

June 9, 2009

**TRAFFIC ANALYSIS PEER REVIEW FOR THE
LAUREL WAY RESIDENTIAL PROJECT
IN THE CITY OF REDWOOD CITY**

This peer review has been conducted for the document *Traffic Study for the Proposed Laurel Way Joint Venture in Redwood City, CA.*⁽¹⁾ Our review has considered that analysis' assumptions and methodologies within the context of accepted traffic engineering standards. Our review and summary sections of the environmental document are provided.

1. Existing Traffic Conditions

a. Existing Peak Hour Operations

The analysis identified existing traffic flow conditions at the following four key intersections in the project area:

- Highland Avenue/Laurel Way
- Highland Avenue/Jefferson Avenue-Farm Hill Boulevard
- Highland Avenue/Jefferson Avenue
- Farm Hill Boulevard/Jefferson Avenue

The traffic analysis indicates that the current intersection operations are an acceptable Level of Service (LOS) "C" or better during both the AM and PM peak commute hours. It is noted that at the signal controlled Farm Hill/Jefferson intersection, the LOS refers to overall intersection delays. At all other study intersections, the LOS refers to delays experienced by traffic on the intersection approach controlled by a stop sign.

There are currently no traffic controls at the Highland Avenue/Laurel Way intersection. The report has appropriately assumed stop sign control for the Laurel Way approach.

b. Traffic Volumes on Residential Streets

The report also provides a discussion of residential traffic characteristics. A discussion of residential traffic volumes is helpful in identifying the existing (and with project) characteristics of Laurel Way, Altamont Way and Highland Avenue.

Residential street traffic flow characteristics do not necessarily lend themselves to typical traffic capacity analyses. In essence, residential street traffic capacities relate more closely to residents' concerns regarding noise, pedestrian safety and conflicts between through traffic and driveway access. There has been little research conducted on this topic, and there is not a generally established guideline which considers these factors relative to traffic effects on residential streets. Although no national consensus exists, "local" streets have been generally characterized as carrying a maximum of 2,000 to 3,000 daily vehicles. Streets carrying less than 1,000 daily vehicles would tend to be purely minor residential streets, serving the access

needs of adjacent residences. Residential streets serving adjacent residences as well as providing linkages to several neighborhoods can normally be expected to carry 1,000 to 3,000 daily vehicles.

Specific residential traffic issues in the project area would include the following:

- Due to the roadways' curvature and foliage, sight distance is limited at certain points along the local streets, affecting access in/out of residential driveways and side streets.
- The width of Highland Avenue is limited, particularly immediately south of Laurel Way. At that point, Highland Avenue has a width of about 15 feet, extremely narrow for a two lane roadway.
- The visibility for vehicles exiting from Laurel Way onto Highland Avenue is somewhat limited, particularly to the south.

The existing daily traffic volumes on local streets are listed in Table 2. As indicated, all of the volumes are below 1,000 daily vehicles, consistent with levels expected for minor residential streets.

2. Project Traffic Impacts

a. Trip Generation/Distribution

The trip generation of the proposed project was calculated based on standard trip rates compiled by the Institute of Transportation Engineers (ITE). The project's trip generation would be 172 daily vehicles, 13 AM peak commute hour trips and 18 PM peak commute hour trips. It is noted that the ITE trip rates appear to be consistent with the actual traffic being generated by current Laurel Way residences. The distributions of the project trips were based on existing traffic patterns at the study intersections, and these distributions appear to be reasonable..

b. Impacts at Study Intersections

The expected net traffic increase – the “project” – was added to the existing traffic and the resulting operations analyzed.

As shown on Table 1, the intersection LOS and delays would essentially be unchanged. The study intersection's existing plus project conditions would continue to be LOS “D” or better which is acceptable. It is noted that as per City of Redwood City guidelines, these project related intersection impacts would be considered less than significant

c. Local Street Impacts

As indicated in Table 2, the addition of project trips would increase daily traffic volumes on the area's residential streets. However, all of the streets would maintain daily volumes below 1,000 vehicles, and the streets would continue to be local in nature.

Although some features of the local street network are substandard, it is not expected that the traffic increases due to the project would result in significant impacts relative to those local street features.

d. Project Access, Circulation and Parking

The proposed project would be served by a private cul-de-sac street. The project's 13 AM and 18 PM peak hour trips would not result in significant conflicts with the traffic flows at the Highland/Laurel intersection. As recommended in the traffic report, the outbound Laurel Way traffic flows should be stop-sign controlled at Highland Avenue.

The primary issues for access design are the vehicle visibility and operation relative to vehicles traveling on Highland Avenue and vehicles turning in/out of Laurel Way. The required vehicle visibility or "corner sight distance" is a function of the travel speeds on Highland Avenue. Caltrans design standards indicate that for appropriate corner sight distance, "a substantially clear line of sight should be maintained between the driver of a vehicle waiting at the cross road and the driver of an approaching vehicle in the right lane of the main highway." Based on Caltrans design standards, the typical 25 mph vehicle speeds on Highland Avenue require a sight distance of about 150 feet, and the report indicates that the measured sight distances exceed this minimum.

The City Zoning Code requires 2 covered parking spaces per single family residential unit. The planned parking for the project's units would include two garage spaces per unit and two spaces available on each driveway (76 total spaces). In addition, there would be 9 visitor parking spaces in parking bays along Laurel Way. The total of 85 spaces located within the project, would meet the typical daily parking needs of the project.

The City's private street standards have been reviewed relative to the project's proposed extension of Laurel Way and the cul-de-sac that would be constructed at the end of Laurel Way. It appears that the design (a 28 foot width plus a sidewalk on one side) would generally exceed the City's standards (a 25-foot width, a sidewalk on one side and a 45-foot cul-de-sac radius). It is noted that due to the steep topography, about 275 feet of Laurel Way would be constructed as a "split level" roadway with westbound traffic on the lower level and eastbound traffic on the upper level. The overall roadway width would meet the City standard, but it is recognized that the split design would result in some access inconvenience for those parcels fronting this section of Laurel Way.

3. Cumulative Traffic Flow Conditions

Cumulative traffic volumes were estimated and traffic operations calculated in a separate analysis report.⁽²⁾ This analysis assumed 10% growth (1% per year between 2008 and 2018) in through traffic on Jefferson Avenue and Farm Hill Boulevard. (It was assumed that the Highland Avenue/Laurel Way intersection would experience minimal cumulative traffic growth other than the proposed project.) These growth factors were applied to the existing

through traffic volumes at the study intersections. In addition, the Laurel Way project trips were added to the cumulative flows at the intersections.

The intersection operations were recalculated and all of the intersections' operation would remain at LOS "D" or better which is acceptable. Cumulative intersection impacts would be considered less than significant.

4. Construction Traffic Impacts

The project's construction traffic would include three basic components:

- Delivery (and eventual removal) of heavy equipment needed for the grading and roadway/utility improvement work;
- Truck and employee traffic associated with grading and roadway/utility improvements and removal of graded materials; and
- Truck and employee traffic generated during the actual construction of the project's residences.

Based on a review of available routes, it is expected that the construction traffic would use Highland Avenue south of Laurel Way for travel to/from Jefferson Avenue and Farm Hill Boulevard. This route would provide somewhat lesser grades and more moderate curves as well as signal controlled access at Jefferson/Farm Hill.

The initial delivery of equipment would include the delivery of five (5) pieces of equipment and two (2) trucks that would be on-site during the site grading. A similar number of equipment pieces and trucks would be delivered during the utility and drainage improvements and actual roadway paving. During the 4 month grading, utility and paving construction, the addition of these trips would not have a measurable impact on traffic flow conditions or pavement degradation. The existing daily traffic on Highland Avenue at Laurel Way is 780 vehicles, and the equipment delivery trips would add minimally to existing volumes.

The highest level of construction traffic activity would occur during the grading and subdivision improvement phase of the project. During this phase, the overall site would be rough graded and excess materials trucked off site. Utility and drainage improvements would be constructed (including the importation of trench backfill material), and the Laurel Way roadway construction (including the importation of base rock) would be completed. Both the utility/drainage construction and the roadway construction would require periodic concrete deliveries. Over the 4 month period of this work, it is expected that there would be days where 3-4 trucks are traveling to/from the site (on days where the construction activity is focused on site, there may be little or no truck activity). In addition, 10-15 construction employees would be expected on site during a typical day. These activities could generate 25-35 daily trips on Highland Avenue. While this increase would be measurable near the project site (a 4-5% increase over the existing 780 daily vehicles on Highland at Laurel), the low overall volumes and the temporary nature of this traffic would suggest a less than significant impact.

The actual house construction would involve 4-5 houses annually over an estimated 5 year time frame. The house construction would involve various workers throughout the project life. There would also be periodic deliveries of materials. If it is assumed that 10-15 construction workers would be on site on any given day, their 10-15 peak hour commute trips (assuming no ride-sharing) would be comparable to the completed project's 13-18 peak hour trips identified in the DEIR. Some delivery of materials would be expected on a daily basis, but even if 3-4 deliveries per day were experienced, the truck traffic would not measurably affect traffic flow conditions.

Finally, it is recognized that the project would be responsible for preparing a construction management plan for approval by the City. It is expected that this plan would outline construction travel routes, accepted hours for truck traffic and a plan for rehabilitating roadways that might experience pavement damage due to the construction traffic.

5. Traffic Safety Issues

The issue of traffic safety relates to safety at the project access on Highland Avenue and traffic safety along Highland Avenue. To determine the extent of existing traffic safety problems, the City of Redwood City was contacted to obtain accident records on Highland Avenue for the most recent 5 year period.⁽³⁾

During the 2004-2008 five year period, there were a total of 3 reported accidents on Highland Avenue between Laurel Way and Jefferson Avenue north and 1 reported accident between Laurel Way and Jefferson Avenue south. The yearly accident summaries are as follows:

- 2004 2 accidents;
- 2005 no accidents;
- 2006 2 accidents;
- 2007 no accidents;
- 2008 no accidents.

As these accident summaries suggest, there is no clearly consistent pattern of accident history.

The proposed project would result in higher traffic volumes and the potential for a higher number of accidents on Highland Avenue. As outlined in Table 2, daily traffic volumes would increase by 9-12% on Highland Avenue. Although these increases would add proportionally to the potential for traffic accidents, the change would not be considered significant.

6. Conclusions and Project Mitigation

Based on City of Redwood City guidelines, the project impacts would be less than significant at the study intersections.

The project's impacts on the local residential traffic flow characteristics would also be less than significant. In response to potential traffic access impacts, the traffic report recommends the following:

- The Laurel Way approach at Highland Avenue should be controlled by a stop sign.
- Foliage and any other obstacles should be removed at the Highland/Laurel intersection to maintain the necessary 150 feet of sight distance.

The project would provide adequate on-site parking for residents and visitors and would not be expected to impact area parking.

With regard to construction traffic impacts, the following mitigation measures are recommended:

- Applicant shall submit a construction traffic plan including a truck routing plan, a parking plan for construction employees and a specific access/staging plan for earthwork and materials delivery trucks;
- Truck traffic is prohibited on weekends and holidays and is restricted to the hours of 7:30 AM – 4:00 PM on weekdays;
- The applicant's engineer shall perform Traffic Index (T.I.) calculations to identify the current conditions on Highland Avenue and the conditions during the construction process. These calculations should be submitted to the City staff to establish the potential for pavement degradation (and possible reimbursement) related to the project's construction.

References:

- (1) Hexagon Transportation Consultants, Inc., *Traffic Study for the Proposed Laurel Way Joint Venture in Redwood City, CA*, May 21, 2008.
- (2) Hexagon Transportation Consultants, Inc., *Cumulative Scenario for the Traffic Study for the Proposed Laurel Way Joint Venture in Redwood City, CA*, July 18, 2008 (memorandum report).
- (3) Mr. Peter Delgado, Associate Engineer, City of Redwood City, June 5, 2009.

**TABLE 1
LEVEL OF SERVICE (LOS)/DELAY
AT STUDY INTERSECTIONS**

Study Intersections	Existing	Existing + Project
Highland/Laurel ⁽¹⁾	AM LOS A/8.9 sec.	AM LOS A/8.9 sec.
	PM LOS A/8.9 sec.	AM LOS A/8.9 sec.
Highland/Jefferson- Farm Hill ⁽²⁾	AM LOS C/23.8 sec.	AM LOS C/24.9 sec.
	PM LOS C/24.6 sec.	PM LOS D/25.3 sec.
Highland/Jefferson ⁽²⁾	AM LOS A/9.4 sec.	AM LOS A/9.6 sec.
	PM LOS A/9.2 sec.	PM LOS A/9.3 sec.
Farm Hill/ Jefferson ⁽³⁾	AM LOS A/7.4 sec.	AM LOS A/7.5 sec.
	PM LOS A/5.5 sec.	PM LOS A/5.6 sec.

- (1) This intersection currently has no controls. The operations calculations assume Laurel Way would be stop sign controlled at Highland and the LOS/delay refer to a stop controlled Laurel Way approach.
- (2) The operations calculations listed for these intersections refer to the LOS/delay by vehicles on the stop sign controlled approach.
- (3) The operations calculations at this signal controlled intersection reflect LOS/delay for all vehicles.

**TABLE 2
DAILY TRAFFIC VOLUMES ON
PROJECT AREA RESIDENTIAL STREETS**

Residential Street	Existing Daily Volume	Existing + Project Daily Volume
Highland North of Laurel	780 vehicles	875 vehicles
Highland North of Jefferson	760 vehicles (estimated)	827 vehicles
Laurel at Highland	100 vehicles	272 vehicles
Altamont at Highland	75 vehicles	85 vehicles