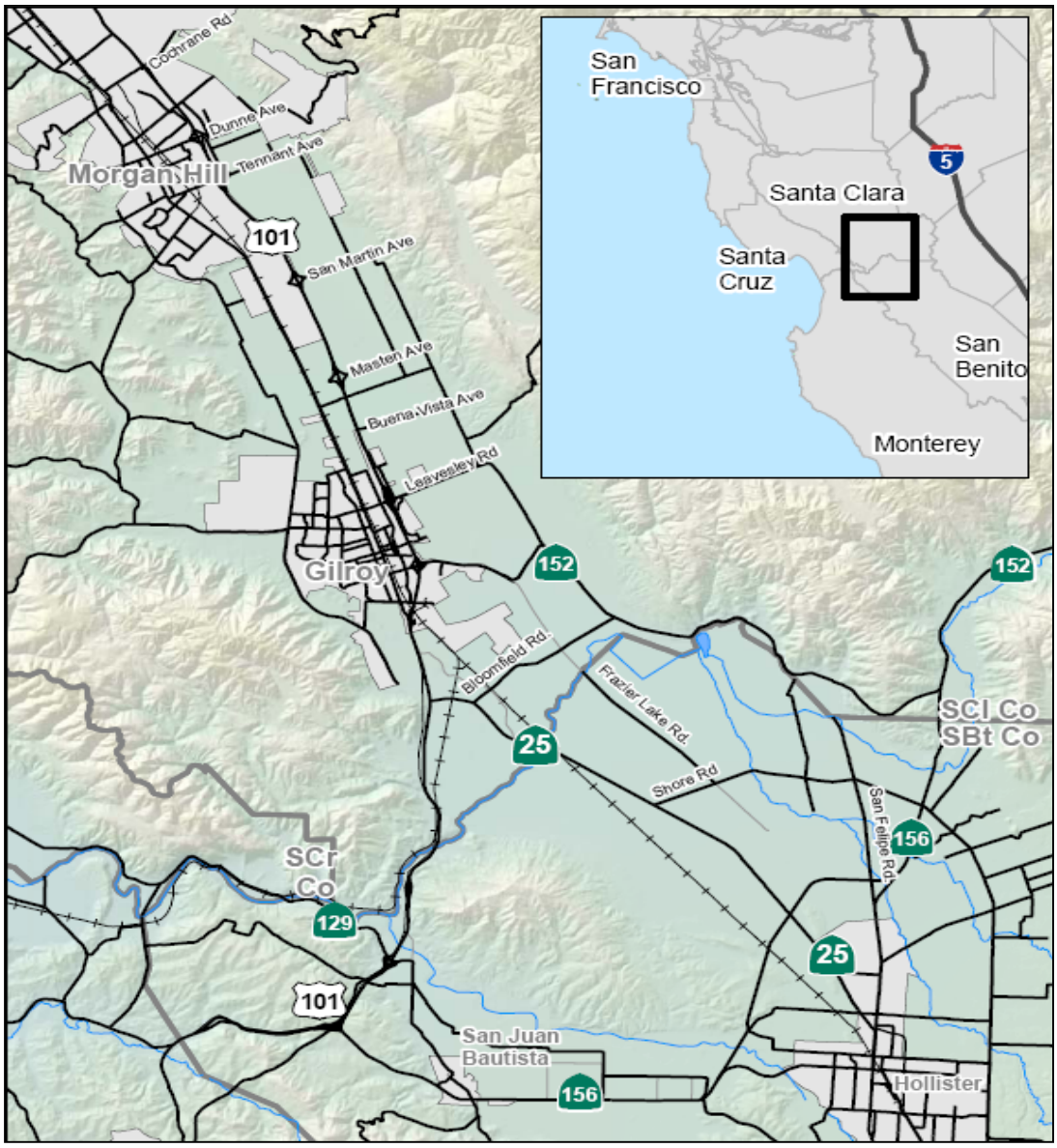
# System Analysis Study
# Of Focus Routes 101, 152, and 156




In cooperation with:
Council of San Benito County Governments
Santa Clara Valley Transportation Authority
Association of Monterey Bay Area Governments
Merced County Association of Governments
Metropolitan Transportation Commission

June 2008

The *System Analysis Study of Focus Routes 101, 152, and 156* is provided as a reference and guide for recommendations concerning US 101 and State Routes 25, 152 and 156 in northern San Benito County and southern Santa Clara County.

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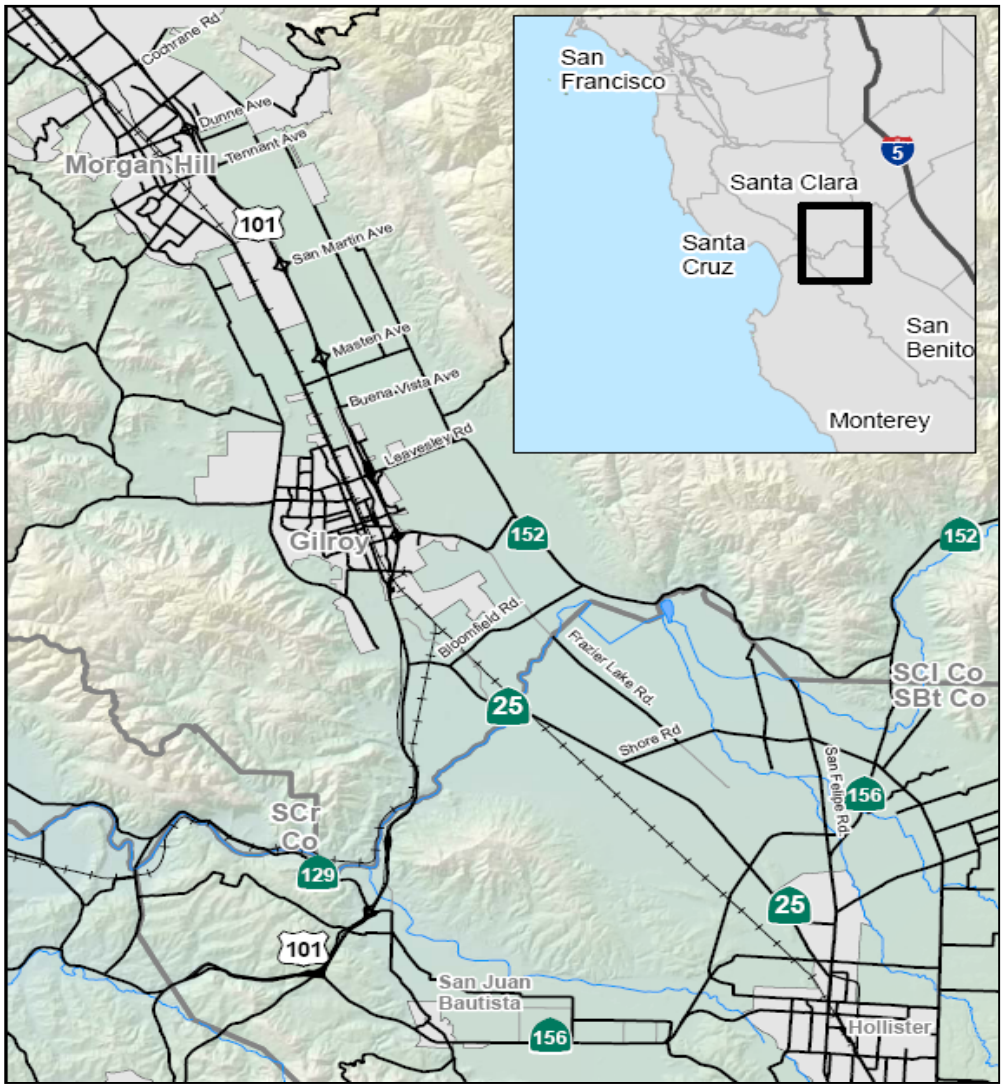
# INTRODUCTION

## Existing Facilities

State Routes (SR) 101, 152, 156 and 25 provide the major east-west and north-south service for interregional travel in California south of the San Francisco Bay Area. Located in northern San Benito and southern Santa Clara Counties, these routes connect the Central Valley, I-5, and SR 99 in the east with SR 101 in the west. From there, SR 101 connects with Monterey, Santa Cruz, and Santa Clara Counties and points beyond. State Routes 101, 152 and 156 are designated by Caltrans as Focus Routes, meaning these roadways are especially important for goods movement and have interregional and statewide significance. Further, they have the highest priority for completion to minimum facility standards.

**Figure 1. Project Location Map (2006)**



Routes in this system are currently congested, which is hindering efficient movement of traffic throughout the region. Continued growth in interregional traffic as well as growth in regional and local population and jobs will result in increased travel demand on the Focus Routes and on SR 25. This study therefore investigates potential investments in the roadway system. Traffic, cost, benefit-cost, and environmental study results are provided to help decision-makers develop a strategy for improving east-west traffic flow through the study area.

## Environmental Setting

**Farmlands:** Both San Benito and Santa Clara Counties are rich in agriculture. Growing, processing, and distribution of agricultural products remain essential elements of this region's economy and employment base. While the majority of San Benito County lands is designated as Open Space and agriculture, in Santa Clara County the areas of South County generally south and east of Gilroy, as well as areas in the vicinity of Morgan Hill, represent the last remaining areas of large scale agriculture in the county.

The California Department of Conservation classifies farmland under the following categories:

- ✓ Prime Farmlands
- ✓ Farmland of Statewide Importance
- ✓ Unique Farmland
- ✓ Farmland of Local Importance
- ✓ Grazing Land

According to maps produced by the Farmland Mapping and Monitoring Program, the SAS area contains an abundance of these agricultural resource types interspersed with urban and built-up land (see Appendix F).

**Scenic Resources:** North San Benito County and south Santa Clara County possess scenic qualities afforded by mountain and agricultural environments. The most striking features in the study area are the Diablo, Gabilan, and Santa Cruz mountain ranges and their associated valleys. The agricultural landscape is composed of orchards and row crops in the flat areas and pastures on the hillsides. The visual setting of the study area consists of large areas of flat open space planted with row crops or orchards, bordered by rolling hills and scattered rural residential development.

Denser suburban, commercial, and light industrial development is found near downtown San Juan Bautista and Hollister at the south end of the study area, and Gilroy and Mountain View to the north. The existing highways are also a major component of the view. Sections of several highways in the study area are listed as eligible State Scenic Highways in the *Highways Eligible for Official Scenic Highway Designation* (California Streets and Highways

Code Section 263.1-263.8). Overall within the study area, oak and grass-covered hillsides and riparian corridors along rivers and streams combined with agricultural land uses create a predominantly rural feeling and characterize the region's scenic beauty (See aerial and vegetation and land use maps in Appendix F for more detail).

**Waters of the U.S. & Wetlands**: The study area contains two major rivers (Pajaro and San Benito), one lake (San Felipe), one large slough (Tequisquita) and numerous creek corridors, which tend to be confined between cropland resources. These water bodies include stream channels that are considered other waters of the U.S. and wetland areas that are considered jurisdictional wetlands of the U.S. by the U.S. Army Corps of Engineers. Apart from these water aquatic resources, a variety of other wetland aquatic habitat types are found in the study area, including isolated wetlands such as alkaline swales, vernal pools, and irrigation ditches. In addition to the naturally occurring wetland habitats water bodies, many areas of wetlands aquatic sites within the study area have been created as a result of direct or indirect human activities (e.g., reservoirs, canals, irrigation ditches).

**Biological Resources**: As described above, numerous water bodies are located within the study area. In addition to wetlands, an extensive riparian habitat can be found along the river and creek corridors. These water aquatic resources coupled with extensive rangeland and agricultural parcels provide a wide variety of habitats for plants and animals.

**Wildlife Corridors**: Examples of typical wildlife corridors in the area include vegetated river and stream corridors, open grasslands, farmlands, dry gullies, and chaparral covered hillsides. Uvas Creek, which is crossed by all of the proposed scenarios, has been previously identified as a wildlife choke point; bridges currently provide linkage on this waterway.

Appendix F includes maps showing the location of sensitive plant and animal species and the major water bodies in the System Analysis Study area.

**Cultural Resources**: Located at the crossroads of important historic and prehistoric travel routes, the study area is rich in cultural resources. The Ohlone and their predecessors left behind large village sites, small campsites, and quarries, often located at canyon mouths and marsh margins. This landscape is overlain by historic development beginning in 1797 with the establishment of Mission San Juan Bautista. Many adobe buildings remain from that era. Beginning in the 1800s, cattle ranching and agricultural production has characterized the region, as evidenced by rural residential and farming facilities.

# BACKGROUND

In the mid-2000s, Santa Clara Valley Transportation Authority (VTA) studied travel in the northern San Benito County – southern Santa Clara County area. VTA examined existing and future land use conditions and the resulting expected changes in travel patterns. VTA then developed and evaluated six conceptual roadway improvement alternatives and published the results in the *Southern Gateway Transportation and Land Use Study, Final Report* (SGS) in August 2006.

After completion of VTA's analysis, both the Association of Monterey Bay Area Governments (AMBAG) and VTA updated their regional travel demand models with new demographic and travel behavior data from the 2000 Census and 2001 Caltrans Household Travel Survey. In collaboration with regional transportation agencies, Caltrans District 5 Transportation Planning Branch (D5 staff) re-evaluated the SGS alternatives with the new AMBAG model. Further, D5 staff introduced a benefit-cost framework so that decision-makers would be able to compare the alternatives in a systematic and comprehensive manner. Finally, D5 staff expanded the analysis with more thorough environmental considerations.

The results of this analysis are presented in this report, *System Analysis Study of Focus Routes 101, 152, and 156* (SAS).

# METHODOLOGY

To address the region's growing congestion, the SAS evaluates the traffic, cost, and environmental considerations of the No Build and five alternative alignments and roadway configurations of state highways in the area. The methodology for this analysis is described below. A comparison of the SGS alternatives and the SAS scenarios can be found in Appendix A.

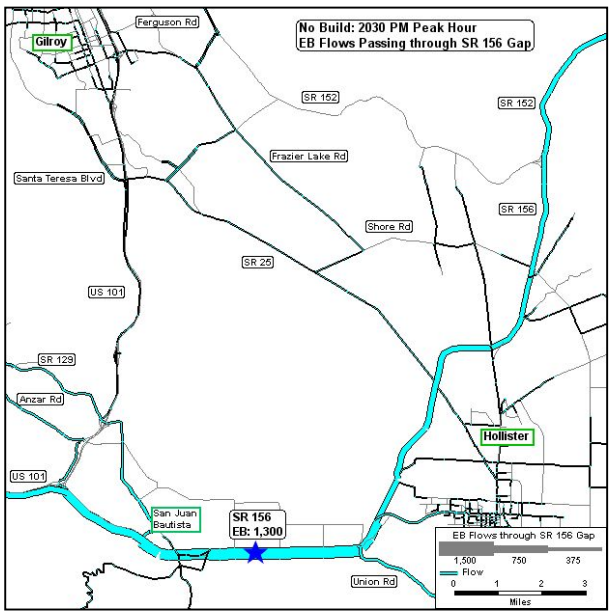
## Study Area

As shown in Figure 1, the study area includes US Highway 101 (US 101) between State Route (SR) 156 in San Benito County and Cochrane Road in Santa Clara County. It also includes SR 25 between US 101 and San Felipe Road/Bolsa "Y" in Hollister, SR 152 between US 101 and SR 156, and SR 156 in San Benito and Santa Clara Counties.

## Traffic Flows

To investigate traffic flows and patterns, the SAS utilized AMBAG's regional travel demand model from April 2004 modified for the study.[1] The model provided traffic flow information for the 2030 PM peak hour, the afternoon being the heaviest travel time in the area.[2] It also provided daily traffic flow information that, combined with peak hour data, was used in the benefit-cost analysis. Using the regional travel demand model allowed Caltrans to capture the interactive travel effects of different improvement scenarios in the area.

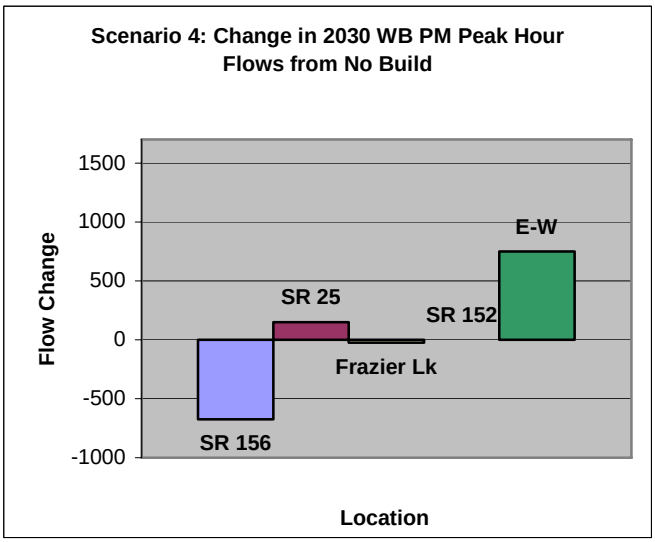
In addition, the model provided information on travel patterns at selected locations important to east-west travel on the area's state highways. To identify the travel patterns, the SAS relied on select-link analyses. In the example to the right, a star shows a selected location while the thickness of the highlighted line indicates the volume of traffic passing through that location as well as the directions from and to which the traffic travels. Select-link results are provided in Appendix E.




[1] AMBAG makes no warranty, express or implied, on the results or opinions derived from these data for any PROJECT study not conducted by AMBAG.

[2] Like most models, the model provides travel flows for a typical Tuesday-Wednesday-Thursday.

In addition, at selected locations, a scenario's expected traffic volumes are compared with the No Build traffic flows. Differences between the volumes are displayed in bar charts like the example below.




At a glance, the bar chart shows the change in future westbound (WB) PM peak hour traffic for Scenario 4 compared to the No Build Scenario. Traffic volumes would be lower on SR 156 and Frazier Lake Road, would be higher on SR 25, would show no change on SR 152, and would be approximately 750 on the new East-West Route.

In the following, traffic volumes are rounded to the nearest 25, and percentages are usually rounded to the nearest 5.

<u>Congestion</u>

In the SAS, the scenarios' traffic flows are described in terms of congestion. Congestion was defined as the ratio of expected volumes to the roadway's design capacity (VOC) as follows.

Light Congestion (shown in green on the maps)

VOC: Less than 0.85

Description: Traffic flows generally at posted speeds, maneuverability is fairly good, and minor disturbances do not cause serious disruptions in traffic.

Medium Congestion (shown in gold on the maps)

VOC: Greater than or equal to 0.85 and less than 1.0

Description: Traffic speeds begin to decline, maneuverability is decreased, and minor disturbances can cause serious disruptions in traffic.

Heavy Congestion (shown in red on the maps)

VOC: Greater than or equal to 1.0

Description: Travel speeds are generally less than 35 miles per hour and may be stop-and-go. Maneuverability is low and minor disturbances cause serious disruptions in traffic.

Goods Movement

The AMBAG model includes a separate truck component that provided goods movement flows through the region for the different scenarios. Truck origins and destinations were constant from scenario to scenario, but route choices did change depending on congestion conditions.

Cost Estimates

Each improvement scenario has associated costs that were estimated for the SAS. Costs include total capital (construction and right-of-way) and support costs as well as operating and maintenance costs. Costs are planning level estimates and are in 2006 dollars. A percentage contingency cost was included to account for environmental mitigation. Cost estimates are described in detail in Appendix B.

Benefit-Cost Results

The traffic and cost information described above was combined with safety data to evaluate the benefits and costs of each improvement scenario. Benefit-cost analysis provides a systematic, economic evaluation of the advantages (benefits) and disadvantages (costs) of a set of investment alternatives. It allows us to incorporate different types of benefits and costs (e.g., safety improvements and travel time savings, and construction and operating and maintenance costs) into one analysis, thereby facilitating comparison of investment alternatives.

As used in the SAS, benefit-cost analysis accounts for the trade-offs to travelers from scenario improvements. For example, improved roadways with faster travel times provide increased accessibility to jobs and other activities farther away. The SAS benefit-cost analysis accounts for the trade-offs between this increased accessibility and increased vehicle operating costs incurred from traveling longer distances to these new locations. The analysis also captures the effects of reduced travel times on parallel roads affected by the improved highway, it accounts for the automobile and truck operating costs at different speeds and grades on the roadway system, and it includes possible safety benefits from improved roadways. Due to the many different benefits and costs of each scenario, the scenarios can be difficult to compare. However, benefit-cost analysis provides a guideline for determining which scenario is the best investment.

The benefits considered in the SAS analysis are referred to as “user” benefits since they accrue to the traveling public. User benefits include travel time savings (mobility benefits),

vehicle operating cost savings, and safety benefits.[3] No attempt was made to incorporate other "societal" benefits such as air quality improvements. Details on benefits are provided in Appendix C while cost details can be found in Appendix B.

Benefits and costs are estimated for each scenario for each year and then discounted to the investment start year. The benefits and costs are then compared in two ways. First, the benefit-cost ratio is calculated for each investment scenario as:

Benefit-Cost Ratio = Sum of Discounted Benefits / Sum of Discounted Costs.

A benefit-cost ratio greater than or equal to one means that the investment is economically justified.

The second comparison is the Net Present Value, defined as:

Net Present Value = Sum of Discounted Benefits – Sum of Discounted Costs.

A net present value (NPV) of zero means that the project is earning the normal rate of return, which is equivalent to the discount rate. When the NPV is greater than zero, the project is worth doing since it returns more than the normal rate of return, while a NPV less than zero means that the project is not economically justified. Therefore, the higher the NPV, the more attractive is a given project.[4] Appendix C provides a more comprehensive explanation of these concepts and the underlying assumptions.

For the SAS analysis, the benefit-cost results assume that full funding is available and that any scenario could begin construction in 2010 and be open by 2013. The AMBAG regional travel demand future year is 2030, and results were extrapolated to 2035 for the benefit-cost analysis. Improvement scenarios are compared with the No Build scenario to obtain the incremental benefits and costs of each scenario. D5 staff used the software tool NET_BC[5] to estimate benefits and costs and to obtain the benefit-cost ratio and NPV. This software is especially well-suited for long-range planning and for capturing impacts across intricate roadway networks. Assumptions used in NET_BC are described in Appendix C.

## Environmental Considerations

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[3] Possible safety benefits were based on 2004 California accident rates groups, which are averages. Therefore, the safety benefits reported in the SAS should be regarded as planning level estimates and not be used for actual accident analyses of the study area.

[4] Benefit Cost Analysis Guide, Treasury Board of Canada, Secretariat, Draft July 1998, http://www.tbs-sct.gc.ca/fin/sigs/Reolving_Funds/bcag/BCA2_E.asp. See Appendix C for a more comprehensive explanation of these concepts and the underlying assumptions.

[5] **NET_BC** was developed by Bernardin, Lochmueller & Associates, Inc., and modified for use by Caltrans.

The Caltrans District 5 Environmental Branch prepared a screening level analysis to provide basic information regarding potential environmental effects that may result from construction of the proposed scenarios. This information was gathered from numerous sources including:

- Caltrans technical studies, resource maps, photo logs
- California Natural Diversity Data Base
- U.S. Fish and Wildlife Service species lists
- San Benito County General Plan
- Santa Clara County General Plan
- Various State and Federal publications

The primary issue areas identified in the study area include scenic resources, biological resources (sensitive species, wildlife movement corridors, wetlands), farmlands, and cultural/Section 4(f) resources.

Factors taken into consideration when evaluating the effects of new transportation structures (i.e. highways, intersections with signals and lighting, grade separations, noise and vehicle barriers, extensive cut and fill operations) to environmental resources included:

- ✓ Changes in scenic character
- ✓ Number of sensitive plant and animal species and sensitive habitat present
- ✓ Removal of vegetation
- ✓ Loss of or segmenting of open space
- ✓ Impacts to water bodies and riparian corridors
- ✓ Conversion to non-agricultural uses, segmentation of active parcels, disruption of agricultural activities
- ✓ Number of recorded prehistoric and historic resources; number of resources listed or eligible for listing on the National Register of Historic Places

Using the applicable factors listed above for each scenario, each resource was assigned a ranking of “high”, “medium”, or “low”, with “high” signifying greater potential for impacts and “low” indicating less potential for impacts. The rankings were based on a qualitative evaluation of the resources present and potential magnitude of the effect of the scenario on the respective resource. An additional factor was added to address resources that are afforded additional regulatory protection outside the realm of the California Environmental Quality Act and the National Environmental Policy Act. A comparison of potential resource impacts for each scenario is provided in Table 7 in the “Findings” section of this document.

The information provided for use in the System Analysis Study is not taken from an approved environmental document. Preliminary analysis and determinations are based on the scenario

descriptions provided. The conclusions provided are approximate and are based on cursory analysis of probable effects.

Technical Advisory Committee

Caltrans District 5 staff performed the analysis with the help and guidance of consultant teams and a technical advisory committee (TAC) consisting of the Council of San Benito County Governments (SBtCOG), Santa Clara Valley Transportation Authority (VTA), the Association of Monterey Bay Area Governments (AMBAG), Merced County Association of Governments, the Metropolitan Transportation Commission, and Caltrans Headquarters and Districts 4 and 10. The TAC met periodically to determine the scenarios to be studied and to discuss interim results. Information on the technical advisory committee is provided in Appendix D.

# NO BUILD SCENARIO ANALYSIS

## Expected Area Growth

Growth in households and employment in the study and surrounding areas is expected to result in increasing congestion on the state highways and local roads by 2030 if no improvements are made to the system. Household and employment growth is shown in Table 1.

**Table 1. Household and Employment Growth in AMBAG Area**

| County | Households | | | | Employment | | | |
|---|---|---|---|---|---|---|---|---|
| | 2000 | 2030 | Absolute Change | AAGR* | 2000 | 2030 | Absolute Change | AAGR* |
| San Benito | 15,483 | 23,528 | 8,045 | 1.4% | 21,552 | 37,867 | 16,315 | 1.9% |
| Santa Clara | 565,501 | 703,905 | 138,404 | 0.7% | 1,018,789 | 1,347,808 | 329,019 | 0.9% |
| Monterey | 123,250 | 180,822 | 57,572 | 1.3% | 222,441 | 335,381 | 112,940 | 1.4% |
| Santa Cruz | 89,773 | 123,857 | 34,084 | 1.1% | 149,618 | 213,251 | 63,633 | 1.2% |

* Note: AAGR = average annual growth rate
Source: AMBAG Regional Travel Demand Model April 2004 TAZ Data

## No Build Scenario

The No Build Scenario is basically a "do nothing" case study. It assumes that no improvements are made to the state highways in the study area beyond those currently under construction: 1) truck climbing lanes on SR 152 between US 101 and SR 156, 2) a flyover and reconfiguration of the SR 152 – SR 156 junction, and 3) the SR 25 Bypass around Hollister.

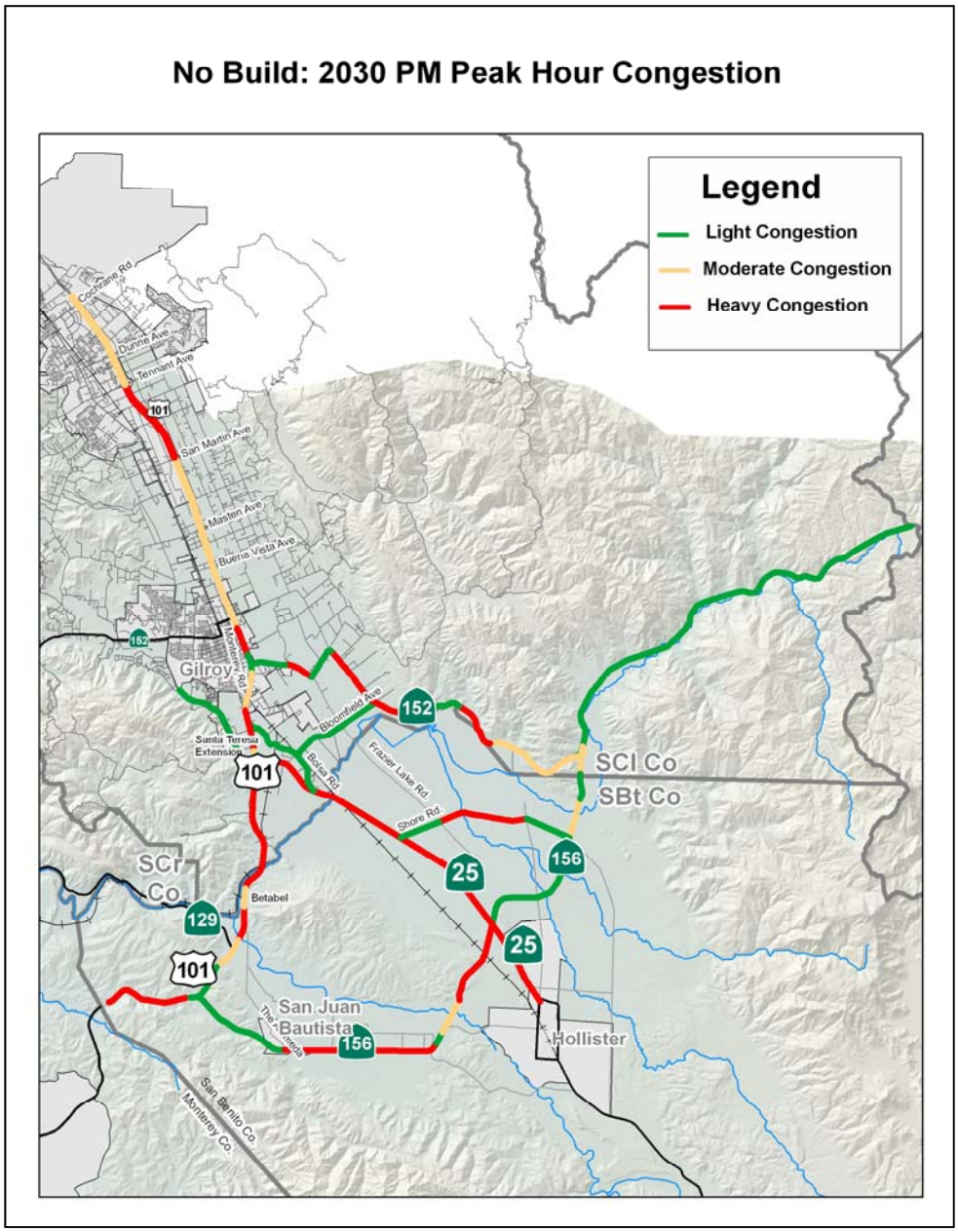
## No Build Traffic Flows

Given the expected household and employment growth in the AMBAG area, the resulting traffic flows and congestion levels in the 2030 PM peak hour are shown for the No Build Scenario in Figure 2. Red roadway sections indicate heavy congestion, gold indicates medium congestion, and green indicates light congestion.

In 2030, there is widespread, heavy congestion expected in the PM peak hour in the entire area. To better understand this congestion on east-west traffic flows, travel patterns on the major east-west state highways in the area are examined in more detail. The locations

selected for further analysis are: 1) SR 156 between San Juan Bautista and Hollister, 2) SR 25 north of Shore Road, and 3) SR 152 east of Ferguson Road.

Figure 2. No Build: 2030 PM Peak Hour Congestion

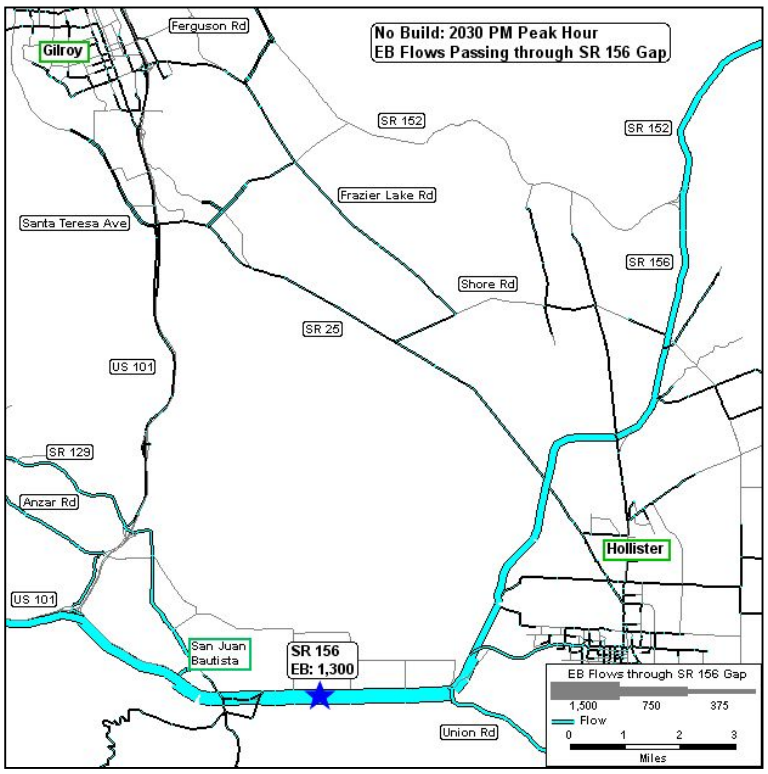


## SR 156 between San Juan Bautista and Hollister

East-west flows traveling on SR 156 between San Juan Bautista and Hollister are shown in Figures 3 and 4. Flows are for the 2030 PM peak hour.

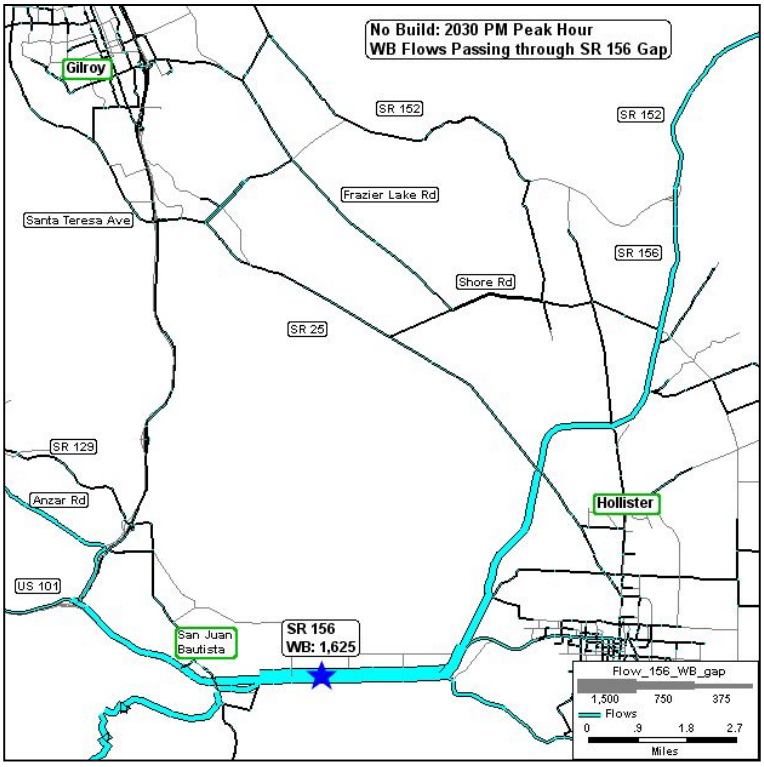
As seen in Figure 3, eastbound (EB) traffic on SR 156 has traveled mainly from two directions: 1) from the west, e.g., from Santa Cruz and Watsonville accessed via SR 129 and Anzar Road, and 2) from the south including Castroville, Monterey Peninsula, and Salinas accessed via US 101 and SR 156 West. Traffic from the west accounts for approximately 35% of the trips while traffic from the south accounts for 55% of the trips.

Figure 3. EB Flows Passing through SR 156 Gap




The major destinations of this traffic are: 1) Greater Hollister, defined as the area southeast of SR 156, and 2) Merced County and beyond, accessed via SR 152 East. Greater Hollister traffic comprises about 55% of trips passing through the study location on SR 156, with Merced County trips accounting for about 40% of the trips.

**Figure 4. WB Flows Passing through SR 156 Gap**




In 2030, the PM peak hour direction on this stretch of SR 156 will have shifted from the current EB direction to the WB direction due to the relatively high job growth projected for San Benito County and the large household growth in the northern Salinas growth area. 55% of WB trips will come mainly from Greater Hollister, with slightly less than 30% of trips coming from Merced County and beyond.

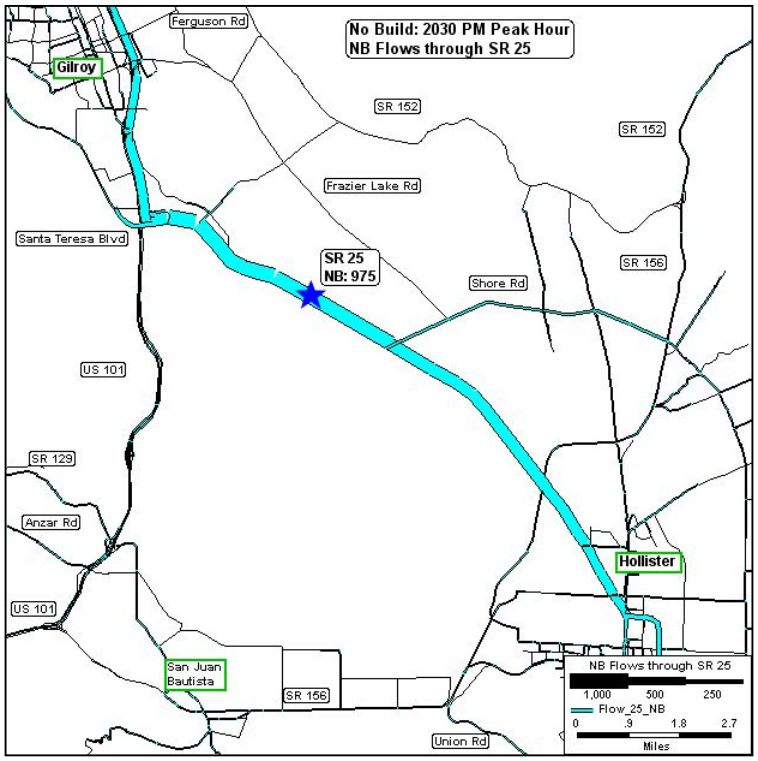
Major destinations are to the west and to the south. Slightly less than 30% of all trips head to locations in the west such as Watsonville and Santa Cruz. About 60% of trips head south.

One of the interesting aspects of trips passing through SR 156 between San Juan Bautista and Hollister in the 2030 PM peak hour is that there is hardly any traffic coming from or going to the Gilroy-San Jose area.

## SR 25 North of Shore Road

North-south flows traveling on SR 25 north of Shore Road in the 2030 PM peak hour are shown in Figures 5 and 6.

**Figure 5. NB Flows Passing through SR 25**

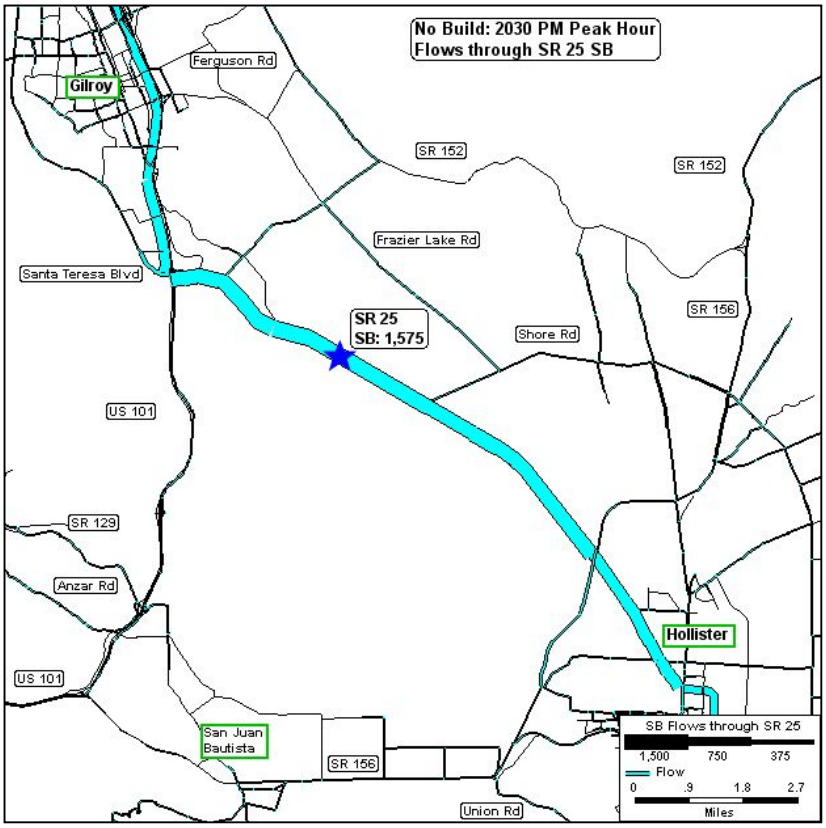



The off-peak direction on SR 25 will continue to be in the northbound (NB) in the 2030 PM peak hour. Only slightly more than 10% of this traffic comes from Merced County and beyond via SR 152 East. Greater Hollister accounts for most of the traffic, with a share of almost 85%.

As expected, major NB destinations are in the Gilroy-San Jose area and beyond. About 70% of trips travel to the area between and including Gilroy-Morgan Hill, and slightly more than 20% of SR 25 trips utilize NB US 101 north of Cochrane Road in Morgan Hill.

In the southbound (SB) direction, about 60% of trips come from the Gilroy-Morgan Hill area, and about 30% of trips have traveled on US 101 from locations north of Cochrane Road. Almost all trips (90%) are headed to the Greater Hollister area, with less than 5% traveling to Merced County and beyond via SR 152 East. SB traffic flows are shown in Figure 6.

**Figure 6. SB Flows Passing through SR 25**




As with SR 156, traffic on SR 25 in the 2030 PM peak hour shows a distinct pattern. There is heavy travel between Greater Hollister and Gilroy-San Jose, with very little traffic heading to or from Merced County or to or from western and southern locations.

## SR 152 East of Ferguson Road

East-west flows traveling on SR 152 east of Ferguson Road in the 2030 PM peak hour are shown in Figures 7 and 8.

In the 2030 PM peak hour, the peak direction on SR 152 east of Ferguson Road is expected to continue to be EB. About 70% of EB trips passing through this location come from the Gilroy-Morgan Hill area, and slightly less than 25% of trips have traveled on US 101 from locations north of Morgan Hill.

Approximately 80% of trips travel to Merced County and beyond. Slightly more than 15% of trips travel to Greater Hollister by using SR 152 and local roads.

Figure 7. EB Flows Passing through SR 152 East

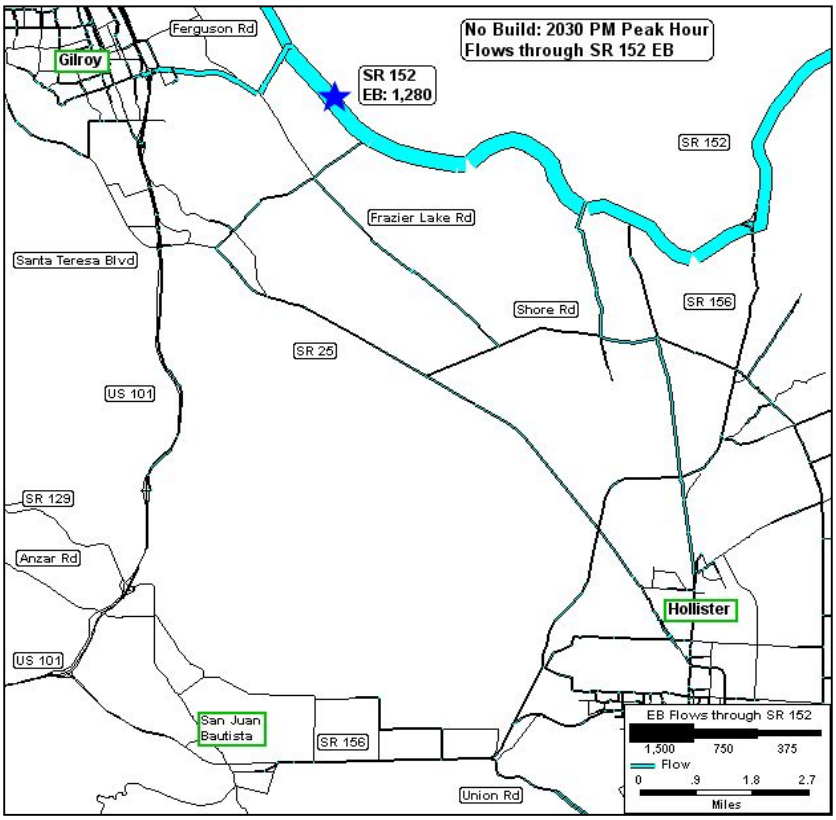
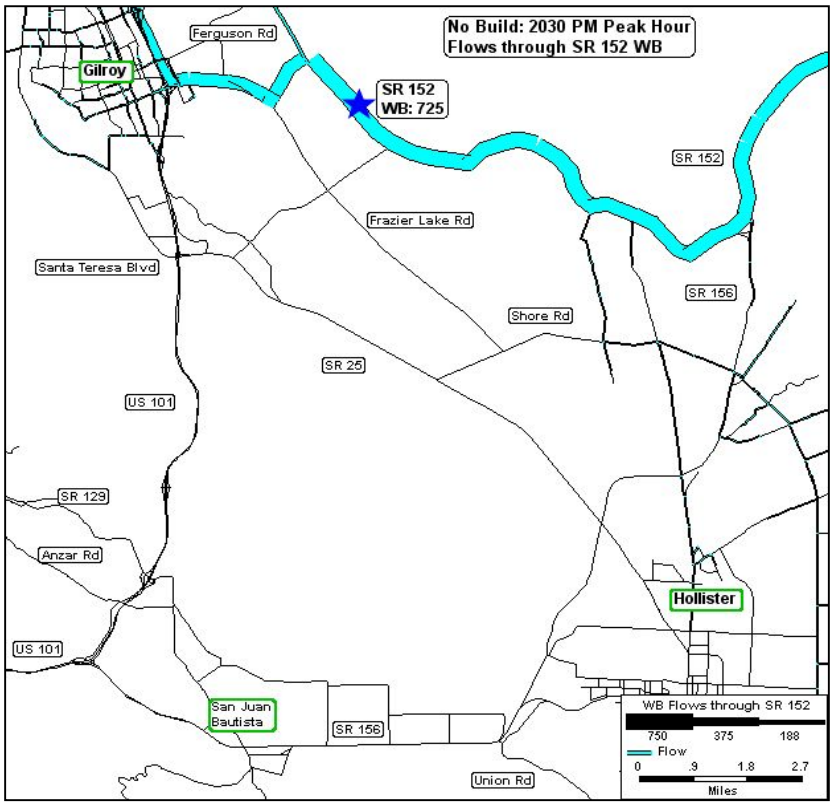


Figure 8. WB Flows Passing through SR 152




In the WB direction, 90% of trips has come from Merced County and beyond. Approximately 5% of trips originate in the Greater Hollister area.

Major WB trip destinations include the Gilroy-Morgan Hill area and locations north of Cochrane Road. About 70% of trips head to the Gilroy-Morgan Hill area, while about 25% of trips travel to locations north of Cochrane Road accessed via US 101.

Again, as with SRs 156 and 25, there are distinct travel origins and destinations for traffic passing through SR 152 east of Ferguson Road. The Gilroy-San Jose to and from Merced County and beyond travel path is dominant, with a relatively small amount of Greater Hollister traffic using SR 152 as well.

## No Build Environmental Considerations

Under the No Build Scenario as described in this section, there is the potential for both adverse and beneficial impacts to environmental resources.

- ✓ Adverse Impacts – As previously stated, growth in the study area and surrounding areas is expected to result in major congestion if no improvements are made to the system. The slower vehicle movement likely to result from this congestion could possibly have an adverse impact on air quality in the area.

- ✓ Beneficial Impacts – With the No Build Scenario, potential impacts to biological resources, scenic resources, farmlands, and cultural resources could be avoided.

## PROPOSED SCENARIO ANALYSES

To address anticipated heavy congestion in the area, five improvement scenarios were developed and analyzed comprehensively (Scenarios 1, 2, 4, 5, and 6). Three additional scenarios (Scenarios 4A, 6A, and 7) were also examined but only for the changes in traffic patterns. The results are presented below.

Note that these improvement scenarios are conceptual. As such, they may not correspond exactly to projects being developed and programmed at the time of this report.

### US 101 North Corridor

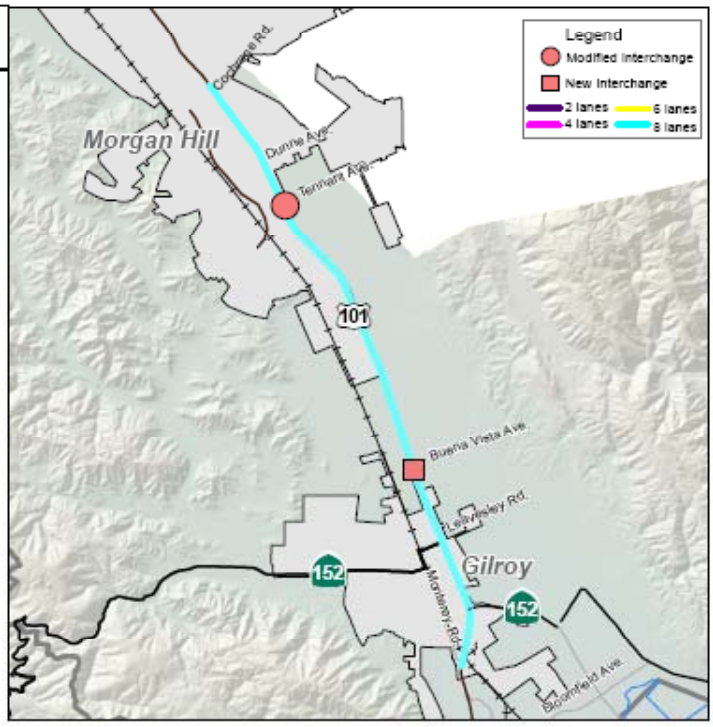
Widening the US 101 North Corridor is common to all the improvement scenarios. It is therefore described only once in this section.

Figure 9. US 101 North Corridor

101 North Corridor - System Analysis Study

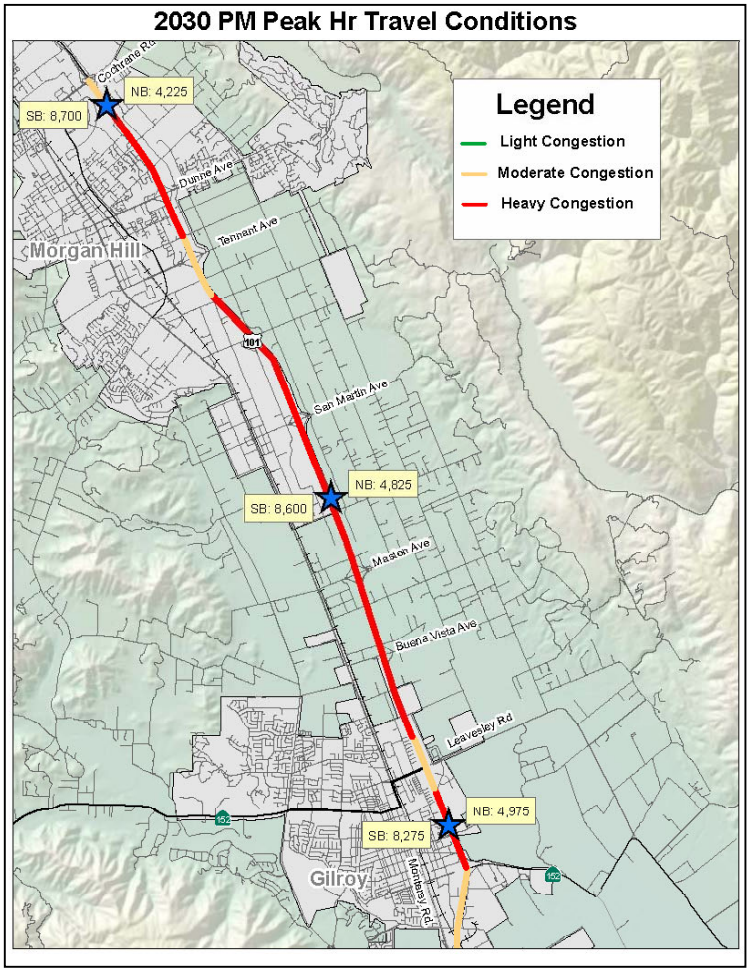
| Route | Improvement Limits | Length (miles) | Existing Lanes | Proposed Lanes |
|---|---|---|---|---|
| 101 | Monterey Road to Cochrane Road | 13.7 | 4 | 8 |

101 North Corridor Proposals



**Description.** The US 101 North Corridor widens the US 101 facility from the Monterey Road Undercrossing (PM R4.9) in the south to Cochrane Road (PM R17.8) in the north. The widening consists of adding a high occupancy vehicle (HOV) lane in each direction, resulting in an eight-lane freeway facility that extends the HOV system from Morgan Hill in the north to Gilroy in the south. The addition of a partial cloverleaf loop to the Tennant Avenue Interchange, the construction of a new Buena Vista Avenue Interchange (including improvements for the addition of a CHP Inspection Station), and the extension of Butterfield Boulevard from Tennant Avenue to Monterey Road are also included in this corridor's improvements. The entire limits of the US 101 North Corridor are within Santa Clara County.

**Figure 10. US 101 North Corridor Travel Conditions**




**Traffic Analysis.** As seen in Figure 10, the proposed improvements will only partly alleviate congestion in this corridor in the 2030 PM peak hour.

In the NB direction, about half of the trips traveling on US 101 just north of SR 152 East have come from locations to the south and west of the study area. Only about one-third of these

trips also travel on US 101 north of Cochrane Road, suggesting that there is significant ingress and egress to/from US 101 in the Gilroy-Morgan Hill area.

In the SB direction, approximately half of the trips passing through US 101 just north of SR 152 East have also traveled on US 101 north of Cochrane Road. Major destinations from the US 101-SR 152 East location include Greater Hollister (25% of trips) and locations to the south accessed via US 101 south of SR 156 (45% of trips).

**Cost Estimate**. The proposed improvements are expected to cost approximately $285.2 million (M).

**Benefit-Cost Results**. Results are included in each of the scenario results presented below.

**Environmental Considerations.** Since the 101 North Corridor is part of all of the scenarios, the environmental considerations have been incorporated into each of the scenario discussions.

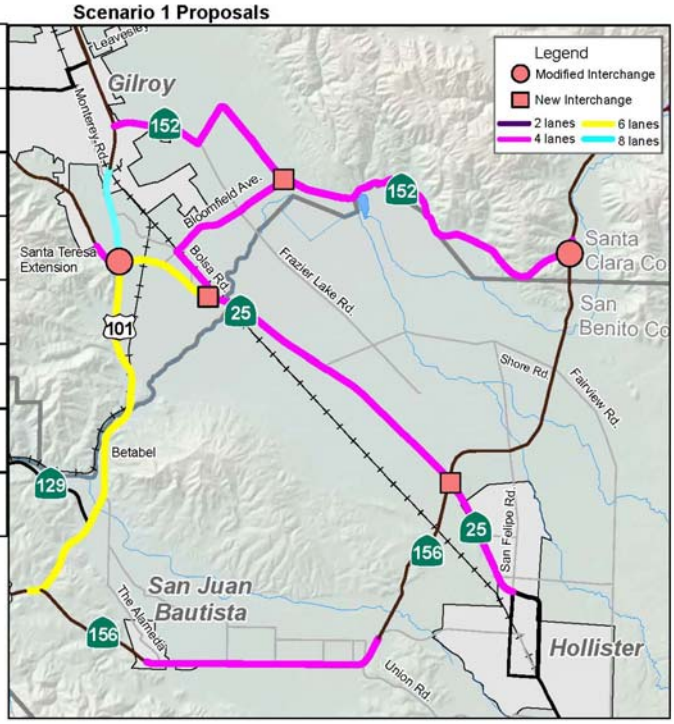
## Scenario 1: Widen US 101, SR 152, Bloomfield Ave., SR 156, and SR 25

**Figure 11. Scenario 1 Description**

### Scenario 1 - System Analysis Study

| Route | Improvement Limits | Length (miles) | Existing Lanes | Proposed Lanes |
|---|---|---|---|---|
| 101 | 25 to Monterey Road | 1.7 | 4 | 8 |
| 101 | 156 to 25 | 7.4 | 4 | 6 |
| | Santa Teresa Extension | 0.8 | 0 | 4 |
| 25 | 101 to Bolsa Road | 2.0 | 2 | 6 |
| 25 | Bolsa Road to San Felipe Road | 9.2 | 2 | 4 |
| | Bloomfield and Bolsa Widening | 4.0 | 2 | 4 |
| 152 | 101 to 156 | 11.7 | 2 | 4 |
| 156 | The Alameda to San Juan Road-4th Street | 5 | 2 | 4 |

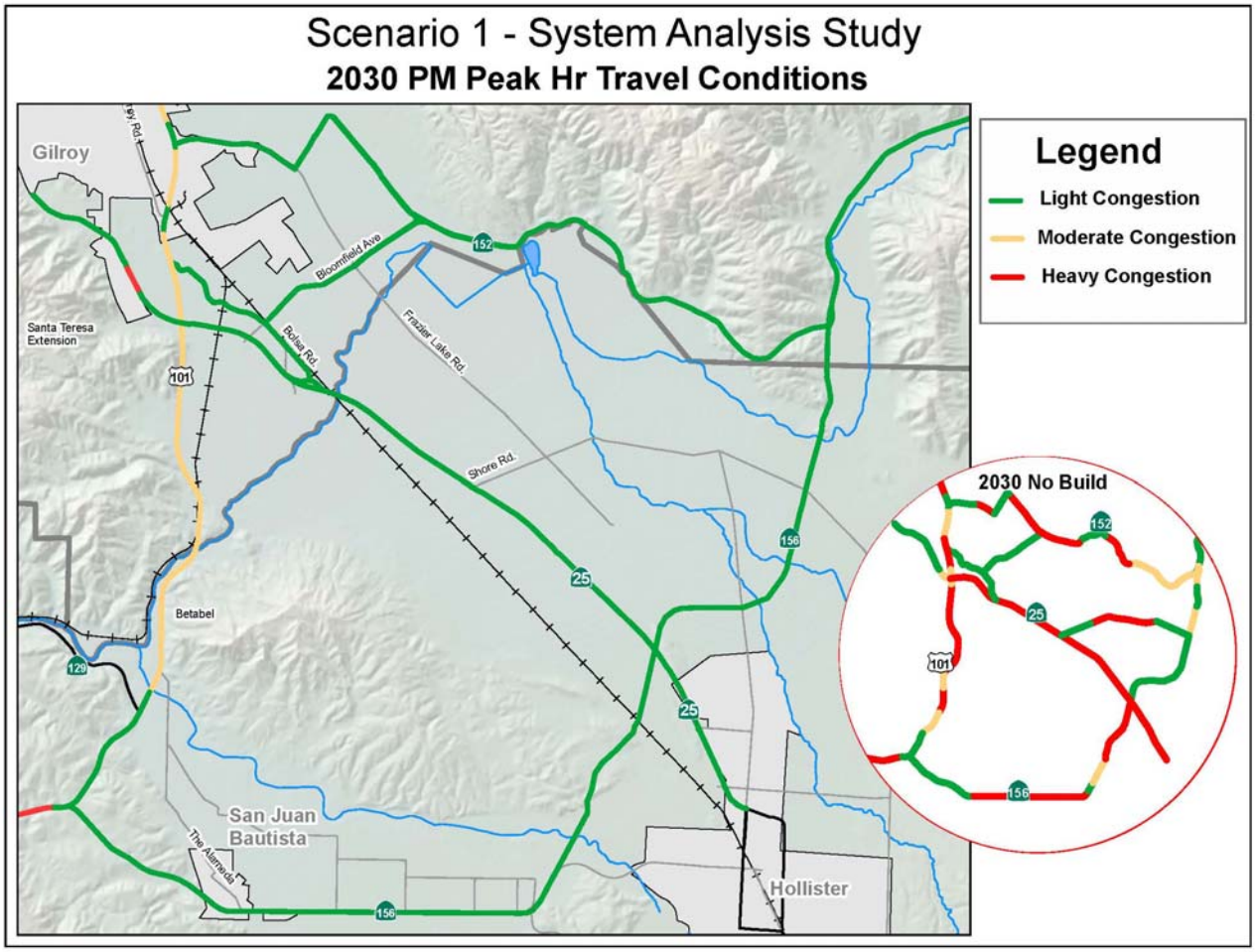
**Scenario 1 Proposals**




**Description.** Scenario 1 calls for improvements along US 101, SR 152, Bloomfield Avenue and Bolsa Road, SR 156, and SR 25. This scenario also includes an extension of Santa Teresa Boulevard (Blvd) west of US 101. Details are shown in Figure 11. Scenario 1 would require roadway construction along challenging vertical and horizontal alignments of SR 152.

US 101 – 6 lane freeway between SR 156 and SR 25
– 8 lane freeway between SR 25 and Monterey Road
SR 152 – 4 lane expressway between US 101 and SR 156
SR 156 – 4 lane expressway between The Alameda and 4th Street (Business Route 156)
SR 25 – 6 lane freeway between US 101 and Bolsa Road
– 4 lane expressway between Bolsa Road and San Felipe Road

Figure 12. Scenario 1 Travel Conditions

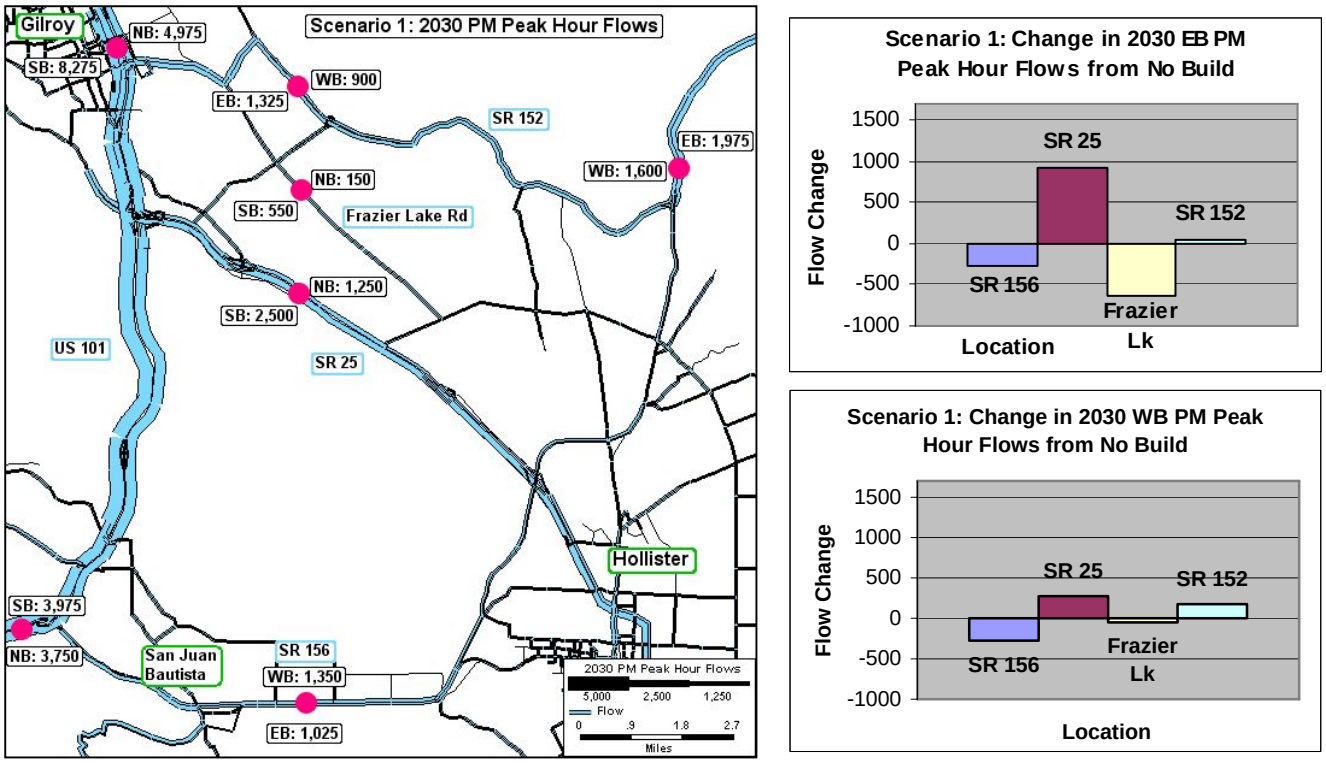



**Traffic Analysis**. Compared to the No Build case, Scenario 1 relieves congestion on all of the state highways in the study area shown in Figures 11 and 12. Improvements provide adequate capacity for vehicles to select more direct routes to their destinations. This is especially true for traffic traveling between the Gilroy-San Jose area and Greater Hollister, with this traffic no longer diverting to Frazier Lake Road as in the No Build case.

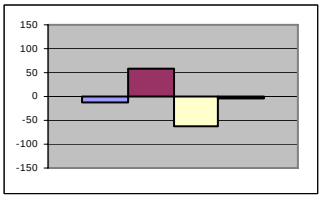
In addition, improved travel times particularly on SR 25 and US 101 lead to changes in travel locations. In this scenario, compared to the No Build Scenario, there are fewer trips to and from western and southern locations and more trips between the Gilroy-San Jose area and Greater Hollister.

As shown in Figure 13, the net result compared to the No Build case is fewer trips on SR 156 and Frazier Lake Road, more trips on SR 25, and little change in traffic on SR 152 at the starred locations. Details are presented in Appendix E.

Figure 13. Scenario 1: 2030 PM Peak Hour Flows




**Goods Movement**. Changes in truck travel through the area tend to mirror the changes in all vehicle traffic displayed above. In the EB direction, the main change from the 2030 PM peak hour No Build Scenario is a shift of trucks off of Frazier Lake Road and onto SR 25. These changes are shown in the figure to the right.




In the WB direction, there is little change in travel paths (not shown). However, for both directions, the added capacity on state routes in Scenario 1 leads to faster speeds on the highways and thereby reduced travel under congested conditions. This is especially beneficial to truck travel.

**Estimated Cost**. Scenario 1 is estimated to cost $1,039.6 million (M) for the southern corridors and $285.2 M for the US 101 North Corridor. Total estimated cost for Scenario 1 is $1,324.8 M.

**Benefit-Cost Results**. Mobility benefits are the largest component of total benefits generated by Scenario 1. In the 2030 forecast year, Scenario 1 generates $115.3 M in mobility benefits, $48.6 M in vehicle operating savings, and $30.0 M in safety benefits. Benefits

attained by auto trips account for the largest share of mobility and safety benefits while truck trips experience considerable vehicle operating cost savings due to the faster speeds on Scenario 1's improved roadways.

Over the analysis period, the results are as follows.

Benefit-Cost Ratio: 1.58
Net Present Value: $781.6 M

The benefit-cost ratio is greater than one, indicating that this scenario is economically justified. The scenario's net present value is the second highest of the five scenarios studied in the SAS.

**Other Comments**. Scenario 1 originally included widening SR 156 to four lanes from Union Road to SR 152. However, the traffic analysis showed that such widening was not needed. With SR 156 as a two-lane facility, 2030 PM peak hour volumes between Union Road and SR 152 varied between 20% and 60% of capacity in the eastbound direction and between 30% and 75% in the westbound direction. There was thus adequate capacity as a two-lane facility to handle the expected traffic flows along this stretch.

Scenarios 1 and 7 are the only ones that include widening SR 152. VTA is currently analyzing SR 152 bypasses.

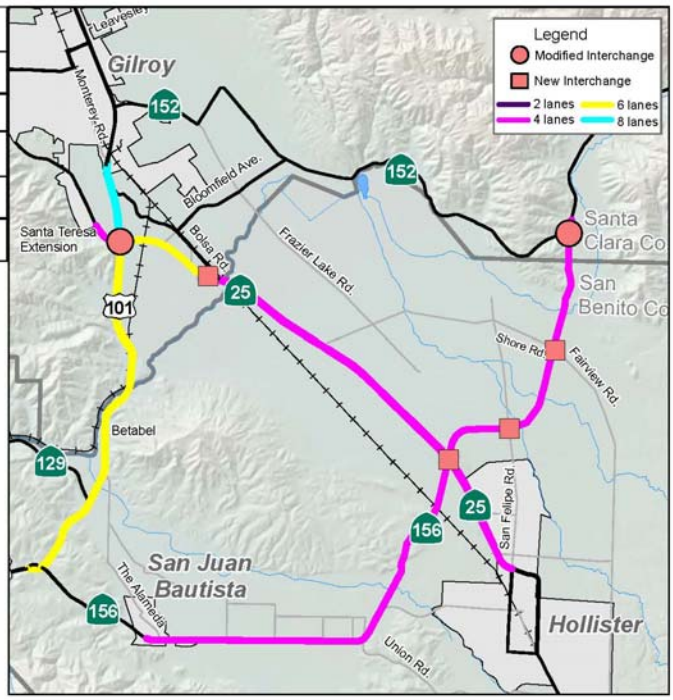
## Scenario 2: Widen US 101, SR 152, and SR 156

Figure 14. Scenario 2 Description

### Scenario 2 - System Analysis Study

| Route | Improvement Limits | Length (miles) | Existing Lanes | Proposed Lanes |
|---|---|---|---|---|
| 101 | 25 to Monterey Road | 1.7 | 4 | 8 |
| 101 | 156 to 25 | 7.4 | 4 | 6 |
| Santa Teresa Extension | | 0.8 | 0 | 4 |
| 25 | 101 to Bolsa Road | 2.0 | 2 | 6 |
| 25 | Bolsa Road to San Felipe Road | 9.2 | 2 | 4 |
| 156 | The Alameda to 152 | 14.8 | 2 | 4 |

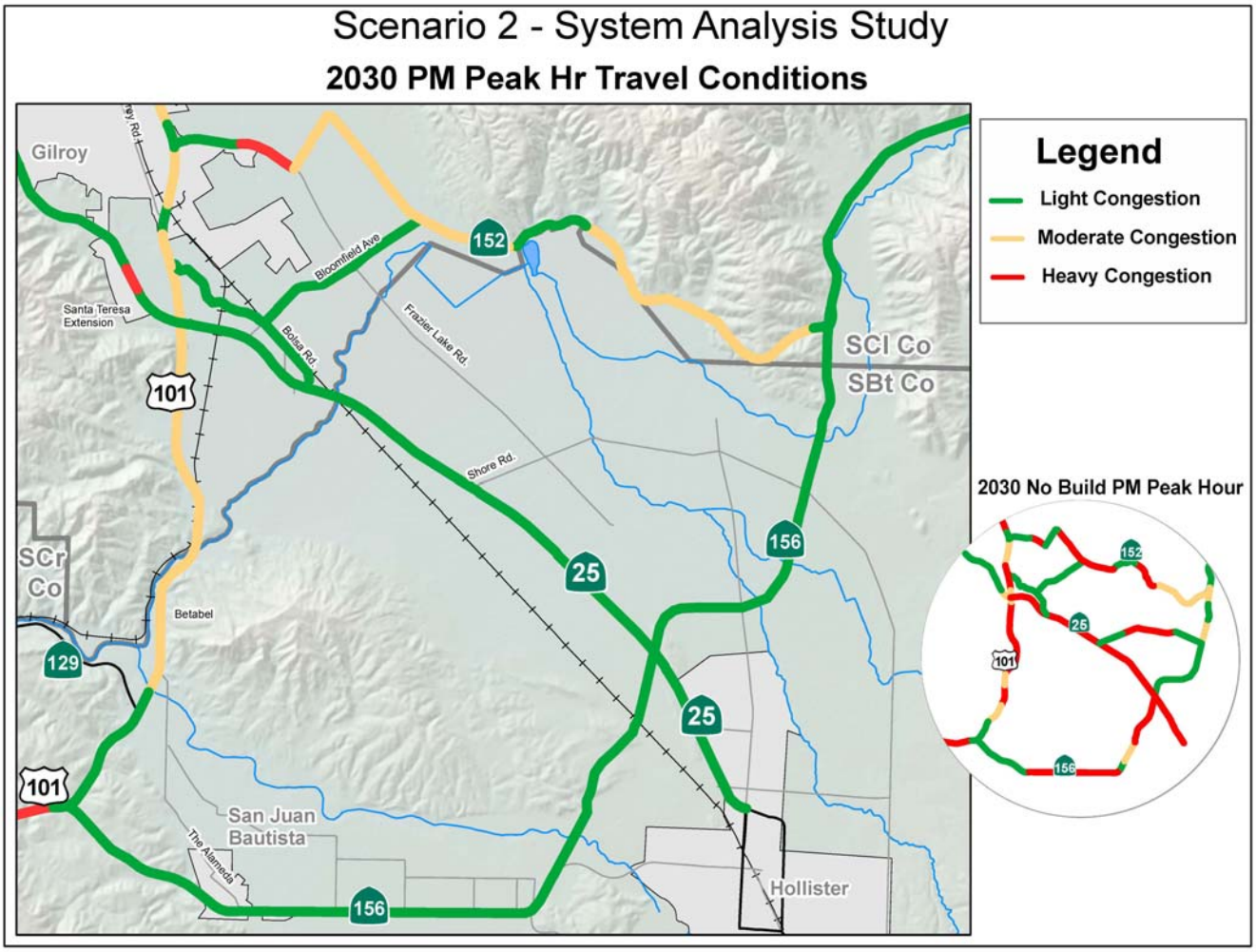
Scenario 2 Proposals




**Description**. Scenario 2 calls for improvements along US 101, SR 156 and SR 25. US 101 would be widened between the SR 156 and Monterey Road interchanges. Capacity would also be added along SR 156 between The Alameda in San Juan Bautista and SR 152 and along SR 25 between San Felipe Road in Hollister and US 101. In addition, Scenario 2 includes the extension of Santa Teresa Blvd. This improvement scenario is shown in Figure 14.

US 101 – 6 lane freeway between SR 156 and SR 25
– 8 lane freeway between SR 25 and Monterey Road
SR 152 – No improvements; 2 lane conventional highway with passing lanes
SR 156 – 4 lane expressway between The Alameda and SR 152
SR 25 – 6 lane freeway between US 101 and Bolsa Road
– 4 lane expressway between Bolsa Road and San Felipe Road

Figure 15. Scenario 2 Travel Conditions




**Traffic Analysis.** Compared to the No Build case, Scenario 2 relieves congestion on all of the state highways in the study area shown in Figure 15. However, since SR 152 is not widened in this scenario, it shows more congestion than in Scenario 1.

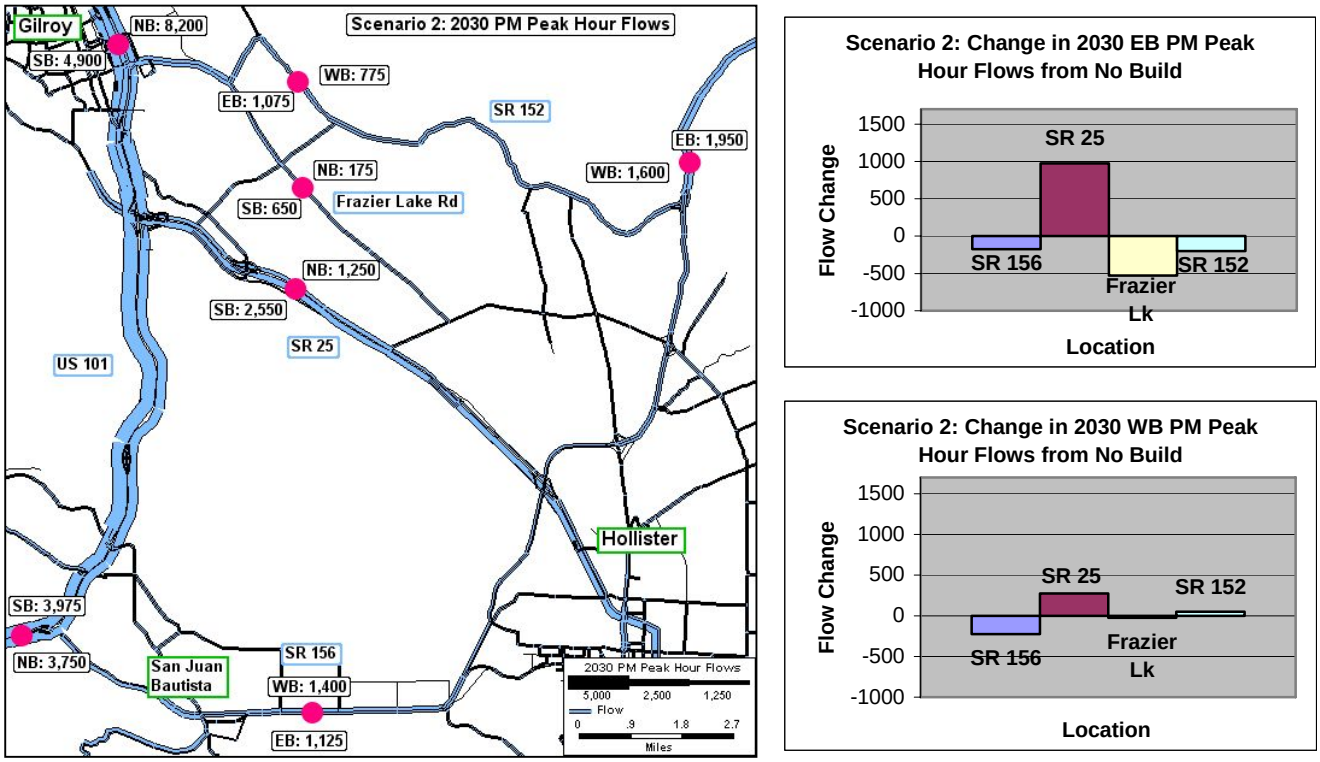
As with Scenario 1, improvements in Scenario 2 provide adequate capacity for vehicles to select more direct routes to their destinations. This is especially true for traffic traveling between the Gilroy-San Jose area and Greater Hollister. This traffic no longer diverts to Frazier Lake Road to the degree it does in the No Build case, and it also uses SR 25 instead of the SR 152-local road path discussed in the No Build Scenario (Figure 7).

In Scenario 2, there is also a shift in travel origins and destinations. When compared to the No Build case, there are fewer trips between locations to the south and Greater Hollister and more trips between the Gilroy-San Jose area and Greater Hollister. This results in lower volumes on SR 156 and higher volumes on SR 25.

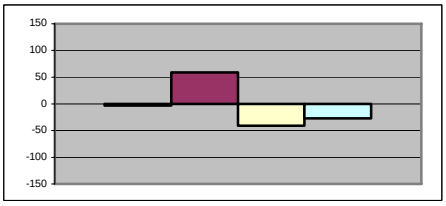
One question explored in Scenario 2 was whether increased capacity on all state routes except SR 152 would draw traffic off of SR 152. In the EB direction in the 2030 PM peak hour, about 200 vehicles shift off of SR 152 and onto SR 25 to get to Greater Hollister. Otherwise, traffic on SR 152 does not appear to be affected by the increased capacity on other state routes in the area. As shown in Figures 7 and 8 above, because travel on SR 152 appears to be mainly between the Gilroy-San Jose area and Merced County and beyond, it is not surprising that this traffic does not shift to SR 25 or SR 156.

The net result compared to the No Build case is shown in Figure 16. There are fewer trips on SR 156, Frazier Lake Road, and EB SR 152, more trips on SR 25, and little change in the number of WB trips on SR 152.

Figure 16. Scenario 2: 2030 PM Peak Hour Flows




**Goods Movement**. Changes in truck travel through the area tend to mirror the changes in all vehicle traffic displayed above. In the EB direction (shown in the map to the right), the main change from the 2030 PM peak hour No Build Scenario is a shift of trucks off of Frazier Lake Road and onto SR 25. Because SR 152 is not widened in Scenario 2 and congested travel speeds remain fairly low there, some truck traffic shifts off of SR 152.



In the WB direction, there is little change in travel paths (not shown). However, for both directions, the added capacity on SRs 25, 156, and 101 in Scenario 2 leads to faster speeds on those highways, with large benefits to truck travel.

**Estimated Cost**. Scenario 2 is estimated to cost $976.4 million (M) for the southern corridors and $285.2 M for the US 101 North Corridor. The total estimated cost for Scenario 2 is $1,261.6 M.

**Benefit-Cost Results**. Mobility benefits constitute the largest component of total benefits generated by Scenario 2. In the forecast year 2030, Scenario 2 generates $111.1 M in mobility benefits, $47.1 M in vehicle operating savings, and $27.1 M in safety benefits. As with Scenario 1, benefits to auto travel constitute the largest component of travel time and safety benefits. Trucks enjoy considerable savings in vehicle operating costs due to faster travel times on the improved state highways.

Over the analysis period, the results are as follows.

Benefit-Cost Ratio: 1.60
Net Present Value: $770.3 M

The benefit-cost ratio is greater than one, indicating that this scenario is economically justified. Scenario 2 achieves the highest net present value of all scenarios, though the results are, in practical terms, equal to Scenario 1 results.

**Other comments**. Additional capacity on US 101 and SR 25 leads to reduced travel times on these highways in the study area. For given travel time budgets, travelers can now reach more destinations in the Gilroy-Morgan Hill area as well as destinations further north. This results in increased traffic on US 101 particularly on the US 101 North Corridor.

## Scenario 3

Rejected, see Appendix A

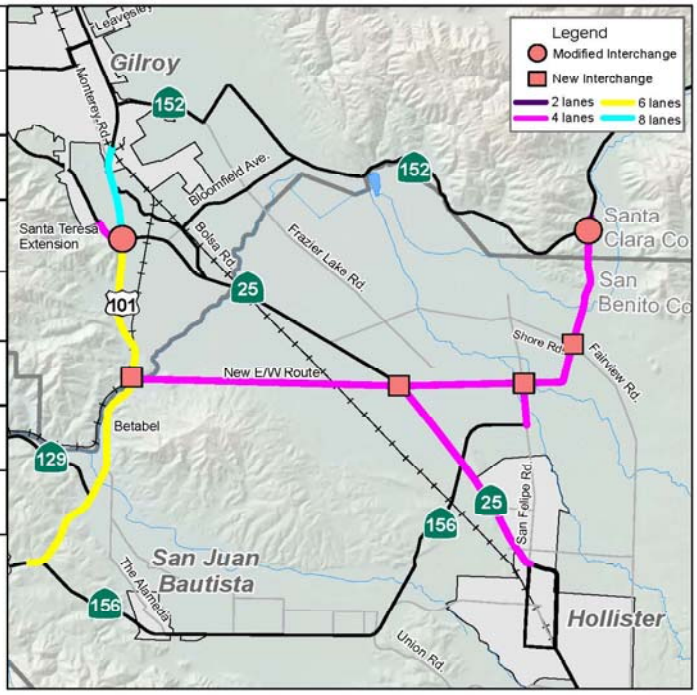
## Scenario 4: New East-West Route South of SR 25

**Figure 17. Scenario 4 Description**

### Scenario 4 - System Analysis Study

| Route | Improvement Limits | Length (miles) | Existing Lanes | Proposed Lanes |
|---|---|---|---|---|
| 101 | 25 to Monterey Road | 4.6 | 4 | 8 |
| 101 | 156 to 25 | 4.5 | 4 | 6 |
| Santa Teresa Extension | | 0.8 | 0 | 4 |
| New E/W Route 101 to San Felipe Road | | 8.0 | 0 | 4 |
| New E/W Route San Felipe Road east to 156 | | 0.9 | 0 | 4 |
| 25 | New E/W Route to San Felipe Road | 4.6 | 2 | 4 |
| 156 | New E/W Route to 152 | 3.3 | 2 | 4 |
| San Felipe Road New E/W Route to 156 | | 0.9 | 2 | 4 |

**Scenario 4 Proposals**




**Description**. Scenario 4 calls for the construction of a new East-West Route (freeway) between US 101 and SR 156, with the connection to US 101 just north of the San Benito - Santa Clara County line. Improvements on both north SR 156 and SR 25 are proposed to accommodate traffic between this new route and the SR 152/SR 156 interchange and the Hollister area, respectively. Scenario 4 includes an extension of San Felipe Road to connect with the new route, an extension of Santa Teresa Blvd, and widening of US 101. Details are shown in Figure 17.

US 101 - 6 lane freeway between SR 156 and SR 25
- 8 lane freeway between SR 25 and Monterey Road

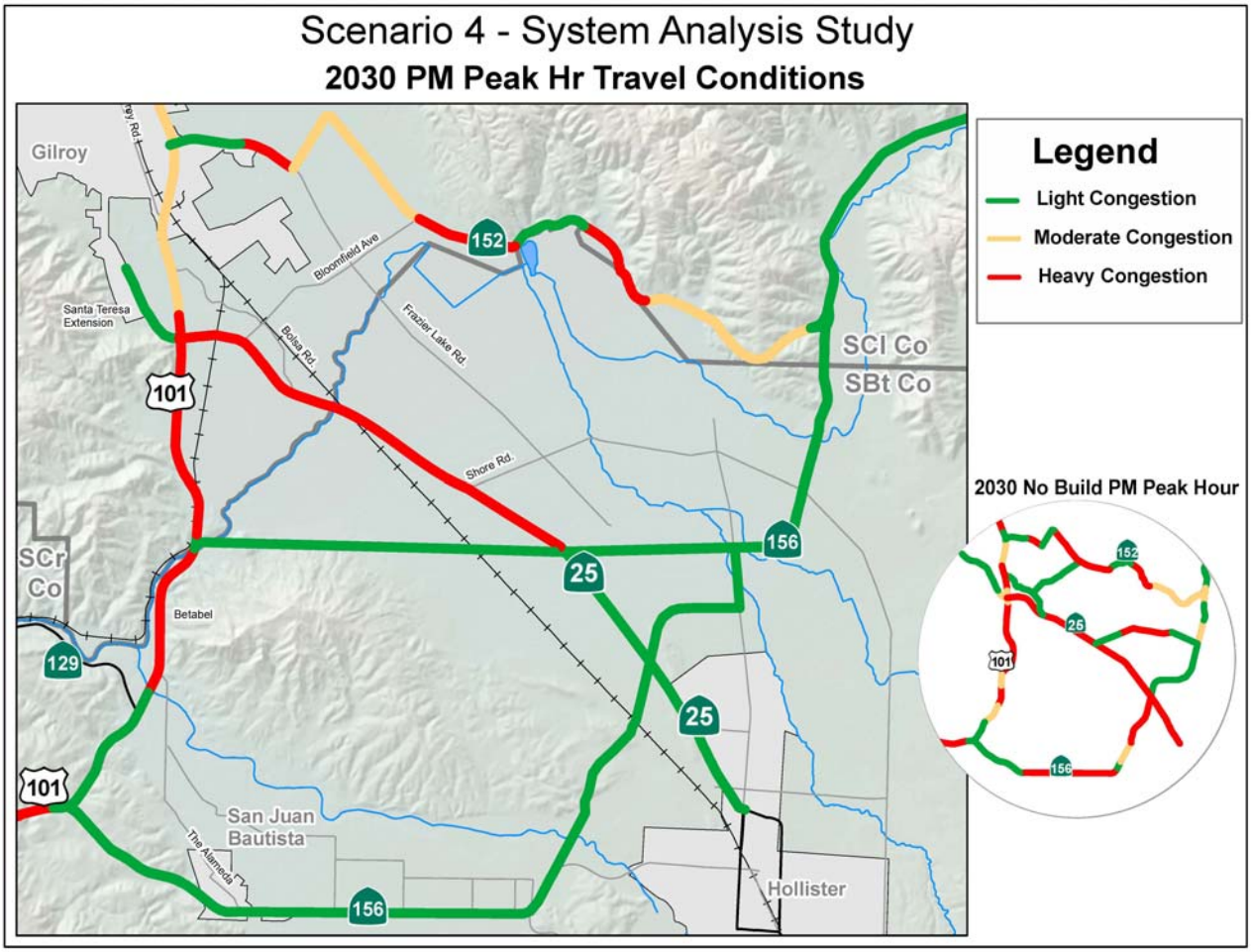
SR 152 - No improvements; 2 lane conventional highway with passing lanes

SR 156 - 4 lane expressway between new East-West Route and SR 152

SR 25 - 4 lane expressway between new East-West Route and San Felipe Road

New East-West Route - 4 lane freeway

Figure 18. Scenario 4 Travel Conditions

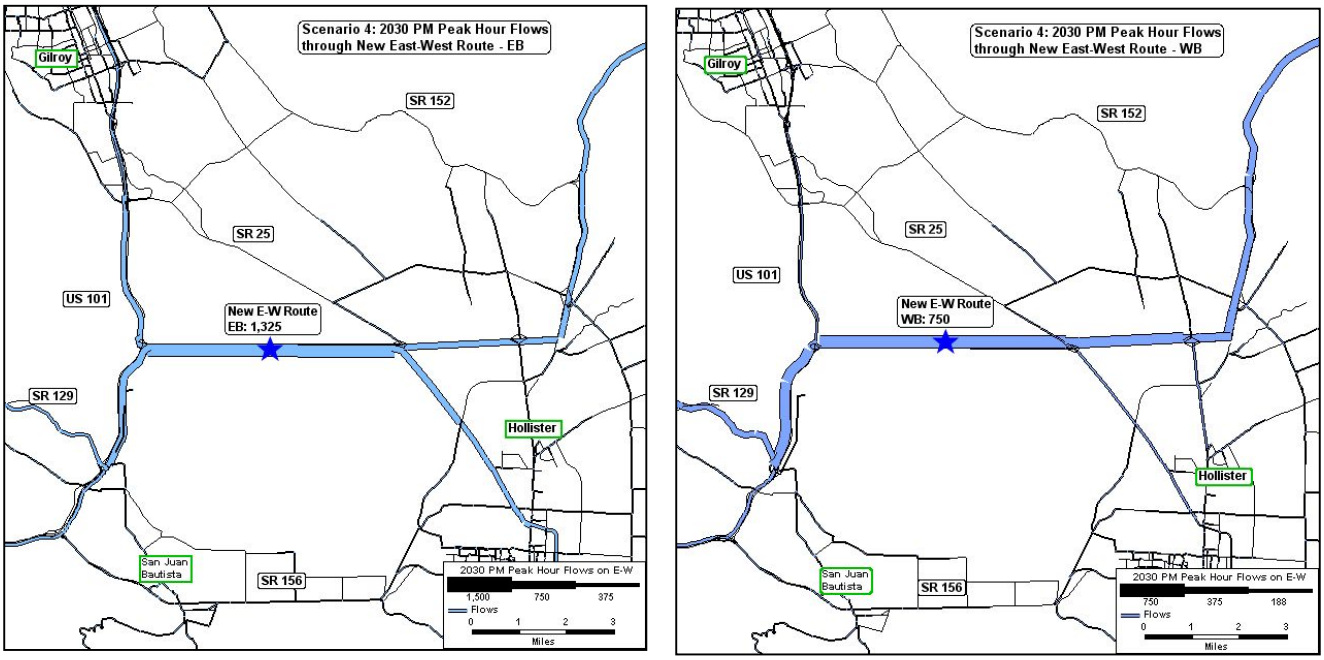



**Traffic Analysis**. Scenario 4 both relieves and adds to congestion on state highways in the area compared to the No Build Scenario. It relieves congestion on SR 156, the widened (southern) section of SR 25, and a small section of SR 152 east of Ferguson Road. However, it adds to congestion on US 101, and it leaves congestion on the unimproved (northern) section of SR 25 and on SR 152.

There are a number of factors contributing to this result. First, interregional traffic shifts off of SR 156 and onto the new East-West Route compared to the No Build case. This is interregional traffic that travels mainly between locations to the west (e.g., Santa Cruz and Watsonville) and Merced County and beyond. Second, some trips between western locations and Greater Hollister that used SR 156 in the No Build case also appear to use the new East-West Route in Scenario 4. These trips add to congestion on US 101. Finally, the remaining travel on SR 156 in Scenario 4 is dominated by trips to and from Greater Hollister, with the

two-lane SR 156 facility accommodating this amount of traffic satisfactorily. Figure 19 displays these new travel patterns.

**Figure 19. Scenario 4 Travel Paths on the New East-West Route**

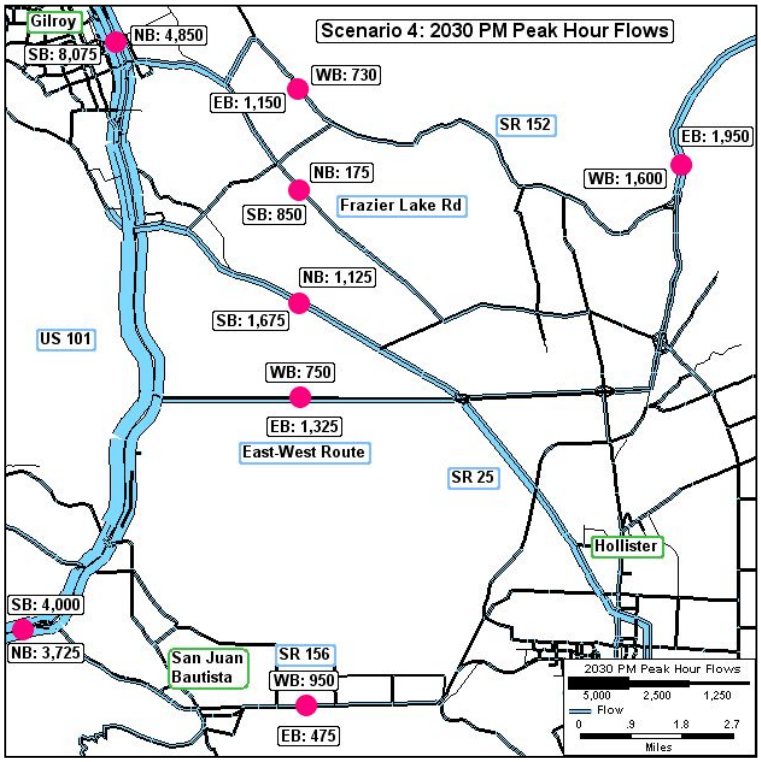


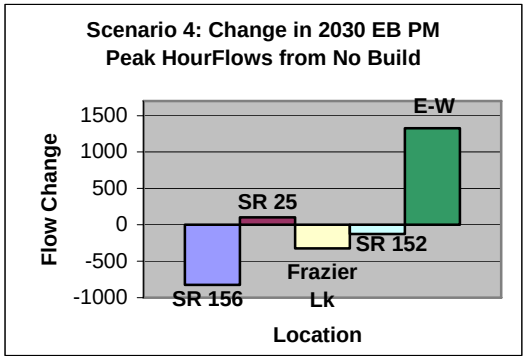

On SR 25, the unimproved section between US 101 and the new East-West Route carries a similar amount of traffic as in the No Build case. However, the improved southern section of SR 25 now carries more traffic. As mentioned above, some of this traffic appears to be trips from the west traveling to Greater Hollister that, in the No Build case, used SR 156. In Scenario 4, these trips travel on US 101 (adding to congestion there), the new East-West Route, and SR 25. Local roads also benefit from the improved SR 25 and new East-West Route. Trips that in the No Build case had diverted to Frazier Lake Road and trips that had traveled on SR 152 and local roads to get to and from Hollister now appear to use SR 25 and the new East-West Route. This leaves the northern sections of both US 101 and SR 25 heavily congested.

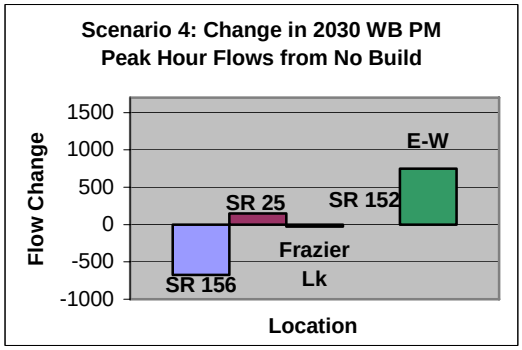
SR 152 volumes are similar in the No Build Scenario and Scenario 4. With a heavy travel pattern between the Gilroy-San Jose area and Merced County and beyond, it is not surprising that these trips do not use the new East-West Route.

The net result is a relatively large decrease in traffic on SR 156, moderate to small decreases in traffic on Frazier Lake Road and SR 152, and slight increases in traffic on SR 25 on the northern section. Figure 20 shows Scenario 4 2030 PM peak hour traffic flows and volume changes at the studied locations.

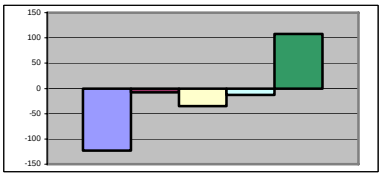
Figure 20. Scenario 4 2030 PM Peak Hour Flows



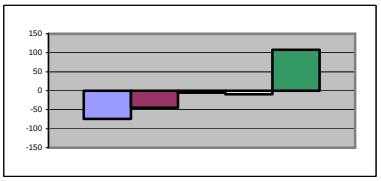




**Goods Movement**. As with the other scenarios, changes in truck travel patterns in Scenario 4 mirror the changes for all vehicles shown above. In the EB direction (shown in the upper map to the right), the shift off of SR 156 onto the new East-West Route accounts for most of the change.



In the WB direction (shown in the lower map to the right), the shift from SR 156 to the new East-West Route also accounts for the greatest change in truck travel paths. There is, however, also a small reduction in truck travel on SR 25.



For both directions, there is little change in truck travel on SR 152.

While trucks traveling on the new East-West Route enjoy high travel speeds, travel on the unimproved state highways in the area is subject to slower congested speeds compared to Scenarios 1 and 2. Additional travel on the improved US 101 going to and from the new East-West Route also increases congestion on US 101 and reduces speeds there compared to Scenarios 1 and 2. This leads to fewer vehicle operating cost savings for trucks, particularly on roads with rolling terrain. Overall, the result is fewer benefits in Scenario 4 than in Scenarios 1 and 2 for trucks and for autos as well.

**Estimated Cost**. Scenario 4 is estimated to cost $765.9 million (M) for the southern corridors and $285.2 M for the US 101 North Corridor. The total estimated cost for Scenario 4 is $1,051.1 M.

**Benefit-Cost Results**. Mobility benefits are the largest component of total benefits generated by Scenario 4 compared to the No Build Scenario. In the 2030 forecast year, Scenario 4 generates $101.1 M in mobility benefits, $14.7 M in vehicle operating savings, and $28.1 M in safety benefits. Auto travel time and safety benefits comprise the largest share of total mobility and safety benefits, with trucks accounting for the largest savings in vehicle operating costs.

Over the analysis period, the results are as follows.

Benefit-Cost Ratio: 1.54
Net Present Value: $583.4 M

Scenario 4 is economically justified as evidenced by its benefit-cost ratio being greater than one. In terms of net present value, Scenario 4 ranks third.

**Other comments**. The new East-West Route was expected to relieve congestion on state routes that are not improved. The traffic analysis shows that while SR 156 operates without congestion in the 2030 PM peak hour, both SRs 25 and 152 experience congestion. Further, the added capacity in the area leads to changes in travel paths such that US 101 is now congested between SR 129 and SR 25.

The SAS looked at a variation of this scenario with truck-only lanes. Results are described in the Other Scenarios section below.

Scenario 4's improvement characteristics differ slightly from the alternative proposed in VTA's *Southern Gateway Transportation and Land Use Study*. Differences are described in Appendix A.

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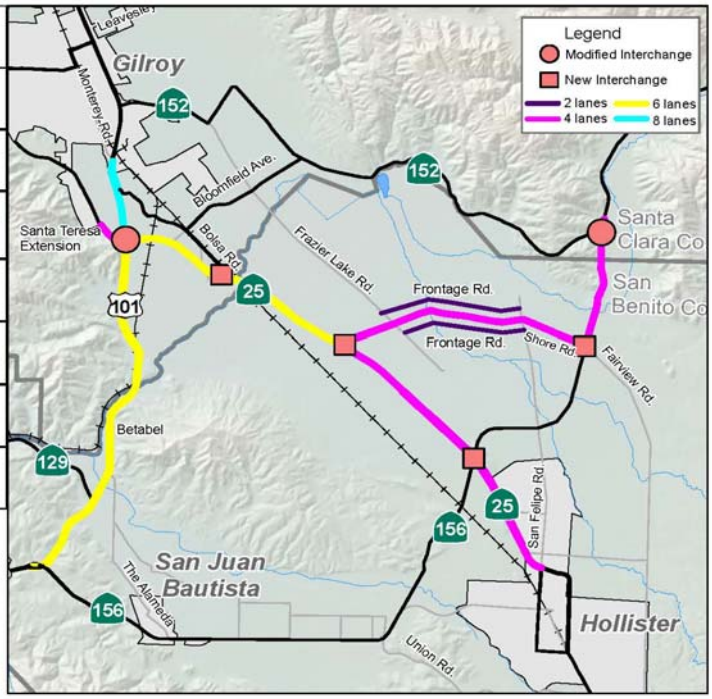
## Scenario 5: New East-West Route along Shore Road

Figure 21. Scenario 5 Description

### Scenario 5 - System Analysis Study

| Route | Improvement Limits | Length (miles) | Existing Lanes | Proposed Lanes |
|---|---|---|---|---|
| 101 | 25 to Monterey Road | 1.7 | 4 | 8 |
| 101 | 156 to 25 | 7.4 | 4 | 6 |
| Santa Teresa Extension | | 0.8 | 0 | 4 |
| New E/W Route 25 to 156 via Shore Road | | 5.2 | 2 | 4 |
| 25 | 101 to Shore Road | 4.9 | 2 | 6 |
| 25 | Shore Road to San Felipe Road | 6.3 | 2 | 4 |
| New E/W Frontage Roads North and South | | 3.3-2.6 | 0 | 2 |
| 156 | Fairview Road to 152 | 2.5 | 2 | 4 |

Scenario 5 Proposals




**Description**. Scenario 5 calls for the construction of a new four-lane expressway between SR 25 and SR 156 along Shore and Fairview Roads. This scenario also includes widening of SR 156 between Fairview Road and SR 152, widening of SR 25 between Hollister and US 101, widening of US 101 between the SR 156 and Monterey Road interchanges, and the extension of Santa Teresa Blvd. Details are shown in Figure 21.

US 101 - 6 lane freeway between SR 156 and SR 25
- 8 lane freeway between SR 25 and Monterey Road

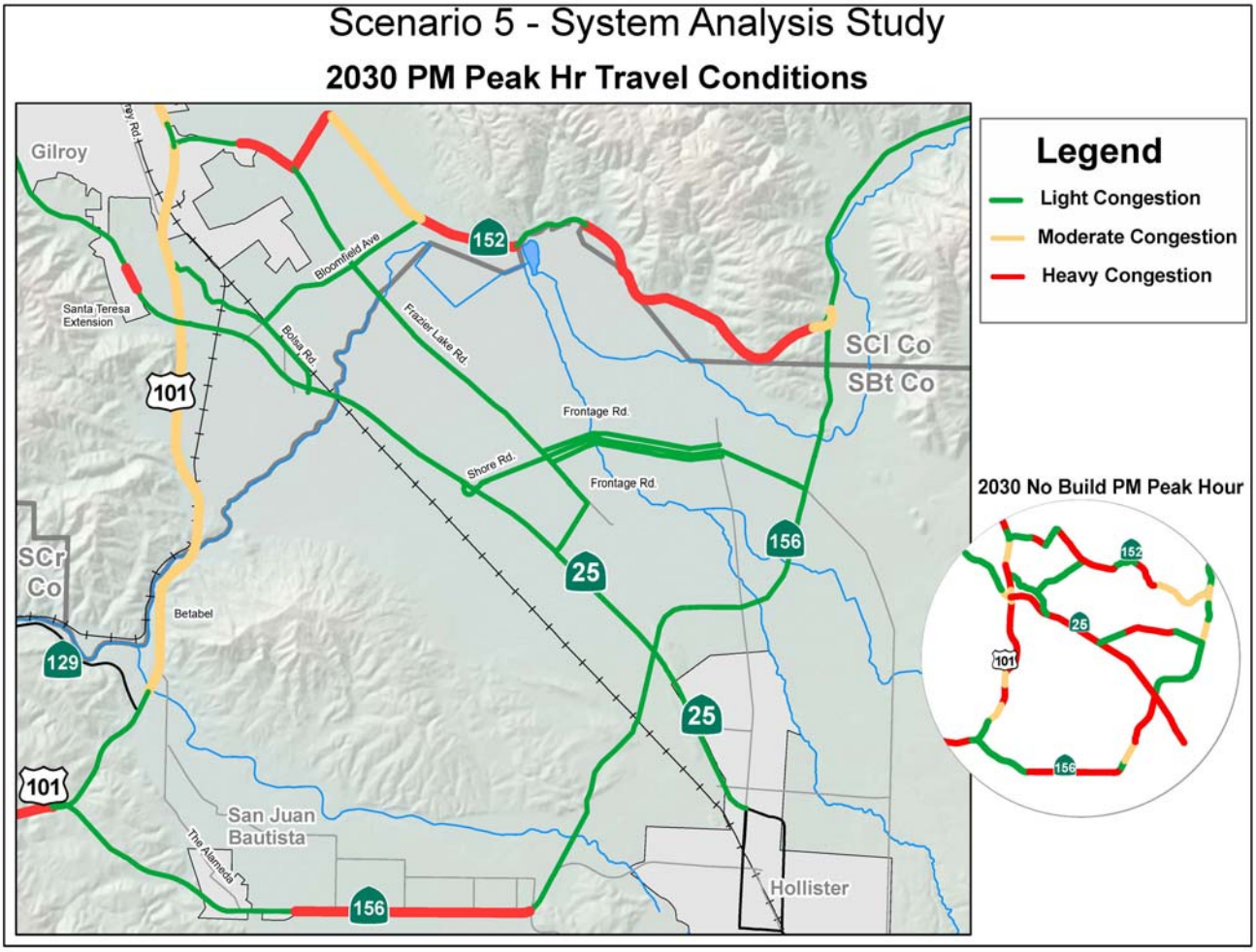
SR 152 - No improvements; 2 lane conventional highway with passing lanes

SR 156 - 4 lane expressway between Shore Road and SR 152
- 2 lane conventional highway between The Alameda and Shore Road

SR 25 - 6 lane expressway between US 101 and Shore Road
- 4 lane expressway between Shore Road and San Felipe Road

Shore Road - 4 lane freeway

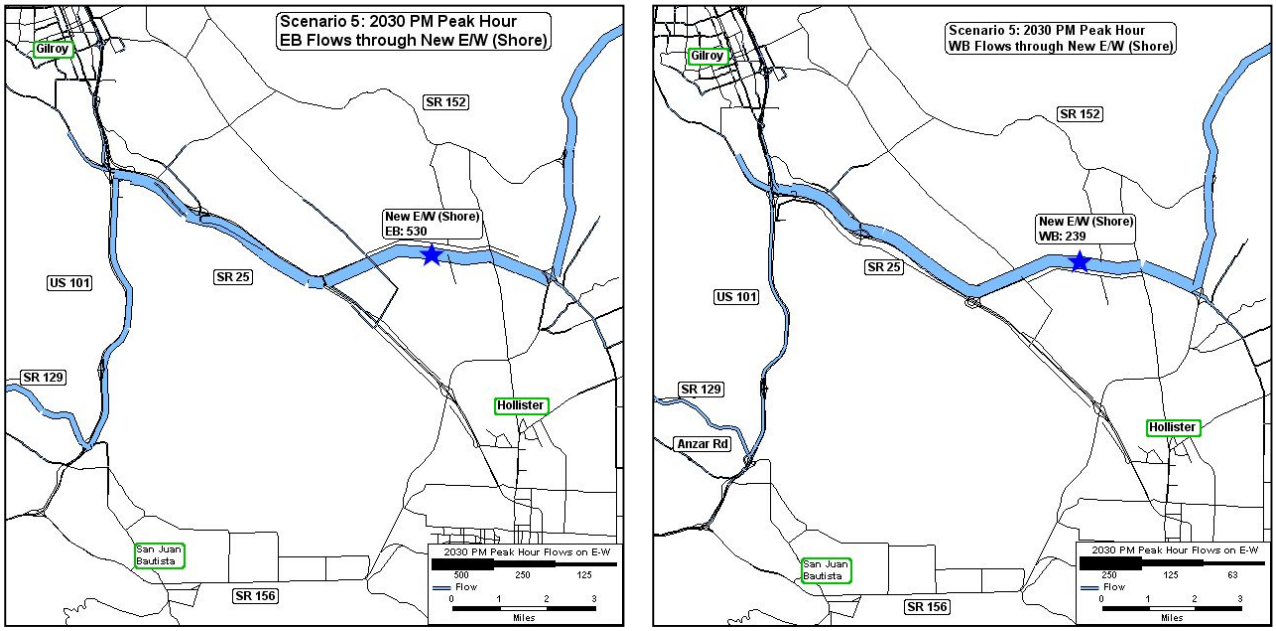
Figure 22. Scenario 5 Travel Conditions




**Traffic Analysis**. The major traffic impacts of Scenario 5 are to SR 25, US 101, and local roads, which all show less congestion than in the No Build case. In particular, travelers driving between western locations and Merced County and beyond make different travel choices in Scenario 5 compared to the No Build case. In Scenario 5, traffic has shifted off of EB SR 156 between San Juan Bautista and Hollister and onto the new East-West Route via US 101, SR 25, and the northern SR 156. Other traffic using the new East-West Route and the improved SR 25 includes trips between the Greater Hollister and Gilroy-San Jose area that in the No Build case diverted to Frazier Lake Road and the SR 152-local road path.

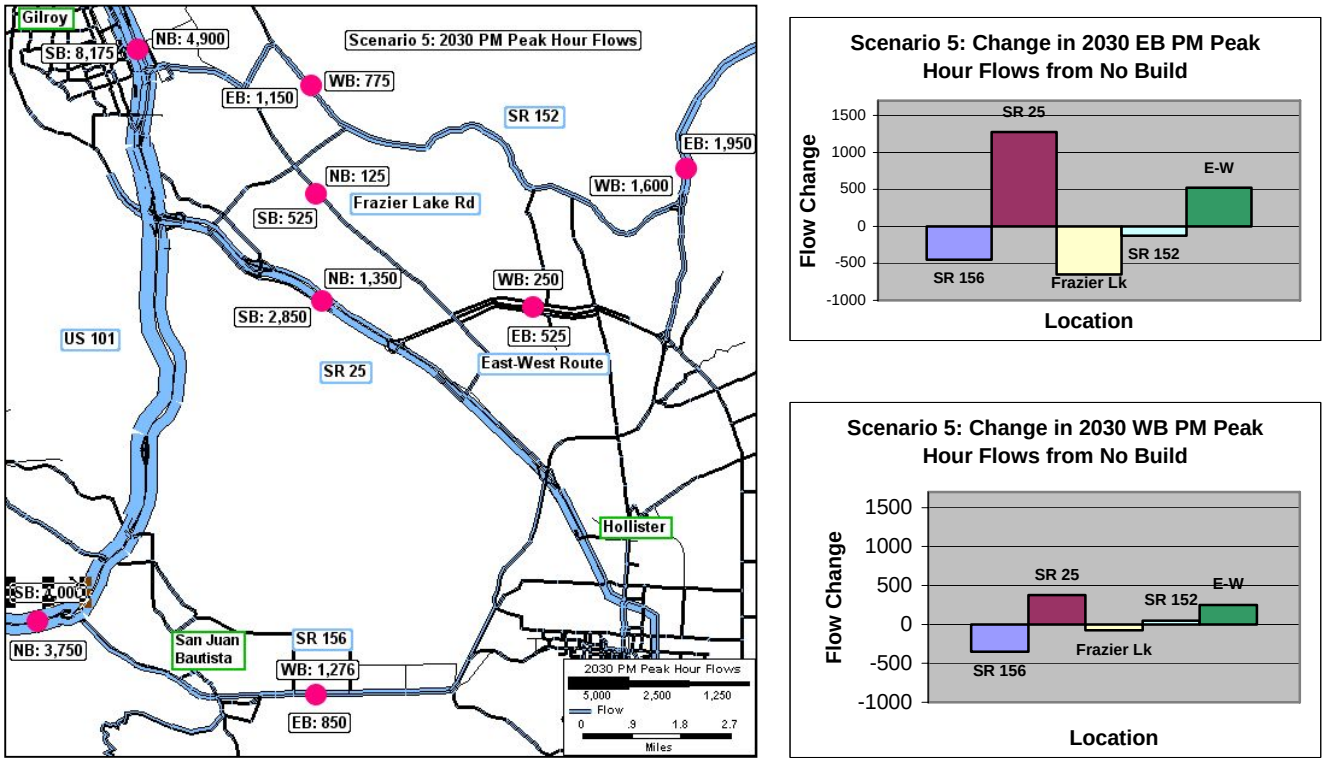
Travel on the new East-West Route is shown in Figure 23.

**Figure 23. Scenario 5 Travel Paths on the New East-West Route**

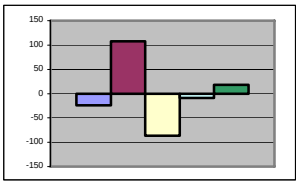



The net result is less traffic on SR 156, Frazier Lake Road, and EB SR 152 and more trips on SR 25 and WB SR 152 as shown at the selected locations in Figure 24.

**Figure 24. Scenario 5 2030 PM Peak Hour Flows**



**Goods Movement**. As with the other scenarios, truck travel comparisons between the No Build and Scenario 5 cases in the 2030 PM peak hour mirror the changes for all vehicles shown above. In the EB direction (shown in the map to the right), trucks travel along the widened SR 25 instead of Frazier Lake Road in Scenario 5, but the shifts in traffic between the new East-West Route and other state highways in the area appear to be small.




In the WB direction (not shown), there is little change in truck traffic between the No Build case and Scenario 5. For both directions, since there is still congestion on SRs 152, 156, and 101 in Scenario 5, travel under congested conditions (i.e., slower speeds) is not reduced as much as in the other scenarios, and benefits to truck travel are therefore correspondingly lower.

**Estimated Cost**. Scenario 5 is estimated to cost $930.2 million (M) for the southern corridors and $285.2 M for the US 101 North Corridor. The total estimated cost for Scenario 5 is $1,215.4 M.

**Benefit-Cost Results**. Mobility benefits comprise the largest component of total benefits generated by Scenario 5 compared to the No Build Scenario. In the 2030 forecast year, Scenario 5 mobility benefits are $105.2 M, or 70% of total benefits. Vehicle operating benefits are $22.3 M and safety benefits are $22.3 M. As with the other scenarios, auto travel time and safety benefits dominate those benefit categories, and truck vehicle operating cost savings are considerable in that category due to faster travel speeds in the area. However, because congestion remains on many heavily traveled roads in 2030, benefits are not as high as in the other scenarios.

Over the analysis period, the results are as follows.

Benefit-Cost Ratio: 1.36
Net Present Value: $446.9 M

As indicated by the benefit-cost ratio, Scenario 5 is economically justified. The scenario's net present value ranks fifth of the five scenarios.

**Other comments**. Commuter traffic between Monterey County and Greater Hollister keeps SR 156 highly congested.

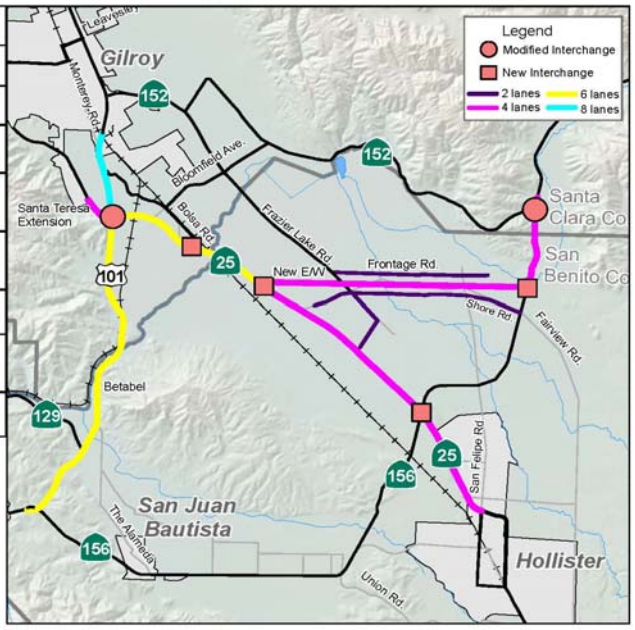
## Scenario 6: New East-West Route North of SR 25

**Figure 25. Scenario 6 Description**

### Scenario 6 - System Analysis Study

| Route | Improvement Limits | Length (miles) | Existing Lanes | Proposed Lanes |
|---|---|---|---|---|
| 101 | 25 to Monterey Road | 1.7 | 4 | 8 |
| 101 | 156 to 25 | 7.4 | 4 | 6 |
| Santa Teresa Extension | | 0.8 | 0 | 4 |
| New E/W Route 25 to 156 | | 6.0 | 0 | 4 |
| New E/W Frontage Roads North and South | | 3.5-3.6 | 0 - 2 | 2 |
| Frazier Lake Extension Shore Road to 25 | | 1.7 | 0 | 2 |
| 25 | 101 to New E/W Route | 3.8 | 2 | 6 |
| 25 | New E/W Route to San Felipe Road | 7.4 | 2 | 4 |
| 156 | New E/W Route to 152 | 2.0 | 2 | 4 |

**Scenario 6 Proposals**




**Description**. Scenario 6 calls for the construction of a new expressway between SR 25 and SR 156. The connection to SR 25 is located just east of where SR 25 crosses the Pajaro River, and the connection to SR 156 is located between Fairview Road to the south and the Pajaro River to the north. This scenario also includes improvement of US 101, improvement of SR 156 from the connection with the new expressway to SR 152, and improvement of SR 25 between Hollister and US 101. Figure 25 shows the proposed improvements.

US 101 - 6 lane freeway between SR 156 and SR 25
- 8 lane freeway between SR 25 and Monterey Road

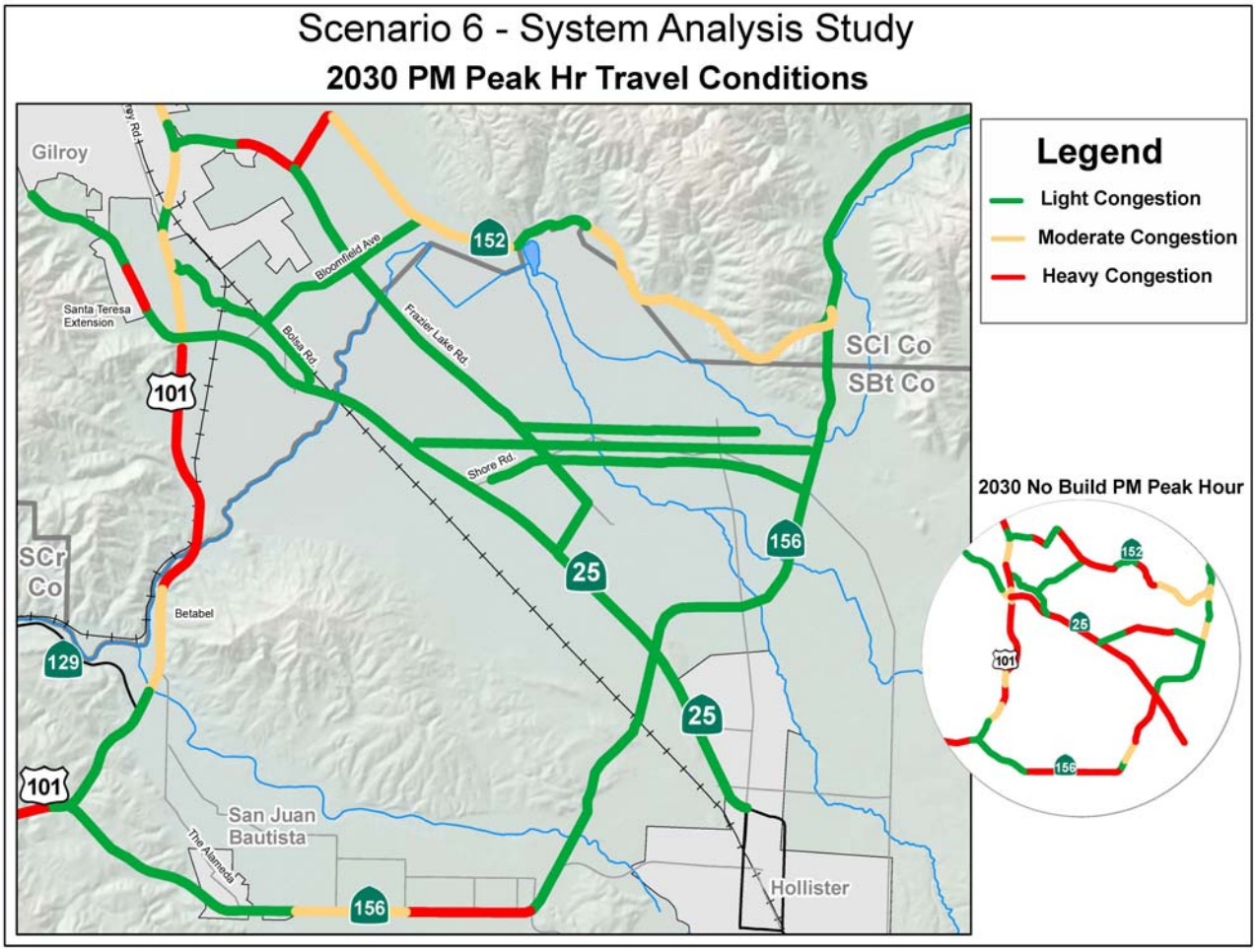
SR 152 - No improvements; 2 lane conventional highway with passing lanes

SR 156 - 4 lane expressway between new East-West Route and SR 152
- 2 lane conventional between The Alameda and new East-West Route

SR 25 - 6 lane expressway between US 101 and new East-West Route
- 4 lane expressway between new East-West Route and San Felipe Road

New East-West Route - 4 lane expressway

Figure 26. Scenario 6 Travel Conditions

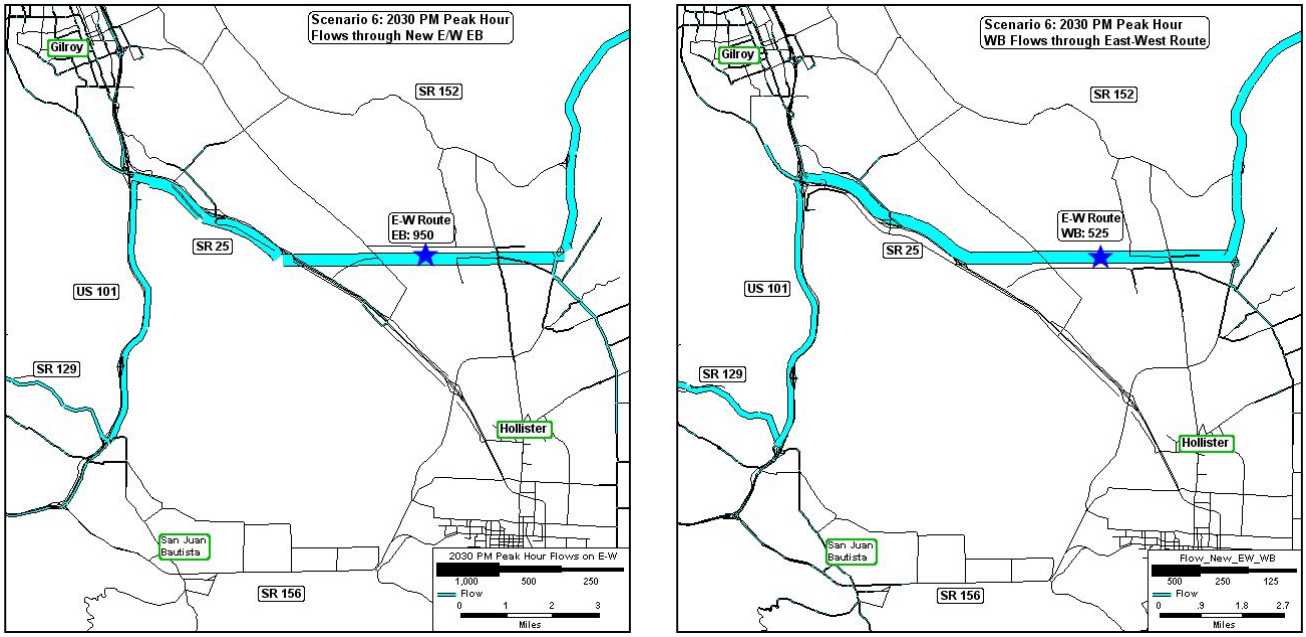



**Traffic Analysis**. Scenario 6 is similar to Scenario 5, except that instead of improving Shore Road, a new East-West Route is proposed just north of Shore Road. Shore Road would become a frontage road. The results show that both US 101 and SR 152 fair a little better than in Scenario 5, but these routes have volumes that are 99% of capacity and are in fact as heavily congested as in Scenario 5.

Similar to Scenario 5, Scenario 6 draws traffic off of SR 156 between San Juan Bautista and Hollister and onto the new East-West Route. This is mainly traffic traveling between western areas and Merced County and beyond. The new East-West Route also carries traffic that diverted onto local roads such as Frazier Lake Road in the No Build case. Because its alignment is more directly east-west, the new East-West Route in Scenario 6 carries more traffic than in Scenario 5.

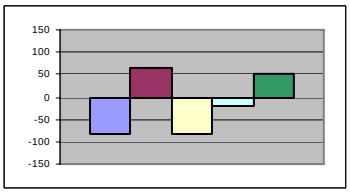
Travel patterns on the new East-West Route are shown in Figure 27.

Figure 27. Scenario 6 Travel Paths on New East-West Route

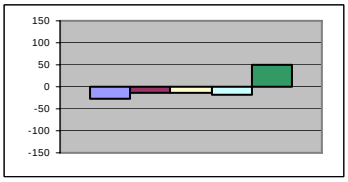



The net result is less traffic on SR 156 between San Juan Bautista and Hollister as well as less traffic on Frazier Lake Road and EB SR 152 compared to the No Build case. More traffic flows on SR 25, and there is little change in the volume of traffic on WB SR 152. Results are shown in Figure 28.

**Goods Movement**. In Scenario 6, truck travel path changes from the 2030 PM peak hour No Build Scenario generally mirror the changes for all vehicles shown below. In the EB direction (shown in the upper map to the right), there appears to be movement of truck traffic off of Frazier Lake Road and onto SR 25. Also, some trucks appear to choose the new East-West Route rather than SR 156.



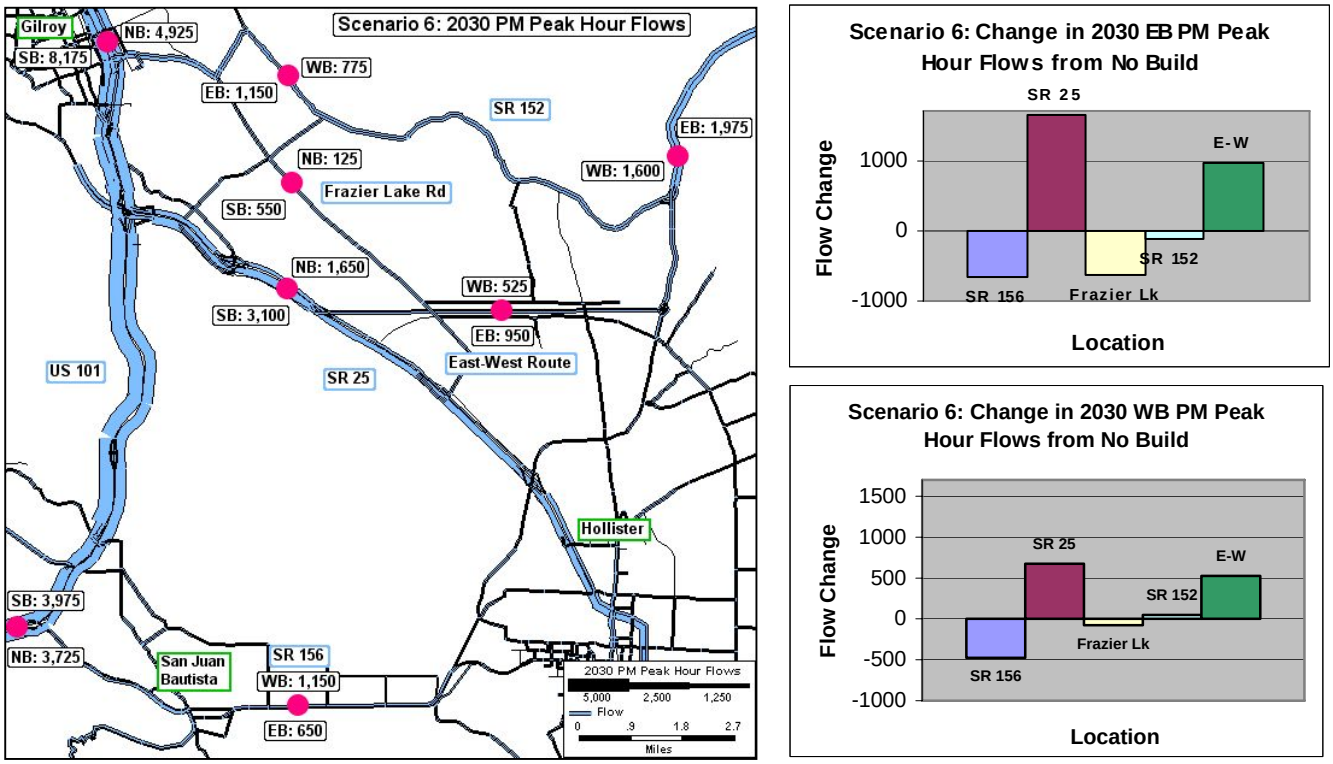

In the WB direction (shown in the lower map to the right), there is not much change in truck travel patterns, with only small changes off of the east-west state highways onto the new East-West Route.




As with Scenarios 4 and 5, congestion on SR 152 and US 101 leads to lower benefits for truck travel than for Scenarios 1 and 2.

**Estimated Cost**. Scenario 6 is estimated to cost $1,087.7 million (M) for the southern corridors and $285.2 M for the US 101 North Corridor. The new East-West Route was estimated based on average costs for the new route in Scenario 4. Total estimated cost for Scenario 6 is $1,372.9 M.

Figure 28. Scenario 6 2030 PM Peak Hour Flows




**Benefit-Cost Results**. Mobility benefits constitute the largest component of total benefits for Scenario 6 compared to the No Build Scenario. In the 2030 forecast year, mobility benefits are estimated to be $113.2 M, with vehicle operating benefits estimated at $29.7 M and safety benefits estimated at $29.9 M. As with Scenarios 4 and 5, congested conditions on the unimproved highways as well as continued congestion on US 101 lead to lower benefits for this scenario than for Scenarios 1 and 2.

Over the analysis period, the results are as follows.

Benefit-Cost Ratio: 1.37
Net Present Value: $515.1 M

Scenario 6 is economically justified, with a benefit-cost ratio greater than one. It ranks fourth in terms of net present value.

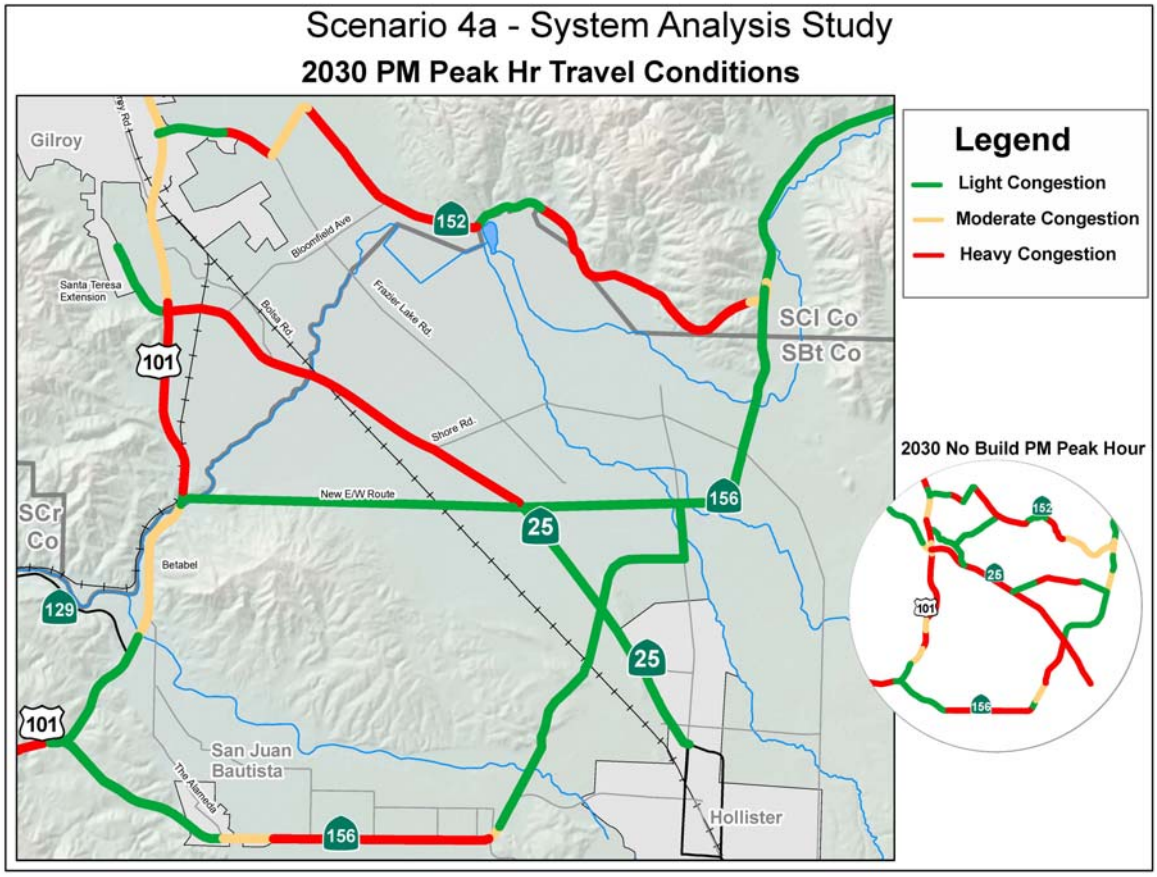
**Other comments**. Commuter traffic between Monterey County and Hollister keeps SR 156 highly congested. The SAS looked at a variation of this scenario that included truck-only lanes on the new East-West Route and on SR 25. Results are shown under Other Scenarios.

## Other Scenarios

The SAS investigated three other improvement scenarios, the results of which are presented in this section. These scenarios were only carried through the traffic analysis stage for reasons noted below.

### Scenario 4A: New East-West Route as Truck-Only Facility

Figure 29. Scenario 4A Travel Conditions




**Description**. Scenario 4A is similar to Scenario 4 but differs in that the new East-West Route is a two lane, truck-only freeway.

US 101 - 6 lanes between SR 156 and SR 25
- 8 lanes between SR 25 and Monterey Road

SR 152 - No improvements; 2 lane conventional highway with passing lanes

SR 156 - 4 lane expressway between new East-West Route and SR 152
- 2 lane conventional highway between The Alameda and new East-West Route

SR 25 - 2 lane conventional highway between US 101 and new East-West Route
- 4 lane expressway between new East-West Route and San Felipe Road

New East-West Route - 2 lane truck-only freeway

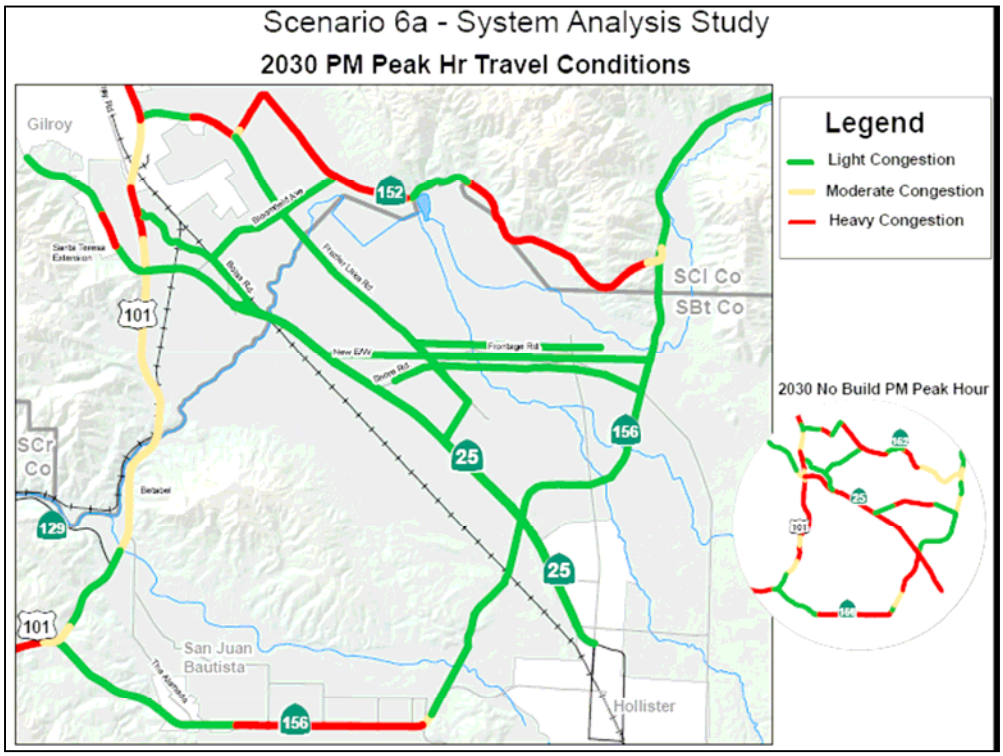
**Traffic Analysis**. Construction of the new East-West Route has the effect of drawing truck traffic mainly off of SRs 156 and 25, and in the EB direction, off of Frazier Lake Road. There are small decreases in truck traffic on SR 152 (less than 20 in each direction). These shifts in truck travel paths result in more truck traffic on US 101.

For all vehicles, the net effect of this scenario is to shift traffic from SR 156, but reductions in travel on SR 156 are not large enough to alleviate congestion there. Widening the southern section of SR 25 draws more traffic to that route, leaving the northern section congested. Travel on the new East-West Route means more vehicles are using US 101. South of the new East-West Route, US 101 is actually very congested, with a volume-to-capacity ratio of 0.99 in the SB direction.

**Other Comments**. Benefit-cost analysis was not performed for Scenario 4A. This scenario was only studied to get a preliminary idea of the traffic flow impacts of truck-only lanes.

## Scenario 6A: New East-West Truck-Only Route North of SR 25

**Figure 30. Scenario 6A Travel Conditions**




**Description**. Scenario 6A is similar to Scenario 6 but differs in two respects. First, the new East-West Route is a two-lane, truck-only freeway, i.e., there is controlled access. Secondly, while SR 25 is widened to six lanes between the new East-West Route and US 101, one lane in each direction is a truck-only lane.

US 101 - 6 lane freeway between SR 156 and SR 25
- 8 lane freeway between SR 25 and Monterey Road

SR 152 - No improvements; 2 lane conventional highway with passing lanes

SR 156 - 4 lane expressway between new East-West Route and SR 152
- 2 lane conventional between The Alameda and new East-West Route

SR 25 - 6 lane expressway with 2 truck-only lanes between US 101 and new E-W Route
- 4 lane expressway between new East-West Route and San Felipe Road

New East-West Route - 2 lane truck-only freeway

**Traffic Analysis**. In general, traffic moves off of SRs 156 and 152 and onto SR 25 and the new East-West Route. However, there is not enough diversion to reduce congestion on SRs 152 or 156.

**Other Comments**. Benefit-cost analysis was not performed for Scenario 6A. This scenario was only studied to get a preliminary idea of the traffic flow impacts of truck-only lanes.

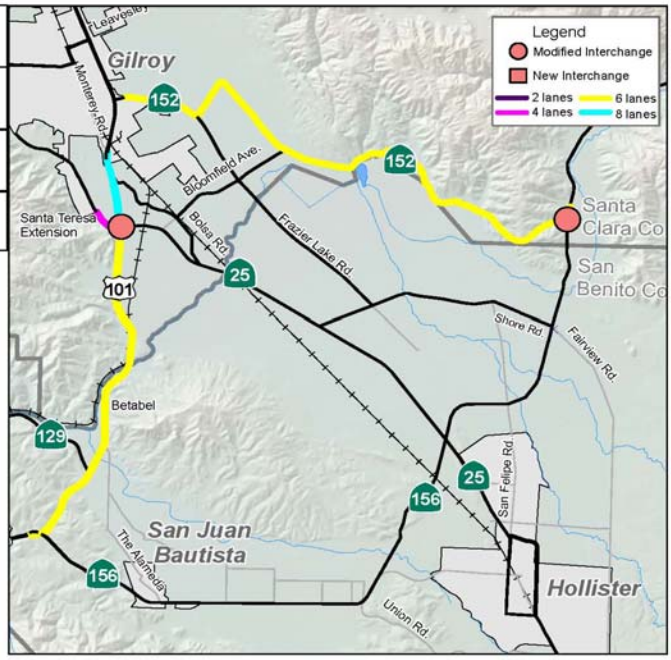
## Scenario 7: Widen SR 152 and US 101 Only

Figure 31. Scenario 7 Description

### Scenario 7 - System Analysis Study

| Route | Improvement Limits | Length (miles) | Existing Lanes | Proposed Lanes |
|---|---|---|---|---|
| 101 | 25 to Monterey Road | 1.7 | 4 | 8 |
| 101 | 156 to 25 | 7.4 | 4 | 6 |
| | Santa Teresa Extension | 0.8 | 0 | 4 |
| 152 | 101 to 156 | 11.7 | 2 | 6 |

Scenario 7 Proposals

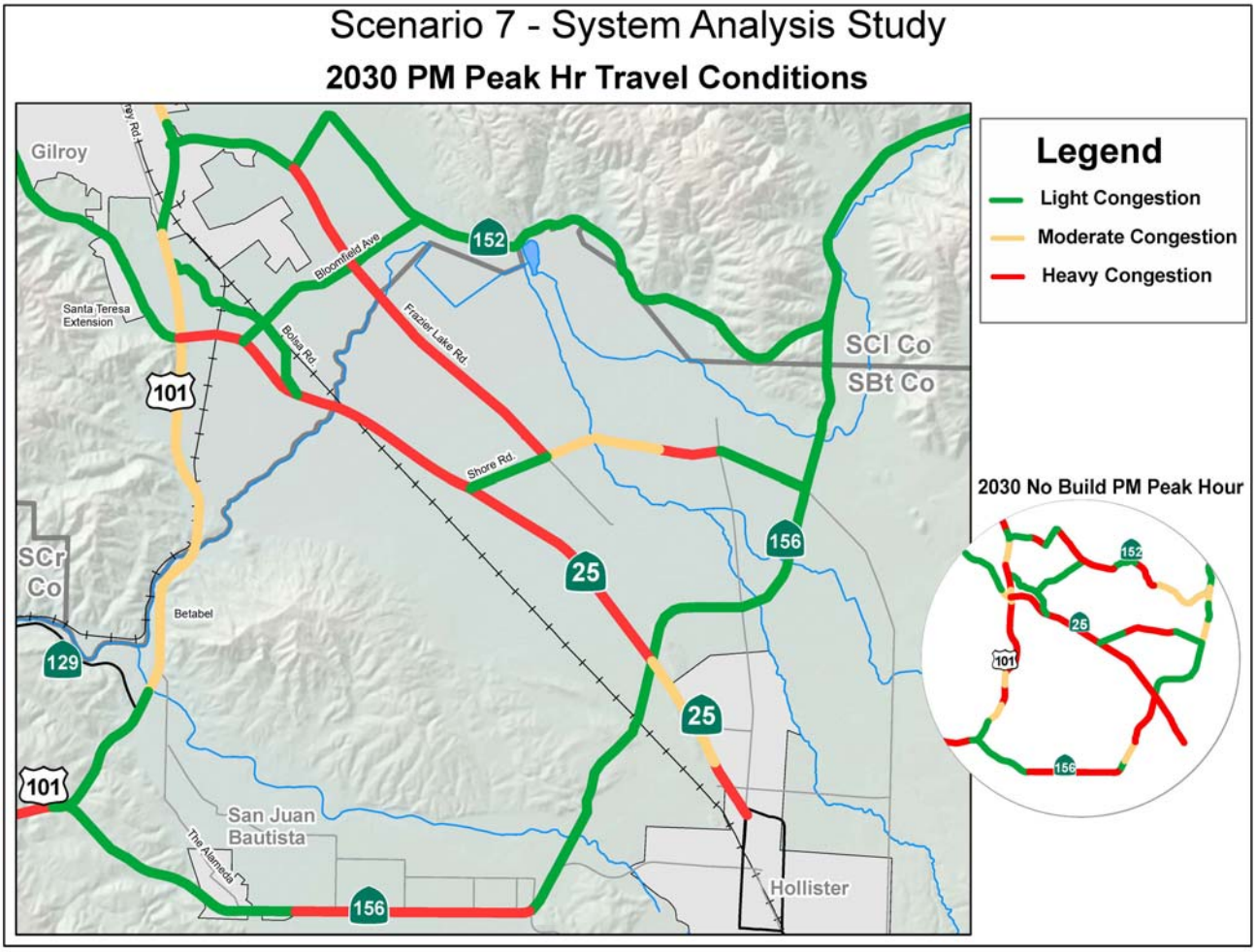



**Description**. Scenario 7 calls for widening SR 152 to a six-lane expressway. Capacity would be added to US 101 as well, and Santa Teresa Blvd would be extended. Widening SR 152 would require roadway construction along challenging vertical and horizontal alignments. Widening would also entail numerous creek crossings, especially between US 101 and Bloomfield Avenue. Figure 31 contains detailed information for this scenario.

US 101 – 6 lane freeway between SR 156 and SR 25
– 8 lane freeway between SR 25 and Monterey Road

SR 152 – 6 lane expressway

Figure 32. Scenario 7 Travel Conditions




**Traffic Analysis**. Scenario 7 answers the question, "Would widening SR 152 leave the rest of the system without congestion?" The results show that this option would not improve congestion on the other east-west routes. Rather, the results suggest that commuter and interregional traffic between Santa Clara and Monterey Counties to and from Greater Hollister and Merced County is great enough that SR 25 and 156 would be highly congested in the PM peak in 2030. Local roads such as Frazier Lake Road and Shore Road would also experience high congestion from commuter traffic. US 101 experiences moderate congestion even though it has been widened to six and eight lanes.

**Other Comments**. Scenario 7 was only analyzed to identify traffic flow patterns. The natural terrain and environmental impacts make widening SR 152 to six lanes with the needed frontage road system extremely difficult. VTA is currently studying SR 152 bypasses.

# PROPOSED SCENARIO ENVIRONMENTAL ANALYSES

On a regional level, there are potential impacts to environmental resources that are common to all of the SAS scenarios. These common elements are presented in the paragraphs below and are followed in this section by specific impacts that differentiate the scenarios. The impact rating assigned to each resource is meant to compare the scenarios and does not reflect an overall potential level of impact to the resource. For example, all of the scenarios, if looked at individually, could have potentially high adverse effects on biological resources. But when compared to each other, two scenarios were determined to have potentially high impacts, two medium impacts, and one low impact.

Given new and current legislation, air quality and global warming considerations will be required as actual projects are programmed and constructed. The SAS review determined that there were not specific air quality and global warming impacts that differentiated the scenarios. Therefore, a detailed analysis of these items was not conducted for this study.

## Farmlands

Both Santa Clara and San Benito Counties have historically been agricultural areas. In recent years however, many acres of agricultural land have been converted to non-agricultural uses. This conversion has been slower in San Benito County; however the trend towards non-agricultural uses persists.

Conversion of agricultural land is given consideration in the environmental review process under CEQA (CA PRC 21095) and NEPA. The National Environmental Policy Act and the provisions of the federal Farmland Protection Policy Act (7 CFR Ch. VI part 658) require that before taking or approving any federal action that would result in conversion of farmland, the agency must examine the effects of the action using the criteria set forth in the Act, and, if there are adverse effects, must consider alternatives to lessen them.

All of the routes in the SAS area pass through Prime Farmland, Farmland of Statewide Importance, Unique Farmland, Farmland of Local Importance and Grazing Lands, and there are many farm roads and driveways that intersect with SRs 25, 152, 156, and on U.S. 101 between the SR 25 interchange and Bolsa Road. For the purposes of this analysis, we looked at whether or not each scenario included the following elements that would likely result in conversion of farmland:

- ✓ Widening of existing roadways
- ✓ Construction of new alignment
- ✓ Construction of more than one new alignment

Widening of the existing routes would likely result in some permanent loss of designated farmlands and may result in temporary closure and/or relocation of the ingress/egress points and be disruptive to existing farming operations. It is likely that widening would result in less impact to farmlands than construction of new alignments because widening would impact the fringes of agricultural use as opposed to bisecting existing operations.

Scenarios 1and 2

Because these scenarios involve widening of existing routes, with permanent impacts likely involving loss of farmland directly adjacent to the highways, they were given a "low" impact ranking.

Scenarios 4, 5 and 6

These scenarios all include construction of new alignments and widening of existing highways. Creation of new highway corridors could result in a higher level of permanent impact because of factors such as loss of a greater amount of productive farmland, potential splitting of active parcels, and disruption of existing farming operations.

Because Scenario 4 involves construction of only one new alignment, it has been given the ranking of "medium".

Both Scenarios 5 and 6 involve construction of new roadway alignments, plus new frontage roads to the north and south of the proposed new alignments. The proposed new alignments in Scenarios 5 and 6 would impact more farmland than the other scenarios and have therefore been assigned a "high" ranking.

**Table 2. Potential Impacts to Farmlands**

| Scenario | Widen Existing Roadways through Farmland (Y/N) | One New Roadway through Farmland (Y/N) | Multiple New Roadways through Farmland (Y/N) | **Impact Ranking** |
|---|---|---|---|---|
| 1 | Y | N | N | L |
| 2 | Y | N | N | L |
| 4 | Y | Y | N | M |
| 5 | Y | Y | Y | H |
| 6 | Y | Y | Y | H |

Impact Ranking: Low = Widen existing only
Medium = Widen + construct 1 new alignment
High = Widen + construct multiple new alignments

## Scenic Resources

Though not protected by specific state or federal regulation, both CEQA and NEPA require project proponents to consider project impacts to scenic resources and avoid or minimize impacts where possible [CA Public Resources Code Section 21001(b); 42 U.S.C. 4331(b)(2); 23 U.S.C 109(h)].

All of the scenarios include widening of existing routes that would involve extensive cut and fill operations, removal of trees and other vegetation, construction of noise and traffic barriers, and modified bridges, interchanges, railroad crossings, and other highway related facilities. Given the existing scenic qualities found within the SAS area, all of the widening projects could have an adverse effect on the rural feeling that is experienced in this region. In order to compare the five build scenarios, the number of new interchanges, railroad crossings, creek/river crossings, and new alignments were taken into consideration. The 101 North Corridor would have one new interchange and one new railroad crossing. These two new facilities are included in all scenario quantities listed below in Table 3.

**Table 3. New Structures with Potential to Affect Scenic Resources**

| Scenario | New Interchanges | New Railroad Crossings | New Roadway Over/Under-crossings | New River/Creek Crossings | New Routes | **Total # of New Structures** | **Impact Ranking** |
|---|---|---|---|---|---|---|---|
| 1 | 4 | 3 | 0 | 0 | 0 | **8*** | **M** |
| 2 | 5 | 3 | 0 | 0 | 0 | **8** | **M** |
| 4 | 5 | 2 | 0 | 2 | 1 | **10** | **M** |
| 5 | 5 | 3 | 0 | 3 | 3 | **14** | **H** |
| 6 | 5 | 3 | 2 | 3 | 3 | **16** | **H** |

* Because Scenario 1 would involve the most creek/river crossings and also widen SR 152, which would require substantial cut and fill due to the number of horizontal and vertical curves, it has been assigned an extra point value.

Impact Ranking: Low = 1-5; Medium = 6-10; High = 11-16

## Biological Resources

*Sensitive Plants and Animals* – Numerous sensitive plant and animal species have been identified as having the potential to occur within or adjacent to the SAS study area (See Sensitive Biological Resources Map in Appendix F). These include species protected under the State and Federal Endangered Species Acts (ESA). No ESA listed plants have been

identified in this area, however several animal species afforded protection under both the Federal and State ESA may be present. These include:

- California red-legged frog (FT)
- California tiger salamander (FT)
- Least Bell's vireo (FE/SE)
- Bank Swallow (ST)
- San Joaquin kit fox (FE/SE)
- and Steelhead (FE)
- Several vernal pool branchiopods (FT).

The study area also contains federally designated critical habitat (CH) for California tiger salamander and steelhead.[6]

All of the proposed scenarios would have the potential to impact the above-listed species and designated critical habitat. The designated critical habitat for the California tiger salamander occurs along SR 152 from the west side of San Felipe Lake east to SR 156. The CALWATER Pajaro River Hydrological Unit has been designated critical habitat for steelhead. Other animal species considered sensitive by the California Department of Fish and Game and plant species that are considered rare by the California Native Plant Society also occur in the region affected by the proposed scenarios. In addition, migratory birds protected by the federal Migratory Bird Treaty Act of 1918 occur throughout the region.

*Waters of the U.S. (waters) and Wetlands* – As described in the Environmental Setting section, there are numerous aquatic resources that occur within the study area (See Appendix F). Executive Order 11990 – Protection of Wetlands (1977) calls for no net loss of habitats referred to as wetlands. At the federal level, the Clean Water Act (33 U.S.C. 1344; Section 404) is the primary law regulating wetlands and waters. At the state level, wetlands and waters are regulated primarily by the California Department of Fish and Game (Sections 1600-1607) and the Regional Water Quality Control Board (Section 401 of the Clean Water Act; Porter-Cologne Water Quality Control Act). With all scenarios, there is potential to affect both other waters of the U.S. and jurisdictional wetlands of the U.S. that occur in or adjacent to the stream channels that would be affected by the proposed scenarios.

*Wildlife Corridors/Fish Passage* – Construction of new roads and the widening of existing roadways from either four lanes to six lanes or two lanes to four lanes could further hinder movement of wildlife that currently cross roadways by making wildlife movement across the highways even more hazardous.

Senate Bill SB 857 requires that impediments and barriers to migratory fish species that are anadromous be addressed and fixed as part of any proposed project. Each stream crossing

[6] FT=Federal Threatened, FE=Federal Endangered, ST=State Threatened, SE=State Endangered, CH=Critical Habitat

would need to be evaluated for potential migratory fish issues, especially those streams where there are current or historic records of anadromous fish.

Scenario 1

Scenario 1 widens four existing highways, which include US 101, SR 156, SR 152, and SR 25. This scenario, which has 21 stream crossings involving 16 water bodies, has the highest number of stream crossings compared to the other scenarios. In addition, wetlands associated with San Felipe Lake are present along the eastbound side of SR 152.

Since this scenario has the potential to affect the largest number of stream channels and has the greatest number of stream crossings, it also has the greatest potential to affect riparian wildlife corridors, stream channels that are important for anadromous fish and designated critical habitat for steelhead. Widening the north/south highways as well as the east/west highways also increases the potential barrier effect to wildlife movement between the surrounding mountain ranges as well as along the valley floor where the major highway systems occur.

Scenario 2

Scenario 2 widens three existing highways, which include US 101, SR 156, and SR 25, and involves up to nine water bodies and potentially includes 13 stream crossings.

Although Scenario 2 has fewer stream crossings, avoids the wetlands associated with San Felipe Lake on Highway 152, and affects a smaller portion of designated critical habitat for the California tiger salamander, widening of three major highways has the potential to affect biological resources in the region. This scenario could still hinder movement of wildlife along riparian corridors, affect fish passage for anadromous fish, and increase the potential barrier effect to wildlife movement between the surrounding mountain ranges as well as along the valley floor where the major highway systems occur.

Scenario 4

Scenario 4 widens the existing US 101, widens only sections of SR 156 and SR 25, and constructs a new four-lane east/west route between US 101 and SR 156. This scenario could involve up to nine water bodies and potentially include nine stream crossings.

Since Scenario 4 involves widening fewer of the existing routes and has fewer stream crossings than Scenarios 1 or 2, it has less potential to affect wildlife corridors and stream channels that are important for anadromous fish. However, the construction of a new roadway could further fragment wildlife habitat and potentially create a new barrier to wildlife movements, especially for the California red-legged frog and the California tiger salamander, since the area between SR 25 and SR 156 would be bisected by a new roadway.

Scenario 5 and Scenario 6

Scenarios 5 and 6 are similar and include widening US 101 and SR 25, widening a section of SR 156, and constructing a new four-lane east/west route that includes frontage roads between SR 25 and SR 156. In addition, both scenarios potentially involve 11 stream crossings.

Although Scenarios 5 and 6 involve widening fewer of the existing routes than Scenarios 1 or 2, they do include a new east/west road between SR 25 and SR 156. The construction of a new roadway could further fragment wildlife habitat in the region and potentially create a new barrier for wildlife movement.

Each of the SAS scenarios has high potential to affect the biological resources discussed in this document. In order to compare the scenarios for this study, the ranking for biological resources for each scenario is directly related to the number of highways widened and the number of potential stream crossings. The greater the number of highways to be widened and the greater the number of stream crossings, the higher the ranking since those elements could potentially have the greatest effect on the resources discussed under each scenario.

**Table 4. Potential Impacts to Biological Resources**

| | Scenarios | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | | 2 | | 4 | | 5 | | 6 |
| Biological Resources | H | | H | | L | | M | | M |

Impact Ranking: H = High; M = Medium; L = Low

## Cultural Resources

The term "cultural resources" as used in this document refers to historic and archaeological resources. Under California law, cultural resources are protected under CEQA as well as Public Resources Code Section 5024.1, which established the California Register of Historic Places. If there is federal involvement in construction of any of the scenarios, the project(s) would be subject to Section 106 of the National Historic Preservation Act as well.

The rating scale for cultural resources was based on the current inventory of recorded prehistoric and historic resources, and properties or cultural sites that are listed, or eligible for listing, on the National Register of Historic Places. The results of the record search are provided in the following table along with the impact ranking for each scenario.

**Table 5. Results of Archival Record Search**

| Scenario | Recorded Cultural Resource Surveys, Inventories, and Studies | Recorded Prehistoric and Historic Resources | **Impact Ranking** |
|---|---|---|---|
| 1 | 124 | 49 | H |
| 2 | 113 | 45 | H |
| 4 | 96 | 12 | L |
| 5 | 95 | 26 | M |
| 6 | 108 | 27 | M |

Impact Ranking: Low = 1-16; Medium = 16-33; High = 34-49

## Section 4(f)

Another federal regulation that could apply to any of the scenarios is Section 4(f) of the Department of Transportation Act of 1966, which set the policy on park and recreation lands, wildlife and waterfowl refuges, and historic sites. Examples of Section 4(f) properties may include public parks, schools, any public recreation trail, designated wildlife and waterfowl refuges, historic bridges and buildings, and prehistoric archaeological sites that are listed, or determined eligible for listing, in the National Register of Historic Places. Of these Section 4(f) property types, the proposed scenarios would only involve potential impacts to historic or prehistoric sites.

The rating scale for Section 4(f) resources was based on the current inventory of recorded prehistoric and historic resources, and properties or cultural sites that are listed, or are eligible for listing, on the National Register of Historic Places (NRHP). The results of the record search are provided in the following table along with the impact ranking for each of the scenarios.

**Table 6. Known NRHP Eligible or Listed Properties**

| Scenario | Known National Register of Historic Places Eligible or Listed Properties | **Impact Ranking** |
|---|---|---|
| 1 | 15 | H |
| 2 | 14 | H |
| 4 | 4 | L |
| 5 | 5 | L |
| 6 | 6 | M |

Impact Ranking: Low = 1-5; Medium = 6-10; High = 11-15

# FINDINGS

In 2030, congestion on state highways in northern San Benito County and southern Santa Clara County is expected to be widespread in the PM peak hour. The *System Analysis Study of Routes 101, 152, and 156* (SAS) evaluates five scenarios thought to improve the future east-west traffic flow through the area. The study concludes that all five scenarios provide at least some improvement to east-west flows in the sense that congestion is alleviated to various degrees compared to the No Build Scenario, i.e., the "do nothing" case.

Since congestion and scenario cost alone are not adequate to determine which scenario is the best use of investment funds, should full funding be available, the SAS included a benefit-cost analysis. If all scenarios could be constructed by the year 2013, then all five scenarios are economically justified as evidenced by benefit-cost ratios greater than one. Scenarios 1 and 2 have the highest net present values,[7] followed by Scenario 4, Scenario 6, and Scenario 5.

## Environmental Resources

**Farmlands** – As discussed in previous sections, agriculture is extremely important to the economy of both San Benito and Santa Clara Counties, and preservation of farmland should be considered with any transportation project proposed for the SAS area. All of the proposed scenarios could have permanent and/or temporary impacts to existing farmlands, either by temporary construction easements or by conversion of farmland to transportation uses. However Scenarios 5 and 6 would likely have greater permanent impacts since they involve construction of more new highway facilities through designated farmlands.

**Scenic Resources** – Preserving the scenic and aesthetic qualities of both the natural and built environments of the region is an important element of the General Plans for both San Benito and Santa Clara Counties. Strategies to protect these resources should include context sensitive design of new highway facilities whenever possible. Because Scenarios 4, 5 and 6 involve construction of new highways, the potential for adverse impacts to scenic resources would likely be higher than the other two scenarios.

**Biological Resources** –
Sensitive Species/Waters of the U.S. & Wetlands: The widening and/or realignment of any of the existing highways or the construction of brand new alignments has the potential to affect state and federal listed species, wetlands, numerous stream channels and riparian areas that provide habitat for many species of wildlife and fish.

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[7] Net present value comparisons assume investments are of equal scale. Therefore, the SAS assumes that the difference in cost between the most expensive scenario and a given scenario earns the normal rate of return.

Wildlife Movement: Maintaining movement corridors for wildlife is becoming a critical issue as development encroaches more and more upon open space. This will be an important area to study with any of the proposed scenarios since northern San Benito County and Southern Santa Clara County are still relatively rural. The widening and/or realignment of any of the existing highways or the construction of brand new alignments has the potential to affect wildlife linkages through the Hollister Valley and between the Gabilan and Diablo Ranges and the Santa Cruz Mountains.

Since Scenarios 1 and 2 have the greatest number of highways to be widened and the greatest number of stream crossings, it was determined that these scenarios could potentially have the greatest effect on the biological resources discussed.

**Cultural Resources/Section 4(f)** – Since much of the study area is undeveloped and/or retains many structures from early settlements, protection of prehistoric and historic resources is essential to maintaining a connection to the past for local communities and all residents of California. This can be achieved by avoidance measures whenever possible in designing projects associated with the scenarios. All of the scenarios have potential to impact cultural and/or Section 4(f) historic resources; however Scenarios 1 and 2 have the highest number of recorded sites and were therefore given the highest ranking of potential impact.

**Environmental Findings** – The following table provides a comparative look at the primary environmental resource areas for each of the build scenarios that have been proposed in the SAS study area. The last column indicates which resource types are afforded additional regulatory protection.

On a regional level, all of the scenarios have common potential impacts to environmental resources. The sensitivity rating assigned to each resource is meant to compare the scenarios and does not reflect an overall potential level of impact to the resource. For example, all of the scenarios, if looked at individually, could have potentially high adverse effects on biological resources. But when compared to each other, two scenarios were determined to have potentially higher impacts, two medium, and one lower impact.

Based on the table below, and relative to each other, it appears that Scenarios 1 and 2 would have a higher sensitivity to environmental resources than the other scenarios. Scenario 4 would impact resources the least, and Scenarios 5 and 6 would have medium potential effects, all relative to the other scenarios. This ranking assigns equal weight to the different resource categories. Further and to re-iterate the above, a low ranking does not imply a low (absolute) level of impact to the given resource, i.e., the ranking is relative among scenarios.

**Table 7. Relative Comparison of Potential Resource Sensitivity of SAS Scenarios**

| | 1 | | 2 | | 4 | | 5 | | 6 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Resources** | | | | | | | | | | | |
| Farmlands | L | | L | | M | | H | | H | | |
| Scenic | M | | M | | H | | H | | H | | |
| Biological | H | | H | | L | | M | | M | | ◇ |
| Cultural | H | | H | | L | | M | | M | | ◇ |
| Section 4(f) | H | | H | | L | | L | | M | | ◇ |

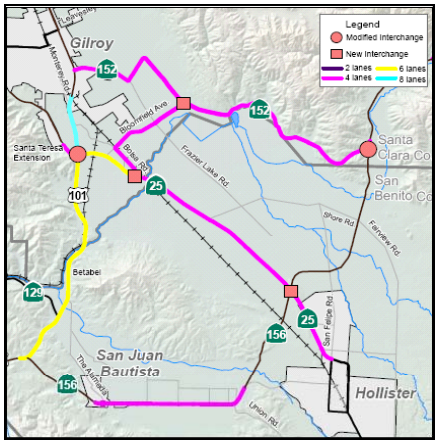
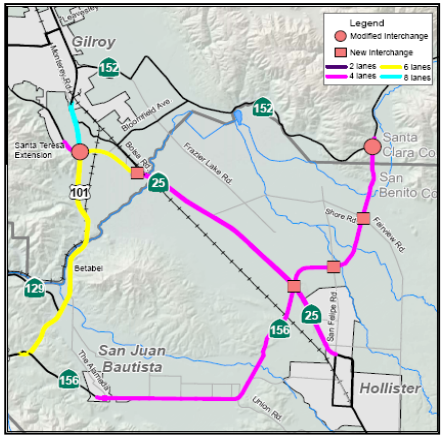
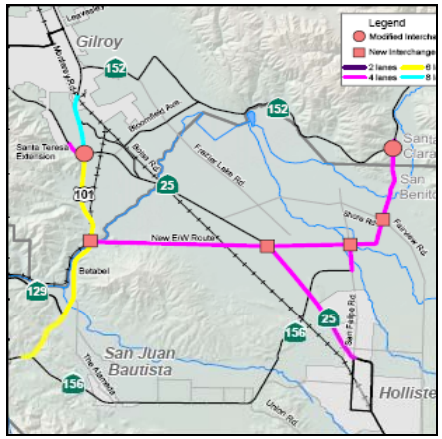
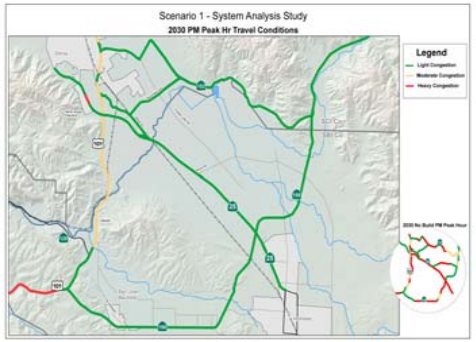
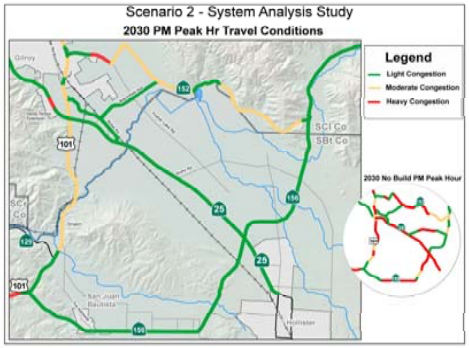
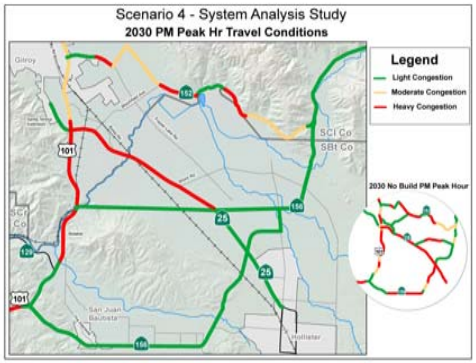
Sensitivity Ranking: H = High, M = Medium, L = Low
◇ = Additional Federal & State Regulatory Protections Apply

The environmental analysis has been prepared from a regional planning level rather than a single corridor or project-by-project level aspect. With the early identification of environmental resources that may be impacted within the study area, this analysis will hopefully provide some framework for developing advanced mitigation strategies on a regional level. The concept of advanced mitigation looks at matching future mitigation needs for transportation projects with existing conservation needs and opportunities within a given region. With the current level of growth to the south and north of the SAS area, we are provided with a unique opportunity to facilitate and subsequently implement long-range conservation planning and advanced mitigation within the southern Santa Clara County - northern San Benito County region, an area that still maintains its rural nature and is thus far relatively untouched by large-scale development.

**Further study**. Including a benefit-cost sensitivity analysis would enhance the SAS. This type of analysis determines how assumptions about model inputs affect the traffic analysis and benefit-cost results. In addition, given that full funding will not be available to construct a complete scenario by 2013, phasing and associated benefits and costs could be examined to develop an optimal phasing strategy. Continued congestion on US 101 suggests that additional study to improve flows along that corridor is warranted. Finally, VTA is currently studying SR 152 bypasses, which should provide more accurate cost estimates and evaluation of Scenario 6.

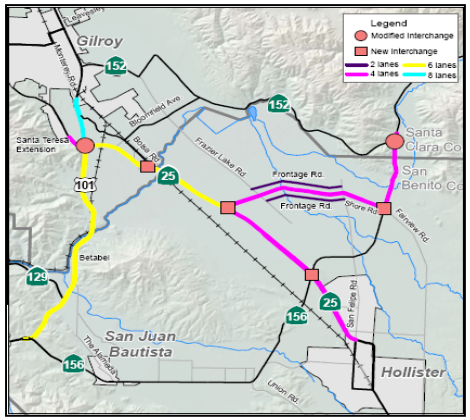
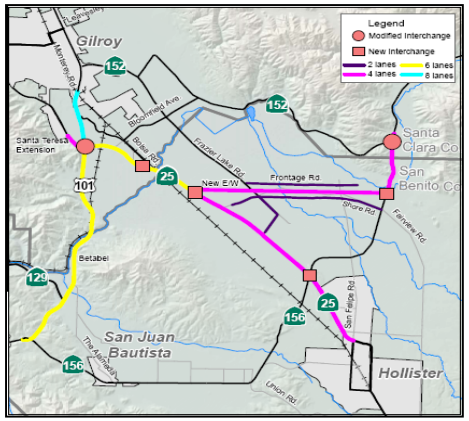
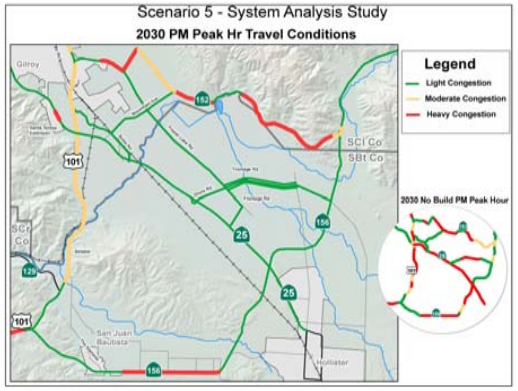
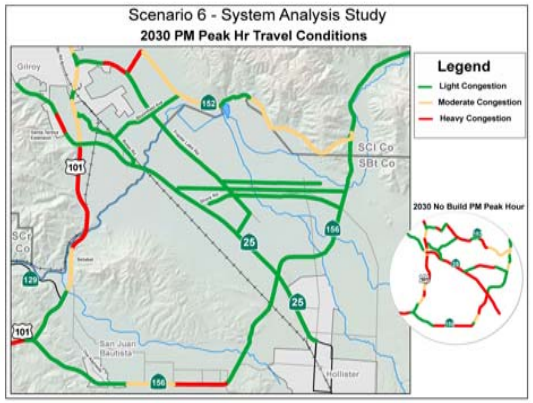
Figure 33 summarizes the SAS congestion and benefit-cost findings.

**Figure 33. Summary of SAS Findings**

| | Scenario 1 | Scenario 2 | Scenario 4 |
|---|---|---|---|
| Scenario Improvements |   |   |   |
| Net Present Value* | $781.6 M | $770.3 M | $583.4 M |
| B/C Ratio* | 1.58 | 1.60 | 1.54 |
| Cost | $1,382.2 M | $1,320.3 M | $1,116.9 M |
| Projected Future Congestion |   |   |   |

* Net Present Value = sum of discounted benefits – sum of discounted costs; B/C Ratio = sum of discounted benefits/sum of discounted costs

**Figure 33. Summary of SAS Findings**

| | Scenario 5 | Scenario 6 |
|---|---|---|
| Scenario Improvements |  |  |
| Net Present Value* | $446.9 M | $515.1 M |
| B/C Ratio* | 1.36 | 1.37 |
| Cost | $1,256.7 M | $1,420.7 M |
| Projected Future Congestion |  |  |

* Net Present Value = sum of discounted benefits – sum of discounted costs; B/C Ratio = sum of discounted benefits/sum of discounted costs