SACOG

Transportation Committee

Item #14-5-8A
Information

May 8, 2014

2016 MTP/SCS Update: Methodology for Regional Scenarios

Issue: What is the method for developing regional land use and transportation scenarios and what factors are considered in the development of the land use component of the scenarios?

Recommendation: This item will be presented to all three Board committees for information and discussion.

Discussion: In March, the Board adopted a framework for creating and analyzing scenarios (Attachment A) that describes four steps toward development of a draft preferred scenario for the 2016 MTP/SCS. The first step is to create three regional land use and transportation scenarios for the plan horizon year of 2036. In reviewing and adopting this scenario framework, the Board requested more information on the method for creating the regional scenarios, and in particular, more information on the land use component of the scenarios.

Process for Scenario Review

Scenario information is vetted through planning and public works staff at each SACOG member jurisdiction. Last November, local staff provided input on the proposed scope, cost, and timing of transportation investments for consideration in the plan update. The first vetting of land use information occurred in summer 2013, with local staff review of the 2012 existing conditions land uses. The next period of review occurred in winter 2013 with local staff review of the modeled inventory of adopted and proposed local land use plans. Both transportation and land use assumptions for a set of regional scenarios will be vetted through local staffs in July before final model runs and analyses are conducted to prepare for October public workshops. When the Board directs the development of a draft preferred scenario at the end of 2014, SACOG staff will develop a preliminary draft preferred scenario for vetting again through local planning and public works staff, with reasonable opportunity for local elected bodies to provide input on the assumptions in early 2015 if desired.

General Method for Developing Scenarios

The regional land use and transportation scenarios will be built up from scenarios used for the current plan and the information gathered from local government planning and public works staff over the last several months, which started with informational interviews with each government's staff on recent planning activity and project submittals in response to SACOG's call for projects. Because all three scenarios must meet some reasonableness test for CEQA and federal regional transportation planning requirements, they are also subject to "guardrails," or a framework, of land use and transportation constraints. For example:

- All three scenarios will have the same amount of housing, employment and population growth and transportation budget.
- All three scenarios will have a land use pattern paired with a transportation budget and network.
- The land use component of the scenarios will represent a realistic range of possible future development patterns through the year 2036 based on adopted and proposed local plans and policies, market performance information, and regulatory and resource constraints.
- The scenarios will follow the land use and transportation descriptions of the scenarios developed for the current plan:
    - Scenario 1: The land use pattern has the highest amount of growth in Developing Communities, the least amount of growth in Transit Priority Areas and infill areas, and the highest amount of growth in lower density housing of the three scenarios. In terms of transportation investments, Scenario 1 has the highest investment in new and expanded roads of the three scenarios and the lowest amount of funding for transit and non-motorized transportation.

- Scenario 2: This is the 2012 MTP/SCS. It is in the middle of Scenarios 1 and 3 on all land use and transportation indicators.
- Scenario 3: The land use pattern has the highest amount of growth in Centers and Corridors and Established Communities, the most amount of growth in Transit Priority Areas and infill areas, and the highest amount of growth in higher density housing of the three scenarios. In terms of transportation investments, Scenario 3 has the highest investment in transit and non-motorized transportation of the three scenarios and the lowest amount of funding for new and expanded roads.

The land use scenario is developed and then the transportation network is tailored to the land use pattern. For the transportation component of the scenarios, the starting point for Scenarios 1 and 3 will be Scenarios 1 and 3 from the 2012 MTP/SCS, updated to account for newer proposed projects and changes to existing projects. Scenario 2 is the 2012 MTP/SCS. The attached framework for transportation scenario development (Attachment B, updated from the 2012 MTP/SCS) will guide the update of Scenarios 1 and 3.

Methodology for Land Use Allocation

SACOG's process for creating a land use allocation, whether for alternatives scenarios or a preferred scenario, considers a number of policy, regulatory and market factors that can affect the location or rate of development, starting first and foremost with each adopted and proposed land use plan identified and inventoried in consultation with local agency planning staff. The inventory of land use plans forms the basis for allocating housing and employment growth spatially within a jurisdiction. The decision on how much and what kind of housing and employment to allocate is based on an analysis of the other policy, regulatory and market factors. These data are particularly important in assessing development readiness of specific plans and master plans, which, unless they are under construction, inevitably have some amount of local, state or regional entitlement plus infrastructure improvement required in order to begin construction. The following is a sample list of factors considered in the estimation of growth within subareas of a jurisdiction: status of local, state and federal entitlement applications, as applicable; past housing permit activity in the vicinity of the project; major infrastructure requirements; developer readiness to pursue entitlement and construction; proximity to job centers and services; and housing product mix. These and additional factors are described in detail in Attachment C. Not all of these factors are easily quantifiable; SACOG considers factors about each project area in relative terms. In other words, for any given development factor (e.g., major infrastructure requirements), all projects are evaluated relative to each other. The effect of this evaluation is a filtering of projects that are more likely and less likely to build during the course of the plan update, followed by how much growth can be expected.

The process and resulting preliminary draft growth estimate consider each jurisdiction individually. However, the MTP/SCS growth projections are created for the region, so each jurisdiction must also be considered as a share of the regional economy. To do this, the preliminary jurisdiction growth estimate is analyzed and adjusted to achieve the regional projections for housing and employment growth by considering: the jurisdiction's share of regional housing and employment today compared to historical share, what it will be in the future, and what the basis is for the changes; how quickly or slowly the jurisdiction has grown in the past relative to the regional average growth rate and relative to other jurisdictions in the same market area and/or of similar size; how adopted and proposed plans might change the jurisdiction's growth rate from past trends; the amount of growth assumed in the market area; and the jobs/housing ratio today compared to the jobs/housing ratio for the estimated growth.

Summary of Research on Factors Influencing Development

Staff is updating research from the 2012 plan on a variety of development factors in order to have the most up-to-date information for the 2016 plan. Since this research directly informs the land use scenario process, which will begin this month, staff is providing a brief summary on the findings of the research to date and how each factor is likely to affect the regional land use scenarios.

Inventory of Adopted and Proposed Local Land Use Plans: This is the basis for all MTP/SCS scenario development, whether alternatives for CEQA analysis or the draft preferred scenario for the plan. The current inventory shows that there is significantly more residential and employment capacity planned than projected demand.

Floodplains and Levee Improvements: Local governments within floodplains are working toward compliance with state and federal floodplain regulations. The main urban growth areas in the region that are affected by floodplain remapping or levee de-certification include: Woodland, Wheatland, Yuba City, and the Natomas Basin portions of Sacramento, Sacramento County, and Sutter County. The timing of funding and construction of levee improvements is one factor that may influence the timing of construction of land development projects in these jurisdictions. For the purposes of scenario development, floodplain and levee improvement schedules are assumed to affect timing of development.

Habitat Conservation Plans/Natural Communities Conservation Plans Development: With the exception of the Natomas Basin Habitat Conservation Plan, the HCPs and NCCPs in the region continue to be under development. Given the complexity of issues and number and variety of participating parties, there continues to be uncertainty around the completion of each plan. At the same time, almost all development projects located within the HCPs/NCCPs subject to Clean Water Act and Endangered Species Act permitting requirements are pursuing independent permits. The timing of permit issuance is expected to affect the timing of construction of development projects. According to the federal and state resource agencies, the timing of individual permitting versus permitting under a future HCP/NCCP could affect the viability of some projects, because without an approved HCP, the currently identified lands available for mitigation of these projects is not sufficient to mitigate the needs of all of these projects. For the purposes of scenario development, federal and state permit status are assumed to affect timing of development.

Water Supply: Staff is still researching this topic but information gathered so far -- based on discussions with local government planners, the Placer County Water Agency and Regional Water Authority -- indicates that long term (20-year) water supply in and of itself is not likely to be a limiter of growth. Rather, the factors that would have the greatest effect on the timing of development projects are the timing of financing and construction of new treatment, storage and conveyance facilities needed for new development areas, and consideration of the amount of development that could be built before significant investments in water infrastructure are needed. Staff is still gathering information on the timing aspects of water infrastructure (i.e., which projects have sufficient water supply and infrastructure available such that a large percentage of a project could be constructed in the next four years).

Housing Market Trends: A housing market trends white paper was written to support the 2012 MTP/SCS. Research is underway to update the literature review for that paper. A review of literature to date on local and national housing market and demographic trends, as well as consultation with the development industry, points to a continuation of the trends identified in the 2012 paper. The biggest issue arising out of this research is housing affordability: what kind of housing can the private sector afford to build that households can afford to buy or rent. For the purposes of scenario development, this affects the type and location of new housing.

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MTP/SCS Framework: Approach to Creating and Analyzing Scenarios

Consistent with the Board's direction to focus this MTP/SCS update on implementation issues, the following approach will be used to create and analyze scenarios to inform the 2016 MTP/SCS update. The scenarios developed in this process will be used to illustrate trade-offs and effects of different development patterns and transportation investments compared to the adopted MTP/SCS. In keeping with the implementation themes of the plan update, the scenarios will be used in the following ways: to inform discussions of the Board, stakeholders, member and partner agencies, and public workshop participants on policy issues of the plan update; as alternatives for the environmental impact report; as the basis for making necessary refinements to Scenario 2 (the adopted MTP/SCS).

1. Three scenarios for plan horizon year 2036 will be based on the current plan plus two updated/refined scenarios from last plan cycle.
   Discussion: Scenarios should bracket a reasonable range of possible futures, taking into account all major market and policy/regulatory influences. All scenarios are designed to represent reasonable possibilities of what might occur (i.e. not idealized futures driven solely by 1 or 2 considerations to the exclusion of others). The three scenarios analyzed last time met this real world test, and varied principally by how much housing and transportation choice they created. The S\scenario (#3) with the most use of a range of transportation modes had the most amounts of new development in Centers and Corridors and Established Communities and attached housing. On the other end, the scenario (#1) with the least use of transportation modes other than the automobile had the most amounts of new development in Developing Communities and Rural Communities and large lot single family housing. The final plan adopted by the Board was most like the scenario in the middle (#2), but it included elements of both Scenarios #1 and #3 based on input from our members, the public and stakeholders and technical analysis. (See attached Table to compare the adopted MTP/SCS with the three scenarios analyzed during that plan's development process.)

   For the 2016 MTP/SCS update staff suggests that the existing MTP/SCS be one of the scenarios, with the other 2 scenarios being similar to the first and third Scenarios from the last plan cycle, refreshed and updated to reflect relevant actions and trends that have occurred in the interim. For example, the updated Scenario 1 would have similar amounts of new growth in each of the 4 community types as Scenario 1 from the last plan cycle, but the specific properties forecasted to be developed within each community type would differ at least to some extent based on local government land use approvals since the last plan, market trends, and the intentions and capability of the property owners/developers. Similarly this updated Scenario 1 would have similar amounts of housing growth in the lower density and higher density housing types as Scenario 1 from the last cycle, though they may be located to some extent in different places. A preliminary look at the data leads staff to believe that this approach likely creates sufficient flexibility to ensure that the Plan and EIR documents this cycle analyze a reasonable range of alternatives that might be likely to occur.

   While this step will be important, we are trying to keep the level of effort contained so that it is possible to maximize the effort available for Step 2.

2. Analyze different timing to construction of transportation and land use components of current MTP/SCS.
   Discussion: Key components of the Board's December 2013 action focusing this plan cycle on implementation issues were to explore the full potential for a "fix-it-first" investment strategy, and to analyze whether there are reasons to alter the timing that land use and transportation projects in the current plan should be constructed. In other words, even if the end state in 2035 (now 2036) was the same, does it make a difference how (in what order) the region builds the projects that lead to that end condition? Staff has done some very preliminary thinking on this topic and believes that in some areas differences in timing might have a substantial impact on the life cycle costs and benefits of the plan. To illustrate the point at the extremes, there may be significant differences in variables such as total new lane miles, vehicle miles traveled, air pollution and water use from first building the growth forecast in the plan for Rural Communities and Developing Communities versus first building the growth forecast for Centers and Corridors and Established Communities. SACOG has never focused on this type of information when constructing the plan (except to ensure compliance with federal clean air act and SB 375 standards) and staff believes it could really help the Board and stakeholders focus on new policy issues that might improve life cycle plan performance (i.e. even if the end state in 2036 remained substantially the same as the current plan).

3. Analyze different levels and types of transportation revenue
   Discussion: Every plan cycle SACOG must refresh its revenue assumptions, consistent with federal requirements that our plan contain "reasonably reliable" revenues. Mainly this involves scrutinizing existing, long-term revenue streams like federal, state and local transportation taxes and local development fees, but within reasonable limits it can also involve new future revenue streams that we forecast to be available in the plan. Staff suggests that this revenue analysis first be focused on the currently adopted MTP/SCS (i.e. will we have the same, more or less revenues to build the projects included in the plan?). Then, if the scenario and timing analyses conducted under #1 and #2 above indicate there may be a need for new revenue (which seems likely), that we analyze the merits and viability of a focused list of new revenue sources. For example, the following new revenue sources are potential candidates for consideration: state cap and trade revenue, new local transportation sales taxes, statewide vehicle registration fee.

4. Prepare draft plan scenario
   Discussion: Based on input from public workshops, stakeholders (including our cross-sectoral working group), member and partner staff and Board members over the next several months staff will create by the end of 2014 a framework for a draft preferred scenario for Board consideration that includes both the end state condition in 2036, and a timing sequence for building the transportation network and estimating when development projects will be constructed.

	Land Use Inputs	Scenario #1	Scenario #2 (Adopted MTP/SCS)	Scenario #3
1	Share of growth in Center & Corridor Communities *(percent of new homes)*	19%	30%	36%
2	Share of growth in Established Communities *(percent of new homes)*	30%	26%	27%
3	Share of growth in Developing Communities (percent of new homes)	46%	42%	35%
4	Share of growth in Rural Residential Communities *(percent of new homes)*	5%	1%	2%
5	Share of growth in large-lot single-family homes *(percent)*	39%	28%	25%
6	Share of growth in small-lot, single-family homes *(percent)*	30%	28%	23%
7	Share of growth in attached homes *(percent)*	31%	43%	52%
	Transportation Inputs	Scenario #1	Scenario #2 (Adopted MTP/SCS)	Scenario #3
8	New or expanded roads *(lane miles, percent increase from 2008)*	32%	29%	26%
9	Transit service *(Vehicle Service Hours, percent increases from*	54%	98%	127%

	2008)			
10	Funding for transit *($ in billions)*	$10.7	$11.3	$13.7
11	Funding for road, bike and pedestrian maintenance *($ in billions)*	$10.9	$11.3	$11
12	Funding for new road capacity *($ in billions)*	$8.7	$7.4	$6.7
13	Funding for bike and pedestrian street and trail improvements *($ in billions)*	$2.8	$3.0	$3.0
14	Additional miles of bicycle paths, lanes and routes *(Class 1, 2 and 3 = 1,700 in 2008)*	800	1,100	1,300
15	Funding for Programs *($ in billions)*	$1.5	$2.2	$1.7

	Performance Outcomes	Scenario #1	Scenario #2 (Adopted MTP/SCS)	Scenario #3
16	Square miles of farmland converted to development *(4,166 square miles of farmland in 2008)*	93	57	50
17	Square miles of vernal pools affected by development	9	7	7
18	Share of new homes near high-frequency transit *(percent of new homes)*	22%	38%	35%
19	Share of new jobs near high-frequency transit *(percent of new jobs)*	26%	39%	44%
20	Transit costs recovered by ticket sales *(percent)*	38%	38%	51%
21	Total homes in environmental justice areas near high-frequency transit *(percent of homes, 30% in 2008)*	43%	55%	47%
22	Share of trips by transit, bike or walk *(percent increase per capita from 2008)*	12%	33%	31%
23	Vehicle miles traveled (VMT) *(percent change per capital from 2008)*	-6%	-6.9%	-9%
24	Vehicle miles traveled in heavy congestion *(percent of total VMT)*	5%	6%	7%
25	Travel time spent in car per capita *(percent change from 2008)*	-3%	-4%	-4%
26	Weekday passenger vehicle CO_2 emissions *(percent change per capita from 2005)*	-14%	-16%	-17%

TRANSPORTATION FRAMEWORK FOR ALTERNATIVE SCENARIOS FOR THE MTP/SCS UPDATE

At the March 2014 Board meeting, a general approach was adopted for creating scenarios for the 2016 MTP/SCS update. The approach relies on updating Scenarios 1 and 3 from the 2012 MTP/SCS analysis, and treating the current MTP/SCS as Scenario 2. Practically speaking, the update of the transportation components of Scenarios 1 and 3 will focus on changes to transportation projects since the 2012 MTP/SCS was adopted: adding in newly proposed projects, and updating descriptions/costs of projects that have changed. Additionally, all scenarios must "fit" into the budget, which may require delaying some projects.

This document provides more background and detail on the transportation options that made up the scenarios for the 2012 MTP/SCS, and that will be used to update Scenarios 1 and 3 for use in the 2016 MTP/SCS. The options in this document were originally described for the Board in June 2010 and adopted by the SACOG Board as part of the 2012 MTP/SCS scenario development.

Transportation Options

Table 1 lists the transportation options that were used to define the three 2012 MTP/SCS scenarios. More detailed definitions of each option are provided in the following pages.

Table 1. Transportation Project Options for MTP/SCS Scenarios

Scenario Name	Land Use	Transit	Local Streets Ped/Bike	Bridges and Freeways
Sample Projects/ Measures	▪ Compact Development ▪ Mixed Use ▪ Development in Transit Priority Areas	▪ Shuttles ▪ Commuter bus ▪ Fixed route bus ▪ BRT ▪ Street car ▪ LRT	▪ Bike Lanes ▪ Sidewalks/Paths ▪ ITS ▪ Complete Streets ▪ Street widening	▪ ITS ▪ Auxiliary Lanes ▪ HOV Lanes ▪ Interchanges ▪ Bridges ▪ New Mixed Flow

Revised excerpt of memorandum to SACOG Board, June 2010.

Data and Information Used in Developing Transportation Scenarios

A few key guiding principles for combining transportation options and land use scenarios were used to form the three scenarios for the 2012 MTP/SCS analysis:

- Varying the amount of direct corridor improvements, transit investment, and road rehabilitation funding levels to support rural mobility
    - Scenario 1 provides opportunities to increase capacity on select rural corridor segments with growing urban traffic near the urban/rural edge.
    - Scenarios 2 and 3 have higher levels of inter-community transit investments and road rehabilitation funding to support investments in closing shoulder gaps and intersection improvements that make corridors safer and support farm-to-market travel.

- Varying the amount and type of growth within transit corridors, to support higher (or lower) levels of transit service.
    - Scenario 1 provides opportunities for expanded coverage of transit services, relative to Scenario 2 and 3.
    - Scenario 3 provides more opportunities for higher frequency/higher capacity transit, relative to Scenarios 1 and 2.
- Varying the mix of complete streets projects among the scenarios.
    - Scenario 1 has a relatively greater share of complete streets projects in new growth areas.
    - Scenario 3 has a relatively greater share of complete streets "remodeling" projects in the currently urbanized areas.
- Varying the amount of demand management and Intelligent Transportation Systems (ITS) among the scenarios.
    - Scenario 3 relies more on demand and system management options (e.g., ITS) than Scenarios 1 and 2.
- Varying the balance of transportation options targeted to alleviating existing or future bottleneck locations.
    - Scenario 1 has a relatively greater share of projects intended to alleviate future bottlenecks, compared to Scenarios 2 and 3.
    - Scenario 3 has a relatively greater share of projects intended to alleviate existing bottleneck locations in the currently urbanized areas, relative to Scenarios 1 and 2.

Outlined below are data, standards and thresholds which were used to develop Scenarios 1, 2 and 3, based on the guiding principles.

Transit-Oriented Development. It has long been understood that the land use and demographic characteristics in a corridor affect its potential for supporting transit, and the type of transit which may be appropriate for the corridor. The following factors have been shown to influence the transit ridership and productivity of different types of transit service in transit corridors: density of development, with higher density supporting higher frequency and capacity transit services; the mix of uses, with better mix of uses allowing transit to be used for non-work and non-peak period trips; the income demographics of residents, with lower income residents more likely to utilize transit service; the prevalence of paid parking, with higher levels of paid parking generating more transit ridership; and block size and street pattern, with smaller block sizes and finer street networks supporting higher levels of walk access to/from transit. Table 2 summarizes metrics to evaluate transit-supportive land uses.

Table 2. Land Use / Transit Service Integration Guidelines

Factor	Metric	Thresholds
Density	Dwelling units per residential acre	< 4 du / res acre: >60 minute service < 5,000 people/sq mi 4-15 du / res acre: 15 to 60 minute service 5,000 – 15,000 people/sq mi >15 du / res acre: 15-or-less minute service >15,000 people/sq mi
	Population / square mile	
Mix of Use	Mix index	Greater than average mix supports midday, evening service
Income Demographics	Median household income	Lower than average income supports more frequent service, midday and evening service
Street Pattern / Block Size	Intersection density	Smaller block size supports walk access
Serves Major Jobs Center	Total employment at center	>50,000 jobs + >20 jobs / empl acre + paid parking = high capacity bus or rail <50,000 jobs or <20 jobs / empl acre = conventional express bus
	Employment density at center	
	Paid parking at center	

Complete Streets Opportunities. There is no cookie cutter for complete streets projects, but there are some common elements. Complete streets projects are intended to serve multiple modes and users, so complete streets opportunities exist where there is a likelihood of multiple types of users. Table 7 lists six user groups to be considered in a complete street project (passenger vehicles, transit vehicles, transit passengers, pedestrians, bicyclists, trucks or commercial vehicles). In some areas, streets may serve high volumes of all six user groups (e.g., arterial streets in urban core areas). In other areas, two or three of these user groups may be served—for example, in a commercial district of a smaller town, overall traffic volumes may be lower, and transit users (both transit vehicles and passengers) may be few in number, but streets may serve significant volumes of automobiles, delivery trucks, pedestrians, and bicyclists. Some rural roadways may serve automobiles, farm vehicles, and also cater to recreational bicyclists. Opportunity areas for complete streets consider adjacent land uses (mix of uses, density, etc.), presence of transit, likelihood of high volumes of pedestrians and bicyclists, and overall traffic volumes. Many of the same metrics shown in Table 2 also apply to identify opportunities for higher-intensity complete streets projects, since transit-oriented development generates higher levels of pedestrian use, and higher numbers of transit passengers and vehicles.

Bottleneck Locations. For purposes of the MTP/SCS scenarios, these areas are characterized by congestion which persists for three hours or longer during peak periods of demand. Indications of congestion are: on freeways, average speeds 35 miles per hour or below and stop-and-go driving; on surface streets, average speeds 20 miles per hour or below average over longer stretches of roadway, and long queues at intersections with waits through one or more signal

cycles. Traffic counts showing volumes within 5 percent of normal hourly capacity for three successive hours during peak demand periods are evidence of bottlenecks. Table 3 summarizes the thresholds.

Table 3. Roadway Bottleneck Indicators

Variable	Metric	Threshold
Traffic Volume	Daily Traffic Per Lane	>15,000 for freeways >6,000 for surface streets
Duration of congestion	Peak spreading	Hourly volumes per lane > 95% of capacity for 3 successive hours
Delay	Travel Speed	<35mph for freeways <20 mph for arterial streets

Definitions of Transportation Options

Below are more detailed definitions of transportation options that may be updated in the transportation scenarios. For projects in the current MTP/SCS that are carried over to the transportation scenarios for the 2016 plan update, these options will be used to tally investment levels by different types of projects. Planning-level descriptions of any new projects added to the transportation scenarios will be based on these definitions.

Transit Service Types. Six service types focused on local or intra-regional service may be updated in varying degrees: shuttles, commuter buses, conventional fixed route buses, bus rapid transit, street cars, and LRT. Table 4 provides service characteristics of these types. Two primarily inter-regional service types are included in the scenarios as well: conventional inter-city rail and high-speed rail.

Bike Lanes, and Pedestrian Paths. The conventional definition of bike lane types in the Caltrans design manual are used: Class I, II, and III lanes.

Intelligent Transportation Systems (ITS). ITS includes options for efficient management of arterial roadways, freeways, and connections between them. For local streets, these options conform to the ITS America definition of "Arterial Management", with emphasis on the surveillance, traffic control, and information dissemination functions. The existing agency transportation management centers and STARNET provide the basis for expanded implementation (see Table 5).

Demand Management. Includes policies, programs, information, services, and tools that increase overall system efficiency by encouraging a shift from single-occupant vehicles to non-single-occupant modes or a shift of auto trips out of peak periods. see Table 6).

Complete Streets. A complete street is a street designed with features and amenities (not merely accommodations) for as many users of the street as can reasonably be expected, based on the surrounding land uses, transit system, and other factors. There is no single design for a complete

street. A complete street in a rural area, for example, will look much different from a complete street in a denser, urban area. Information from the National Coalition for Complete Streets is used to identify complete streets strategies that work in different contexts. The key elements of complete streets are listed in Table 7.

Conventional Street Widening. A conventional street widening is the addition of a lane to a surface street connecting between two or more intersections, along with improvement of other facilities along the street such as addition of Class 2 bike lanes, sidewalk improvements, ramps at crosswalks, etc. Conventional street widenings are implemented to address congestion on roadway segments where bicycle, pedestrian, or transit volumes may not be high enough to justify higher level, multi-modal amenities typically associated with a complete street improvement.

Freeway Auxiliary Lane. Lanes that connect from an on-ramp lane at one interchange to the next downstream off-ramp are defined as freeway auxiliary lanes. Lanes of this sort can greatly improve operations in congested freeway segments, allowing greater distance for vehicles exiting or entering the freeway main line lanes to merge. This extra distance is especially useful for trucks and larger vehicles entering or exiting the freeway.

High Occupancy Vehicle Lanes. HOV lanes are the most common sort of managed lanes. For purposes of MTP/SCS scenarios, HOV lanes are conventional HOV lanes as they are currently implemented in the region, i.e., operating 6:00 to 10:00 AM and 3:00 to 7:00 PM, limited to two-plus carpools and transit vehicles, with no barrier separations.

Freeway Interchanges. Freeway interchanges are points where access is provided between local surface streets and freeway or restricted access facilities. Interchanges can be simple (e.g., a standard "L-9" or "split-diamond" configuration), or very complex (e.g., the recent improvements to the I-80 / Douglas Boulevard interchange in Roseville). Other physical or operational features can be included with interchanges (e.g., ramp meters, HOV bypass lanes, or direct-to-HOV-lane-ramps). New interchange projects are often accompanied by auxiliary lane developments (e.g., auxiliary lanes added from the last upstream interchange or to the next downstream interchange). Where present, these additional features are called out separately.

River Crossings. Although many structured spans of roadway or rail exist in the region, for purposes of the MTP/SCS, bridges refer to structured spans that cross major rivers in the region (American, Sacramento, Feather, Bear, Yuba rivers, or the Yolo Causeway), and accommodate high volumes of travelers. Roadway or other structured spans that cross minor rivers or creeks, or are constructed as part of a freeway interchange project, are included with the roadway or interchange project, and are not tallied or described separately as "river crossing" projects. Table 8 provides a listing of river crossings that were in place in 2008 (the base year for the current MTP/SCS). Future spans that accommodate similarly high volumes of travelers may be included in scenario updates.

Freeway Mixed Flow Lanes. Any new, unrestricted lane that continues through at least one interchange (i.e., the lane does not meet the definition of a "freeway auxiliary lane" above), or that connects to an existing mixed flow lane, and effectively extends the existing lane, is

described and tallied as a new mixed flow lane addition.

Other Projects. The listing of project options defined above covers the vast majority of projects included in the current MTP/SCS. However, other project options are present in the current plan in significant numbers, and are likely to be included in the update of MTP/SCS scenarios:

- Freeway Operations Improvements—Projects that add new lanes, extend existing lanes, or make other improvements that are not freeway auxiliary lanes or mixed flow lanes, will be grouped together as operations improvements. Examples: an extension of an existing off-ramp further upstream, but not connecting with the next upstream off-ramp; adding an on-ramp lane, but not connecting the lane through to the next downstream off-ramp.
- Intersection Operational Improvements—A project that adds auxiliary lanes to a surface street intersection in order to accommodate expected queues of vehicles at peak demand times is an example of a common intersection improvement, which does not meet the definition of a street widening or a complete street.
- Safety Projects—A project for which the primary purpose is amelioration of an existing safety problem, and which does not meet the definition of a street widening, freeway auxiliary lane project, or freeway mixed flow lane project, is defined as a safety project.

Bottleneck Locations. Bottleneck locations are segments of the roadway system that are heavily congested for long periods of time during normal weekdays. Indications of bottleneck conditions are: slow speeds or stop-and-go conditions for long periods within commute hours; long queues at intersections, with waits through one or more signal cycles. Additionally, bottlenecks must serve high volumes of travelers, relative to their facility type.

Table 4. Transit Service Types

Service Type	Vehicle Type	Operating ROW or Guideway	Operating Speeds	Station/Stop Characteristics	Station/Stop Spacing	Service Frequency	Capacity
Shuttle	Vans, small buses	Surface streets	With traffic, plus stops (ranges 10-25 mph)	Potential route deviation; some urban bus stops	Varies	Varies--likely 30+ minute headways	10-15 passengers per vehicle
Commuter Bus	Commuter Bus	Freeways, state highways, surface streets	Line haul on HOV lanes (55+ mph); varies with traffic on freeway and surface streets	Park-and-ride lots and home end; urban bus stops at work end	Wide spacing + long line hauls	Peak periods only	40-45 passengers per vehicle
Conventional Fixed Route Bus	Urban bus	Surface streets	With traffic, plus stops (ranges 10-25 mph)	Curbside urban bus stops	1/4 to 1/2 mile	Varies-- 10+minutes; potential day-long coverage, with late Evening service	35-45 passengers per vehicle
BRT	Varies: Urban bus to articulated buses or "trains on rubber tires"	Varies: Surface streets to busways	Varies: with traffic + operational improvements (15-30mph average)	Varies: urban bus stops, some loading platforms	1/4 to 1/2 mile for "low" BRT; 1/2+ for "high" BRT	Varies- 10+minutes; potential day-long service, with late evening service	Varies: 35-45 for "low" BRT; 60-90 for articulated vehicles
Streetcar	Smaller train cars	Rail-in-street, some exclusive rail	With traffic, plus stops (ranges 10-25 mph)	Varies: some curbside or median stops, some stations	1/4 to 1/2 mile	Varies-- 10+minutes; potential day-long coverage, with late evening service	Varies by length of train…likely smaller than LRT
Light Rail	Light rail vehicles	Exclusive rail, some rail-in-street	On exclusive guideway up to 60mph; averages 20-40mph with stops	Major transfers to local bus; park-and-ride lots at some stations	1/2 to 1 mile	Varies-- 10+minutes; likely day-long coverage, with late evening service	125 - 600 passengers per train length
Intercity Rail	California car	Shared with freight rail, or exclusive heavy rail	Up to 70mph; averages 50mph with stops	Major intermodal transfer points to local service; park-and-ride lots at most stations	10-20 miles	Varies-- High weekend demands	Varies by length of train
High Speed Rail	TBA	TBA	TBA	TBA	TBA	TBA	Varies by length of train

Source: SACOG, June 2010.

Table 5. ITS Options

Arterial or Freeway ITS Option	Candidate Locations
Arterial Management	Major arterial roadways
Ramp Metering	On ramps in congested freeway segments
Variable Message Signs	High volume decision points
Active Traffic Management	Freeways, major non-freeway locations (e.g. river crossings)
Incident Management	High volume locations; high accident locations
Integrated Corridor Management	Combined freeway / LRT / major parallel arterial corridors
Traveler Information	Areawide, with targeted traveler markets

Source: SACOG, June 2010.

Table 6. Demand Management Options

Demand Management Option	Examples	Candidate Locations
Transportation Management Agencies	TMA's currently operating in region	Large employment centers
Work-Based Incentives	Transit fare subsidies; non-motorized travel subsidies; carpool subsidies	TMA's, large individual employers
Work-at-Home and Alternative Work Week	9/80 or 4/10 schedules; video conferencing	Regionwide
Vanpool Support	SANDAG vanpool program	TMA's, large individual employers
Car-Sharing Programs	Zipcar	Large employment centers
Accountability / Program Evaluation		Regionwide

Source: SACOG, June 2010.

Table 7. Complete Streets and Corridor Elements

User Groups	Design features	Operational features
Light Passenger Vehicles (Cars and light duty trucks)	▪ Appropriately sized travel lanes in urban areas & shoulders on rural corridors with heavy traffic ▪ Physical barriers (e.g., medians)	▪ Traffic signal coordination ▪ Real-time monitoring of conditions
Transit Vehicles	▪ Appropriately sized travel lanes ▪ Efficient access to/from stations and stops and travel lanes	▪ Queue jumps ▪ Signal priority
Pedestrians	▪ Appropriately sized sidewalks or separate/parallel paths, free from obstructions ▪ Well-placed crosswalks ▪ Spatial/physical separation from vehicle travel lanes ▪ Bulbs, curb extensions, etc.	
Bicyclists	▪ Bike lanes or paths ▪ Lockup/storage facilities	▪ Bike detectors
Transit Passengers	▪ Shelters/street furniture at stations/stops ▪ Efficient, convenient access to/from stations/stops and vehicles	▪ Real-time transit information at stations/stops
Commercial Vehicles	▪ Accommodation for deliveries, etc. on commercial streets ▪ Geometric intersection design improvements and turn-outs to support farm vehicles on roadways serving agriculture areas	

Source: SACOG, June 2010.

Table 8. Major River Crossings in the SACOG region in 2008

Description	Lanes	Weekday Volume
American River		
Rainbow Bridge	2	38,027
Lake Natoma Crossing	4	32,986
Hazel Avenue Bridge	4	48,260
Sunrise Boulevard Bridge	6	89,281
Watt Avenue Bridge	6	93,083
Howe Avenue Bridge	4	68,056
H Street Bridge	4	43,096
Capital City Freeway	6	172,373
State Route 160	6	55,000
Interstate 5	10	204,000
American River Subtotal	*52*	*844,162*
Sacramento River		
Interstate 5 between Sacramento and Yolo Co.	4	52,926
Interstate 80 between Sacramento and Yolo Co.	6	90,252
I Street Bridge/ Railyards	2	12,600
Tower Bridge	4	16,821
US 50 Pioneer Bridge	8	189,000
Sacramento River Subtotal	*24*	*361,599*
Yuba River		
State Route 70 S. of Marysville	6	63,806
Feather River		
5th Street Bridge between Marysville and Yuba City	2	31,427
10th Street Bridge between Marysville and Yuba City	4	45,258
State Route 99 N. of SR70/99 "Y"	4	15,882
Feather River Subtotal	*10*	*92,567*
Bear River		
State Route 70 over Bear River	2	19,486
State Route 65 E. of Bear River	4	20,516
Bear River Subtotal	*6*	*40,002*
Other		
Interstate 80 Yolo Causeway	6	150,000
All Crossings	*104*	*1,552,136*

Source: SACOG, updated in 2014

Methodology for MTP/SCS Jurisdiction-Level Land Use Allocation
Last updated: May 5, 2014

Purpose: The purpose of this document is to provide specific information about how jurisdiction-level growth allocations are developed for MTP/SCS land use scenarios.

1. Creating Jurisdiction Growth Estimates

SACOG's process for creating a land use allocation begins with creating housing and employment growth estimates by jurisdiction. The following is a description of how SACOG creates housing unit and employee scenario allocations for a jurisdiction in the MTP/SCS.

a. What do base line and historic residential and employment growth trends indicate about a jurisdiction's potential long-term growth?

First, SACOG assembles all of the numerical data considerations available and relevant to each jurisdiction. This data is not intended to be definitive; it is the best available useful information that is considered as part of the analytical process that leads to the jurisdictional growth estimates. This includes jurisdiction-level summaries of:

- Baseline data
    - Total number of housing units and employees today (2012);
    - Jobs/Housing ratio today (2012);
    - Percent of regional growth share for housing units and employees today (2012).
- Historic reference data
    - Annual, five-year average and ten-year average historic residential building permits;
    - Percent of regional five-year and ten-year residential permits;
    - An extrapolation of the five-year and ten-year building permit averages to estimate 2012-2036 housing unit growth if those past trends defined the future;
    - Historic county-level employment estimates from State of California Employment Development Department;
    - Employment estimates from past SACOG MTP and MTP/SCS base years (2004 and 2008);
    - Percent of regional employment estimates from past SACOG MTP and MTP/SCS base years (2004 and 2008);

- Capacity data
    - General Plan and specific plan capacity for housing units and employees;
    - How close existing housing units and employees are to reaching the capacity estimate (how close the jurisdiction is to build-out today);
    - Mix of planned employment uses; mix of planned residential uses.
- MTP/SCS data
    - Housing units and employees assumed in the last MTP/SCS;
    - Regional share of growth of housing units and employees in the last MTP/SCS;
    - Job/Housing ratio in the last MTP/SCS;
    - A projection of housing unit and employee growth based on percentage share of growth from the current MTP/SCS applied to the new regional growth forecast.

While local land use plans have a strong influence on the estimated growth pattern, it is more accurate to state that they are the start, not the end, of the process. There are many reasons for this, but essentially the sum of all local policies and regulations never yields a growth pattern exactly consistent with the projected amount of employment and housing growth for the entire region. For example, the current sum of adopted and proposed local plans can accommodate 50 to 60 years of residential and 80 to 90 years of employment growth compared to the 20-year growth rate of the 2016 MTP/SCS update. Additionally, the time horizons of general plans seldom exactly match the time horizon for an MTP/SCS. All of these plans and regulations are also likely to change many times throughout the planning horizon of the MTP/SCS. So assuming that they are, in effect, frozen for two or more decades on the date the MTP/SCS is adopted is not likely to be accurate. For this reason, other policy, regulatory and market information is gathered and analyzed.

b. What other policy, regulatory and market factors might influence the location, shape, and pace of growth within a jurisdiction?

Next, for each jurisdiction SACOG gathers and considers a number of other policy, regulatory and market factors that can affect the location or rate of development, not all of which are easily quantifiable in a spreadsheet. In addition to local land use plans, other data are gathered and used to assess development readiness of specific plans and master plans, which, unless they are under construction, inevitably have some amount of local, state or regional entitlement plus infrastructure improvement required in order to begin construction.

This information comes largely from local government planning staff at each SACOG member agency, but can also come from other sources. For additional policy and regulatory factors, SACOG consults with other governmental agencies such as flood control agencies, local agency formation commissions, federal and state natural resources agencies, and water agencies. SACOG also reaches out to the development industry through the MTP/SCS cross-sectoral sounding

board—and in this 2016 update has regular meetings with the North State Building Industry Association—to solicit input on the market and regulatory factors influencing development. Again, data gathered through these interactions are not intended to be conclusive by themselves; they are part of the information gathered and considered in the process of creating jurisdictional growth estimates. SACOG considers factors about each project in relative terms. In other words, for any given development factor (e.g., major infrastructure requirements), all projects are evaluated relative to each other. The information considered includes:

- The number and development capacity of greenfield (Developing Communities) and/or infill opportunities (Center and Corridor and Established Communities) in and around the jurisdiction.
    - For specific plans:
        - Is the plan approved; and what levels of approval does it have?
        - Has construction started on the site?
        - Does the project require annexation through a local agency formation commission (LAFCo)?
        - Are there natural resource issues to consider and does the project require federal and/or state permit(s)?
        - Are there development agreements to consider?
        - Is there pending litigation on the project?
        - Does the plan help or hinder the region's ability to attain air quality conformance under the federal Clean Air Act?
        - Was the plan part of the last MTP/SCS and is there updated information about the plan that should be considered?
        - What type of infrastructure needs to be built to support the development (wastewater treatment plant, water conveyance, highway interchange, etc.)?
        - Are there other specific plans in the area and if so what is their entitlement status?
        - How competitive is the project's location in the regional market/how close is it to job centers and services?
        - How close is the project to existing urban development and/or how far is it from urban development in the future?

        - How does the project's mix of housing products compare to projected housing product demand?
        - How does the project's mix of employment land uses compare to projected growth in employment sectors?
        - How active is the developer(s) in pursuing entitlements?

- General Plan land use policies that may influence the timing, shape and location of development:
    - When was the plan adopted?
    - Is the plan currently being updated?
    - What are the land uses, densities, and intensities allowed?
    - Are there policies about mixed-use and/or redevelopment?
    - Are there policies about jobs-housing balance?
    - Are there policies about infrastructure provision?
    - Are there agricultural preservation policies?
- Major job centers in or near the jurisdiction (existing or proposed)
- Strength of the current residential market in the jurisdiction's market area
- Strength of the commercial, office and industrial markets in the jurisdiction's market area
- Major infrastructure or natural resource constraints to building (such as water/sewer capacity, flooding, habitat issues, etc.)
- The level of transit service today and planned in the last MTP/SCS

c. Combining base line and historic data with policy, regulatory and market factors to create a preliminary jurisdiction growth estimate.

The jurisdiction-level base line and historic data are used to estimate a jurisdiction's overall housing and employment growth. The policy, regulatory and market factors are evaluated to assess which subareas and projects within a jurisdiction are more likely and less likely to build during the course of the plan update, and how much of their capacity might be absorbed. Using all of the data and information above, SACOG creates a preliminary draft allocation of housing and employment growth for each jurisdiction.

d. Adjusting the preliminary jurisdiction growth estimates to achieve the regional projections for housing and employment growth.

The process described in steps 1a through 1c and resulting preliminary draft growth estimate consider each jurisdiction individually. However, the MTP/SCS growth projections are created for the region, so each jurisdiction must also be considered as a share of the regional economy. The MTP/SCS land use forecast is bounded by SACOG's regional growth forecast. For the 2016 MTP/SCS, this equates to 287,000 new homes and 479,000 new jobs between 2012 and 2036. These regional housing and employment growth projections are further divided into projections by housing type and employment sector. Therefore, the preliminary jurisdiction growth estimate is analyzed and adjusted to achieve the regional projections for housing and employment growth, by considering the following:

- The jurisdiction's share of regional housing and employment today compared to what it will be in the future, and the basis for the changes;
- How quickly or slowly the jurisdiction has grown in the past relative to the regional average growth rate and relative to other jurisdictions in the same market area and/or of a similar size;
- How adopted and proposed plans might change the jurisdiction's growth rate from past trends;
- The amount of growth assumed in the larger sub-regional market area;
- The jobs/housing ratio today compared to the jobs/housing ratio for the estimated growth.

Creating jurisdictional growth estimates that match the region's growth forecast is an iterative process involving the above steps 1a through 1d. Once preliminary housing and employment growth "targets" are set for all jurisdictions, they are then modeled in a GIS.

2. Modeling the Preliminary Draft Growth Estimates

The primary reasons for modeling the preliminary allocation are to 1) be able to account spatially for the estimated growth, which makes it possible to make further refinements if needed and, 2) to provide the ability to vet all preliminary assumptions with local jurisdictions in an easily understandable format.

Land use scenario software tools are used for developing and comparing land use scenarios; by themselves, they are not projections or forecasting tools. SACOG formerly used I-PLACE^{3}S and is currently transitioning to an open source software called UrbanFootprint. In either case, the software tool is used to spatially allocate development to jurisdictions by subareas (which are defined by local planning areas) to reach the jurisdictional estimates developed according to the land use allocation process described above. If the resulting modeled land use allocation does not match the jurisdiction target of housing and employment growth, both sets of numbers are then analyzed to

determine whether one, or both, should be adjusted. The allocation process is thus an iterative process to achieve a land use scenario that reflects the regional growth forecast.

Once the scenario is modeled, it can be visually displayed in a number of ways and can also be tallied and summarized by different geographies. For the 2012 MTP/SCS land use forecast and accompanying scenarios, SACOG primarily summarized and displayed the dataset using the MTP/SCS Community Types.

3. Vetting Draft Land Use Scenarios

Regional land use scenarios and the draft preferred scenario are vetted through planning staff at each SACOG member jurisdiction. To support local staff's review, SACOG provides jurisdiction-level tabular summaries showing housing and employment estimates for 2012, 2036, and build out capacity at the Community Type level, as well as a corresponding Community Type map. If other summaries, maps, or individual data files are requested, SACOG also provides these. After receiving comments and feedback from the jurisdictions, SACOG uses the new information provided as well as all the data and considerations outlined earlier in this document, to determine if proposed refinements should be made to a scenario. A change in one jurisdiction can affect growth assumptions elsewhere in the region, so when refinements are proposed, all jurisdictions are re-analyzed to determine whether or not the refinements should be made and where other refinements may be required in order to maintain the regional housing and employee growth totals. The revised information is again circulated to local jurisdiction planning staff for review.

Throughout the 2016 MTP/SCS process, SACOG will conduct four review periods directed to local planning staff at various stages of the plan update, with many additional opportunities for review and comment through the regularly scheduled Planners Committee and Regional Planning Partnership meetings and individual meetings or phone calls as requested by jurisdiction staff. The various review periods are summarized below. The first vetting of information occurred in summer 2013, with local staff review of the 2012 existing conditions land uses. The next period of review occurred in winter 2014 with local staff review of the modeled inventory of adopted and proposed local land use plans. The regional scenarios will be vetted through local staffs in July 2014 before travel model runs and analyses are conducted to prepare for October public workshops. After the Board directs the development of a draft preferred scenario at the end of 2014, SACOG staff will develop a preliminary draft preferred scenario for vetting again through local planning and public works staff, with reasonable opportunity for local elected bodies to provide input on the assumptions in early 2015, if they so choose. These review periods are anticipated to occur in February and April of 2015.

4. Creating Interim Year Land Use Forecasts

For the 2012 MTP/SCS, one interim year (2020) was developed using the above-described growth allocation process. The starting point of the 2020 MTP/SCS land use forecast was the 2035 MTP/SCS land use forecast, including all of the assumptions that SACOG developed in coordination with local agency planning staff and the SACOG Board endorsed for use in the 2012 plan update. For the 2016 plan update, interim year forecasts will be developed for the years 2020 and 2035 to satisfy SB 375 requirements, and likely another interim year of 2025 or 2027, in order to support the Board in its exploration of investment timing and strategies.

Most jurisdictions do not grow at a constant rate over time, so each jurisdiction's unique planning and development circumstance must be considered to determine whether its growth is likely to happen faster or slower (e.g., more of its growth between 2012 and 2020 or more of it between 2020 and 2036). The iterative process described earlier in this memo will be used to create jurisdiction level growth estimates for each of the interim periods of the plan. In addition, the process for creating an interim year growth forecast is defined by the longer term 2036 growth rate; in other words, an interim year growth forecast for a jurisdiction, and the region as a whole, must be consistent with the location and rate of growth defined in the horizon year (2036) forecast.