2.0 Description of Proposed Project

2.1 Introduction

This section describes the alternatives considered for this proposed project and functions as the heart of this ND/Final EA. It describes the Mixed Flow Alternative, the No-Build Alternative and the HOV Alternative. Based on the descriptions of the relevant resources in **Section 3** and the predicted effects of all alternatives in **Section 4**, this chapter presents a description of all alternatives in comparative form, providing a clear basis for choice among the options presented.

2.2 Existing Facility and Scope of Project

The project location is in Sonoma County on Route 101 from Wilfred Avenue to Route 12 in Santa Rosa, a distance of 7.8 km (4.85 mi.). Route 101, within the limits of the proposed project, is a four-lane freeway separated by a 14.0 m (46 ft) median with a double thrie beam barrier dividing the northbound and southbound lanes. The freeway has 1.5 m (5 ft) inside shoulders and 2.4 m (8 ft) outside shoulders. It was constructed in early 60's. Two projects, one in 1984 and another in 1994, overlayed the concrete pavement with asphalt concrete from south of the Wilfred Avenue/Golf Course Drive Interchange to the Baker Avenue Overcrossing.

Five interchanges and one pedestrian overcrossing (POC) are within the limits of the proposed project. **Exhibit 2-1** and **Exhibit 2-2** show the general project area and specific project limits respectively. These project elements are described below:

- KP 24.2 Wilfred Avenue/Golf Course Drive - In 1991, the ramps were reconstructed and auxiliary lanes to the Santa Rosa Avenue Interchange were constructed. The two lane cross street, north of the ramps, runs parallel to the railroad tracks that are owned by the Northwestern Pacific Railroad Authority.
- KP 25.0 Santa Rosa Interchange - This partial interchange has a northbound off-ramp that connects directly to the southern end of Santa Rosa Avenue and a southbound on-ramp from Santa Rosa Avenue to the freeway by way of an overcrossing.
- KP 26.6 Todd Road - This interchange has ramps connecting directly to Todd Road with an overcrossing approximately 90.0 m (.06 mi.) to the south. The overcrossing structure is two lanes with 0.6 m (2 ft.) shoulders and a 1.5 m (5 ft.) sidewalk on the south side of the structure.
- KP 29.8 Hearn Avenue - This is an interchange with a two lane overcrossing and 0.6 m shoulders on the structure. The overcrossing is north of the ramps. A 430.0 m (.27 mi.) northbound auxiliary lane precedes the off-ramp and a northbound auxiliary connects the on-ramp to the Baker Avenue off-ramp. Shoulders are 3.0 m (10 ft.) wide on the auxiliary lanes.
- KP 30.6 Baker Avenue - This is an interchange northbound with a two lane street connecting the ramps to the frontage road. The two lane overcrossing has 0.6 m (2 ft) shoulders.
- KP 31.4 Earle Street Pedestrian Overcrossing – This overcrossing is the approximate northern limit of the proposed project. The Route 12/101 Separation is just to the north.

2.3 Current Land Use Planning Status

- This project is part of a larger effort to improve safety and traffic flow along Route 101 in Marin and Sonoma Counties. In November 1998, a sales tax to fund the widening of Route 101 from Windsor, south to the county line through Santa Rosa, Rohnert Park, Cotati and Petaluma, went before voters and was defeated. However, a measure supporting a priority list of transportation projects for the region was approved by voters indicating strong support for the projects but ambiguous support for the local funding scheme.

- Highway upgrades such as HOV lane additions are part of the larger transportation improvement vision for the county and the region. By encouraging travelers to use travel modes other than single occupancy, HOV lanes can help lessen congestion by providing time savings over mixed flow lanes. Increased usage of HOV lanes can also accommodate future commute travel growth. Other elements include 1) a rail transit system,

2) expansion and improvement of bus service, 3) a move toward completion of a countywide bikeways plan, 4) the addition of pedestrian trails, and 5) compact and mixed-use land use development.

- A strong initiative to stem growth and reduce associated traffic congestion has motivated many Sonoma County cities to enact Urban Growth Boundaries (UGB). Current UGB ordinances exist on the books in Santa Rosa, Healdsburg, Windsor, Rohnert Park, Cotati, Petaluma and Sebastopol. It is possible that growth control measures for the County of Sonoma will appear on the November 2000 ballot.

- The 1995 Congestion Management Programs for Rohnert Park and Santa Rosa indicate that Highway 101 operates at Levels of Service (LOS) of E and F respectively. The report also posits two primary causes for existing traffic bottlenecks and delays along the Highway 101 corridor:
  1. Insufficient capacity along critical segments of Highway 101, where gaps between segments that provide high occupancy vehicle (HOV) lanes narrow or end; and
  2. growth in travel demands resulting from new North Bay jobs and households.

- MTC stated in its report entitled *1997 High-Occupancy Vehicle (HOV) Lane Master Plan Update for the San Francisco Bay Area* that this segment of Route 101 through Santa Rosa be expanded to provide a continuos HOV system through this city if other local funding sources can be identified.

- The Sonoma/Marin Multi-Modal Transportation & Land Use Study (Calthorpe Study, June 1997) identifies the project area as one of the most adversely affected by inadequate highway facilities. It endorses the installation of HOV lanes in the region between Windsor River Road in Windsor and State Highway 116 in Cotati.

- The California Interregional Road System (IRRS), identified in statute in 1989, serves interregional movement of people and goods. The IRRS falls within Caltrans' statutory responsibility for interregional transportation planning. The segment of Route 101 in the North Bay has been identified as both an "IRRS Focus Route" and a "IRRS High Emphasis Route" within Caltrans District 4's Interregional Improvement Program, dated December 9, 1998 due to its major link between the San Francisco Region and the northwest coastal corridor.

- The proposed project is to be funded from the Regional Transportation Improvement Program in the 1999/00 FY.

- A Project Study Report (EA 2724U1) to construct median barriers in various counties was approved October 1, 1997. **The Route 12 portion of the work in that report is proposed to be included in this project.** The Project Report (EA 24920K) for the Route 12 portion was approved January 22, 1999. In addition, a Categorical Exclusion/ Exemption was prepared, which determined that for the work on Route 12 a significant effect to the environment would not occur. A thrie beam barrier on Route 101 would be reconstructed at the freeway median from Fulton Road to Farmers Lane. By including the Route 12 work in the project, cost savings would be achieved from the re-use of thrie beam metal barrier materials.

- Work on this proposed project could begin as early as the latter part of 2000. This timeline assumes that Caltrans is able to acquire the necessary permits without unexpected delays or problems.

2.4 Status of Other Projects and Programs in Project Area

2.4.1 Overview of the Transportation Funding Process

A discussion of transportation projects programmed for construction for the region is incomplete without an overall understanding of how Bay Area transportation projects are typically funded. Federal and State Transportation funds are committed to all projects competing for such funds by the Metropolitan Transportation Commission (MTC), which is the organization designated in the Bay Area to plan the transportation network for the nine Bay Area counties. As a rule, local planning authorities initially review transportation projects for coordination with local preferences. Public participation is an integral component of each level of the planning and programming process.

Federal Funds

MTC prepares the federally required **Transportation Improvement Program,** or **TIP,** every two years with the cooperation of local governments, transit operators and Caltrans. The TIP is a comprehensive, multiyear federal transportation spending plan for the region. The TIP must conform to federal Clean Air Act requirements (meaning the projects, taken as a whole, must not worsen air quality). As the primary federal spending plan for the region, the TIP is one of the principal means of implementing the goals and priorities identified in the **Regional Transportation Plan (RTP)**.

The 1998 RTP, formally adopted on October 28, 1998, sets Bay Area transportation priorities for the period from 1999 to 2018. Also prepared by MTC, the RTP is MTC's principal planning document. Projects in the RTP represent MTC's best effort to guide development of a transportation system that meets the region's mobility needs while addressing other important goals such as environmental sensitivity.

State Funds

Conversely, to receive state funding, projects must be included in the **State Transportation Improvement Program, or STIP**. Largely revamped in 1998 to be the state transportation spending plan and covering a four-year span to be updated every two years, the STIP determines if and when projects will be funded by the state. The **California Transportation Commission (CTC)**, a statewide panel appointed by the governor, approves the STIP. All projects receiving federal funds are included in the STIP but they must appear in the FTIP and FSTIP as well.

MTC prepares the **Regional Transportation Improvement Program, or RTIP**, which recommends Bay Area projects to the CTC for inclusion in the STIP**.** MTC works closely with local jurisdictions in preparing the RTIP. County-level congestion management agencies, or CMAs, set local priorities that feed into MTC's regional process. Caltrans, also makes recommendations to the CTC based upon statewide priorities. The CTC then sorts out the requests and commits state transportation funds to projects via the STIP.

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To receive state and federal funding, it was necessary that the proposed project be programmed in both the TIP and the STIP. As a whole, projects approved through this typical funding process commit allocation of federal and/or state transportation funds to an integrated process that balances conformity to local and regional goals with responsiveness to specific public initiatives.

2.4.2 Project and Program Status

The status of the following projects is included in the Regional Transportation Plan and State Transportation Improvement Plan:

The 1998 State Transportation Improvement Plan (STIP) features the following projects

- Sonoma Route 101 - HOV lanes from Route 12 to Steele Lane in Santa Rosa
- Sonoma Route 101 - Wilfred Interchange in Rohnert Park, south of Wilfred Ave. Widen for HOV lanes (Right-of - Way only).

Per the 1998 RTP for the San Francisco Bay Area

- Sonoma Route 101 - Steele Lane Interchange improvements
- Sonoma Route 101 - Rainier Avenue extension in Petaluma. Construct interchange and auxiliary lanes.
- Sonoma Route 101 - Arata Lane Interchange in Windsor: 3 ramps including 2 SB ramps and 1 NB off-ramp.

The Route 101 widening and inclusion of an HOV lane project was also included in the 1996 update to the Sonoma County Congestion Management Plan.

2.5 Alternatives Considered but Eliminated from Detailed Study

2.5.1 HOV/Toll Lane Alternative

One alternative approach to improve highway operations in the project area would add an "HOV/Toll Lane" in each direction. In a study initiated by the Sonoma County Transportation Authority (SCTA) and MTC, HOV/Toll Lanes are available to vehicles meeting the definition of High Occupancy Vehicle, and also to users that pay a toll. (As envisioned in the SCTA/MTC study, HOV's would not be charged a toll.) These HOV/Toll Lanes, also known as "HOT Lanes," have been implemented in California, in other areas of the country, and abroad. As envisioned, there would be a single HOT lane in each direction, separated from the mixed-flow traffic by plastic pylons. Drivers would pay tolls by means of electronic toll readers, similar to "FasTrak" readers used at certain toll bridges in the region.

The draft report of the SCTA/MTC study, issued in September 1998, predicted that a HOT lane would improve overall corridor performance. However, the alternative was not advanced for detailed study in this environmental document because HOT lanes are not on the list of priorities forwarded by Sonoma County jurisdictions. For a HOT lane proposal to be feasible, a number of actions would need to take place prior to its implementation. Enabling legislation would be required allowing operation of a toll lane; MTC would need to amend the Regional Transportation Plan; the public would need to accept the concept; and additional funding would be required. Consequently, the HOT lane concept is not being considered as an alternative at this time.

2.6 Proposed Project Alternatives

2.6.1 HOV Lane Alternative (HOV 2+)

The main feature of the HOV Lane Alternative, also known as the HOV 2+ Alternative, would be the addition a new southbound lane and a new northbound lane, both designated for use by high occupancy vehicles during peak periods. This alternative is consistent with local, state, and federal plans. Under the HOV Lane Alternative (See **Exhibit 2-6.1**), the proposed project on Route 101 would include the following engineering features:

The proposal is to widen the freeway within the existing 14 m (46 ft.) median to provide a 3.6 m (12 ft.) northbound and southbound lane with 3.0 m (10 ft) inside shoulders divided by a concrete median barrier. The inside lane (the new number one lane) between the Santa Rosa Avenue interchanges and the Route 12/101 interchange in both directions would be designated as an HOV lane. High occupancy vehicles are defined for this project as vehicles with two or more persons during the AM and the PM peak periods. HOV bypass lanes are proposed for on-ramps at three interchanges. The outside freeway shoulders would be widened to 3.0 m (10 ft) and the existing lanes would be restriped to 3.6 m (12 ft.)

- Auxiliary lanes would be added:
  - Southbound between the Baker Avenue on-ramp and the Hearn Avenue off-ramp
  - Northbound between the Baker Avenue on-ramp and the Route 12 connector
  - Southbound from the Route 12 connector to north of the Baker Avenue Overcrossing
    If the southbound auxiliary lane were extended to the Baker Avenue off-ramp, replacement of the overcrossing would be required. Realignment of the freeway between the Baker Avenue Overcrossing and the Earle Street Pedestrian Overcrossing is required to avoid acquiring new right of way on the east side for the freeway widening.

- Soundwalls are proposed at thirteen locations adjacent to Caltrans right of way line and on the edge of the highway shoulder. (See soundwall locations in **Exhibit 2-6.1**)
  - The soundwall southbound between Hearn Avenue and Baker Avenue would need to be constructed on top of a retaining wall.
  - Temporary construction easements and permanent underground easements would be required for construction of soundwalls, retaining walls and drainage easements would be needed where culverts are extended to the right of way lines.

- Ramp Metering
  Ramp metering signals are proposed for all of the on-ramps. Ramps and local streets would be widened where possible to provide for storage for the ramp metering. Seven ramp intersections would require signalization and four intersections would require modifications to signals.

- Freeway resurfacing
  The freeway was resurfaced recently within the southern limits of the project to the Baker Avenue Overcrossing. It is also proposed to resurface the freeway from the Baker Avenue Overcrossing to the Earle Street Pedestrian Overcrossing with a minimum of 105 mm of asphalt concrete.

- Right of Way Takes
  The project proposes three "fee" right of way takes, that is, takes in which Caltrans pays land owners to obtain all rights to right of way. The first, 777m^2 (2549 sq. ft.), at the south end of Santa Rosa Avenue will be obtained from Sonoma County. The second 13 m^2 (43 sq. ft.) is on Barham Avenue adjacent to the east of the State's right of way line and will be obtained from the City of Santa Rosa. The third parcel, 11 m^2 (36 sq. ft.) will be on the west side of the freeway at soundwall CM 307. The property owner requested that the soundwall be relocated from the edge of shoulder closer to his billboard sign. The distance (3.6 meters closer) will also provide for a future lane. Three easements for utilities, 10 m^2 (33 sq. ft.) are required for signals at Todd Road Overcrossing and Todd Road intersection. Three drainage easements, 79, 60, and 50 m^2 respectively (259 sq. ft, 197 sq. ft., 164 sq. ft.) are required where drainage culverts end at the right of way line. At two locations, footing and underground easements, 61 m^2 and 1557 m^2 (200 sq. ft. and 5108 sq. ft.), are required for extending the culvert at Colgan Creek and the retaining wall/ soundwall on the west side right of way between Hearn Avenue and Baker Avenue.

  Temporary construction easements will be obtained for all work that is adjacent to the right of way line.

- At the concrete lined North Branch Laguna De Santa Rosa Flood Channel at the south end of Santa Rosa Avenue, a triple box culvert on the west side of Santa Rosa Avenue will be widened.

- Between the freeway and Santa Rosa Avenue a new off-ramp bridge will be constructed over the North Branch Laguna De Santa Rosa Flood Channel.

- The southbound on-ramp at Baker Avenue will be widened at the on-ramp and the parapet will be raised at the outflow of the box culvert at the concrete lined Colgan Creek. About 1.5 m of the top of the culvert needs to be replaced.

- Phased Construction
  Work on the project will occur in a phased manner with the initial stage planned to include the construction of the additional lanes northbound and southbound concurrent with construction of Soundwalls CM 255 (Soundwall 1), and WS 314 (Soundwall 14).

  The second phase will include the construction of all remaining Soundwalls:
  CM 271 (Soundwall 3)
  CM 274 (Soundwall 4)
  CM 277 (Soundwall 5)
  CM 281 (Soundwall 6)
  CM 282 (Soundwall 7)
  CM 287 (Soundwall 8)
  CM 299 (Soundwall 9)
  CM 300 (Soundwall 10)
  CM 303 (Soundwall 11)
  CM 307 (Soundwall 12)
  NW 312 (Soundwall 13)

  Drainage work will also be completed to accommodate construction impacts of soundwalls completed in Phase 2.

Phase 3 work will encompass tree replacements and ivy plantings for the soundwalls.

Work on each phase may occur coincident with other phases or subsequent to previous phases.

- Specific improvements proposed at the interchanges include–
  - **Wilfred Avenue**
    - Ramp metering signals at on-ramps.
  - **Santa Rosa Avenue**
    - Ramp metering signals at the southbound on-ramp.
    - Realign and widen the northbound off-ramp to northbound Santa Rosa Avenue and the northbound off-ramp to southbound Santa Rosa Avenue. Realign Santa Rosa Avenue/Roberts Lake Road to make a continuous street.
    - Construct a concrete barrier on the northbound off-ramp to northbound Santa Rosa Avenue.
    - Widen a portion of Santa Rosa Avenue north of the off-ramps to provide two lanes in each direction, eventually tapering to the existing two-lane road.
    - Eliminate the northbound left-turn lane onto the southbound on-ramp at the request of Sonoma County.
    - Signalize the off-ramp at Santa Rosa Avenue.
  - **Todd Road**
    - Provide auxiliary lanes prior to the off-ramps to mitigate the non-standard deceleration length distance.
    - Widen the northbound on-ramp to provide two mixed flow lanes, ramp metering and a CHP enforcement area.
    - Provide ramp metering and a CHP enforcement area at the southbound on-ramp.
    - Widen the three intersections on Todd Road and on Moorland Avenue and signalize all intersections.
    - Widen sections of Todd Road Overcrossing to provide merging and turning lanes.
    - Widen the southbound off-ramp.
  - **Hearn Avenue**
    - Provide one HOV lane and two mixed flow lanes on the northbound on-ramp, ramp metering and a CHP enforcement area.
    - At the southbound on-ramp, provide two mixed flow lanes, ramp metering and a CHP enforcement area.
    - Widen the intersection at the ramps and Corby Avenue, at Hearn Avenue and, at Corby Avenue and Santa Rosa Avenue.
    - Widen eastbound Hearn Avenue.
    - Signalize all intersections.

- **Baker Avenue**

  - Widen the northbound ramps to conform to Baker Avenue; provide ramp metering and a CHP enforcement area at the northbound on-ramp.

  - Modify the intersection of the Baker Avenue Overcrossing and Santa Rosa Avenue.

  - Widen the southbound on-ramp to provide two mixed flow lanes, ramp metering and a CHP enforcement area.

  - Widen Baker Avenue between Corby Avenue and the southbound ramps.

  - Widen southbound Baker Avenue between the ramp intersection and the overcrossing to provide storage and signalize the ramp intersection.

  - Construct a concrete barrier on the southbound off-ramp to Baker Avenue to replace the existing metal beam guardrail. An extra lane will also be added for storage.

- Two sites have been designated as sites to locate leaded material. All materials will be handled in accordance with the current Department of Toxic Control Substances variance (see **Section 5.VII** Hazardous Waste).

  - Embankment Site No 1 is located on southbound Route 101 between the freeway and southbound Santa Rosa Ave on-ramp. Approximately 22,300 m^3 of leaded material will be placed at this site, capped with 0.6 m (3200 m^3) of clean fill from Site No 2.

  - Embankment and Borrow Site No. 2 is located at the northeast corner of Farmer's Lane and Hoen Road at the Route 12/ Farmers Lane Interchange. Approximately 36,000 m^3 of leaded material from the Route 101 widening project will be stored at this location and 11,100 m^3 of this clean material will be removed as fill for the widening project. The site will be contour graded and covered with .6 m (7000 m^3) of clean fill from the site.

Certain details of the project design do not meet the highway design standards that Caltrans projects typically meet. Specifically, the proposed deviations are: the widths of medians or of shoulders in some areas would not meet the three-meter standard; some deceleration lanes at off-ramps are shorter than the standard; new lanes would not achieve the standard of a 5.1-meter vertical clearance in locations where existing overcrossings are already less than 5.1 meters high; some existing interchanges are closer together than the standard of 1.5 km; and overcrossings at Santa Rosa Avenue, Todd Road, Hearn Avenue, and Baker Avenue are narrower than the standard width for a two-lane overcrossing at an interchange. Caltrans would make safety improvements to non-standard features by separating opposite directions of traffic flow with concrete barriers, by upgrading guardrails, by adding concrete barriers to protect structure columns at the center of the highway, and by providing auxiliary lanes prior to the off-ramps at Todd Road and Hearn Avenue. Non-standard features having to do with the location or design of the interchanges would not be addressed in this project.

- The project would include replacement landscaping as recommended by the Office of Landscape Architecture.

- Erosion control would be provided on disturbed construction areas.

- Relocation Impact Studies - No relocation is required.

- Airspace Lease Areas - There are no potential airspace lease areas.

2.6.2 Mixed Flow Alternative

The Mixed Flow Alternative proposes the same improvements as the HOV Lane Alternative, described above in Section 2.6.1, with a few exceptions. Both alternatives include the features that are shown graphically in Exhibit 2.6.1. In summary, the improvements that the Mixed Flow Alternative proposal shares with the HOV Lane Alternative are: widen to add a northbound and a southbound lane, add auxilliary lanes, construct 13 soundwalls, add ramp metering, and improve five interchanges. The difference between this alternative and the HOV Lane Alternative is that the inside lane (the new number one lane) would not be designated for high occupancy vehicles.

2.6.3 No-Build Alternative

Under the No-Build Alternative, the existing freeway width would be retained and the existing median would not be altered. Congestion is projected to worsen within the project area as population and traffic volumes increase, leading to added commute time delays. These added delays could potentially lead to delays in the timely delivery of goods and services or in the response time for emergency services. The increased traffic congestion will also deteriorate ambient air quality in the Bay Area. Ongoing maintenance would continue as in the past. Major transportation objectives associated with the project area, would not be adequately addressed under this alternative.

2.6.4 Identification of the Preferred Alternative

The three alternatives for improving traffic congestion and vehicular for this portion of Sonoma County Highway 101 from Wilfred to Route 12 were evaluated. Overall, the results of these analyses indicate that widening the freeway under the HOV 2+ Lane alternative best meets the stated purpose and need for this project by reduced peak hour travel times on the freeway, improving vehicular efficiency, and enhancing air quality. See **Table 2-6.1** for a comparison of alternatives.

Table 2-6.1[1]

Expected Freeway Travel Times (in minutes) between Route 116 and River Road
Based on FREFLO simulation model analysis

		Year 2000		Year 2015		Year 2020	
		A.M.	**P.M.**	**A.M.**	**P.M.**	**A.M.**	**P.M.**
Southbound	**No-Build**:	19.9	18.4	27.2	40.9	30.6	47.6
	Build HOV Lane:						
	• Mixed-Flow Traffic (non-carpools):	19.8	17.8	35.7	46.7	40.6	50.3
	• HOV 2 +Traffic (carpools):	18.3	17.0	26.6	36.4	32.3	35.2
	Build Mixed-Flow Lane:	21.7	19.6	28.5	36.2	31.1	36.9

		Year 2000		Year 2015		Year 2020	
		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Northbound	**No-Build**:	15.8	21.6	23.0	27.8	24.1	28.4
	Build HOV 2+ Lane:						
	• Mixed-Flow Traffic (non-carpools):	13.8	20.9	20.5	25.3	22.9	26.3
	• HOV Traffic (carpools):	13.6	20.8	20.3	25.3	22.9	26.3
	Build Mixed-Flow Lane:	13.9	21.5	21.2	26.1	22.7	27.0

[1] The new **Table 2-6.1** contains all the data included in **Tables 2.6.1, 2.6.2,** and **2.6.3** in the original draft document.

There were some cases that suggested that freeway travel times would actually increase with the "Build" alternatives (See the shaded areas in **Table 2-6.1**). To address the discrepancies, Caltrans performed additional technical studies to determine why some of the "Build" alternatives appear to perform more poorly than the "No-Build" alternative. The results of these studies revealed the following:

- The traffic model used to forecast future year traffic volumes assigned a disproportionate amount of peak hour traffic to the freeway in the "Build" alternatives than would be consistent with the resulting amount of congestion. If congestion and delays under this alternative occurred, many motorists would have returned to the local arterial system, seeking a less congested route.

- Greater delays occur on the on-ramps for the "No-Build" alternative than with either of the widening alternatives. Combining ramp delays with the freeway delays shows that both the HOV 2+ lane and Mixed-Flow lane alternatives carry more traffic with less overall delay than the "No-Build" alternative.

- Peak hour traffic performance outside of the study limits (North of River Road and South of Route 116 in Cotati) for some combinations of study year and alternatives were not accounted for in the original traffic studies. When additional studies were done to include all congestion related to locations where traffic demand exceeded the capacity (bottlenecks), the HOV 2+ Lane alternative would carry more traffic (carpools and non-carpools) than any other alternative and, in the majority of scenarios, have lower travel times than the other alternative.

2.6.5 Details of the Traffic Technical Studies

The technical studies consisted of a screenline analysis. A screenline is an imaginary line perpendicular to the predominant travel direction that intercepts all major routes of a corridor. Three east-west oriented screenlines were employed. The first (northern) screenline is along the south edge of Route 12 at the northern end of the project area. The second (central) screenline is at the middle of the project area between Todd Road and Bellevue Avenue. The third (southern) screenline runs along the north edge of Wilfred Road, at the southern end of the project area. (See **Exhibit 2.6-2**)

To capture as much of the local transportation network as possible, all three screenlines were extended to the west from the SR-116/Gravensteen Highway to Bennett Valley Road/Crane Canyon Road/Petaluma Hill Road to the east.

After completion of the screenline analysis, it was determined that for each year/peak period scenario, the total number of vehicle trips on both the aterials and the freeway will remain essentially identical for all alternatives. However, subsequent forecast models project a traffic diversion from parallel local arterials to the freeway when capacity is added to the freeway in the HOV 2+ Lane and Mixed-Flow alternatives.

Below, the results of the analysis of the central screenline for the sample year 2015 are summarized. The table shows the relative proportion of peak hour trips on the local arterial system as compared to the freeway.

Table 2-6.2

Distribution of Traffic Demand Between Arterials and Freeway
Year 2015 - Central Screenline (Todd Rd to Bellevue Avenue**)**

Southbound		**Total Trips**	**Arterials**	**Freeway**
A.M.	No-Build	9,664	50%	50%
	Mixed Flow	9,545	43%	57%
	HOV + 2	9,796	44%	56%
P.M.	No-Build	12,192	56%	44%
	Mixed Flow	12,290	50%	50%
	HOV 2+	12,065	51%	49%

Northbound		**Total Trips**	**Arterials**	**Freeway**
A.M.	No-Build	10,415	51%	49%
	Mixed Flow	10,294	44%	56%
	HOV 2+	10,579	45%	55%
P.M.	No-Build	11,919	55%	45%
	Mixed Flow	12,016	49%	51%
	HOV 2+	11,807	51%	49%

Disproportionate levels of traffic were attributed to the freeway.
The key conclusion here is that a disproportionate level of traffic is attributed to the freeway. The proportion of traffic assigned to the freeway in **Table 2-6.2** is approximately 6 to 7 percent higher for the HOV 2 + Lane Alternative than for the No-Build Alternative. This means that about 500 to 700 additional vehicles are predicted to travel through the project area if one extra HOV lane is constructed in the northbound and southbound directions. A simultaneous reduction of local traffic is predicted at the central screenline as well. Reductions range from 470 to 630 vehicles per hour, with the most substantial reductions on Santa Rosa Avenue and Stony Point Road.

The implications drawn from this discussion are twofold:

- The original forecast model shown in **Table 2-6.1** likely assigned too much traffic to the freeway in the HOV 2+ Lane Alternative. If congestion and delays under this alternative occurred, many motorists would have returned to the local arterial system, seeking a less congested route.
- If traffic were actually distributed between the freeway and arterials in the proportions shown in **Table 2-6.2**, it is likely there would be significant improvements in the level of service (LOS) on the arterial systems. An improvement in arterial LOS would also tend to draw motorists from the freeway to the arterials.

Since the original model did not identify this effect, it is quite conceivable that the "Build" alternatives would appear to do more poorly than the "No-Build" alternative in **Table 2-6.1**.

Greater delays on "No-Build" alternative on-ramps
Not all vehicles traveling the entire length of the project area remain on the freeway. Many travelers experience delays at freeway on-ramps. While this travel behavior was not represented in the original studies represented by **Table 2-6.1**, it was captured in the subsequent screenline studies. See **Table 2-6.3** below.

The term Total Freeway Travel (defined in vehicle miles traveled) is a measure of how much traffic the freeway is able to carry. A higher Total Freeway Travel number would imply the freeway is carrying more traffic while the local arterial system is carrying less.

The term Total Freeway Delay Time measures for the total freeway delay time (depicted in vehicle hours traveled) and quantifies the amount of congestion on the freeway, reflecting delays jointly generated by the mainline and on-ramp traffic.

Table 2-6.3

Effects of Alternatives on Total Freeway Travel and Total Freeway Delay

		Year 2000		Year 2015		Year 2020	
Southbound		**Total Freeway Travel (veh-mile)**	**Total Freeway Delay (veh-hrs)**	**Total Freeway Travel (veh-mile)**	**Total Freeway Delay (veh-hrs)**	**Total Freeway Travel (veh-mile)**	**Total Freeway Delay (veh-hrs)**
A. M.	No-Build	50,600	540	51,000	890	50,400	1,370
	HOV 2+	53,100	490	53,700	1,070	53,600	1,500
	Mixed Flow	54,900	600	55,700	950	55,300	1,430
P. M.	No-Build	49,000	410	48,600	1,520	48,200	1,830
	HOV 2+	51,200	310	51,300	1,470	52,200	1,590
	Mixed Flow	53,900	440	55,400	1,400	55,600	1,630

		Year 2000		Year 2015		Year 2020	
Northbound		**Total Freeway Travel (veh-mile)**	**Total Freeway Delay (veh-hrs)**	**Total Freeway Travel (veh-mile)**	**Total Freeway Delay (veh-hrs)**	**Total Freeway Travel (veh-mile)**	**Total Freeway Delay (veh-hrs)**
A. M.	No-Build	44,500	220	47,500	650	48,500	710
	HOV 2+	48,500	60	50,700	430	51,900	610
	Mixed Flow	49,300	80	52,100	480	52,900	570
P. M.	No-Build	47,400	510	51,700	830	52,700	890
	HOV 2+	46,800	450	53,200	660	54,200	720
	Mixed Flow	49,000	480	53,400	700	54,700	740

As shown above in the "Total Freeway Travel" columns, the HOV 2+ and the Mixed Flow Lane alternative, carry more overall traffic than the No-Build alternative. This is true even in the six scenarios in which the HOV 2+ lane or Mixed Flow lane alternative have higher expected travel times than the No-Build. The "Total Freeway Delay" columns indicate that in virtually all cases, the HOV lane or Mixed Flow lane alternatives have less overall freeway delay than the No-Build.

Even in two of the four scenarios in which corridor travel time for the HOV 2+ lane alternative was higher than the No-Build (southbound, PM, years 2015 & 2020), the total freeway delay is less under the HOV lane alternative. In the remaining four scenarios (southbound, AM, years 2015 & 2020), although the Build alternatives would exhibit slightly greater delays than the No-Build alternative, the relative difference is substantially less than the differences in corridor travel time shown in **Table 2-6.1.**

Congestion occurring outside of study limits

The results presented above indicate that the freeway widening alternatives would provide better peak hour traffic performance within the study limits. However, congestion is expected to occur both north of River Road and south of Route 116 and some combinations of study years and alternatives were not accounted for.

Using the FREQ 11 model, (which better accounts for traffic queues outside of the study area) additional year 2000 and 2020 traffic analyses were performed to more completely assess the travel time effort of each alternative within an expanded area. The new study area included all congestion south of Route 116 and north of River Road.

- Total Expected Freeway Travel Times (**See Table 2-6.4**)

For the Mixed-Flow lane alternative, travel times would be reduced in only four of the eight scenarios analyzed and the increases for the remaining Mixed Flow lane scenario would be a maximum of 2 minutes (year 2020 northbound A.M. scenario). In these scenarios, the primary bottlenecks for both the northbound and southbound traffic are expected to occur in the freeway segment between the Wilfred Avenue and Rohnert Park Expressway interchanges. Because these bottlenecks both occur outside the limits of the proposed route 12 to Wilfred Avenue widening, the

capacity of the bottlenecks will not be affected by the widening and the benefit of additional mixed flow lanes would be limited in some scenarios.

Conversely, the HOV 2+ lane alternative would, in all but one scenario, provide improved travel times for both carpools and non-carpools compared to the No-Build alternative. The travel times are lower than the No-Build alternative in seven of the eight scenarios analyzed except in the year 2020 northbound A.M. The HOV lane alternative would also provide southbound carpools with added time savings by allowing them to bypass up to 7.3 minutes of congestion in the Mixed-Flow lanes between Route 12 and the beginning of the freeway bottleneck section at Wilfred Avenue.

The shaded areas in **Table 2-6.4** indicate travel times *in excess* of the No-Build alternative.

Table 2-6.4

Total Expected Freeway Travel Times (in minutes)
Includes areas of expected congestion outside study limits
Based on FREQ 11 Analysis

		Year 2000 A.M. (min.)	Year 2000 P.M. (min.)	Year 2020 A.M. (min.)	Year 2020 P.M. (min.)
Southbound	**No-Build:**	33.3	29.8	47.4	57.0
	Build HOV Lane:				
	• Mixed-Flow Traffic (non-carpools)	32.5	29.4	43.6	52.9
	• HOV 2+ Traffic (carpools)	30.4	27.6	37.4	45.6
	Build Mixed-Flow Lane:	33.4	30.0	42.1	44.6

		Year 2000 A.M. (min.)	Year 2000 P.M. (min.)	Year 2020 A.M. (min.)	Year 2020 P.M. (min.)
Northbound	**No-Build:**	33.6	40.1	42.8	52.4
	Build HOV Lane:				
	• Mixed-Flow Traffic (non-carpools)	30.6	39.2	46.2	48.7
	• HOV 2+ Traffic (carpools)	29.5	39.2	45.3	48.2
	Build Mixed-Flow Lane:	30.5	41.1	44.8	49.2

- Total Freeway Travel Comparisons (See **Table 2-6.5**)

Both the HOV lane and the Mixed-Flow lane alternatives carry more overall traffic than the No-Build alternative for all combinations of alternative and study year. This is true even for the scenarios in which expected freeway travel times for the HOV lane and Mixed-Flow alternative are higher than those expected for the No-Build alternative, demonstrating that either of the "Build alternatives has greater traffic carrying capacity than the No-Build alternative.

Table 2-6.5

Total Expected Freeway Travel (in vehicle-miles)
Includes areas of expected congestion outside of study limits
Based on FREQ 11 Analysis

		Year 2000		Year 2020	
		A.M.	**P.M.**	**A.M.**	**P.M.**
Southbound	**No-Build:**	91,998	83,716	90,757	84,338
	Build HOV Lane:	94,334	85,968	95,503	88,205
	Build Mixed-Flow Lane:	97,073	89,691	99,128	95,479

		Year 2000		Year 2020	
		A.M.	**P.M.**	**A.M.**	**P.M.**
Northbound	**No-Build:**	97,296	114,514	114,258	122,084
	Build HOV Lane:	103,544	116,106	121,398	124,109
	Build Mixed-Flow Lane:	105,888	119,141	119,683	123,792