 5 (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 2019 Federal RTP 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 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 2019 Federal RTP and 2018 RTIP, as amended, SANDAG built and verified five highway networks (2020, 2023, 2030, 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.11 and B.13. 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, and streetcars
- Streets used by buses that are not part of local general plan circulation elements

Rapid service has stop spacing similar to commuter rail stations and operating characteristics midway between rail and bus service. *Rapid* 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 $1.75 for NCTD and $2.25 MTS (COASTER Connection buses are free and some future shuttle routes charge $1)
- 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 *Rapid* routes, which are assumed to charge $2.50 ($5 for Express Freeway *Rapids*)
- Proposed *Rapid* Bus routes, which are assumed to charge $2.25

Transit fares reflect ridership costs at the time the transportation model was developed. Fares are expressed in 2010 dollars and are held 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 2019 Federal RTP 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 2019 Federal RTP and the 2018 RTIP, as amended. Once network coding is completed, the ABM2 is run for the applicable scenarios (2020, 2023, 2030, 2040, and 2050).

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 for walking and biking and from TAZ to TAZ for biking modes. These active transportation accessibility measures are inputs to the SANDAG ABM2 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) class IV – bike boulevard; and (5) class V – cycle track.

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 2016–2017 Household Travel Behavior Survey (HTS2016) with smartphone-based travel diaries as the primary means of travel data collection. 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. HTS2016 surveyed 6,139 households in San Diego County. The survey asked all household with smartphones to participate using the smartphone-based GPS travel diary and survey app (rMove) for one week and accommodated participating households without smartphones by allowing them to complete their one-day travel diary online or by calling the study call center.

Additional data needed for the mode choice components of the ABM2 come from a transit on-board survey. The most recent SANDAG survey of this kind is the 2015 Transit On-Board Survey (OBS2015). OBS2015 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.

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
ABM2 Input Data

SANDAG Surveys	Outside Data Sources

• Household Travel Behavior Survey (2016)
• Transit On-Board Survey (2015)
• 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

On March 1, 2018, ARB released EMFAC2017 v1.0.2 to the public. On August 15, 2019, the U.S. EPA approved EMFAC2017 for use in conformity determinations and allowed for a two-year grace period (84 FR 41717).

Consistent with 40 CFR 93.111, EMFAC2017 v1.0.2, as the latest emissions model was used to project the regional emissions for the 2019 Federal RTP conformity determination and 2018 RTIP, as amended, conformity redetermination.

Projections of daily regional emissions were prepared for reactive organic gases (ROG) and nitrogen oxides (NOx).

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

EMFAC2017 models multiple vehicle categories, including the following:

- Passenger cars
- Motor homes
- Medium-duty trucks
- Medium-heavy-duty trucks
- School buses
- Motor coaches
- Motorcycles
- Light-duty trucks
- Light-heavy-duty trucks
- Heavy-heavy-duty trucks
- Urban buses
- Other bus types

EMFAC2017 includes updated motor vehicle fleet information from the California Department of Motor Vehicles for 2013–2016 and a new module which improves the characterization of activity and emissions from transit buses. Additionally, EMFAC2017 allows users to estimate emissions of natural gas-powered vehicles in addition to gasoline- and diesel-powered vehicles.

Regional Emissions Forecasts

Regional transportation forecasts were initiated in June 2019. Output from the ABM2 was then reformatted and adjusted to be useful for emissions modeling. Beginning in June 2019, SANDAG prepared countywide forecasts of average weekday ROG and NOx emissions for 2020, 2023, 2030, 2040, and 2050 using the EMFAC2017 v1.0.2 model. ROG and NOx emissions are based upon the summer season.

2008 Eight-Hour Ozone Standard

Effective December 4, 2017, the U.S. EPA found the motor vehicle emissions budgets for the Reasonable Further Progress milestone year of 2017 from the 2008 Eight-Hour Ozone Attainment Plan for San Diego County adequate for transportation conformity purposes for the 2008 ozone NAAQS (82 FR 54339).

The analysis years were selected to comply with 40 CFR 93.106(a)(1) and 93.118(a). According to these sections of the Conformity Rule, the first horizon year (2020) must be within ten years from the base year used to validate the regional transportation model (2016), 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 (2030 and 2040). The 2020 analysis year is also used to demonstration conformity to the 2008 ozone standard attainment year.

2015 Eight-Hour Ozone Standard

The SANDAG region was designated as a nonattainment area for the 2015 Eight-Hour Ozone standard with a classification of moderate, effective August 3, 2018 (83 FR 25776). Nonattainment areas with a moderate classification have an attainment date of August 3, 2024. The nearest complete ozone season (January–December) to the attainment year must be included in the analysis years (see implementation requirements for 2015 ozone standard, 83 FR 62998).

The analysis years were selected to comply with 40 CFR 93.106(a)(1), 93.118(a), and 93.119(g). According to these sections of the Conformity Rule, the first horizon year (2020) must be within ten years from the base year used to validate the regional transportation model (2016), 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 (2030 and 2040). In addition, the first analysis year must be no more than five years beyond the year in which the conformity determination is being made (2020, 2023). The year 2023 was included in the emissions analysis to demonstrate conformity to the 2015 ozone NAAQS attainment year.

This conformity determination precedes the development of a SIP for the 2015 ozone standard, which would establish new emission budgets. U.S. EPA has published the Transportation Conformity Guidance for 2015 Ozone NAAQS Nonattainment Areas, which details procedures needed to demonstrate conformity without a 2015 Ozone SIP. The conformity analysis was conducted in accordance with the above guidance and 40 CFR 93.109(c)(2).

SANDAG meets the two criteria established by the EPA guidance needed to allow for the "budget test" procedure (i.e., using emissions budgets for the 2008 ozone standard) to demonstrate conformity. The qualification criteria for the budget test are:

1. The region has approved budgets for a previous (2008 eight-hour) ozone NAAQS.
2. The non-attainment areas for the previous ozone NAAQS and 2015 ozone NAAQS are identical.

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 2019 Federal RTP and redetermine conformity of the 2018 RTIP, as amended, the emission analysis described in the Regional Emissions Forecast section was used. Table B.9 shows that the projected ROG and NOx emissions from the 2019 Federal RTP and 2018 RTIP, as amended, are below the applicable ROG and NOx budgets for both the 2008 and 2015 ozone standards.

Table B.9

2019 Federal Regional Transportation Plan and 2018 RTIP, as amended Conformity Analysis for the 2008 and 2015 Eight-Hour Ozone Standards (EMFAC2017)

			ROG		NOx	
Year	Average Weekday Vehicle Starts (1,000s)	Average Weekday Vehicle Miles (1,000s)	SIP Emissions Budget Tons/Day	ROG Emissions Tons/Day	SIP Emissions Budget Tons/Day	NOx Emissions Tons/Day
2020	10,807	83,650	23	17	42	25
2023	11,183	84,716	23	14	42	17
2030	12,565	90,457	23	11	42	14
2040	14,006	95,639	23	9	42	12
2050	15,225	100,040	23	8	42	13

Note: Emissions budgets from the *2008 Eight-Hour Ozone Attainment Plan for San Diego County (December 2016)*, which were found adequate for transportation conformity purposes by the U.S. EPA effective December 4, 2017, are used for all analysis years.

Exempt Projects

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

Table B.10 illustrates the exempt projects considered in the Revenue Constrained 2019 Federal RTP and 2018 RTIP, as amended. 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.10
Exempt Projects

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

Table B.10 (continued)
Exempt Projects

Project/Program Description	Project/Program Description
Safety Improvement Program	*Transportation Systems Management*
Bridge Rehabilitation/Preservation/Retrofit	Traveler Information System
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	Intelligent Transportation System for Transit
Safe Routes to School	ITS Operations
Transit Terminals	*Joint Transportation Operations Center*
Airport Intermodal Transit Center/Terminal	Trolley Fiber Communication Network
San Ysidro Intermodal Transit Center/Terminal	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) bicycle 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[6]. Ridesharing, transit, bicycling, and traffic flow improvements continue to be funded, although the level of implementation established in the SIP has been surpassed.

Interagency Consultation Process and Public Input

The consultation process followed to prepare the Air Quality Conformity Analysis for the 2019 Federal RTP, and 2018 RTIP, as amended, complies with the San Diego Transportation Conformity Procedures adopted in July 1998. In turn, these procedures comply with federal requirements under 40 CFR Part 93. Interagency consultation involves SANDAG (as the MPO for San Diego County), the APCD, Caltrans, CARB, U.S. DOT, and U.S. EPA.

Consultation is a three-tier process that:

1. Formulates and reviews drafts through a conformity working group.
2. Provides local agencies and the public with opportunities for input through existing regional advisory committees and workshops.
3. 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 2019 Federal RTP and 2018 RTIP, as amended, at meetings of the San Diego Region CWG, as follows:

- On March 6, 2019, SANDAG staff presented the action plan approved by the Board on February 22, 2019, for the development of the 2019 Federal RTP.
- On April 3, 2019, SANDAG staff presented information about the criteria and procedures to be followed for its conformity analysis. Staff presented information on the 2050 Regional Growth Forecast, Travel Demand Model, Transportation Control Measures, Revenue Constrained financial assumptions, latest emissions model and emissions budgets, and public involvement and outreach.
- On June 5, 2019, SANDAG staff presented additional information on the 2019 Federal RTP schedule, travel demand modeling, and updated revenue-constrained financial assumptions.
- On July 22, 2019, through August 21, 2019, public comment was sought on the proposed draft transportation network for the 2019 Federal RTP.
- On July 26, 2019, SANDAG staff presented the 2019 Federal RTP proposed draft transportation network to the Board.
- On August 2, 2019, SANDAG staff distributed the 2019 Federal RTP proposed draft transportation network to the CWG. The project lists were discussed at the August 7, 2019, CWG meeting.
- On September 20, 2019, SANDAG staff distributed the draft conformity analysis for the 2019 Federal RTP and 2018 RTIP, as amended to the CWG for interagency consultation.
- The CWG discussed the conformity analysis for the 2019 Federal RTP conformity demonstration and a redemonstration of conformity for the 2018 RTP, as amended, at its October 2, 2019, meeting.
- On October 25, 2019, the SANDAG Board of Directors adopted Resolution No. 2019-12, adopting the air quality conformity determination, finding that the Revenue Constrained Plan is in conformance with the State Implementation Plan for air quality; adopting the 2019 Federal Regional Transportation Plan and its supporting analyses, and; adopting findings in support of a Notice of Exemption under the California Environmental Quality Act.

Members of the public were welcomed to provide comments at meetings of the CWG, the *TransNet* Independent Taxpayer Oversight Committee, the Transportation Committee, and the Board.

Table B.11

Phased Highway Projects – 2019 Federal Regional Transportation Plan

Conformity Analysis Year	Freeway	From	To	Existing	With Improvements	Capital Cost ($2019); millions	Capital Cost ($YOE); millions
Managed Lanes / Toll Lanes							
2023	SR 11/ Otay Mesa East Port of Entry (POE)	SR 125	Mexico	--	4T + POE	$472	$472
2023	I-5	Manchester Ave	SR 78	8F	8F+2ML	$51	$51
2030	I-5	SR 905	SR 54	8F	8F +2ML	$542	$627
2030	I-5	SR 54	SR 15	8F	10F+2ML	$467	$540
2030	I-5	La Jolla Village Dr I-5/I-805 Merge	I-5/805 Merge SR 56	8F/14F 8F/14F+ 2ML	8F/14F+2ML 8F/14F+4ML	$422	$513
2030	I-5	SR 78	Vandegrift Blvd	8F	8F+2ML	$116	$131
2030	I-15	I-8	SR 163	8F	8F+2ML	$64	$72
2030	I-805	SR 94	SR 15	8F	8F+2ML	$234	$264
2030	I-805	SR 52	Carroll Canyon Rd	8F+2ML	8F+4ML	$778	$996
2040	I-5	SR 56	SR 78	8F+2ML	8F+4ML	$2,082	$3,019
2040	SR 15	SR 94	I-805	6F	6F+2ML	$41	$59
2040	SR 78	I-5	I-15	6F	6F+2ML	$1,621	$2,127
2040	SR 94	I-5	I-805	8F	8F+2ML	$728	$955
2040	I-805	SR 905	Palomar St	8F	8F+2ML	$235	$316
2040	I-805	SR 54	SR 94	8F +2ML	8F+4ML	$742	$998
2040	I-805	SR 163	SR 52	8F	8F+2ML	$195	$269
2050	I-5	I-8	La Jolla Village Dr	8F/10F	8F/10F+2ML	$978	$2,067
2050	I-5	SR 78	Vandegrift Blvd	8F+2ML	8F+4ML	$632	$1,336

Table B.11 (continued)

Phased Highway Projects – 2019 Federal Regional Transportation Plan

Conformity Analysis Year	Freeway	From	To	Existing	With Improvements	Capital Cost ($2019); millions	Capital Cost ($YOE); millions
Managed Lanes / Toll Lanes							
2050	I-5	Vandegrift Blvd	Orange County	8F	8F+4T	$3,165	$6,687
2050	I-15	Viaduct		8F	8F+2ML	$1,040	$2,197
2050	I-15	SR 78	Riverside County	8F	8F+4T	$1,744	$3,684
2050	SR 15	I-5	SR 94	6F	8F+2ML	$185	$391
2050	SR 52	I-805	I-15	6F	6F+2ML	$238	$503
2050	SR 52	I-15	SR 125	4F/6F	4F/6F+2ML (R)	$405	$856
2050	SR 54	I-5	SR 125	6F	6F+2ML	$151	$319
2050	SR 94	I-805	SR 125	8F	8F+2ML	$501	$1,057
2050	SR 125	SR 54	I-8	6F/8F	6F/10F+2ML	$690	$1,457
2050	I-805	SR 94	SR 15	8F+2ML	8F+4ML	$83	$175
2050	I-805	SR 15	SR 163	8F/10F	8F/10F+4ML	$1,567	$3,310
2050	I-805	SR 163	SR 52	8F+2ML	8F+4ML	$438	$925
Highway Projects							
2030	SR 67	Mapleview St	Gold Bar Ln	2C	4C	$82	$92
2040	SR 52	Mast Blvd	SR 125	4F	6F	$103	$147
2050	I-8	2nd St	Los Coches	4F/6F	6F	$44	$94
2050	SR 52	I-5	I-805	4F	6F	$151	$319
2050	SR 56	I-5	I-15	4F	6F	$192	$405
2050	SR 67	Gold Bar Ln	Dye Rd	2C/4C	4C	$591	$1,248
2050	SR 94	Avocado Blvd	Jamacha	4C	6C	$124	$261
2050	SR 94	Jamacha	Steele Canyon Rd	2C/4C	4C	$54	$115
2050	SR 94	SR 125	Avocado Blvd	4F	6F	$190	$401
2050	SR 125	San Miguel Rd	SR 54	4F	8F	$241	$509
2050	SR 125	SR 905	San Miguel Rd	4T	8F	$439	$741

Table B.11 (continued)

Phased Highway Projects – 2019 Federal Regional Transportation Plan

Conformity Analysis Year	Freeway	From	To	Existing	With Improvements	Capital Cost ($2019); millions	Capital Cost ($YOE); millions
Operational Projects							
2050	I-5	SR 15	I-8	8F	8F+ Operational	$1,985	$4,194
2050	I-8	I-5	SR 125	8F/10F	8F/10F+ Operational	$907	$1,917
2050	I-8	SR 125	2nd St	6F/8F	6F/8F+ Operational	$227	$480
2050	SR 76	I-15	Couser Canyon	2C/4C	4C/6C+ Operational	$178	$376
Managed Lanes Connectors							
2030	I-5	I-805	North to North & South to South			*	*
2030	I-15	SR 78	East to South & North to West			$144	$171
2030	SR 15	I-805	North to North & South to South			$110	$124
2040	I-5	SR 78	South to East & West to North, North to East & West to South			$344	$451
2040	SR 15	SR 94	South to West & East to North			$97	$127
2040	I-805	SR 52	West to North & South to East			*	*
2040	I-805	SR 94	North to West & East to South			$137	$180
2050	I-15	SR 52	West to North & South to East			$177	$374
Freeway Connectors							
2030	SR 94	SR 125	South to East			$94	$106
2030	SR 94	SR 125	West to North			$110	$134
2040	I-5	SR 56	West to North & South to East			$371	$487
2040	I-5	SR 78	South to East & West to South			$371	$487
2050	I-15	SR 56	North to West			$104	$219

* Project cost included in associated Managed Lane project

Table B.12

Phased Transit Services – 2019 Federal Regional Transportation Plan

Conformity Analysis Year	Service	Route	Description	Capital Cost ($2019); millions	Capital Cost ($YOE); millions
2023	Trolley	510	Mid-Coast Trolley Extension	$919	$919
2030	Airport Express	--	Airport Express Routes [A]	$71	$82
2030	COASTER	398	Phase I: Double tracking (20-minute peak frequencies and 120-minute off-peak frequencies) Phase II: Double tracking (20-minute peak frequencies and 60-minute off-peak frequencies, grade separations at Leucadia Boulevard, stations/platforms at Convention Center/Gaslamp Quarter, and extension to Camp Pendleton)	$609 $1,224	$693 $1,488
2030	*Rapid*	2	North Park to Downtown San Diego via 30th St	$54	$62
2030	*Rapid*	10	La Mesa to Ocean Beach via Mid-City, Hillcrest, Old Town	$57	$65
2030	*Rapid*	11	Spring Valley to SDSU via Southeast San Diego, Downtown, Hillcrest, Mid-City	$154	$199
2030	*Rapid*	28	Point Loma to Kearny Mesa via Old Town, Linda Vista	$67	$80
2030	*Rapid*	30	Old Town to Sorrento Mesa via Pacific Beach, La Jolla, UTC	$143	$172
2030	*Rapid*	41	Fashion Valley to UTC/UC San Diego via Linda Vista and Clairemont	$75	$90
2030	*Rapid*	90	El Cajon Transit Center to San Diego International Airport ITC via SR 94, City College (peak only)	$27	$32
2030	*Rapid*	120	Kearny Mesa to Downtown via Mission Valley	$127	$145
2030	*Rapid*	SR 163 DARs	Kearny Mesa to Downtown via SR 163. Stations at Sharp/Children's Hospital, University Ave, and Fashion Valley Transit Center	$204	$215
2030	*Rapid*	473	Phase I – Solana Beach to UTC/UC San Diego via Highway 101 Coastal Communities, Carmel Valley	$58	$70
2030	*Rapid*	550	SDSU to Palomar Station via East San Diego, Southeast San Diego, National City	$112	$126
2030	*Rapid*	635	Eastlake to Palomar Trolley via Main St Corridor	$105	$126
2030	*Rapid*	638	Iris Trolley Station to Otay Mesa via Otay, Airway Dr, SR 905 Corridor	$52	$67

Table B.12 (continued)

Phased Transit Services – 2019 Federal Regional Transportation Plan

Conformity Analysis Year	Service	Route	Description	Capital Cost ($2019); millions	Capital Cost ($YOE); millions
2030	*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	$208	$229
2030	*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)	$623	$757
2030	*Rapid*	709	H St Trolley Station to Millennia via H St Corridor, Southwestern College	$89	$101
2030	*Rapid*	950	Extension of Iris Trolley Station to Otay Mesa Port of Entry (POE) route with new service to Imperial Beach (formerly route 905)	$3	$3
2030	*Rapid*	910	Coronado to Downtown via Coronado Bridge	$54	$65
2030	Shuttle	448/449	San Marcos Shuttle [B]	$0	$0
2030	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 Drive / Main St, North Dr, Civic Center, Auto Pkwy and Mission Avenue	$1,287	$1,564
2030	Streetcar	553	Downtown San Diego: Little Italy to East Village [C]	$15	$20
2030	Streetcar	554	Hillcrest/Balboa Park/Downtown San Diego Loop [C]	$39	$45
2030	Streetcar	555	30th Street to Downtown San Diego via North Park/Golden Hill[1]	$23	$29
2030	Trolley	510	Phase I – Blue Line Frequency Enhancements and rail grade separations at 28th Street, 32nd Street, E Street, H Street, Palomar Street, and Blue/ Orange Track Connection at 12th & Imperial	$279	$339
2030	Trolley	520	Orange Line Frequency Enhancements and four rail grade separations at Euclid Avenue, Broadway/ Lemon Grove Avenue, Allison Avenue/ University Avenue, Severin Drive	$363	$453
2030	Trolley	561	UTC to COASTER Connection (extension of Route 510)	$467	$581

Table B.12 (continued)

Phased Transit Services – 2019 Federal Regional Transportation Plan

Conformity Analysis Year	Service	Route	Description	Capital Cost ($2019); millions	Capital Cost ($YOE); millions
2030			Local Bus Routes – 15 minutes in key corridors	--	--
2040	*Rapid*	103	Solana Beach to Sabre Springs *Rapid* station via Carmel Valley	$91	$152
2040	*Rapid*	235	Temecula (peak only) Extension of Escondido to Downtown *Rapid* (formerly Route 610)	$133	$222
2040	*Rapid*	440	Carlsbad to Escondido Transit Center via Palomar Airport Road	$140	$234
2040	*Rapid*	473	Phase II – Oceanside to Solana Beach via Hwy 101 Coastal Communities	$118	$197
2040	*Rapid*	477	Camp Pendleton to Carlsbad Village via College Boulevard, Plaza Camino Real	$109	$181
2040	*Rapid*	636	SDSU to Spring Valley via East San Diego, Lemon Grove, Skyline	$53	$88
2040	*Rapid*	637	North Park to 32nd St Trolley Station via Golden Hill	$60	$101
2040	*Rapid*	650	Chula Vista to Palomar Airport Road Business Park via I-805/I-5 (peak only)	$112	$186
2040	*Rapid*	653	Mid-City to Palomar Airport Road via Kearny Mesa/I-805/I-5	$14	$22
2040	SPRINTER	588	SPRINTER Express	$332	$545
2040	Streetcar	565	Mission Beach to La Jolla via Pacific Beach	$34	$57
2040	Trolley	510	Phase II – Blue Line rail grade separations at Taylor Street and Ash Street	$307	$505
2040	Trolley	562	Phase I – San Ysidro to Kearny Mesa via Chula Vista via Highland Avenue/4th Avenue, National City, Southeast San Diego, Mid-City, and Mission Valley	$4,575	$6,290
2040			Local Bus Routes – 10 minutes in key corridors	--	--
2050	COASTER	398	COASTER double tracking (completes double tracking; includes Del Mar Tunnel) and grade separations	$3,921	$8,258
2050	*Rapid*	471	Downtown Escondido to East Escondido	$46	$94
2050	*Rapid*	474	Oceanside to Vista via Mission Avenue/ Santa Fe Road Corridor	$99	$202
2050	*Rapid*	870	El Cajon to UTC via Santee, SR 52, I-805	$100	$190
2050	*Rapid*	890	El Cajon to Sorrento Mesa via SR 52, Kearny Mesa	$16	$31

Table B.12 (continued)

Phased Transit Services – 2019 Federal Regional Transportation Plan

Conformity Analysis Year	Service	Route	Description	Capital Cost ($2019); millions	Capital Cost ($YOE); millions
2050	SPRINTER	399	Branch Extension to Westfield North County	$239	$479
2050	Trolley	520	Orange Line Frequency Enhancements	$0	$0
2050	Trolley	530	Green Line Frequency Enhancements	$0	$0
2050	Trolley	560	SDSU to Downtown via El Cajon Boulevard/ Mid-City (transition of Mid-City *Rapid* to Trolley)	$3,251	$6,676
2050	Trolley	562	Phase II – Kearny Mesa to Carmel Valley	$2,191	$4,389
2050	Trolley	563	Pacific Beach to El Cajon Transit Center	$1,579	$3,024

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

Table B.13

Phased Arterial Projects – 2019 Federal Regional Transportation Plan

Conformity Analysis Year	SANDAG ID	Lead Agency	Project Title	Project Description
2020	CB04B	Carlsbad	El Camino Real and Cannon Road	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
2020	CB13	Carlsbad	Poinsettia Lane Reach E – Cassia Drive to Skimmer Court	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
2020	CB34	Carlsbad	Palomar Airport Road – Palomar Airport Road to Paseo Del Norte	In Carlsbad, widening along eastbound Palomar Airport Road to provide a dedicated right turn lane to southbound Paseo Del Norte
2020	CB35	Carlsbad	Palomar Airport Road – Palomar Airport Road to Paseo Del Norte	In Carlsbad, lengthen the left turn pocket along eastbound Palomar Airport Road to northbound Paseo Del Norte
2020	CHV08	Chula Vista	Willow Street Bridge Project – Bonita Road to Sweetwater Road	Replace 2-lane bridge with 4-lane bridge (Phase II)
2020	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
2020	ESC06	Escondido	El Norte Parkway Bridge at Escondido Creek – Kaile Lane to Key Lime Way	Construct missing 2-lane bridge at Escondido Creek
2020	ESC24	Escondido	Centre City Parkway	Mission Road to SR 78, widen 4 lanes to 6 lanes with intersection improvements

Table B.13 (continued)

Phased Arterial Projects – 2019 Federal Regional Transportation Plan

Conformity Analysis Year	SANDAG ID	Lead Agency	Project Title	Project Description
2020	NC01	National City	Plaza Boulevard Widening	Phase II of Plaza Boulevard from Highland Avenue to N 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
2020	SD83	San Diego	SR 163/Friars Road Interchange Modification	Widen and improve Friars Road and overcrossing; reconstruct interchange including improvements to ramp intersections (Phase 1); construct new connector roadways and structures (Phase 2); construct auxiliary lanes along northbound and southbound SR163 (Phase 3) (CIP Legacy#52-455.0,WBS# S-00851)
2020	SD102A	San Diego	Otay Truck Route Widening	Phase I (from La Media Rd to Drucker Lane) of Otay Truck Route in San Diego from Drucker Lane to La Media, add 1 lane (total 3 lanes) for trucks; from Britannia to La Media, add 1 lane for trucks and one lane for emergency vehicles (border patrol/fire department access); add one lane for trucks along Britannia from Britannia Court to the Otay Truck Route.
2020	SM22	San Marcos	South Santa Fe – Bosstick to Smilax	From Bosstick to Smilax, realign and signalize the South Santa Fe/Smilax intersection (Phase I)
2020	SM31	San Marcos	Discovery Street Improvements	From Via Vera Cruz to Bent Avenue/Craven Road, widen roadway to 4-lane secondary arterial
2020	SM48	San Marcos	Creekside Drive	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
2020	V15	Various	I-5/Gilman Drive Bridge	In San Diego, construct new overcrossing over I-5 between Gilman Drive and Medical Center Drive

Table B.13 (continued)

Phased Arterial Projects – 2019 Federal Regional Transportation Plan

Conformity Analysis Year	SANDAG ID	Lead Agency	Project Title	Project Description
2023	CB12	Carlsbad	College Blvd Reach A – Badger Lane to Cannon Road	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
2023	CB22	Carlsbad	Avenida Encinas – widen from Palomar Airport Road to EWPCF	In Carlsbad, Avenida Encinas from Palomar Airport Road southerly to existing improvements adjacent to Embarcadero Lane, roadway widening to secondary arterial standards
2023	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
2023	CHV69	Chula Vista	Heritage Road 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 median; project is on Heritage Road from the intersection of Main Street and Nirvana Avenue to Entertainment Circle
2023	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
2023	CNTY24	San Diego County	Cole Grade Road	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

Table B.13 (continued)

Phased Arterial Projects – 2019 Federal Regional Transportation Plan

Conformity Analysis Year	SANDAG ID	Lead Agency	Project Title	Project Description
2023	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
2023	ESC04	Escondido	Citracado Parkway II	West Valley to Harmony Grove, widen from 2 to 4 lanes with raised medians; construct bridge over Escondido Creek
2023	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
2023	NC01	National City	Plaza Boulevard Widening	Phase III of Plaza Boulevard from I-805 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
2023	O22	Oceanside	College Boulevard – Avenida de la Plate to Waring Road	In Oceanside, widen from the existing 4 lanes to 6 lanes with bike lanes and raised median
2023	SD70	San Diego	West Mission Bay Drive Bridge	In San Diego, replace bridge and increase from 4- to 6-lane bridge including Class II bike lane (52-643/S00871)
2023	SD247	San Diego	Camino del Sur and Carmel Mountain Road	On Camino del Sur from Carmel Mountain Road to Dormouse Road, and on Camino del Sur from Torrey Santa Fe to Carmel Mountain Rd, construction of Camino del Sur as a 2-lane interim roadway (S00872 and RD15000). Project also includes construction of Carmel Mountain Road, from Sundance Avenue to Camino del Sur as a 4-lane major street with Class II bicycle lanes.

Table B.13 (continued)

Phased Arterial Projects – 2019 Federal Regional Transportation Plan

Conformity Analysis Year	SANDAG ID	Lead Agency	Project Title	Project Description
2023	SM19	San Marcos	Grand Avenue 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
2023	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
2023	SM42	San Marcos	Street Improvements: Discovery Street – Craven Road to West of Twin Oaks Valley Road	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
2023	V18	Various	I-5/Voigt Drive Improvements	In San Diego, on Interstate 5, construction of the realignment of both Campus Point and Voigt Drive between I-5 and Genesee Avenue
2030	CB31	Carlsbad	El Camino Real – La Costa Avenue to Arenal Road	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
2030	CNTY14A	San Diego County	South Santa Fe Avenue 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
2030	CNTY34	San Diego County	Dye Road 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
2030	CNTY35	San Diego County	Ramona Street 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

Table B.13 (continued)

Phased Arterial Projects – 2019 Federal Regional Transportation Plan

Conformity Analysis Year	SANDAG ID	Lead Agency	Project Title	Project Description
2030	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)
2030	SD102A	San Diego	Otay Truck Route Widening	Phase II (from Britannia to La Media Rd) of Otay Truck Route in San Diego from Drucker Lane to La Media, add 1 lane (total 3 lanes) for trucks; from Britannia to La Media, add 1 lane for trucks and one lane for emergency vehicles (border patrol/fire department access); add one lane for trucks along Britannia from Britannia Court to the Otay Truck Route
2030	SD190	San Diego	Palm Avenue/I-805 Interchange	Improvements to the Palm Avenue Bridge over I-805, including repairs to the bridge approaches; a new Project Study Report and Preliminary Environmental Assessment Report. 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. 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)
2030	SM10	San Marcos	SR 78/Smilax	Construct new interchange at Smilax Road interchange and SR 78 improvements
2030	SM24	San Marcos	Woodland Parkway 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
2040	SD81	San Diego	Genesee Avenue – Nobel Drive 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)

Endnotes

[1] San Diego Forward: The Regional Plan Appendix T: SANDAG Travel Demand Model and Forecasting Documentation includes additional detail regarding the overall model structure.

[2] For documentation regarding the model conversion project, see SANDAG Travel Model in Emme User Guide, INRO consultants, 2017.

[3] For documentation regarding the SHRP2 C04 model enhancements, see Pricing and Travel Time Reliability Enhancements in the SANDAG Activity-Based Travel Model: Final Report, Prepared for San Diego Association of Governments by RSG, June 30, 2016.

[4] For documentation regarding the disaggregate commercial vehicle model, see Final CVM Model Development and Calibration Project Deliverable: M.9B by HBA Specto Incorporated, July 2014.

[5] 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.

[6] 2008 Eight-Hour Ozone Attainment Plan for San Diego County, San Diego County Air Pollution Control District, December 2016