

DRAFT CITYWIDE TRAFFIC IMPROVEMENT PLAN

Prepared for:



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Introduction and Summary

Introduction

This report presents an analysis of the traffic impacts that would be associated with the full build out of the City of Cotati, along with a comprehensive list of traffic improvements throughout the City needed to accommodate build out of the land uses contained in the 1998 General Plan. The traffic improvement projects primarily include capacity and operational related mitigations that are based on an updated citywide traffic analysis. Based on a review of the 1998 General Plan, other studies, field review, and analysis in this process, a list of pedestrian, bicycle, and transit improvement projects were also developed.

Summary

Existing Vehicular Traffic Conditions

The existing a.m. and p.m. peak hour traffic volumes were based on new traffic counts collected in November 2004. Under Existing Conditions, all of the signalized study intersections are operating at Level of Service (LOS) C or better. The two study intersections controlled by all-way stop-controls are operating unacceptably at LOS E. And one of the un-signalized study intersections has side street movements operating at LOS F.

Future Vehicular Traffic Conditions

Future build out traffic volumes were developed for the *1998 General Plan* land use for the Cotati study area. Under these Future Conditions, with build out of the general plan land use zoning and an increase in through traffic associated with growth within and adjacent to the sphere of influence, the signalized intersection of Old Redwood Highway/West Sierra Avenue-East Cotati Avenue would be expected to operate unacceptably at LOS F. Three of the study intersections controlled by all-way stop-controls would be expected to operate unacceptably at LOS E or F. These intersections include Old Redwood Highway/William-George Street, East Cotati Avenue/La Salle Avenue, and Old Redwood Highway/Charles Henry Street. And six of the un-signalized study intersections have side street movements operating at LOS F.

Traffic Improvement Plan Elements

New traffic signals or roundabouts should be installed at the following locations to maintain acceptable traffic operation, as warranted by either existing or future deficiencies.

- Redwood Drive/Helman Lane
- Old Redwood Highway/Commerce Boulevard
- Gravenstein Highway/Alder Avenue
- Old Redwood Highway/William-George Street
- East Cotati Avenue/Santero Way
- East Cotati Avenue/La Salle Avenue
- Old Redwood Highway/Henry-Charles Street

Geometry or turn lane improvements will need to be provided at the following study area intersections.

- Gravenstein Highway/West Cotati Avenue
- Gravenstein Highway/U.S. 101 NB Ramps
- Old Redwood Highway/West Sierra Avenue-East Cotati Avenue
- East Cotati Avenue/Charles Street

Roadway segments that would require either widening or re-striping include the following

- Gravenstein Highway (Alder Avenue to Redwood Drive)
- Old Redwood Highway (Gravenstein Highway to East Cotati Avenue)
- East Cotati Avenue (Old Redwood Highway to La Salle Avenue)

Study Parameters

Study Area

Twenty-two (22) focus intersections were identified for analysis as part of this study. The study intersections are identified by number in Figure 1.

1. Redwood Drive/Helman Lane
2. Commerce Boulevard/Wilford Lane
3. Old Redwood Highway/Commerce Boulevard
4. Gravenstein Highway/Alder Avenue
5. Gravenstein Highway/West Cotati Avenue
6. Gravenstein Highway/Redwood Drive
7. Gravenstein Highway/U.S. 101 SB Ramps
8. Gravenstein Highway/U.S. 101 NB Ramps
9. Gravenstein Highway/Old Redwood Highway
10. Old Redwood Highway/William-George Street
11. W. Sierra Avenue/School Street-U.S. 101 SB On-ramp
12. W. Sierra Avenue/U.S. 101 NB Off-ramp
13. W. Sierra/E. School Street
14. Old Redwood Highway/E. Cotati Avenue
15. E. Cotati Avenue/Charles Street
16. E. Cotati Avenue/La Salle Avenue
17. E. Cotati Avenue/Adrian Drive
18. E. Cotati Avenue/Lancaster Drive
19. E. Cotati Avenue/Beverly Drive
20. E. Cotati Avenue/Santero Way
21. Old Redwood Highway/Henry-Charles Street
22. Old Redwood Highway/Myrtle-Valparaiso Avenue

Study Period

The weekday a.m. and p.m. peak hour conditions were used as the basis of the traffic analysis.

Study Scenarios

Two scenarios are included in this study. Descriptions of these scenarios follow.

Existing Conditions

The Existing scenario provides an evaluation of current traffic operation based on traffic counts taken in November of 2004.

Future Build out Conditions

The Future Build out scenario is an evaluation of the potential traffic impacts that are expected with build out of the 1998 *General Plan* land use and growth in the surrounding area. City staff provided Land use projections.

Intersection Level of Service Methodologies

Operational analyses typically focus on intersections rather than road segments since the capacity of the intersections is usually more critical than the capacity of the roadway. Level of Service (LOS) is used to rank traffic operation on various types of facilities based on traffic volumes and roadway capacity using a series of letter designations ranging from A to F. Generally, Level of Service A represents free flow conditions and Level of Service F represents forced flow or breakdown conditions.

The study intersections were analyzed using methodologies from the *Highway Capacity Manual 2000*, Transportation Research Board, 2000. This source contains methodologies for various types of intersection control, all of which are related to a measurement of delay in average number of seconds per vehicle. The ranges of delay associated with the various levels of service are indicated in the following table.

Intersection Level of Service Criteria		
LOS	Un-signalized Intersections	Signalized or All-way Stop-controlled Intersections
A	Delay of 0 to 10 seconds. Gaps in traffic are readily available for drivers exiting the minor street.	Delay of 0 to 10 seconds. Most vehicles arrive during the green phase, so do not stop at all.
B	Delay of 10 to 15 seconds. Gaps in traffic are somewhat less readily available than with LOS A, but no queuing occurs on the minor street.	Delay of 10 to 20 seconds. More vehicles stop than with LOS A, but many drivers still do not have to stop.
C	Delay of 15 to 25 seconds. Acceptable gaps in traffic are less frequent, and drivers may approach while another vehicle is already waiting to exit the side street.	Delay of 20 to 35 seconds. The number of vehicles stopping is significant, although many still pass through without stopping.
D	Delay of 25 to 35 seconds. There are fewer acceptable gaps in traffic, and drivers may enter a queue of one or two vehicles on the side street.	Delay of 35 to 55 seconds. The influence of congestion is noticeable, and most vehicles have to stop.
E	Delay of 35 to 50 seconds. Few acceptable gaps in traffic are available, and longer queues may form on the side street.	Delay of 55 to 80 seconds. Most, if not all, vehicles must stop and drivers consider the delay excessive.
F	Delay of more than 50 seconds. Drivers may wait for long periods before there is an acceptable gap in traffic for exiting the side streets, creating long queues.	Delay of more than 80 seconds. Vehicles may wait through more than one cycle to clear the intersection.

Reference: *Highway Capacity Manual 2000*, Transportation Research Board, 2000.

Signalized Intersection Level of Service Analysis Methodology

The study intersections that are currently or will be signalized were analyzed using the Operations Method contained in the *Highway Capacity Manual 2000* (HCM). The signalized intersection methodology is based on factors including traffic volumes, green time for each movement, phasing, whether or not the signals are coordinated, truck traffic, and pedestrian activity. Average stopped delay per vehicle in seconds is used as the basis for evaluation in this LOS methodology. It should be noted that the levels of service for this study were calculated using optimized signal timing.

All-way Stop-Controlled Intersection Level of Service Analysis Methodology

Operating conditions at the all-way stop-controlled intersections were analyzed using the “All-Way Stop-Controlled Intersection” methodology contained in the HCM. This methodology evaluates delay for each approach based on turning movements, opposing and conflicting traffic

volumes, and the number of lanes. The delay that is calculated is then related to a Level of Service.

Un-signalized Intersection Level of Service Analysis Methodology

The Levels of Service for the intersections with side street stop controls, or those that are “un-signalized,” were analyzed using the un-signalized intersection capacity method from the HCM. This method determines a level of service for each minor turning movement by estimating the level of average delay in seconds per vehicle. The movement with the highest level of delay is presented as the Worst Case Level of Service. The through movements on the main street are assumed to operate at free flow and a Level of Service A.

Traffic Signal Warrants

The Manual on Uniform Traffic Control Devices (MUTCD) contains guidelines for determining the need for a traffic signal. Potential need for installing traffic signals at the un-signalized and all-way stop controlled study intersections was evaluated using Warrant #11, Peak Hour Volume, assuming urban conditions. Although traffic signal warrants may be met for some conditions, the decision to install a traffic signal should also be based on the other traffic signal warrants that consider daily traffic volumes and collision experience, current traffic operation, and adjacent traffic controls.

Traffic Operation Standards

The following standards are recommended in evaluating the study intersections in order to determine appropriate mitigation measures.

Signalized Intersections

The City of Cotati’s adopted Level of Service (LOS) Standard is contained in their *1998 General Plan*. This standard allows for a minimum operation of LOS D for all intersections.

All-Way Stop Controlled Intersections

For intersections with stop controls on all approaches, LOS D operation was considered the minimum acceptable condition. Where lower levels of service were encountered, signalization or other modifications to the control scheme were considered as a potential mitigation to improve operation.

Un-signalized Intersections

On sections of certain arterials, it is not unusual to have all of the side streets operating at LOS E or F with long traffic delays, even where side street volumes are very low. It may be operationally, physically, and/or financially infeasible to provide mitigation that would allow Level of Service D conditions or better from all side streets during peak hours. The most typical mitigation measure used to improve operation for the side street is a traffic signal, and it is both operationally and financially undesirable to provide a traffic signal at every intersection along most road segments. Mitigation measures were considered when LOS F conditions were projected for the minor movements. The volume of traffic associated with the level of service was also considered. Where lower levels of service were encountered for significant volumes of traffic, signalization or other lane improvements were considered as a potential mitigation to improve operation.

Existing Conditions

New peak hour traffic counts were collected on November 16th and 17th 2004 for each of the study intersections. The daily traffic volume counts collected over an entire week including the time turning movements were collected are included in Appendix A. The existing turning movement counts are shown in Figures 2 and 3.

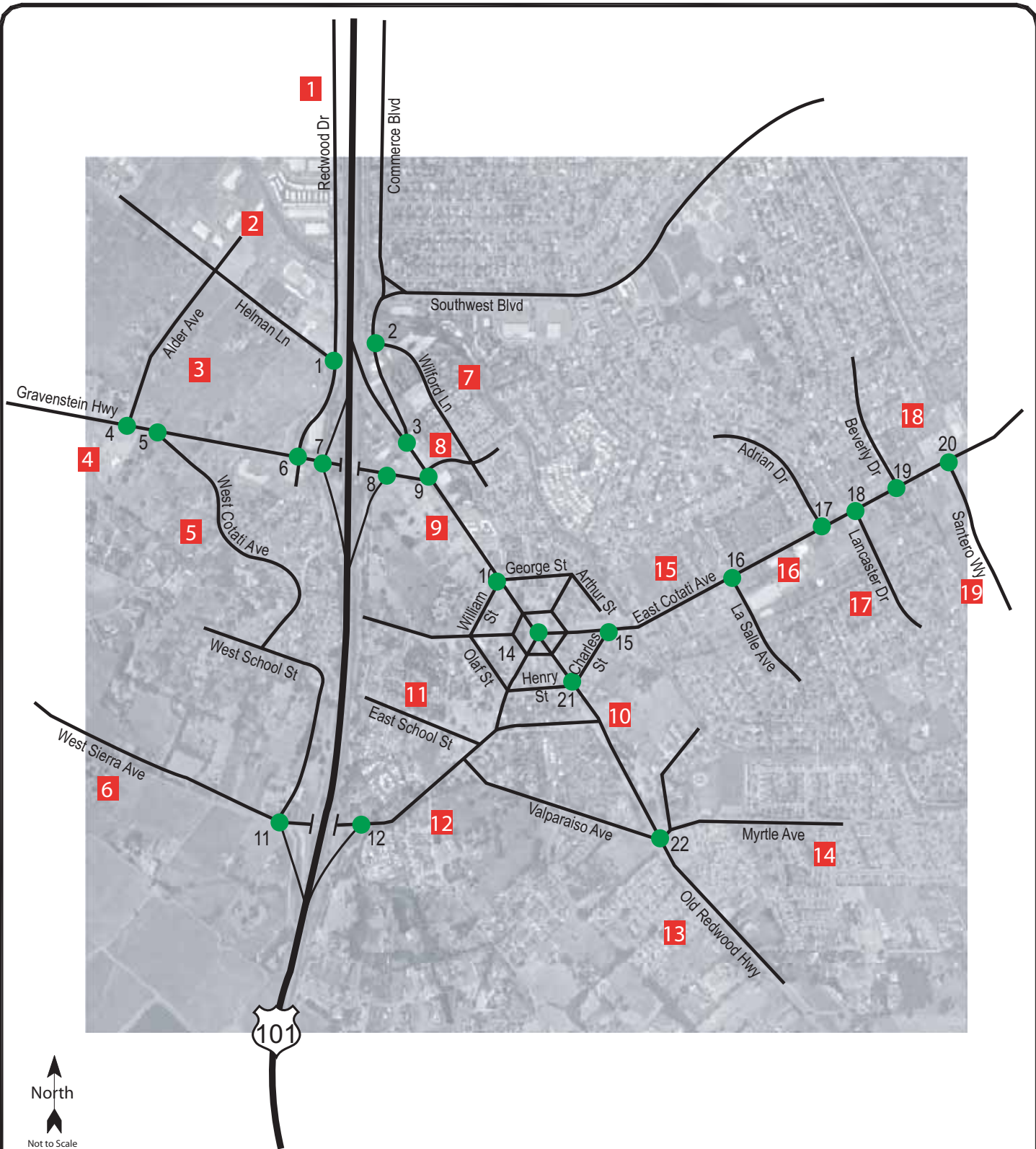
Eight of the study intersections are controlled by traffic signals and four by all-way stop controls, while the remaining ten study intersections are controlled by stop signs on the minor street approaches. The right-of-way controls for each of the study intersections are also shown in the Table 2.

Table 1 Existing Right of Way Controls –

Intersection		Control
1.	Redwood Dr/Helman Ln	Un-Signalized
2.	Commerce Blvd/Wilford Ln	Un-Signalized
3.	Old Redwood Highway/Commerce Blvd	Un-Signalized
4.	Gravenstein Hwy/Alder Ave	Un-Signalized
5.	Gravenstein Hwy/W Cotati Ave	Un-Signalized
6.	Gravenstein Hwy/Redwood Dr	Signalized
7.	Gravenstein Hwy/SB Hwy 101 Ramps	Signalized
8.	Gravenstein Hwy/NB Hwy 101 Off-Ramp	Signalized
9.	Gravenstein Hwy/Old Redwood Highway	Signalized
10.	Old Redwood Hwy/William St-George St	All-way Stop
11.	West Sierra Ave/SB Hwy 101 On-Ramp	Un-Signalized
12.	W Sierra Ave/NB Hwy 101 Off-Ramp	Un-Signalized
13.	W Sierra Ave/E School St	All-way Stop
14.	Old Redwood Hwy/W Sierra Ave-E Cotati Ave	Signalized
15.	E Cotati Ave/Charles St	Un-Signalized
16.	E Cotati Ave/La Salle Ave	All-way Stop
17.	E Cotati Ave/Adrian Dr	Signalized
18.	E Cotati Ave/Lancaster Dr	Signalized
19.	E Cotati Ave/Beverly Dr	Un-Signalized
20.	E Cotati Ave/Santero Way	Un-Signalized
21.	Old Redwood Hwy/Henry St-Charles St	All-way Stop
22.	Old Redwood Hwy/Valparaiso Ave-Myrtle Ave	Signalized

Under Existing Conditions, all of the signalized study intersections are operating at LOS D or better. However, it should be noted that the intersection of Old Redwood Highway/W. Sierra Avenue-E. Cotati Avenue is experiencing excessive queuing in the southbound left-turn lane during both the a.m. and p.m. peak periods. As delay for the left-turn movement increases so does the impact to adjacent roadways as drivers bypass the impacted movement.

The two study intersections controlled by all-way stop-controls are operating unacceptably at LOS F. These intersections include Old Redwood Highway/William-George Street and East Cotati Avenue/La Salle Avenue. However, the intersection of Old Redwood Highway/Henry-



North
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 ↓
 Not to Scale

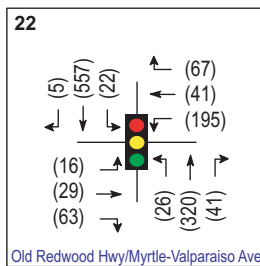
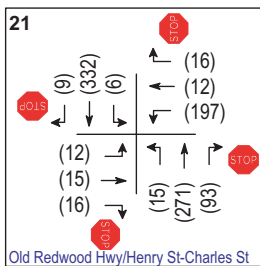
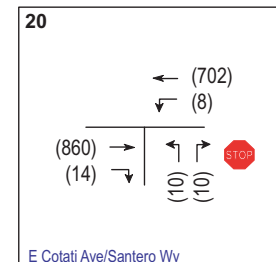
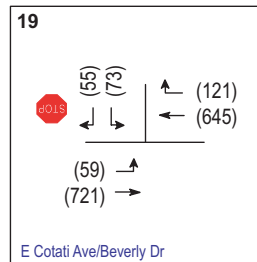
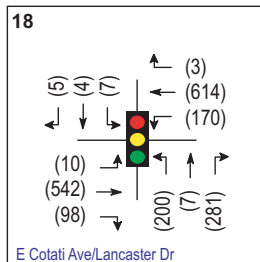
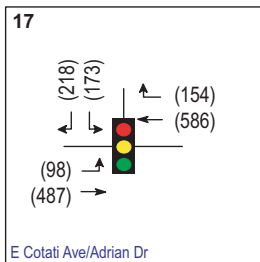
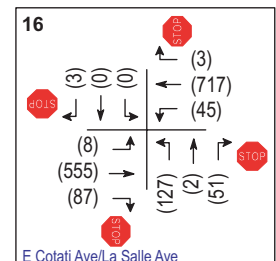
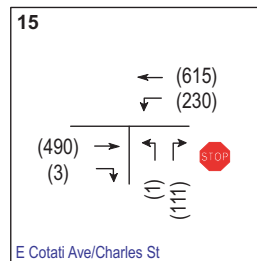
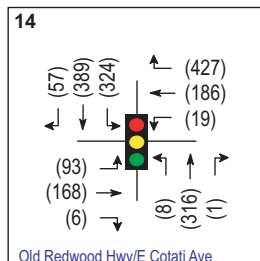
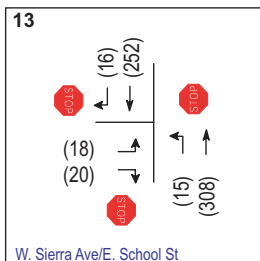
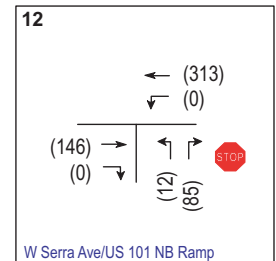
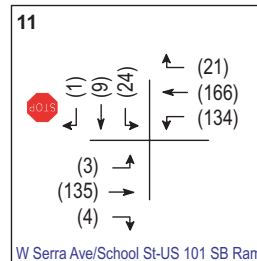
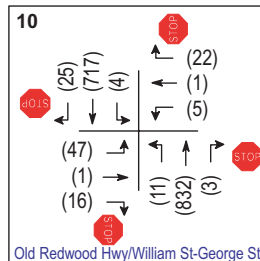
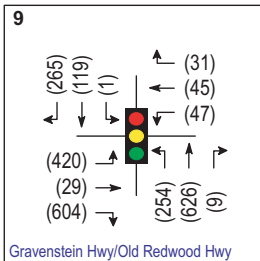
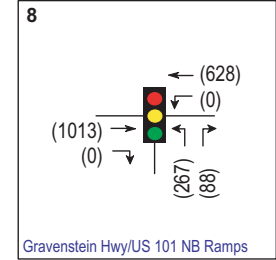
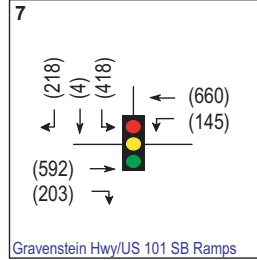
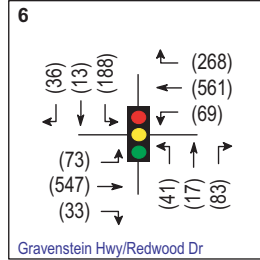
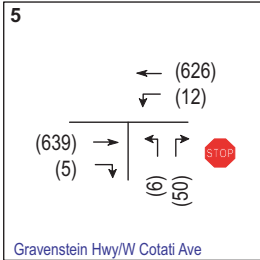
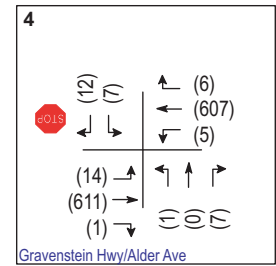
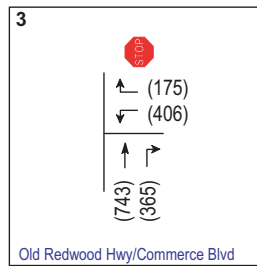
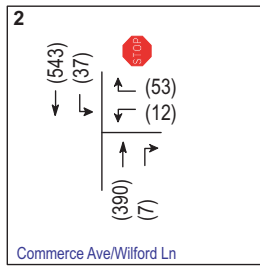
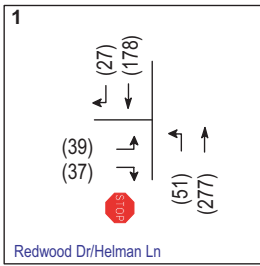
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- Study Intersection
- 1 Zone TAZ

Cotati Circulation Improvement Study
 City of Cotati

Figure I
 Study Area





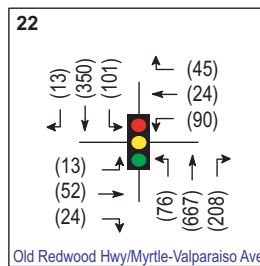
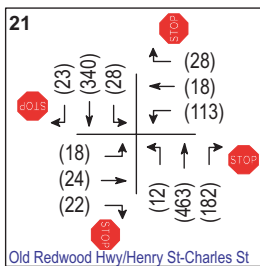
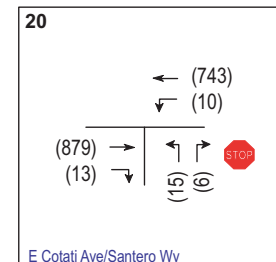
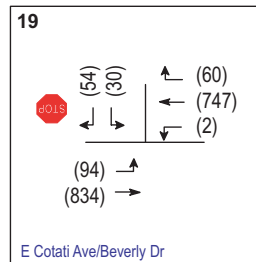
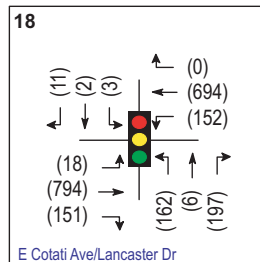
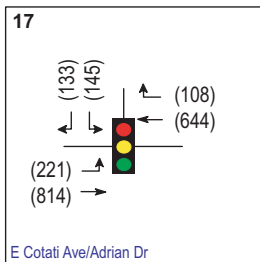
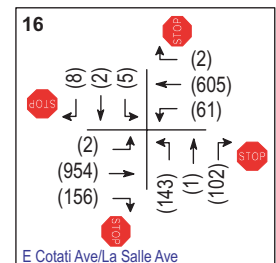
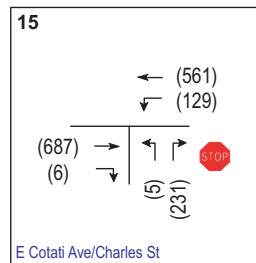
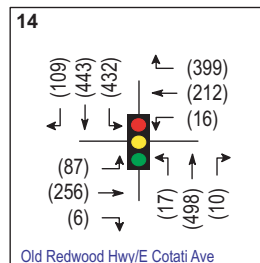
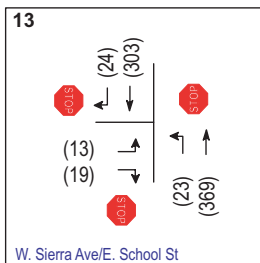
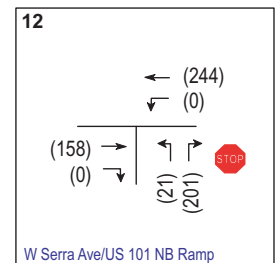
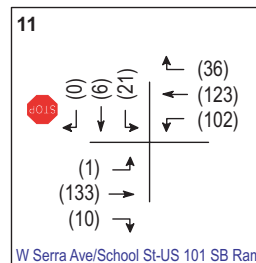
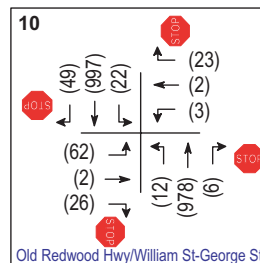
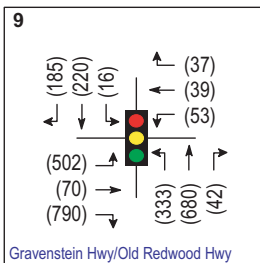
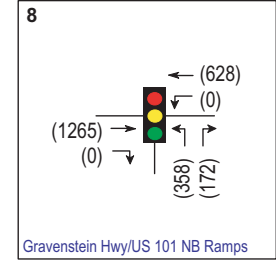
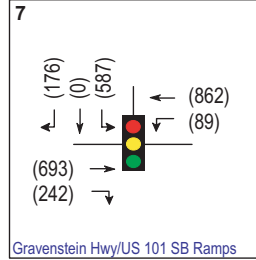
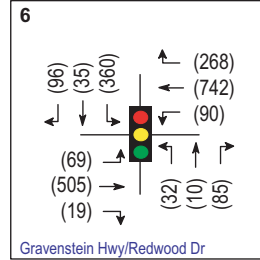
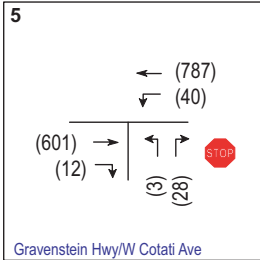
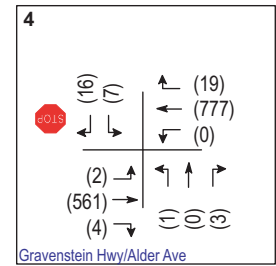
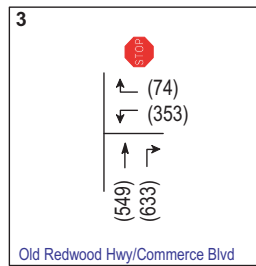
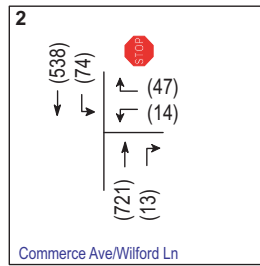
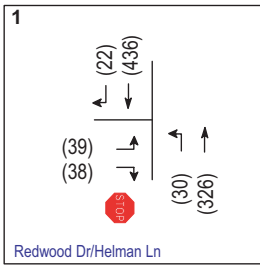
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(xx) A.M. Peak Hour Volume

Cotati Circulation Improvement Study

City of Cotati

Figure 2
Existing Traffic Volumes A.M.





LEGEND
(xx) P.M. Peak Hour Volume

Cotati Circulation Improvement Study

City of Cotati

Figure 3
Existing Traffic Volumes P.M.



Charles Street would be included if it were not for the recent addition of a right-turn lane. Excessive queuing can be observed at each of the intersections and signal warrants are met at all three intersections during the p.m. peak hour.

One of the un-signalized study intersections has side street movements or approaches operating at LOS E, the left-turn movement from Commerce Boulevard to southbound Old Redwood Highway. All of the other un-signalized study intersections have side streets movements or approaches operating at LOS D or better.

The Level of Service calculations for the existing conditions are summarized in Table 2. Copies of the intersection level of service calculations are provided in Appendix B.

Existing arterial roadway traffic volumes are presented in Table 3. It should be noted that the recommended threshold for acceptable operation of a two-way left-turn pocket is around 20,000 vehicles per day. Although the daily volume on Old Redwood Highway exceeds this threshold, the use of the lane is limited by the number of existing driveways on the roadway and undeveloped parcels along the northwestern edge of the roadway.

**Table 2 Network Intersection Level of Service –
Existing Conditions**

Intersection Approach		Existing			
		AM		PM	
		Delay	LOS	Delay	LOS
1.	Redwood Dr/Helman Ln				
	Northbound Left	7.9	A	8.6	A
	Eastbound Approach	13.8	B	19.9	C
2.	Commerce Blvd/Wilford Ln				
	Southbound Left	8.6	A	9.8	A
	Westbound Approach	14.4	B	21.3	C
3.	Old Redwood Highway/Commerce Blvd				
	Westbound Approach	*	F	42.7	E
4.	Gravenstein Hwy/Alder Ave				
	Southbound Approach	25.8	D	25.1	D
	Westbound Left	8.9	A	-	-
	Northbound Approach	16.4	C	19.6	C
	Eastbound Left	9.3	A	9.6	A
5.	Gravenstein Hwy/W Cotati Ave				
	Westbound Left	9.5	A	9.5	A
	Northbound Approach	21.7	C	31.0	D
6.	Gravenstein Hwy/Redwood Dr	21.3	C	26.7	C
7.	Gravenstein Hwy/SB Hwy 101 Ramps	21.2	C	19.5	B
8.	Gravenstein Hwy/NB Hwy 101 Off-Ramp	15.3	B	16.2	B
9.	Gravenstein Hwy/Old Redwood Highway	25.3	C	27.0	C
10.	Old Redwood Hwy/William St-George St	20.6	C	48.1	E
11.	West Sierra Ave/SB Hwy 101 On-Ramp				
	Southbound Approach	16.6	C	13.8	B
	Westbound Left	8.0	A	7.8	A
	Eastbound Left	7.6	A	7.6	A
12.	W Sierra Ave/NB Hwy 101 Off-Ramp				
	Northbound Approach	10.2	B	10.8	B
13.	W Sierra Ave/E School St	10.1	B	11.3	B
14.	Old Redwood Hwy/W Sierra Ave-E Cotati Ave	35.1	D	37.5	D
15.	E Cotati Ave/Charles St				
	Westbound Left	10.0	A	10.0	A
	Northbound Approach	14.7	B	24.7	C
16.	E Cotati Ave/La Salle Ave	19.7	C	47.2	E
17.	E Cotati Ave/Adrian Dr	20.2	C	17.1	B
18.	E Cotati Ave/Lancaster Dr	23.2	C	19.0	B
19.	E Cotati Ave/Beverly Dr				
	Southbound Approach	9.3	A	20.7	C
	Westbound Left	-	-	10.1	B
	Eastbound Left	10.6	B	10.2	B
20.	E Cotati Ave/Santero Way				
	Westbound Left	10.6	B	10.4	B
	Northbound Approach	17.8	C	19.1	C
21.	Old Redwood Hwy/Henry St-Charles St	14.9	B	25.2	D
22.	Old Redwood Hwy/Valparaiso Ave-Myrtle Ave	18.2	B	17.4	B

Notes: * = Average delay exceeds 100 seconds

- = Absence of vehicles making movement during peak hour, LOS not applicable.

Table 3 – Arterial Roadway Daily Volume Summary -

	Arterial Segment	Existing Daily Volume (ADT)	GP Build out Volume (ADT)
1.	East Cotati Avenue		
	<i>Old Redwood Hwy to Eastern City Limit</i>	17,500	29,000
2.	Gravenstein Highway		
	<i>Old Redwood Hwy to Western City Limit</i>	17,000	30,500
3.	Old Redwood Highway		
	<i>Gravenstein Hwy to E Cotati Ave</i>	25,270	38,500
4.	Old Redwood Highway		
	<i>E Cotati Ave to Southern City Limit</i>	12,500	18,500
5.	West Sierra Avenue		
	<i>Western City Limit to Old Redwood Hwy</i>	7,000	10,225

Note: ADT = Average Daily Volume

Future Conditions

Traffic Volume Projections

The future citywide traffic volume projections were determined through use of a forecasting model, *TRAFFIX 7.5*, which is an interactive computer program that enables planners and engineers to efficiently conduct citywide traffic forecasting studies for small sized cities and rapidly forecast the traffic impacts of new developments. All data in *TRAFFIX* is stored in a set of individual development zones, critical intersections, and gateways where new traffic enters and leaves the study area. The land uses, trip generation rates, and trip distribution percentages are then determined by the user and entered for each development zone. The paths that traffic will take moving from each development zone to each gateway are drawn on a graphically scaled street network. *TRAFFIX* then generates the hourly traffic, assigns it to the street system, and reports traffic volumes by link and node. A copy of the model network that was developed is included in Appendix E.

A description of the process used to evaluate future traffic conditions in Cotati follows. In summary, land use projections were obtained from City staff, used to determine trip generation, input into one of 19 Traffic Analysis Zones (TAZ), and distributed to the Cotati street network. Through traffic growth generated from areas outside of Cotati was also projected and distributed onto the City's regional arterial streets.

Land Use Assumptions for Buildout Scenario

City staff examined the adopted 1998 General Plan land use designations for undeveloped and underutilized parcels in Cotati, and developed a parcel map indicating all locations anticipated to experience future development. The estimated development potential of each identified parcel was identified by the number of acres, building square footage, or number of residential units.

Table 4 - Summary of Future Development

Land Use	Units
Single Family Dwellings	383
Multi-Family Dwellings	552
Commercial Uses	158.91 ksf
Industrial Uses	59.4 acres
Office Uses	199.44 ksf
Hotel Uses	50 rooms

Note: ksf = thousand square feet

Based on this information it was projected that approximately 935 new residential units, 358 thousand square feet of new commercial and office space, 59 acres of new industrial uses, and 50 new hotel rooms could be built in Cotati within the next 5 years. A condensed summary of the land use assumptions is shown in Table 4.

Vehicle Trip Generation

The number of a.m. and p.m. peak hour vehicular trips generated by future development was determined by using trip generation rates from *Trip Generation, 7th Edition*, Institute of Transportation Engineers, 2003. This guide is a standard reference used by jurisdictions

throughout the country, and is based on actual trip generation studies performed at numerous locations for various types of land uses in areas of various populations.

A factoring process was used to reduce the potential for double counting vehicular trips. Standard trip rates produce vehicular trips that are experienced at the “driveway” of a particular development. One example of double counting would be a trip made by someone driving from home in Cotati to work in Cotati, wherein the outbound home-based trip and inbound work-based trip would be considered two separate trips, even though in actuality it is only one. In order to reduce this double-counting effect, the trip generation projections for residential and employment-based uses within Cotati were each reduced by 5 percent.

Some portion of traffic associated with retail uses is typically drawn from existing traffic on nearby streets. These vehicle trips are not considered “new,” but are instead comprised of drivers who are already driving on the adjacent street and choose to make an interim stop. The percentage of these “pass-by” trips was based on information provided in the Trip Generation Handbook: An ITE Recommended Practice, Institute of Transportation Engineers, 2001. This reference includes pass-by data collected at numerous locations for many land uses. Based on this information, commercial trips were reduced by between 25 and 50 percent to account for pass-by traffic. Locations that are more highway commercial oriented (such as the gas station on the northwest corner of Gravenstein Highway/Old Redwood Highway) were assumed to have a high percentage of pass-by traffic, whereas locations anticipated to develop with more community-oriented retail had lower pass-by reductions. It should be noted that commercial uses at mixed-use locations, such as the Santero Way Specific Plan area, were assumed to have relatively few pass-by trips but a much higher amount of pedestrian and linked trips.

Approximately 1,703 new a.m. peak hour and 2,348 new p.m. peak hour trips are expected to occur on the Cotati street network at full buildout. These vehicle trips were assigned to the Cotati street network and added to 2004 traffic volumes in order to project future buildout conditions.

Traffic Analysis Zones (TAZ)

The various parcels that are anticipated to experience future development in Cotati were first separated into one of five “areas” of the city, and then into one of 19 “traffic analysis zones” (TAZ). The areas are predominantly used for organizational and summary purposes. Each TAZ represents an area that would be expected to have similar travel characteristics, and may incorporate one to numerous separate parcels. TAZs are often bounded by physical barriers or major roadways. Following is a brief geographical description of each of the five city sub-areas along with the trip generation associated with the specific zone.

Area A - Northwest Cotati (TAZs 1-4) This area is generally bounded on the north and west by the city limits, on the south by the Gravenstein Highway corridor, and on the east by U.S. 101. The area includes the majority of vacant land within Cotati, as well as the bulk of land zoned for non-residential uses, including the Cotati Commons Project.

Area B - Southwest Cotati (TAZs 5-6) The Southwest Cotati area is comprised of hillside residential uses bounded on the north by the Gravenstein Highway corridor, on the south and west by city limits, and on the east by U.S. 101. Future growth in this area would be residential.

Area C - Central Cotati (TAZs 7-11) The central area includes the commercial and office uses along Old Redwood Highway as well as the Cotati Hub. It is bounded on the north by the city limits, on the south by West Sierra and Valparaiso Avenues, on the east by U.S. 101 and on the west by the Old Redwood Highway corridor (including parcels on the east side of the arterial and hub). Much of the future growth in this area would be mixed-use infill development.

Area D - South Cotati (TAZs 12-14) New development in the south area would be residential in nature. The area is generally bounded by Valparaiso Avenue, West Sierra Avenue, and the Laguna de Santa Rosa on the north; the city limits on the south and east; and U.S. 101 on the west.

Area E - East Cotati (TAZs 15-19) The eastern area generally extends along East Cotati Avenue. The area is bounded by the city limits on the north and east, Laguna de Santa Rosa and the city limits on the south, and the eastern edge of the hub and Old Redwood Highway corridor on the west (not including parcels on the hub or along Old Redwood Highway). Development in the area would be predominantly residential in nature, though the easternmost parcel (the Santero Way Specific Plan area) is zoned for mixed uses including some office and retail.

A list of the development assumptions and trip generation assumptions for each Traffic Analysis Zone (TAZ) is provided in Appendix F.

Regional Traffic Growth

Traffic growth on Cotati streets will occur not only from new development within the City, but also from external growth and increased usage of regional roadways like Gravenstein Highway, Old Redwood Highway, and East Cotati Avenue. Since the County of Sonoma is currently in the process of completing a regional traffic model as part of its General Plan update, regional growth assumptions were based on historical growth trends, other available traffic studies and traffic engineering judgment.

The amount of regional through traffic growth will largely depend on available capacity outside of Cotati and the ability of the Cotati street network to attract and serve through traffic. The City of Cotati has established a trend towards transforming Old Redwood Highway in the downtown to a destination street rather than a high capacity through route, and as a result is influencing the traffic capacity of the roadway. This trend was assumed to continue in determining through traffic volume increase in Cotati.

Traffic growth on Gravenstein Highway will be largely related to growth in western Sonoma County. Historically, Gravenstein Highway has experienced growth of between 1 and 2 percent per year, which is consistent with trends observed throughout Sonoma County. A growth rate of 2 percent per year was assumed for the corridor, which translates to a 5-year growth of 13 percent.

Traffic on Old Redwood Highway, on the south side of Cotati, has increased by approximately 6 percent per year, which is a much higher growth rate than most arterials in the County. Much of the traffic growth on Old Redwood Highway has occurred as a result of drivers attempting to

avoid congestion on U.S. 101. This trend is likely to continue until the capacity of Old Redwood Highway is reached or until the freeway is widened. Because available capacity on the roadway is quickly diminishing, a sustained growth rate of 2 percent per year may be unrealistic, and therefore an average growth rate of 1 percent per year was assumed. This translates to a 5-year growth of 6 percent.

Future traffic growth on East Cotati Avenue will be influenced by growth within Rohnert Park and nearby unincorporated areas such as Canon Manor, as well as growth at Sonoma State University. Two alternate sources were reviewed for future buildout traffic volumes. The first was the environmental impact report for the Rohnert Park General Plan. The EIR traffic analysis indicated substantial growth along East Cotati Avenue, though it appears that the model may not have accounted for the planned Sonoma State University main entrance relocation to Rohnert Park Expressway. This change will shift a portion of Sonoma State bound traffic from the East Cotati Avenue corridor to Rohnert Park Expressway. The Rohnert Park analysis also projected higher traffic volume increases for Old Redwood Highway in the downtown Cotati area than could be accommodated. Because the Rohnert Park projections may not clearly reflect future conditions in Cotati, it was necessary to supplement the data with a second source.

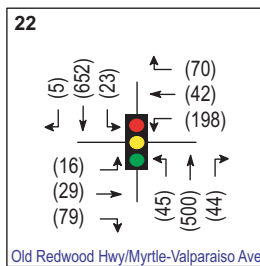
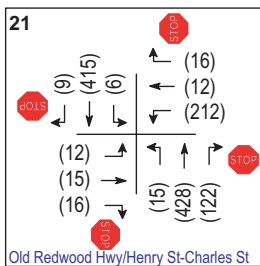
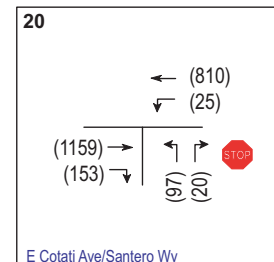
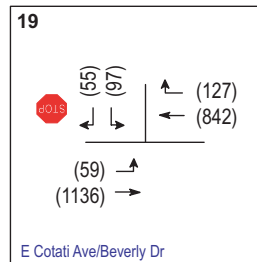
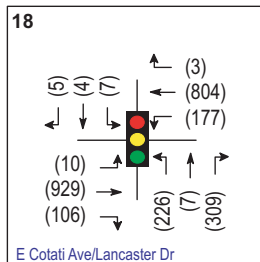
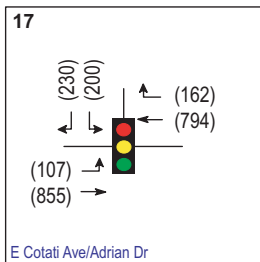
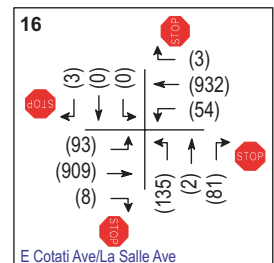
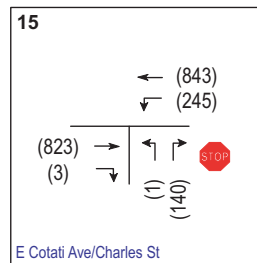
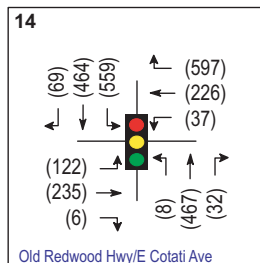
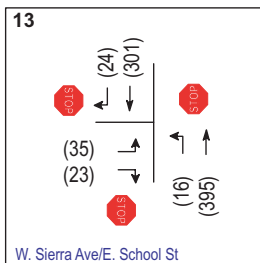
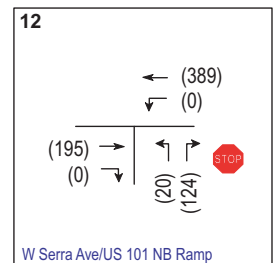
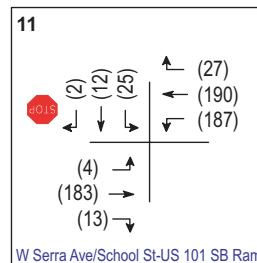
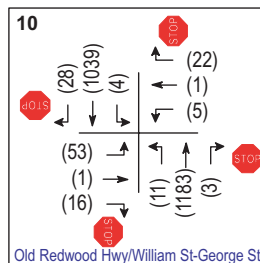
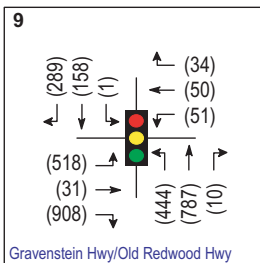
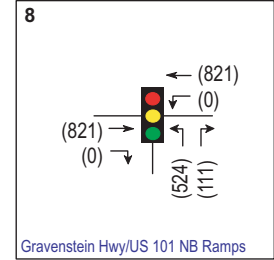
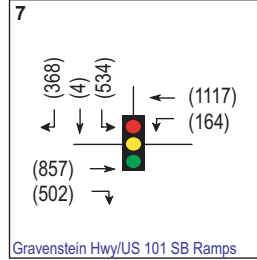
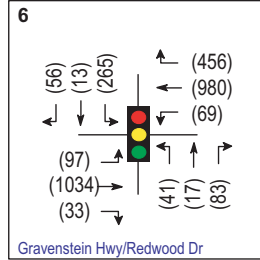
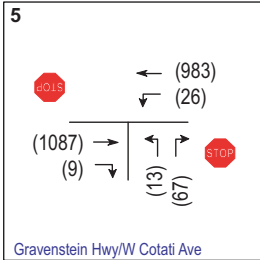
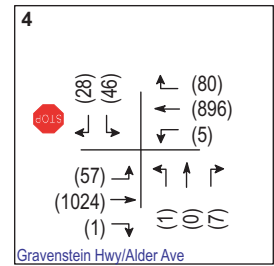
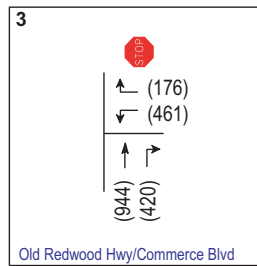
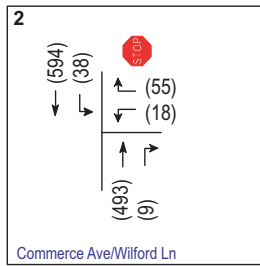
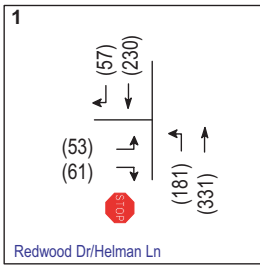
The second source of growth projections was the EIR prepared for the Sonoma State University expansion. The traffic analysis prepared for that document included growth projections from the Rohnert Park General Plan as well as detailed volumes for growth at Sonoma State, including the shift of some traffic to the new northern entrance on Rohnert Park Expressway. The EIR traffic projections indicate an approximate 23.4 percent growth in traffic along East Cotati Avenue. These projections appear to be reasonable based on historical growth and planned changes at the University, and were therefore chosen to represent regional traffic growth along the corridor. It should be noted that the traffic growth along East Cotati Avenue was also assumed to affect portions of Old Redwood Highway and Gravenstein Highway, and so the growth projections stated above for these other two regional corridors are in actuality slightly higher than stated.

Future (Buildout) Traffic Conditions

Under the future condition with buildout of the general plan land use zoning, one of the eight existing signalized intersections would be expected to operate unacceptably at LOS E or F. The intersection of Old Redwood Highway/E. Cotati Avenue-W. Sierra Avenue.

The two study intersections controlled by all-way stop-controls would be expected to continue operating unacceptably at LOS F. These intersections include Old Redwood Highway/William-George Street and E. Cotati Avenue/La Salle Avenue. Additionally the intersection of Old Redwood Highway/Henry-Charles Street would be expected to operate unacceptably.

With the exception of the two W. Sierra Avenue/U.S. 101 ramp intersections, Commerce Boulevard/Wilford Lane, and E Cotati Avenue/Beverly Drive, all of the un-signalized study intersections would have side street movements operating at LOS F. The future volumes are shown in Figure 4. Level of Service calculations under future (buildout) volumes are summarized in Table 5. Copies of the intersection level of service calculations are provided in Appendix B.

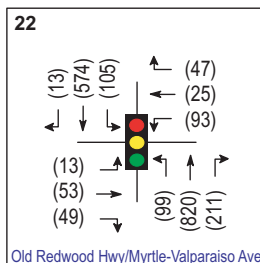
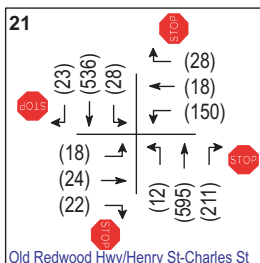
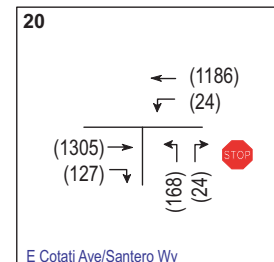
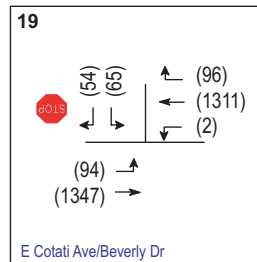
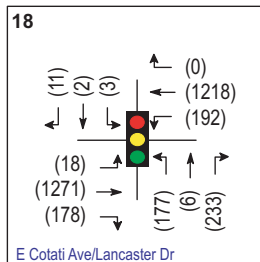
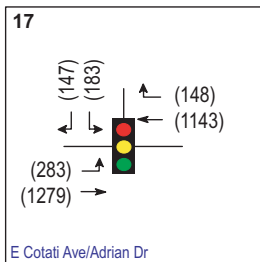
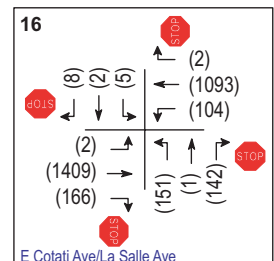
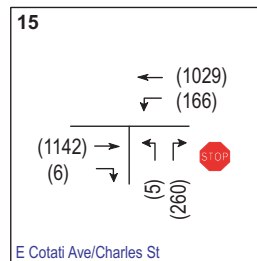
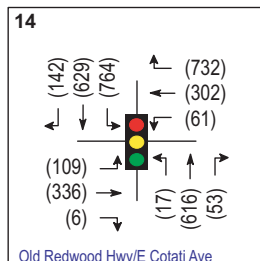
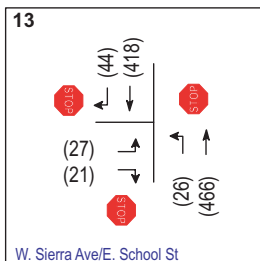
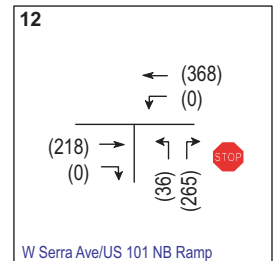
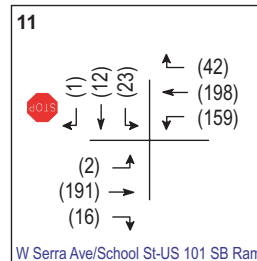
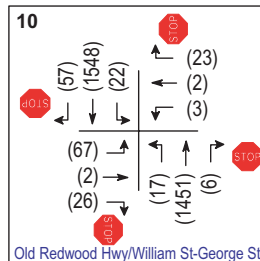
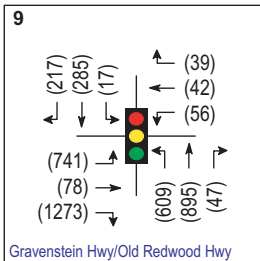
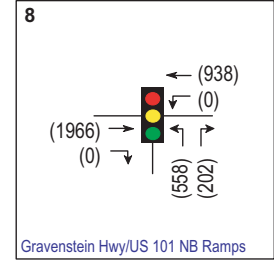
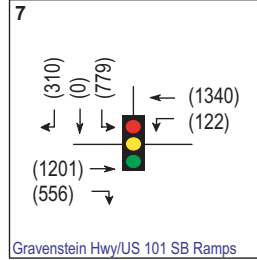
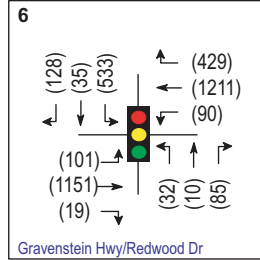
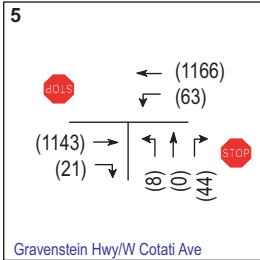
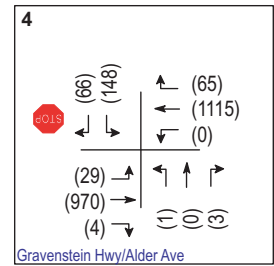
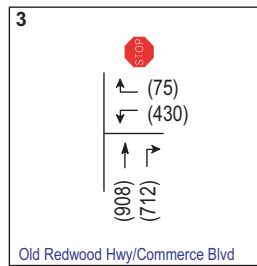
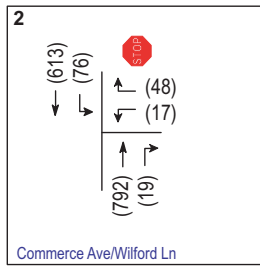
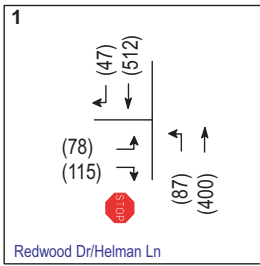


LEGEND
(xx) A.M. Peak Hour Volume

Cotati Circulation Improvement Study City of Cotati

Figure 4
Future Traffic Volumes A.M.





LEGEND
(xx) P.M. Peak Hour Volume

Cotati Circulation Improvement Study City of Cotati

Figure 5
Future Traffic Volumes P.M.



Table 5 - Network Intersection Level of Service - Future (General Plan Buildout) Conditions

Intersection Approach	GP Buildout				GP Buildout Mitigated			
	AM		PM		AM		PM	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Redwood Dr/Helman Ln								
<i>Northbound Left</i>	8.6	A	9.4	A	17.5	B	17.1	B
<i>Eastbound Approach</i>	30.9	D	*	F				
2. Commerce Blvd/Wilford Ln								
<i>Southbound Left</i>	8.8	A	10.3	B				
<i>Westbound Approach</i>	17.1	C	26.9	D				
3. Old Redwood Highway/Commerce Blvd								
<i>Westbound Approach</i>	*	F	*	F	22.1	C	20.9	C
4. Gravenstein Hwy/Alder Ave								
<i>Southbound Approach</i>	*	F	*	F	8.2	A	20.4	C
<i>Westbound Left</i>	10.8	B						
<i>Northbound Approach</i>	47.1	E	93.7	F				
<i>Eastbound Left</i>	11.8	B	11.9	B				
5. Gravenstein Hwy/W Cotati Ave								
<i>Westbound Left</i>	12.7	B	14.1	B	12.9	B	14.3	B
<i>Northbound Approach</i>	*	F	*	F	18.1	C	18.3	C
6. Gravenstein Hwy/Redwood Dr	22.5	C	48.9	D	14.2	B	25.1	C
7. Gravenstein Hwy/SB Hwy 101 Ramps	24.3	C	22.6	C	15.7	B	13.2	B
8. Gravenstein Hwy/NB Hwy 101 Off-Ramp	26.1	C	34.9	C	8.0	A	16.0	B
9. Gravenstein Hwy/Old Redwood Highway	26.5	C	41.4	D	25.6	C	37.9	D
10. Old Redwood Hwy/William St-George St	89.5	F	*	F	3.9	A (1)	5.0	A (1)
11. West Sierra Ave/SB Hwy 101 On-Ramp								
<i>Southbound Approach</i>	23.3	C	20.1	C				
<i>Westbound Left</i>	8.4	A	8.1	A				
<i>Eastbound Left</i>	7.7	A	7.8	A				
12. W Sierra Ave/NB Hwy 101 Off-Ramp								
<i>Northbound Approach</i>	11.3	B	12.8	B				
13. W Sierra Ave/E School St	12.3	B	15.7	C				
14. Old Redwood Hwy/W Sierra Ave-E Cotati Ave	*	F	*	F	32.9	C	40.9	D
15. E Cotati Ave/Charles St								
<i>Westbound Left</i>	13.7	B	14.4	B	13.8	B	14.5	B
<i>Northbound Approach</i>	33.4	D	*	F	15.4	C	26.4	D
16. E Cotati Ave/La Salle Ave	74.8	F	*	F	12.7	A	7.8	A
17. E Cotati Ave/Adrian Dr	19.4	B	16.9	B				
18. E Cotati Ave/Lancaster Dr	24.7	C	21.6	C				
19. E Cotati Ave/Beverly Dr								
<i>Southbound Approach</i>	14.6	B	30.9	D				
<i>Westbound Left</i>			13.5	B				
<i>Eastbound Left</i>	12.5	B	17.9	C				
20. E Cotati Ave/Santero Way								
<i>Westbound Left</i>	14.4	B	14.7	B	5.3	A	7.8	A
<i>Northbound Approach</i>	*	F	*	F				
21. Old Redwood Hwy/Henry St-Charles St	28.3	D	95.1	F	6.1	A (2)	10.0	B (2)
22. Old Redwood Hwy/Valparaiso Ave-Myrtle Ave	19.2	B	18.7	B				

Note: * = Intersection delay exceeds 100 seconds;
 (1) Mitigation could include a traffic signal or roundabout. Level of service represents conditions (with a traffic signal).
 (2) Mitigation could include a traffic signal or roundabout. Level of service represents conditions (with a roundabout).

Alternative Transportation Modes

Based on a review of the 1998 General Plan, other studies, and field review, alternative transportation mode traffic improvements were developed.

Bicycle Facilities

Criteria provided by Caltrans in the Traffic Manual denote a Class I bicycle facility as a separate path, Class II facilities are bike lanes, and a Class III facility is one on which bicycle traffic is promoted but where there is no separate lane or path. Within the City of Cotati, there are existing Class II facilities on Old Redwood Highway, E. Cotati Avenue and Gravenstein Highway.

- It is recommended that continuous bike lanes on Old Redwood Highway, E. Cotati Avenue, Gravenstein Highway and W. Sierra Avenue be created and maintained within the City of Cotati. Currently, there is a gap in the Class II lanes on Gravenstein Highway between Redwood Drive and Old Redwood Highway.
- The Laguna bike path that connects Commerce Boulevard to Lancaster Avenue should be completed.

Pedestrian Facilities

Pedestrian activity areas within the City of Cotati are primarily focused in the hub area of downtown. There is also moderate pedestrian activity along E. Cotati Avenue, Old Redwood Highway, and W. Sierra Avenue. These corridors are generally served by concrete sidewalks. However, there are intermittent sections without sidewalks due to adjacent undeveloped parcels. A number of the residential neighborhoods and industrial areas on the fringes of the community do not have any sidewalks, walkways or shoulder area for pedestrian traffic. In addition, the City has recognized an unwritten policy that supports using a more rural type of pedestrian path rather than the typical curb, gutter and sidewalk in the West Cotati area.

- Gaps in the sidewalk system should be addressed, especially on Old Redwood Highway between Gravenstein Highway and the hub, on Old Redwood Highway between the hub and Valparaiso Avenue-Myrtle Avenue and on West Sierra Avenue between U.S. 101 and Valparaiso Avenue.
- Enhanced pedestrian crossings, including warning lights, pedestrian signage and striping, and medians or bulbouts, should be provided at uncontrolled crossing locations including:
 - East Cotati Avenue at the Laguna trail crossing, east of Charles Street
 - East Cotati Avenue at Charles Street
 - W. Sierra Avenue at La Plaza (west)
 - W. Sierra Avenue at Henry Street-Olaf Street
 - Old Redwood Highway at La Plaza (north)
 - Old Redwood Highway at Page Street

Transit Services

- The provision and maintenance of covered and lighted seating areas at existing and future transit stops along Old Redwood Highway and East Cotati Avenue should be encouraged in order to ensure safety and convenience for riders.
- As demand increases, the City should work with Sonoma County Transit and other State agencies to locate and construct new park-and-ride facilities at the south end of the City.

Traffic Improvements

Future Traffic Conditions

The following mitigations would be necessary for street and intersections in the City of Cotati to operate with acceptable levels of service with buildout of General Plan land use under conditions with the existing interchange configurations. Intersection level of service conditions with these improvements are summarized in Table 5.

Gravenstein Highway (Redwood Drive to Alder Avenue) – At the time of the development of the Cotati Commons site, Gravenstein Highway should be widened from one lane in each direction to two, with a center turn lane. Depending on the extent of development along the Gravenstein Highway corridor, this widening may be needed further west of Alder Avenue. This improvement would allow the intersection of Gravenstein Highway/W. Cotati Avenue to operate with a LOS C. It should be noted that these improvements are planned and approved to be installed as part of the Cotati Commons Project.

Int #1 Redwood Drive/Helman Lane – A traffic signal should be installed. A left-turn lane should be added for northbound left-turns to Helman Lane from Redwood Drive. These improvements would allow the intersection to operate with a LOS B. It should be noted that these improvements are planned and approved to be installed as part of the Cotati Commons Project.

Int #3 Old Redwood Highway/Commerce Boulevard/U.S. 101 Northbound on-ramp – A traffic signal should be installed. If a traffic signal were installed, the signal would need to be interconnected with the traffic signal at Old Redwood Highway/Gravenstein Highway since there is approximately 480 feet separating the two intersections. This improvement is needed in order to provide LOS C conditions. It should be noted that these improvements are planned and approved to be installed as part of the Cotati Commons Project.

Int #4 Gravenstein Highway/Alder Avenue – A traffic signal should be installed. A left-turn lane should be added for eastbound left-turns to Alder Avenue from Gravenstein Highway. If the widening of the highway terminates at this point, the second westbound through lane would terminate at this intersection as a westbound right-turn lane. It should be noted that these improvements are planned and approved to be installed as part of the Cotati Commons Project.

Int #5 Gravenstein Highway/W. Cotati Avenue – Additional through travel lanes and the addition of a two-way left-turn lane would result in an acceptable LOS of C at this intersection. These improvements are listed above under Gravenstein Highway. It should be noted that these improvements are planned and approved to be installed as part of the Cotati Commons Project.

Int #6 Gravenstein Highway/Redwood Drive – The southbound lanes should be modified to provide a left-turn lane and a combined left-turn/through/right-turn lane. The phasing in the north-south direction should be changed to split phase to accommodate the lane re-striping. The existing 8-inch traffic signal heads should be replaced with 12-inch LED heads to increase visibility. Consideration should be given to utilizing coordinated traffic signal times during off-

peak periods to maintain driver expectation. These improvements will result in LOS C conditions. It should be noted that these improvements are planned and approved to be installed as part of the Cotati Commons Project.

Int #8 Gravenstein Highway/U.S. 101 NB Ramps – The northbound approach should be widened to include a second left-turn lane. In addition, off peak coordinated signal timing should be established. It should be noted that these improvements are planned and approved to be installed as part of the Cotati Commons Project.

Int #9 Gravenstein Highway/Old Redwood Highway – Modifications to the traffic signal phasing, re-striping and potential minor widening should be completed to accomplish the following operational improvements.

- a. The northbound Old Redwood Highway approach should be re-striped to include one left-turn lane, one combined through/left-turn lane and one through/right-turn lane.
- b. The signal phasing should be split for the north-south approaches.

It should be noted that these improvements are planned and approved to be installed as part of the Cotati Commons Project.

Int #10 Old Redwood Highway/William-George Street – A traffic signal should be installed. A traffic signal may increase speeds on Old Redwood Highway with the signal operating primarily in green for north-south Old Redwood Highway movements. Therefore, options for this location include the following.

- a. Maintain all-way stop control which will meter traffic under LOS F conditions for all movements, or
- b. Eliminate stop controls on Old Redwood Highway and replace them with arterial traffic calming such as narrower lanes and a median.

Int #14 Old Redwood Highway/W Sierra Avenue-E. Cotati Avenue – The southbound approach should be re-striped to include two left-turn lanes and a combined through/right-turn lane, and an overlap signal phase for the westbound right-turn added. The traffic signal should be re-timed to more fully serve the current traffic demand. These improvements should be completed as soon as possible in order to serve the existing queuing in the southbound left-turn lane.

E. Cotati Avenue (Old Redwood Highway to La Salle Avenue) – The two eastbound through lanes should be carried through the intersection with Charles Street. This appears feasible through re-striping within the existing curb to curb right-of-way. Based on buildout traffic volumes it is anticipated that operation of the existing two-way left-turn lane would approach unacceptable levels.

Int #15 E. Cotati Avenue/Charles Street – The second eastbound through lane discussed above will allow for acceptable conditions for the northbound right-turn lane.

Int #16 E. Cotati Avenue/La Salle Avenue – A traffic signal should be installed with protected left-turn phasing in the east-west direction. In the interim before traffic signals are installed, the City should install medians on East Cotati Avenue to assist with traffic safety conditions, as the average daily volumes approach threshold for acceptable operation of two-way left-turn lanes. These improvements will allow LOS A conditions.

Int #20 E Cotati Avenue/Santero Way – The City should install a traffic signal. It should be noted that a traffic signal is planned and approved for installation as part of the Santero Way transit center improvements.

Int #21 Old Redwood Highway/Henry-Charles Street – The City should install a traffic signal or single lane roundabout. It should be noted that the roundabout will only require single lane approaches while an intersection with a traffic signal generally requires left-turn lanes. At this location, left-turn lanes cannot be provided due to the restricted pavement width and adjacent parking activity; therefore, left-turn would have to be prohibited during peak periods if a traffic signal is installed. A comparison between a traffic signal and roundabout was previously completed as part of *Walkable Cotati Phase 1 Traffic Analysis*, January 2001, W-Trans. Although that analysis was not based on these buildout traffic projections, it demonstrated that a roundabout would result in less delay and shorter queuing than a traffic signal.

Alternative Transportation Modes

Bike Lanes – It is recommended that continuous bike lanes be created and maintained on Old Redwood Highway (except for downtown), E. Cotati Avenue, Gravenstein Highway and W. Sierra Avenue within the City of Cotati. Currently, there is a gap in the Class II lanes on Gravenstein Highway between Redwood Drive and Old Redwood Highway.

Laguna Bike Path – The Laguna bike path, which connects Commerce Boulevard to Lancaster Avenue, should be completed.

Sidewalk Gaps – New sidewalk should be constructed to eliminate gaps in the sidewalk system, especially on Old Redwood Highway between Gravenstein Highway and the hub, as well as between the hub and Valparaiso Avenue-Myrtle Avenue and on West Sierra Avenue between U.S. 101 and Valparaiso Avenue.

Pedestrian Crossings – Enhanced pedestrian crossings including warning lights, pedestrian signage and striping, and medians or bulbouts should be provided at uncontrolled crossing locations including the following.

- East Cotati Avenue at the Laguna bike trail crossing east of Charles Street
- East Cotati Avenue at Charles Street
- W. Sierra Avenue at La Plaza (west)
- W. Sierra Avenue at Henry Street-Olaf Street
- Old Redwood Highway at La Plaza (north)
- Old Redwood Highway at Page Street

Transit Shelters – The provision and maintenance of covered and lighted seating areas at existing and future transit stops along Old Redwood Highway and East Cotati Avenue should be encouraged in order to ensure safety and convenience for riders.

Park-n-Ride – As demand increases, the City should work with Sonoma County Transit and other State agencies to locate and construct new park-and-ride facilities at the south end of the City.

Study Participants and References

Study Participants

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**Appendix A
Traffic Volumes**

Appendix B
Intersection Level of Service Calculations

Appendix C
Traffic Signal Warrant Analysis

Appendix D
Traffic Model Network

Appendix E
Citywide Buildout Trip Generation