
TECHNICAL MEMORANDUM

City of San Luis Obispo

General Plan Update

Sensitivity Analyses of the Roadway Improvements

City of San Luis Obispo, Central Coast Transportation Consulting, Kittelson & Associates Inc.

Date: June 29, 2014 Project #: 172760
To: Jake Hudson, City of San Luis Obispo
From: Jim Damkowitch, Franklin Cai, T.E.
cc:

As shown in Section 2.0, of the DEIR Project Description (Tables 2.4-2 and 2.5-1, respectively), the proposed LUCE Update includes sixteen potential development areas (including the South Broad Street Special Planning Area) and seventeen proposed street network changes. The latter entails changes to the physical transportation assets of the City of San Luis Obispo. This includes new roadway connections (new centerline miles of roadway), one-way to two-way conversions, realignments, over-crossings, new interchanges and road/ramp closures. A complete listing of the candidate improvements are provided on the following page.

All the listed improvements are reflected in the General Plan DEIR Maximum Build-Out alternative. Many of these improvements have been included or considered as part of past planning studies performed for or by the City of San Luis Obispo – including the existing General Plan. The project description adopted by Council included multiple options for various projects, therefore a circulation network which represented the maximum build of those options was studied and a sensitivity analysis of the various alternative options was conducted. The purpose of this memorandum is to detail the sensitivity analysis of the individual options. Using the 2035 Maximum Build-Out condition as the basis, each proposed roadway improvement was analyzed in isolation to determine its operational efficiency and impact to the surrounding street network.

The operational software SYNCHRO was used to evaluate study intersections adjacent to each improvement. Intersection LOS, turn movement LOS and 95th percentile queues were analyzed with and without the improvement. Segment LOS was also determined based on the City's daily thresholds.

The results of each assessment informed the City which improvements should be advanced for inclusion in the proposed General Plan.

Circulation Areas of Change Considered for Inclusion for the Proposed Project:

- Prado Road (Full interchange with phased implementation)
- Bishop Extension
- Orcutt Overpass (not analyzed as part of this analysis)
- LOVR By-Pass
- Hwy 1/Hwy 101 & Broad ramp closures
- Marsh/Higuera - 2 way
- Mission Plaza Expansion
- Madonna –Realign
- Chorro & Broad – Realign
- Boysen & Santa Rosa (Includes grade-separated crossing for bike/ped. Include turn restrictions)
- Bianchi/Pismo/Higuera Realignment
- New collector – Tank Farm to Buckley
- DT Transit Center (not analyzed as part of this analysis)
- Calle Joaquin connection to Dalidio Dr
- Vachel Realign (not analyzed as part of this analysis)
- Victoria Connection (not analyzed as part of this analysis)
- Broad Street – Consolidate access

The following provides the operational summaries of the adjacent facilities when the effect of each improvement is tested:

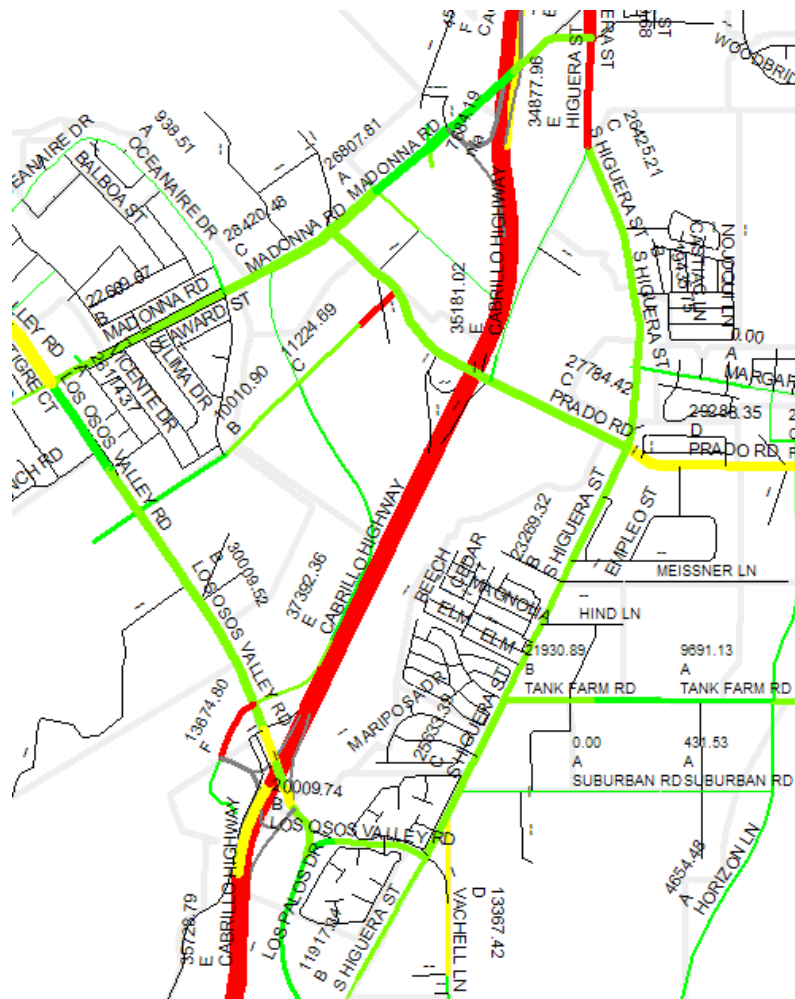
A. Build Prado Rd. Overpass Only & Eliminate Planned Ramps

WITH RAMPS								
Intersections	AM Volume	AM Delay	AM LOS	Mov. Failures	PM Volume	PM Delay	PM LOS	Mov. Failures
Marsh & Higuera	2100	17.9	B	-	2607	86.1	F	EBT,NBR,SBT
Madonna & Higuera	2634	33.8	C	-	3245	71.5	E	EBLT,NBLT, SBT
Madonna & NB 101	1769	8.7	A	-	2191	18.4	B	-
Madonna & SB 101	1965	23.5	C	-	2432	29.4	C	-
Prado & Higuera	4388	49.1	D	WBL,NBLTR,SBLT	4839	35.6	D	NBL
LOVR & Higuera	2451	17.4	B	-	2607	21.2	C	-
LOVR & NB 101	2732	45.7	D	NBL	3781	57.8	E	EBT, WBL, NBL
LOVR & Calle Joaquin / SB 101	3166	24.2	C	-	4433	40.3	D	WBT, SBL

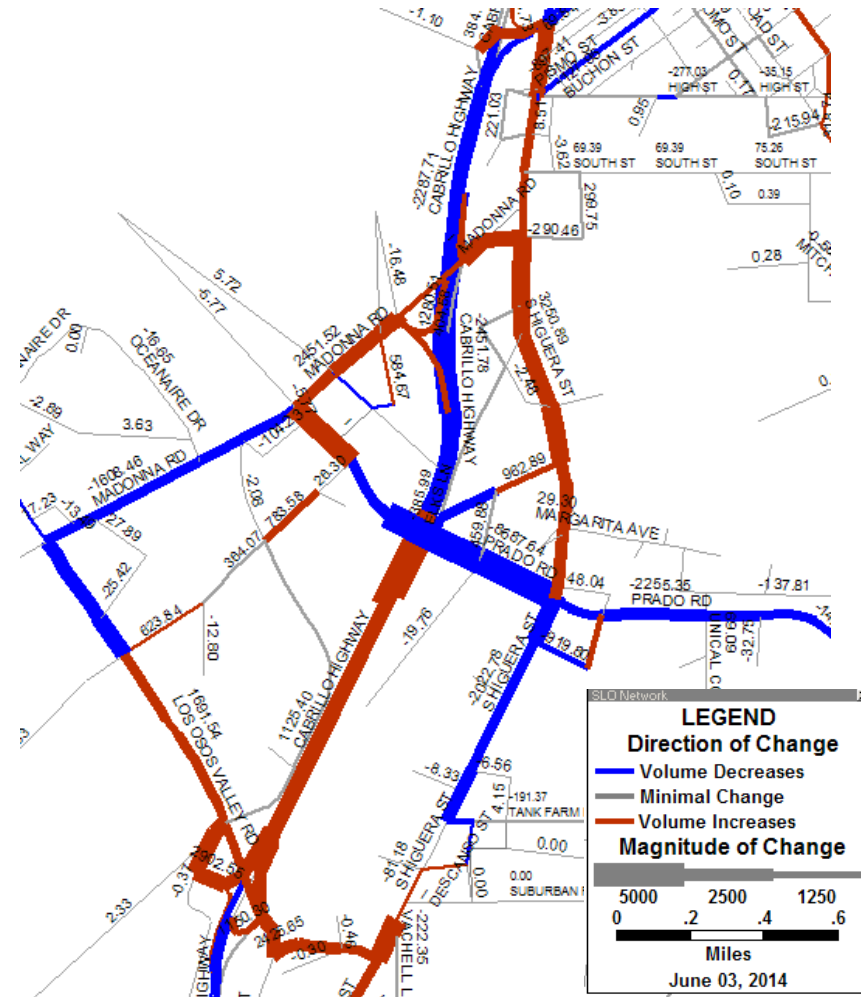
WITHOUT RAMPS								
Intersections	AM Volume	AM Delay	AM LOS	Mov. Failures	PM Volume	PM Delay	PM LOS	Mov. Failures
Marsh & Higuera	2938	64.8	E	EBT, NBL, SBT	2909	151.1	F	EBT,NBL,SBT
Madonna & Higuera	3400	104.3	F	EBLT, NBLT,SBT	3307	104.3	F	EBLT,NBLT,SBT
Madonna & NB 101	2454	13.1	B	-	3040	22.6	C	-
Madonna & SB 101	2715	29.2	C	-	3073	39.4	D	EBL
Prado & Higuera	3629	61.5	E	WBL,NBLT,SBLT	3860	22.1	C	NBL
LOVR & Higuera	2920	50.4	D	NBL	3105	44.1	D	SBR
LOVR & NB 101	3150	84.1	F	EBT, WBL, NBL	4310	101.0	F	EBT,WBLT,NBLR
LOVR & Calle Joaquin / SB 101	3445	30.0	C	EBL	4691	75.2	E	EBL,WBL,NBLT,SBL

Impacted Intersections

LOS & Daily Volumes Without Ramps:



Traffic Redistribution Resulting From Ramp Elimination:



Finding

Eliminating a planned full interchange redistributes traffic to the LOVR, Madonna, & Marsh/Higuera Interchanges causing volumes at those interchanges and surrounding intersection to operate below level of service thresholds. Due to these potential impacts it's recommended that the planned full access Interchange at Prado Rd. should not change at this time. Additional detailed subarea traffic analysis will be conducted as part of adjacent development; these studies may identify other secondary improvements that would allow for the elimination of the ramps.

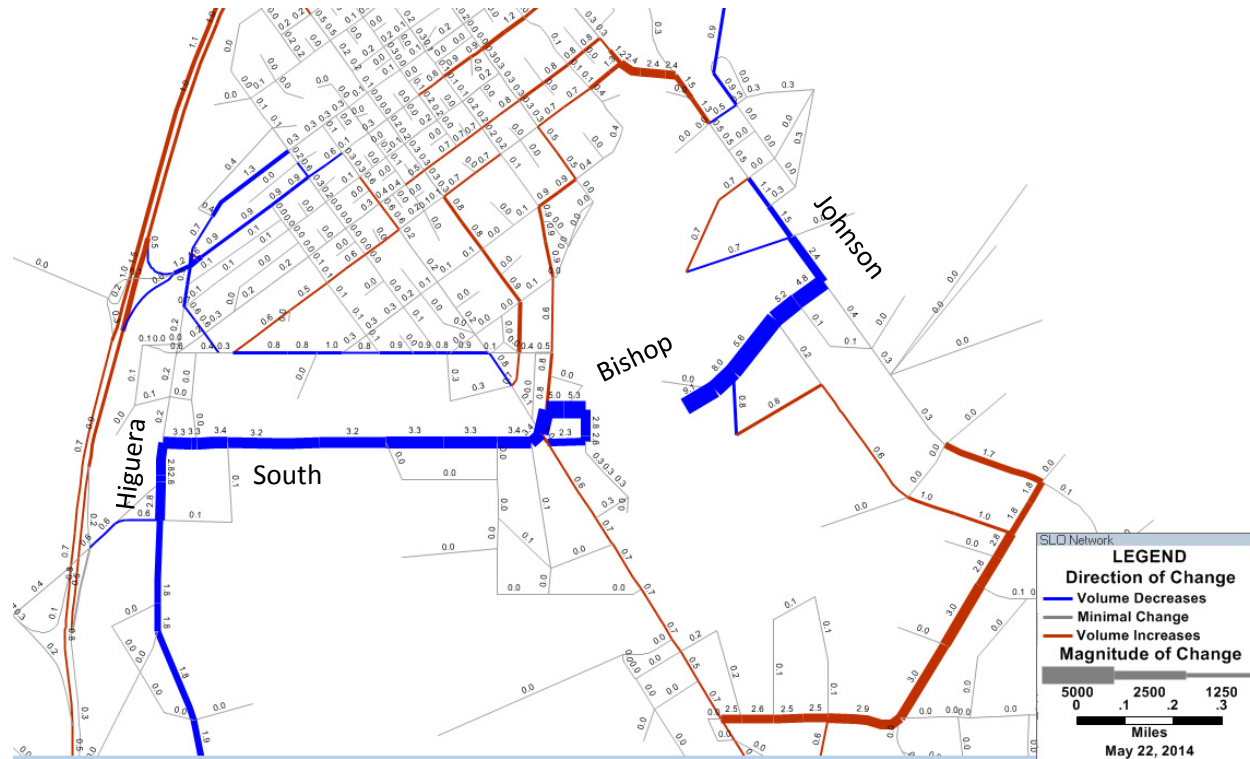
B. Eliminate Planned Bishop Street Extension:

WITH BISHOP STREET EXTENSION								
Intersections	AM Volume	AM Delay	AM LOS	Mov. Failures	PM Volume	PM Delay	PM LOS	Mov. Failures
San Luis Drive & Johnson	2099	21	C	-	2267	18	B	-
Broad & Orcutt	3127	18	B	NBL	388	27	C	SBL
Broad & South / Santa Barbara	3868	106	F	ALL	3918	52	D	EBT,WBL,WBT,NBL,SBL
Segments	Average Daily Traffic			Max. Threshold			Exceeds Threshold	
Pismo	4,000			3,000			YES	
Buchon	3,000			3,000			NO	

WITHOUT BISHOP STREET EXTENSION								
Intersections	AM Volume	AM Delay	AM LOS	Mov. Failures	PM Volume	PM Delay	PM LOS	Mov. Failures
San Luis Drive & Johnson	2334	21.5	C	-	2267	18	B	-
Broad & Orcutt	3033	19.7	B	NBL	388	27	C	SBL
Broad & South / Santa Barbara	3663	54.4	D	EBT,WBLT,NBL,BSLT	3918	52	D	EBT,WBL,WBT,NBL,SBL
Segments	Average Daily Traffic			Max. Threshold			Exceeds Threshold	
Pismo	6,000			3,000			YES	
Buchon	4,000			3,000			YES	

Impacted Intersections/Segments

Traffic Redistribution Resulting From Elimination of Extension:



Finding

Elimination of the planned Bishop Street Connection would reduce projected traffic congestion at Broad & South/Santa Barbara to acceptable levels. However, Elimination of the extension would also push additional traffic into the Pismo & Buchon neighborhoods such that volumes would exceed acceptable levels. Therefore it's recommended that the planned Bishop Street extension not be changed at this time. Given the cost, design difficulties, and other operational improvements it's also suggested that the following policy be added:

"The City shall conduct a detailed subarea traffic analysis to determine if secondary measures can be made to allow for elimination of the Bishop Street Extension and protection of neighborhood traffic levels."

C. Eliminate Planned Orcutt Railroad Overpass

Finding

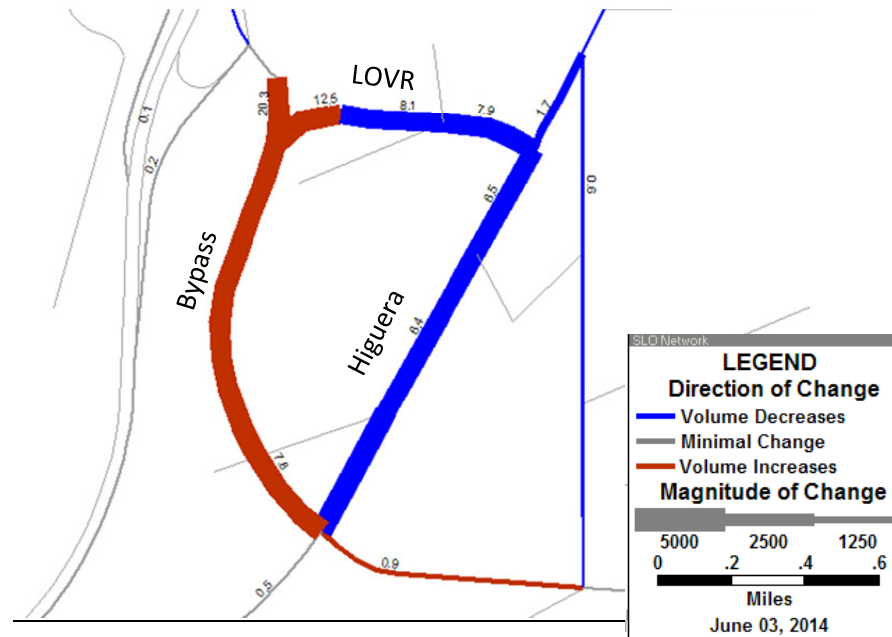
The Orcutt Railroad Overpass was initially planned in order to address delays resulting for trains stopped on the tracks blocking traffic. Since this plan was adopted rail traffic has changed and these types of occurrences are now rare. Also interim improvements have been implemented that fully address all current and forecasted operations. However, because rail traffic is outside the City's control and could resume to prior conditions, changing the current planned overpass is not recommended at this time.

D. Add Los Osos Valley Road Bypass

WITHOUT LOVR BYPASS								
Intersections	AM Volume	AM Delay	AM LOS	Mov. Failures	PM Volume	PM Delay	PM LOS	Mov. Failures
Buckley & Bypass	-							
LOVR & Higuera	2549	20	C	None	3658	87	F	NBL,SBTR
Bypass & LOVR	-							

WITH LOVR BYPASS								
Intersections	AM Volume	AM Delay	AM LOS	Mov. Failures	PM Volume	PM Delay	PM LOS	Mov. Failures
Buckley & Bypass	1370	14	B	-	2180	18	B	-
LOVR & Higuera	2229	13	B	-	2627	21	C	-
Bypass & LOVR	1860	11	B	-	2770	29	C	NBL

Traffic Redistribution Resulting From Addition of Bypass:



Finding

Addition of the LOVR Bypass improves the intersection operations of LOVR & Higuera, however other smaller scale measures already identified as part of the Chevron draft EIR accomplish a similar improvement. A bypass would reduce delays for residents exiting Los Verdes and a roadway in this area would be needed to provide access to development along this corridor. However, the bypass would have potential creek, noise, and farmland impacts. Also the Bypass would be an overall net neutral circulation project with a low cost/benefit ratio. Therefore based on the potential impacts and localized benefit it's not recommended that a roadway be site planned and approved as a capital project at this point. Rather it's recommended that the following policy be added to allow for planning and implementation of a roadway as part of adjacent development:

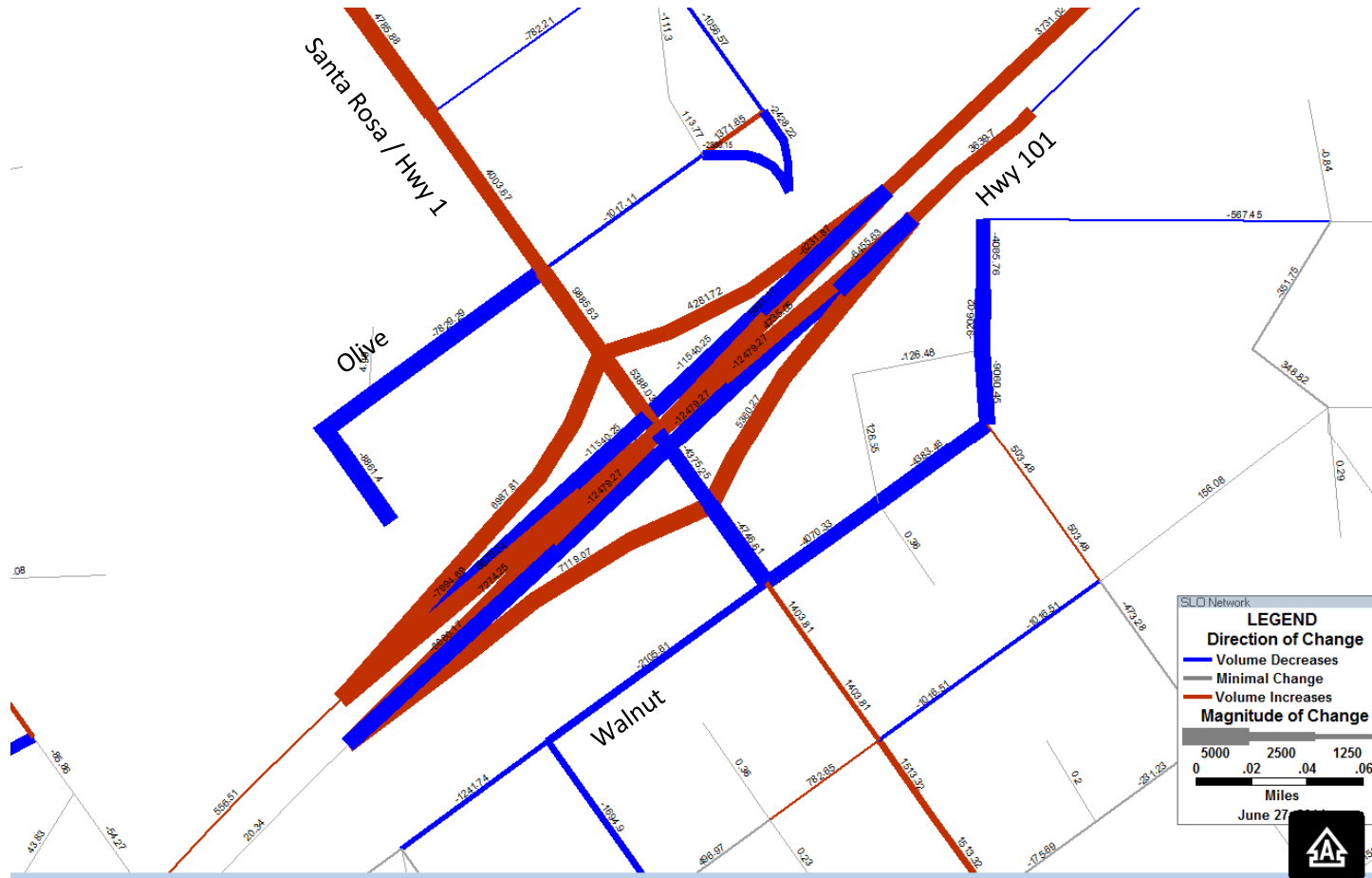
"Development within the area bound by Hwy 101, Los Osos Valley Road, & Higuera street shall incorporate a new roadway connection in some form from Los Osos Valley Road to Higuera."

E. Add Interchange Upgrades at SR-1 and SR-101:1

WITHOUT INTERCHANGE UPGRADES								
Intersections	AM Volume	AM Delay	AM LOS	Mov. Failures	PM Volume	PM Delay	PM LOS	Mov. Failures
Santa Rosa & Olive	3162	20.9	C	SBL	3705	15.4	B	-
Santa Rosa & Walnut	2622	42.1	D	WBR	2891	43.8	D	WBR,SBL
Hwy 1 & 101	-							
Local/Collector Segments	Average Daily Traffic			Max. Threshold			Exceeds Threshold	
Walnut E/ Santa Rosa	9,000			3,000			YES	
Olive E/ Santa Rosa	4,000			5,000			YES	
Walnut W/ Santa Rosa	10,100			3,000			YES	
Arterial Segments	Average Daily Traffic			LOS			Exceeds Threshold	
Olive W/ Santa Rosa	10,200			C			NO	
Santa Rosa N/ 101	44,000			F			YES	
Santa Rosa S/ 101	23,000			D			NO	

WITH INTERCHANGE UPGRADES								
Intersections	AM Volume	AM Delay	AM LOS	Mov. Failures	PM Volume	PM Delay	PM LOS	Mov. Failures
Santa Rosa & Olive	3282	14.3	B	-	4186	2.3	C	NBL
Santa Rosa & Walnut	2200	15	B	-	2434	15.6	B	-
Hwy 1 & 101	5667	34.1	C	SBL, NBL	5655	45.9	D	SBL, NBL
Local/Collector Segments	Average Daily Traffic			Max. Threshold			Exceeds Threshold	
Walnut E/ Santa Rosa	5,200			3,000			YES	
Olive E/ Santa Rosa	2,000			5,000			NO	
Walnut W/ Santa Rosa	7,600			3,000			YES	
Arterial Segments	Average Daily Traffic			LOS			Exceeds Threshold	
Olive W/ Santa Rosa	2,200			A			NO	
Santa Rosa N/ 101	48,000			F			YES	
Santa Rosa S/ 101	30,000			D			NO	

Traffic Redistribution with Interchange Upgrades:



Finding

The current interchange is projected to have many operational issues and neighborhood impacts by 2035, upgrades to the interchange such as conversion to a signal point urban interchange lessen these impacts and operational issues. Therefore it's recommended that this be added as a project.

F. Convert Higuera Street and Marsh Street between Santa Rosa Street and Johnson Ave:

WITHOUT TWO WAY CONVERSION								
Intersections	AM Volume	AM Delay	AM LOS	Mov. Failures	PM Volume	PM Delay	PM LOS	Mov. Failures
Johnson & Marsh	849	27.1	C	-	1337	44.6	D	-
Johnson & Higuera	914	14.6	B	-	1030	17.5	C	-
Santa Rosa & Marsh	1192	10.7	B	-	2062	10.6	B	-
Santa Rosa & Higuera	1807	5.2	A	-	2382	6.7	A	-
Segments	Average Daily Traffic				LOS			Exceeds Threshold
Marsh	5,000				A			NO
Higuera	2,800				A			NO

WITH TWO WAY CONVERSION								
Intersections	AM Volume	AM Delay	AM LOS	Mov. Failures	PM Volume	PM Delay	PM LOS	Mov. Failures
Johnson & Marsh	831	6.8	A	-	1360	16.6	B	-
Johnson & Higuera	844	19.7	C	-	1063	32.3	D	-
Santa Rosa & Marsh	1343	12.3	B	-	2289	10.8	B	-
Santa Rosa & Higuera	831	5.1	A	-	2636	8.1	A	-
Segments	Average Daily Traffic				LOS			Exceeds Threshold
Marsh	10,000				C			NO
Higuera	4,000				B			NO

Finding

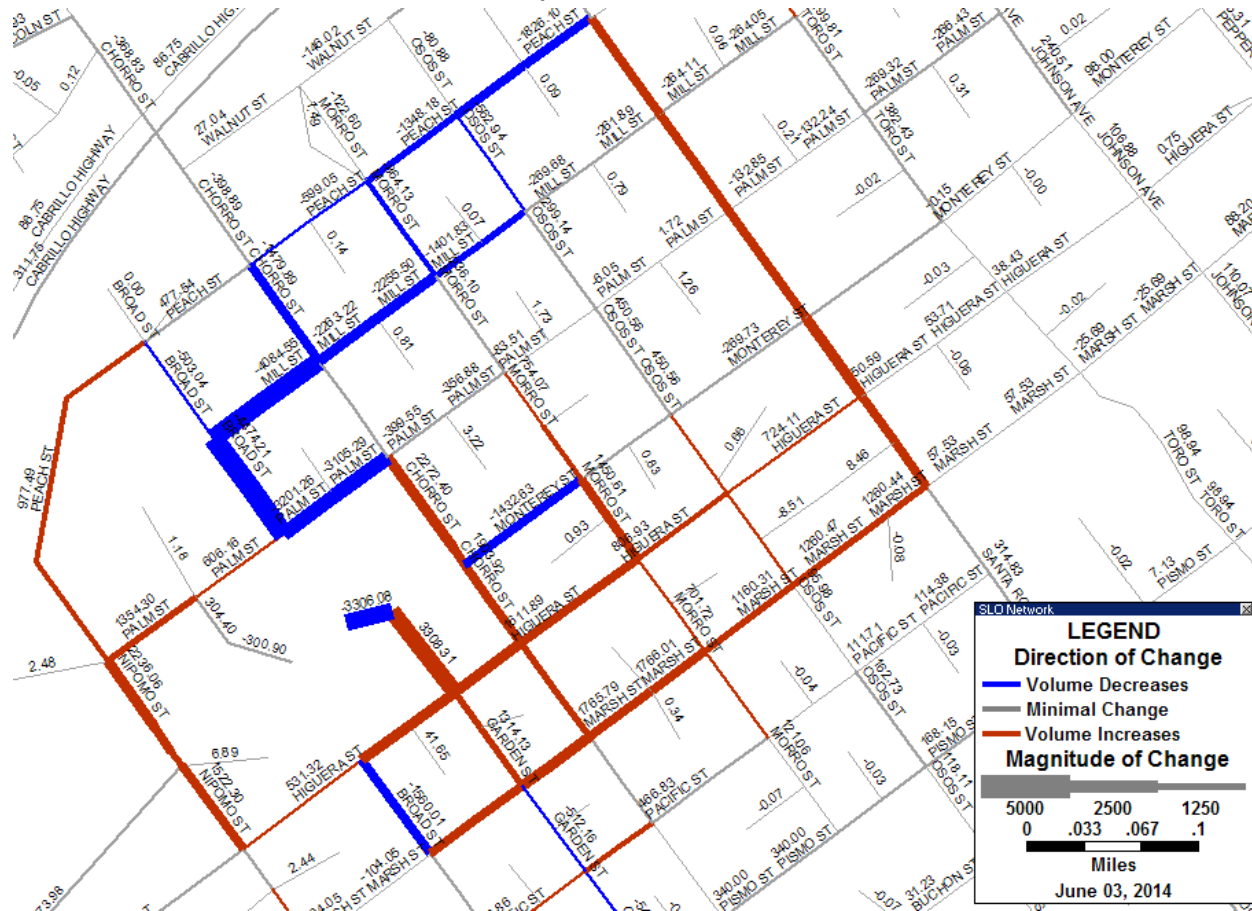
Currently Marsh & Higuera streets between Johnson & Santa Rosa are underutilized and under developed while parallel neighborhood streets are exceeding volume thresholds. Conversion of these streets from one-way to two-way will improve their utilization and draw some traffic from parallel neighborhood streets. Intersections and segments can operationally accommodate the conversion. Therefore it's recommended that this be added as a project.

G. Expand Mission Plaza :

LOS & Daily Volumes With Mission Plaza Expansion:



Traffic Redistribution with Mission Plaza expansion:



Finding

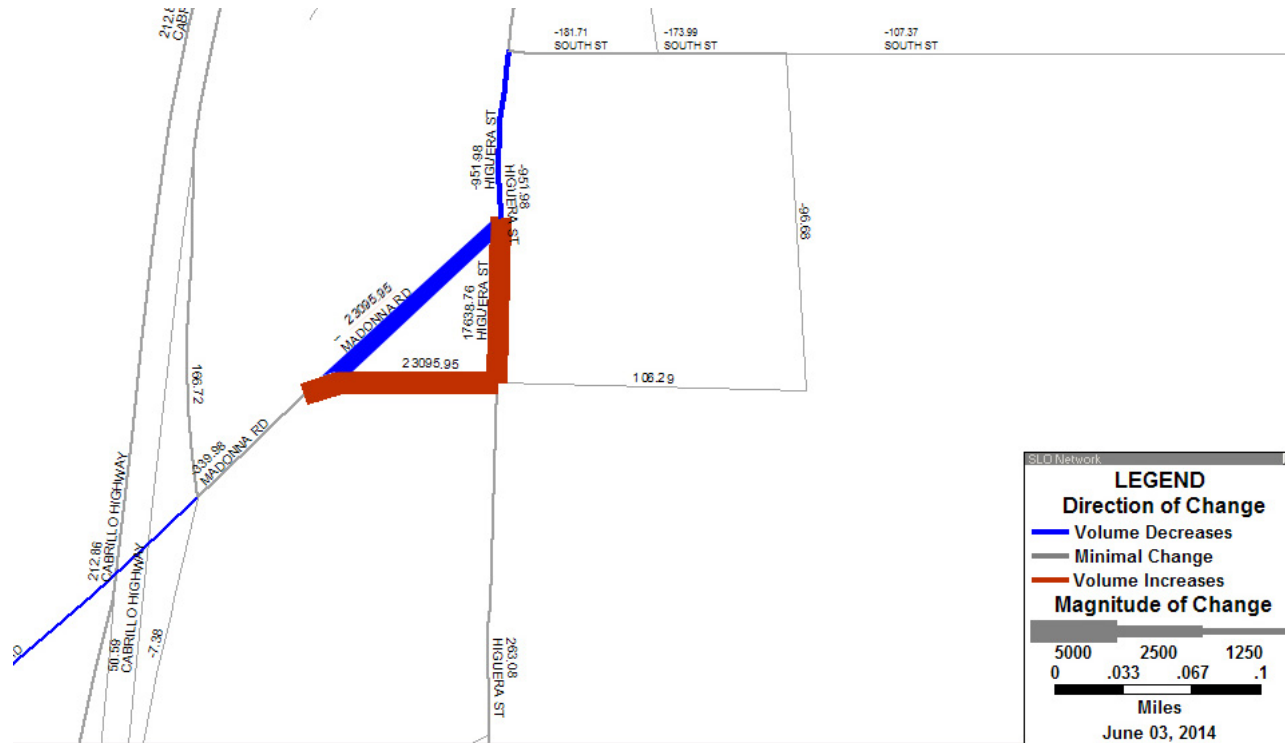
Expansion of the Mission Plaza causes minor to moderate redistributions of traffic within the downtown. Nipomo St. exceeds its level of service threshold on isolated blocks; however, the expansion improves pedestrian access & safety and enhances the downtown atmosphere. Overall, the expansion of Mission Plaza can be accommodated with the current street network. Therefore, it is recommended that this be added as a project.

H. Realign Madonna at Higuera :

LOS & Daily Volumes with Realignment:



Traffic Redistribution with Realignment:



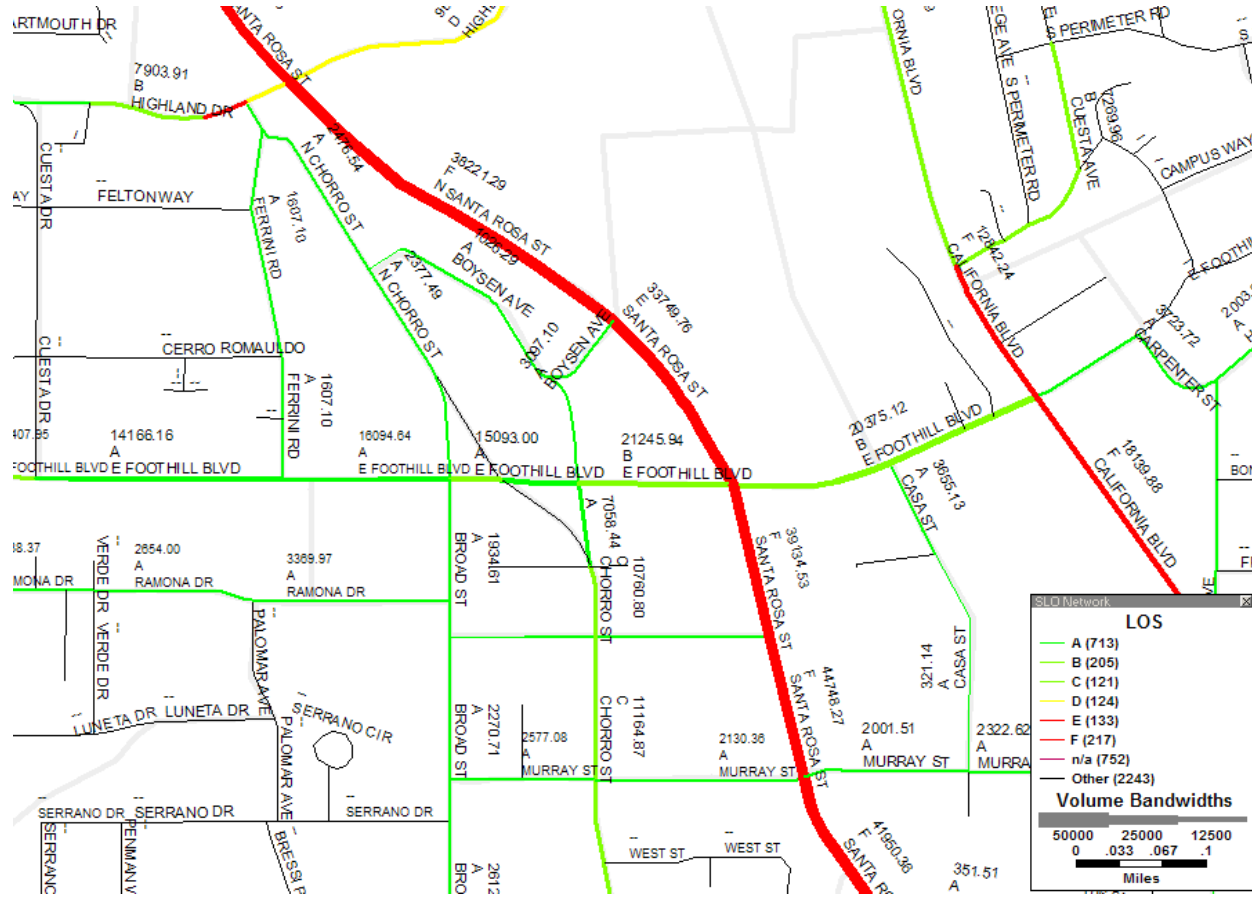
Finding

Realignment of Madonna at Higuera is primarily just a geometric modification resulting in an overall net neutral circulation change and a low cost/benefit ratio. However, the project would improve intersection alignment, safety, and operations. Also the realignment could facilitate greater development of the two adjacent properties. Therefore based on the localized benefit it's not recommended that realignment be site planned and approved as a capital project at this point. Rather it's recommended that the following policy be added to allow for planning and implementation as part of adjacent development:

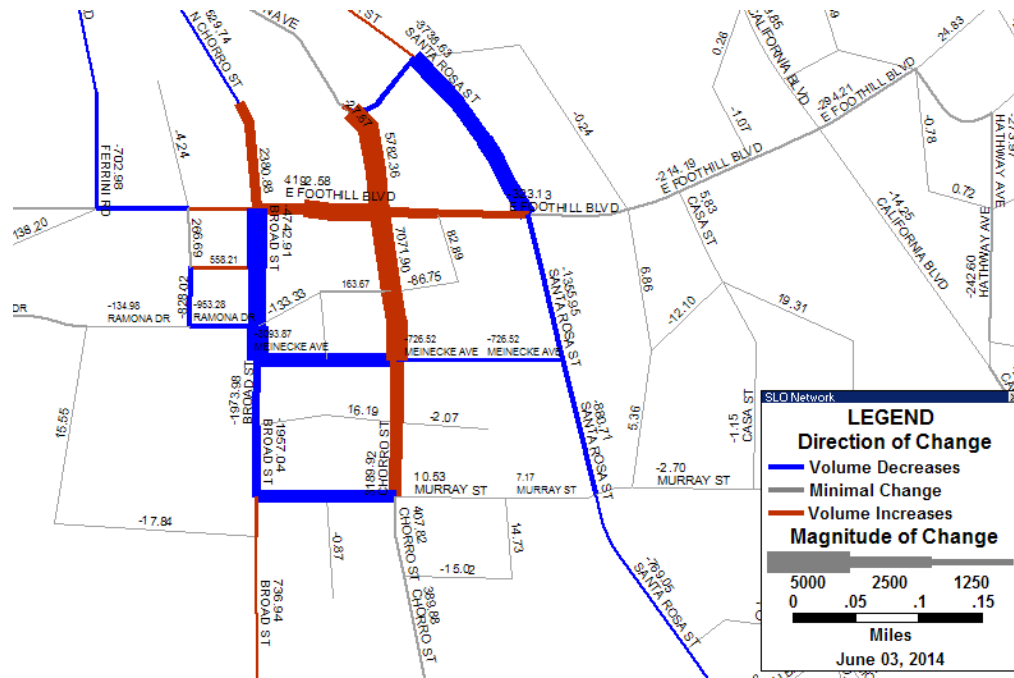
"Development of the properties North and South of Madonna Rd. West of Higuera shall incorporate a detailed geometric analysis and associated improvements for Madonna Road west of Higuera and the intersection of Higuera and Madonna"

I. Realign Broad, Chorro, & Boysen at Foothill :

LOS & Daily Volumes With Realignments:



Traffic Redistribution with Realignments:

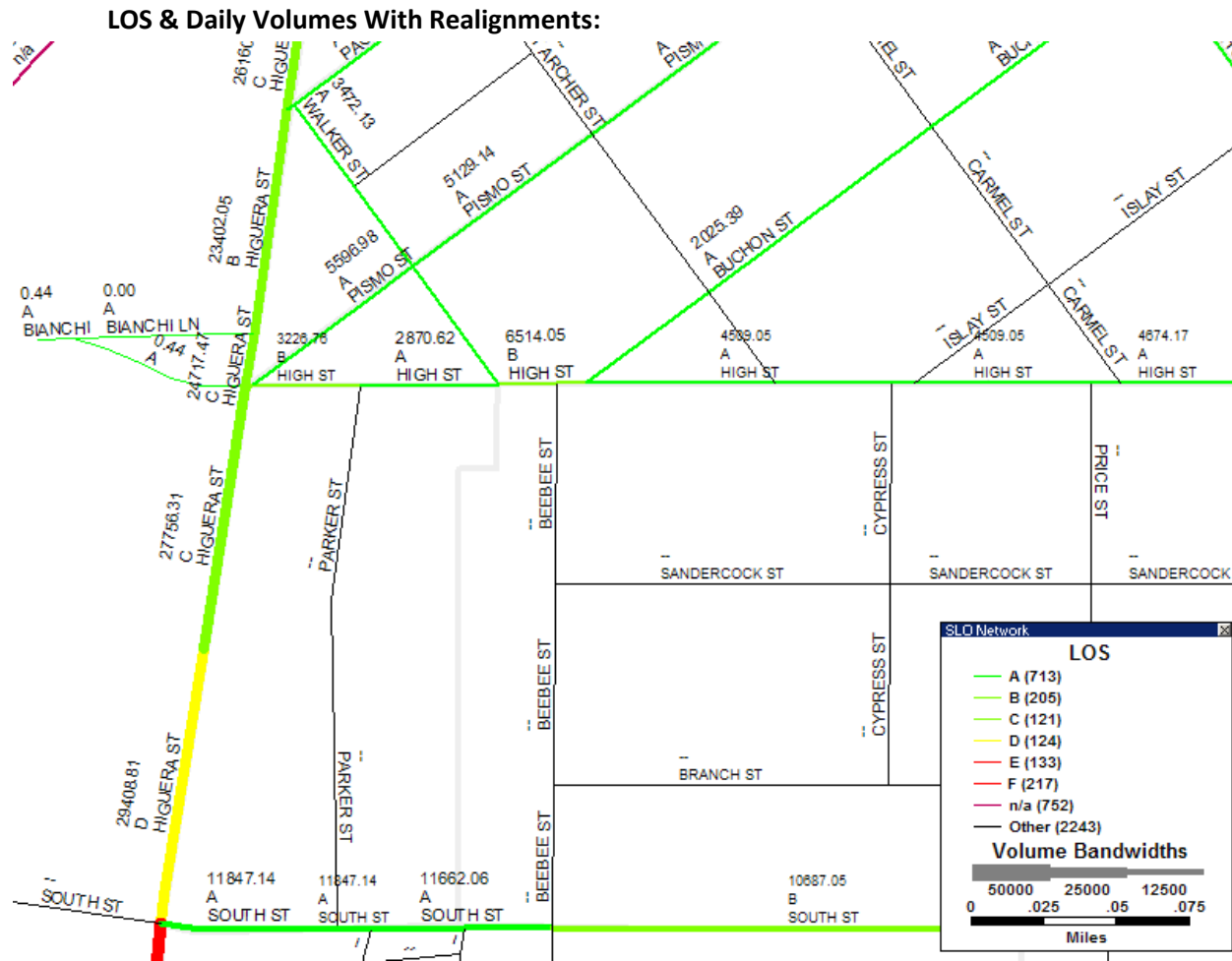


Finding

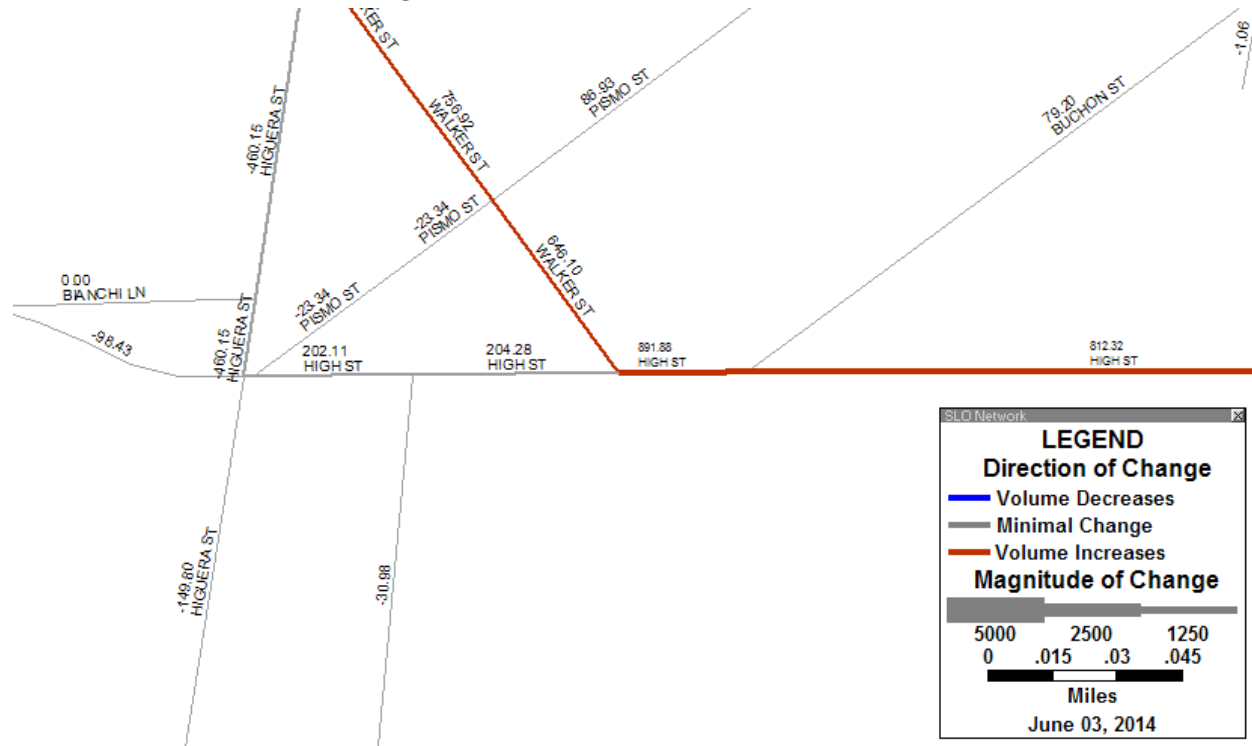
Realignment causes volumes to decrease on Broad & Santa Rosa but increase on Chorro Street such that Chorro Street exceeds Neighborhood volume thresholds. Some form of realignment of Broad & Chorro would improve intersection operations and safety. Also the grade separated pedestrian crossing would provide improved access to & from residential neighborhoods and the commercial center to CalPoly. The grade separated pedestrian is recommended to be included as a project, however due to the potential neighborhood impacts it's not recommended that realignments be site planned and approved as a capital project at this point. Rather it's recommended that the following policy be added to guide adjacent development:

"Development of University Square shall incorporate a detailed geometric analysis and associated improvements for the intersections of Boysen & Santa Rosa, Foothill & Chorro, and Foothill & Broad in addition to any driveway access points along Foothill Blvd."

J. Realign High & Pismo at Higuera :



Traffic Redistribution with Realignments:



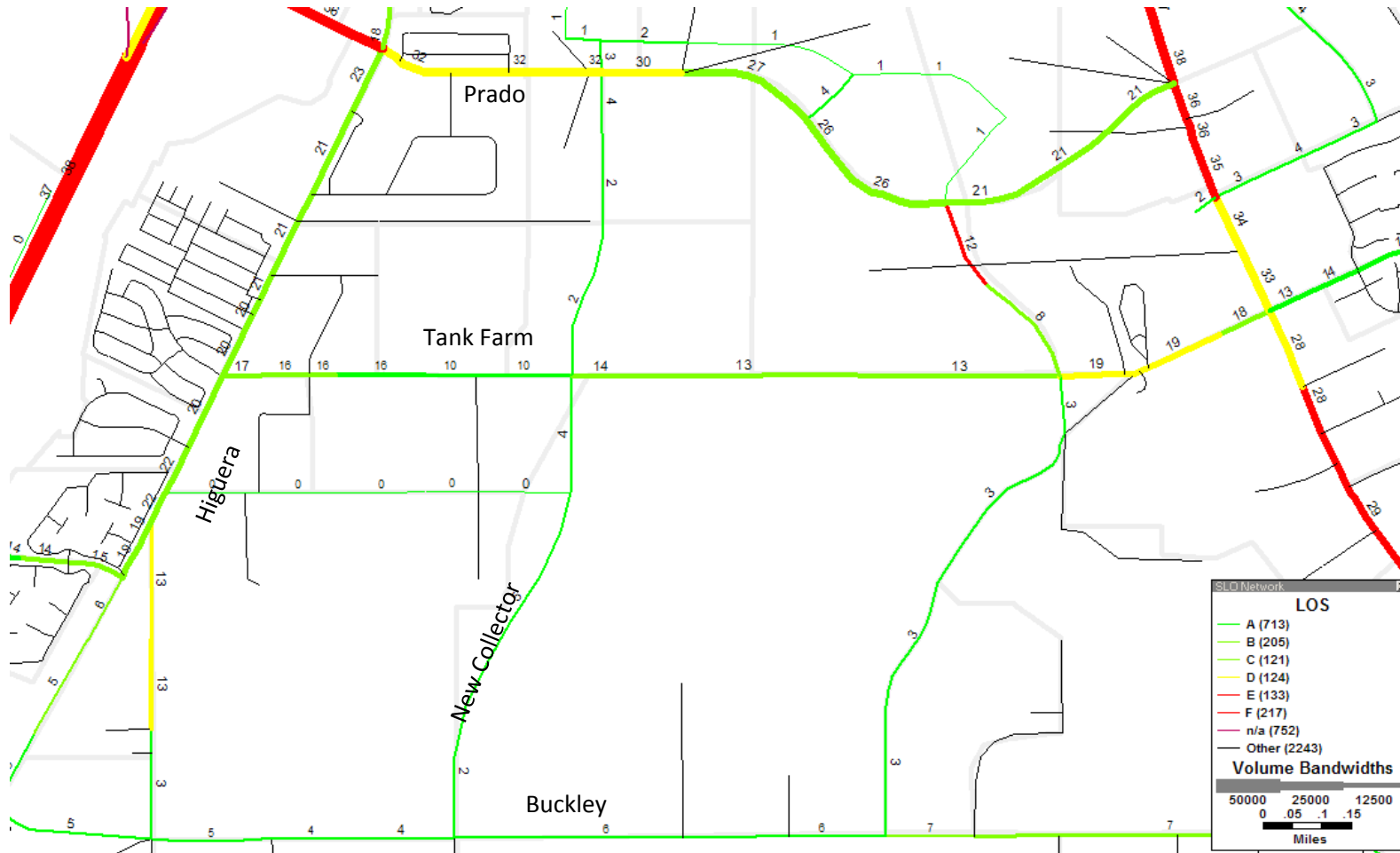
Finding

Realignment of High & Pismo at Higuera is primarily a localized geometric modification resulting in an overall net neutral circulation change and a low public cost/benefit ratio. However, the project would improve intersection alignment, safety, and operations. Therefore based on the localized benefit and property impacts it's not recommended that realignment be site planned and approved as a capital project at this point. Rather it's recommended that the following policy be added to allow for planning and implementation of a roadway as part of adjacent development:

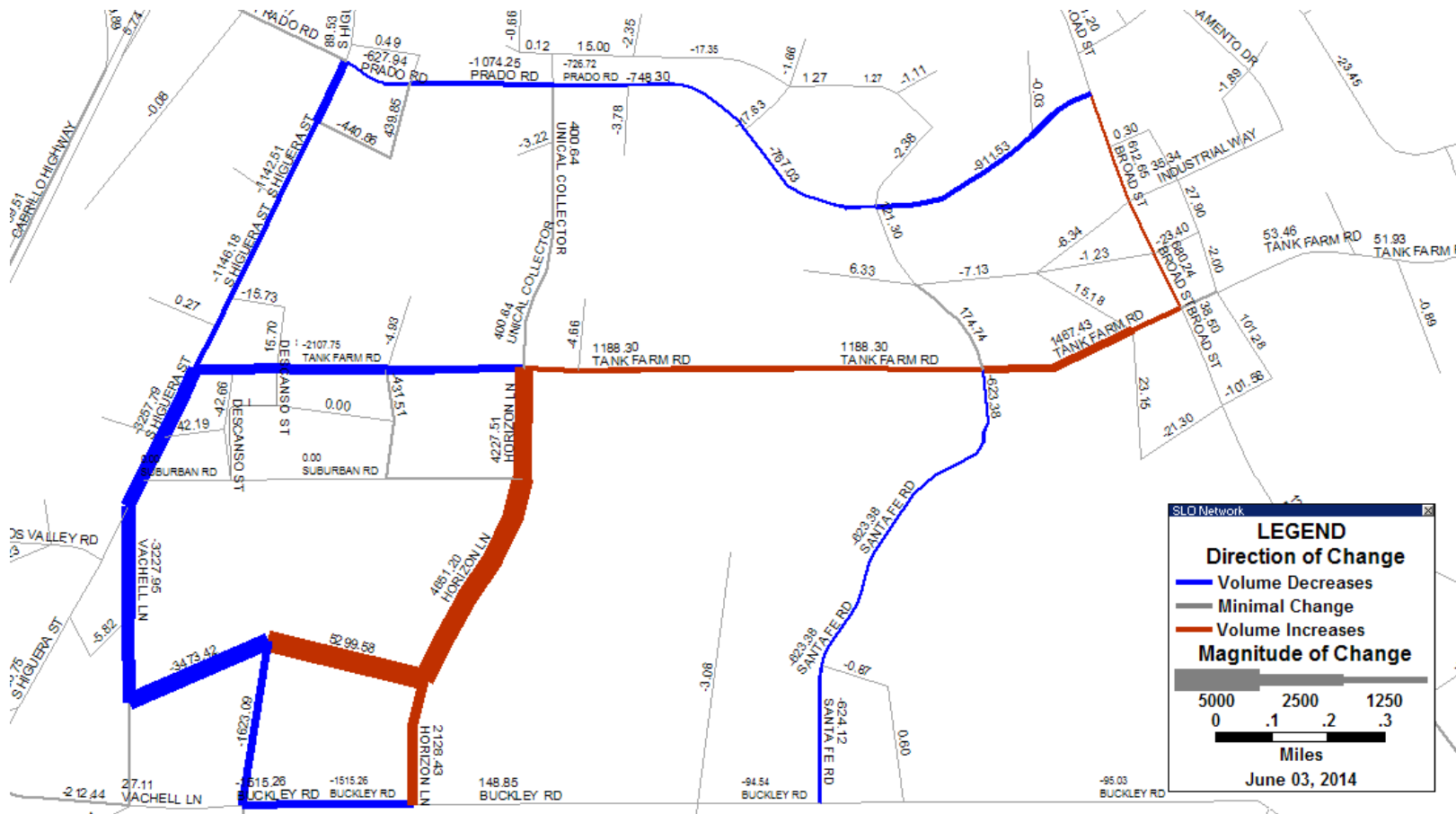
"Re-Development of properties at the intersection of High & Pismo at Higuera shall incorporate a detailed geometric analysis and associated improvements"

K. Add New North/South Collector Between Tank Farm & Buckley

LOS & Daily Volumes with New Connection:



Traffic Redistribution with New Connection:



Finding

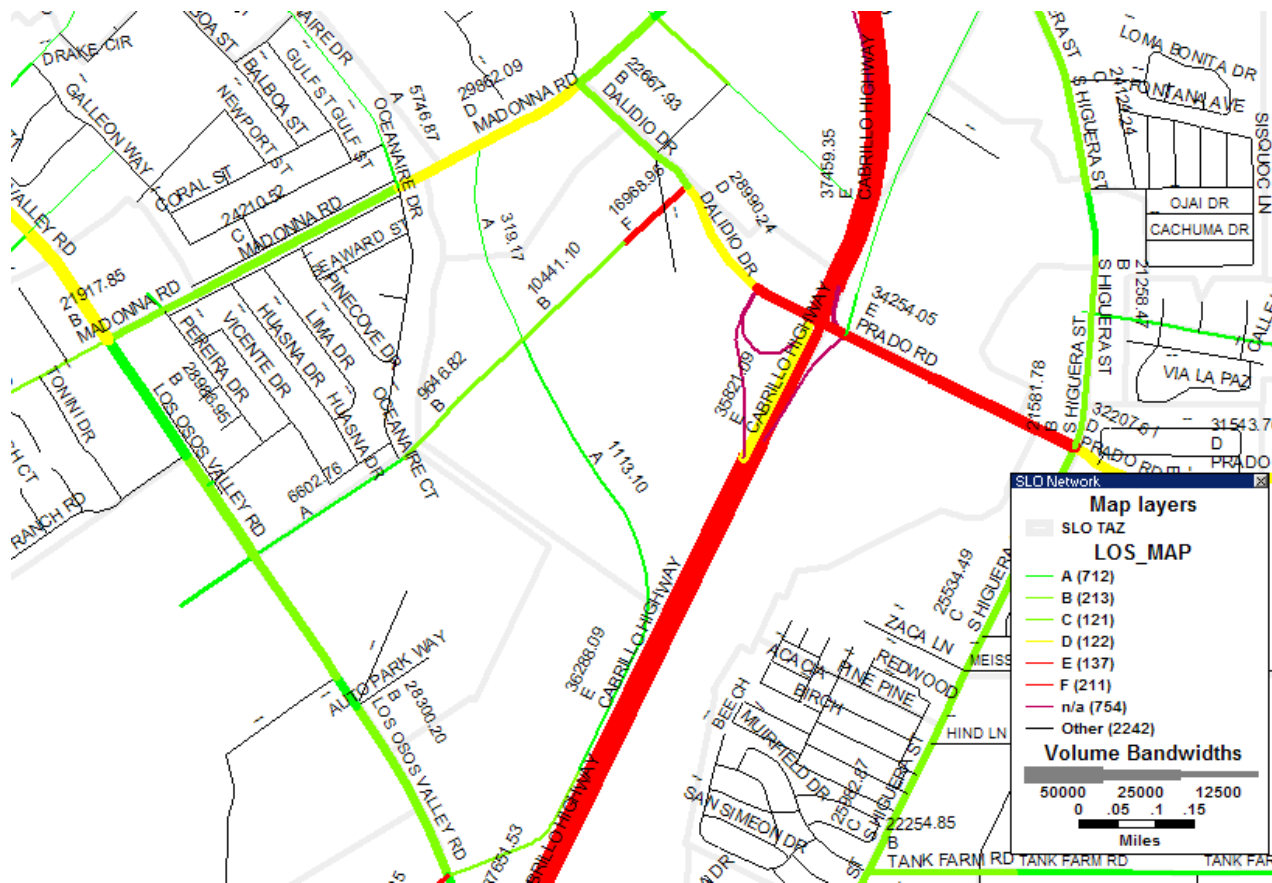
A new North/South collector between Buckley and Tank Farm provides additional access to Avila Ranch and adjacent properties and relieves traffic congestion along S. Higuera Street. Therefore it's recommended that this be added as a project. There may be portions of this road that will be planned and constructed as part of new development in the area.

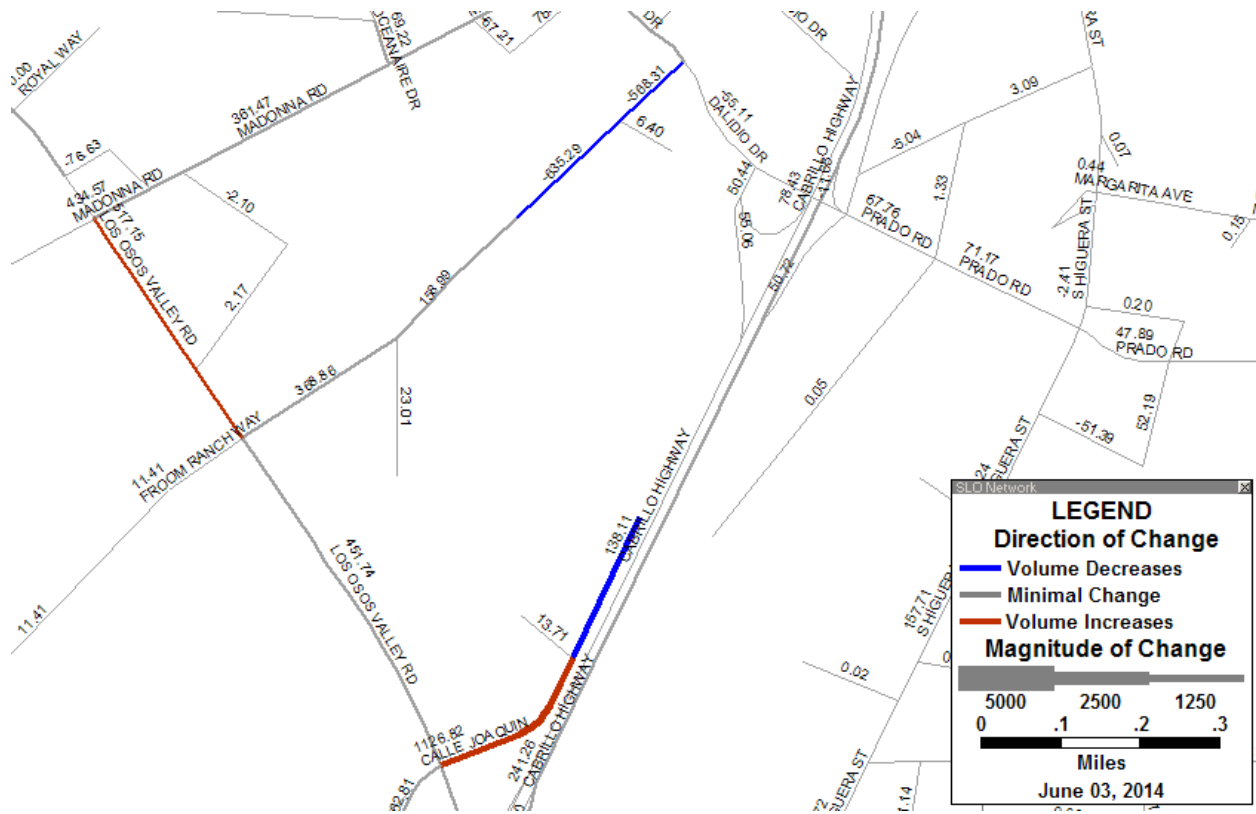
L. DT Transit Center

Preliminary modeling of the transit center showed that there was negligible impact on overall transit forecasts as a result of relocation or consolidation. However consolidation of the transit center is predicted to have significant operational benefits. Therefore it's recommended that this be added as a project that will occur in cooperation with SLOCOG and RTA.

M. Extend Calle Joaquin to Froom or Prado Rd.

LOS & Daily Volumes with New Connection:





Finding

The Calle Joaquin extension to Froom Ranch Way does not draw enough traffic to warrant this new connection. It's not recommended that this be included as a project or policy.

N. Vachel Realignment

This option is primarily a localized geometric modification and when coupled with the Buckley road connection would have negligible impact on overall circulation. Therefore it's not recommended that this be included as a project or policy.

O. Victoria Avenue Connection

The traffic analysis from the prior Broad St. Corridor Plan draft EIR remains valid in regards to the Victoria Ave. extension. The extension provides an alternate NB route to Broad Street thereby reducing Broad Street congestion and improving local access. It's recommended that this improvement be carried forward in the General Plan.