

## 7. Conclusions

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The potential impacts of the project were evaluated in accordance with the standards set forth by the City of San Carlos and the Congestion Management Program (CMP) of San Mateo County. The study included an analysis of AM and PM peak-hour traffic conditions for fifteen signalized intersections, six unsignalized intersections, and five freeway segments in the vicinity of the project site.

The project was found to have significant impacts on intersections under cumulative conditions.

Five of the study intersections would operate at an unacceptable high-end ( $V/C = 0.86$  or higher) LOS D or worse under cumulative conditions. The addition of project traffic would increase the  $V/C$  ratio at two of the five intersections by 0.01 or more, creating a significant project impact. The intersections are:

El Camino Real and Holly Street (LOS D,  $V/C = 0.89$ , PM peak hour)  
Old County Road and Holly Street (LOS D,  $V/C = 0.89$ , PM peak hour)

Although no TDM trip reductions were assumed under cumulative conditions, it should be noted that the City of San Carlos' General Plan identifies a twenty percent (20%) TDM trip reduction as the goal reduction to be achieved by all new development within the City. With implementation of TDM measures by the cumulative development that would achieve a 20% trip reduction, the intersections of El Camino Real/Holly Street and Old County Road/Holly Street could continue to operate under the City's level of service standard.

### **Freeway Segment Analysis**

Additional traffic added to US 101 in the vicinity of the project site by the 2003 draft ESCSP development and the foreseeable projects in San Carlos was estimated. With the addition of the cumulative traffic, traffic conditions at all of the study freeway segments would worsen. However, the proposed project would add traffic representing less than one percent (1%) of the freeway's capacity to all the study freeway segments. Based on CMP standards, there would be no significant impact on the study freeway segments under cumulative conditions.

## ***Freeway Ramp Analysis***

The results of the freeway ramp analysis under cumulative conditions indicate that with implementation of the planned improvements along Holly Street, west of Industrial Road, and the US 101 interchange at Holly (referred to as the Holly Street Improvements), the planned capacity at the US 101 interchange at Holly Street would be adequate to serve the projected traffic volumes under cumulative conditions. All the freeway ramps at this interchange are projected to operate at an acceptable LOS C or better under cumulative conditions.

## ***Signal Warrant Analysis***

The signal warrant analysis showed that both the intersections of Walnut Street/Holly Street and Laurel Street/Holly Street would be at the border of meeting the traffic signal warrant under cumulative conditions. This is the direct result of the additional traffic being added to the Walnut/Holly and Laurel/Holly Street intersections by the cumulative projects and the shift in traffic from San Carlos Avenue to Holly Street associated with the San Carlos Avenue improvements. Project traffic would represent approximately 20 percent of the total growth at these intersections. All other unsignalized study intersections would not warrant a traffic signal under cumulative conditions.

## ***Intersection Operations Analysis***

The operations analysis indicated that the estimated maximum vehicle queue for four of the selected high-demand intersection movements would exceed the existing vehicle storage capacity under project conditions. However, the same turn-movements also are identified to be deficient under existing and future conditions. The deficient turn-movements are:

- El Camino Real and Harbor Boulevard – WBL
- El Camino Real and Holly Street – EB
- Walnut Street and San Carlos Avenue – EB
- El Camino Real and San Carlos Avenue – EB

## ***Site Access***

All access to the project site would be provided via El Camino Real. A total of five access points are shown on the site plan, with two of the access points (hereafter referred to as driveways 1 and 2) located north of Holly Street and 3 of the access points (hereafter referred to as driveways 3, 4, and 5) located south of Holly Street.

The intersection of El Camino/Oak Street would provide the first U-turn opportunity for all project traffic exiting the site via driveways 1 through 4 and wishing to travel south. However, due to the close proximity of driveway 1 to the El Camino/Oak intersection (approximately 50 feet), traffic exiting driveway 1 could find it difficult to accomplish a two-lane change to access the left-turn lane at Oak Street. If a vehicle is unable to merge to the left-turn lane at Oak Street, it would need to travel north for about 700 feet and make a U-turn at Hull Drive. Approximately 16 and 8 AM and PM peak hour project trips, respectively, from driveway 1 would have to make a U-turn at one of these intersections. Despite the difficulty, to present a worst-case analysis, this study assumes that the U-turns would be made at the El Camino/Oak Street intersection. It is estimated that approximately 53 and 28 project trips during the AM and PM peak hour, respectively, from driveways 1 and 2 would have to make a U-turn at El Camino Real/Oak Street, and 10 AM and PM peak hour project trips, respectively from driveways 3 and 4, for a total of 63 AM and 38 PM peak hour project trips making this movement.

A new southbound left-turn pocket on El Camino Real to driveway 5 would be required in order to provide full access at the El Camino Real/Cherry Street intersection. The new southbound left-turn pocket would be adjacent (back-to-back) to the northbound left-turn pocket at San Carlos Avenue. It was estimated that under project conditions, the southbound left-turn pocket at El Camino/Cherry would serve 15 and 5 AM and PM peak hour project trips, respectively, for a total of 46 and 33 AM and PM peak hour trips, respectively, under project conditions. Using Poisson probability distribution to estimate the required queue storage capacity for the projected volume, it was calculated that the southbound left-turn lane at El Camino/Cherry should provide queue storage capacity for at least 3 vehicles, or 75 feet long. However, since the new southbound left-turn pocket at Cherry Street would provide access to both passenger vehicles and buses, it is recommended that the new left-turn pocket be at least 150 ft. long, providing sufficient queue storage capacity for up to three buses.

### ***On-Site Circulation***

Parking for the proposed project would be provided by six underground parking garages, three small surface parking lots, and the parking lot south of the project, which also would provide parking to the Caltrain Station.

Parking garages 1 through 4 would be located north of Holly Street, with access via driveways 1 and 2. Two of the three surface parking lots also would be accessed via driveways 1 and 2. Both of the surface parking lots north of Holly Street are shown to be a dead end aisle. This is less than ideal since traffic driving into the parking area and not finding parking would have to make a three-point turn within the parking area to exit the site. In particular, the second parking lot (accessed via driveway 2) could be problematic since parking spaces are shown next to the eastern boundary of the lot. However, these are small parking lots (8 and 12 spaces only) serving a residential area that has its own parking supply, so it is not expected that they would attract a constant in and out flow of traffic. Nevertheless, it is recommended that these parking spaces be designated as visitor only parking and/or have a time limit. This would prevent residents from using these parking spaces as alternative long-term parking.

Parking stalls within all the parking garages are shown to be 90-degree stalls. Garage 1 shows most parking spaces along the perimeter of the garage, with a row of parking spaces in the middle of the garage. The layout of this parking garage allows for easy circulation in and out of the garage. Parking spaces at the rest of the parking garages are located mostly along the perimeter of the garages with a single two-way drive aisle in the middle of the garage. Circulation around garages 2 and 3 (which are connected and served by a single entrance point) is expected to be adequate in particular because of the turn-around at the end of parking garage 2 formed by an aisle of parking spaces located in the middle of this garage. Both garages 4 and garages 5 and 6 (garages 5 and 6 are combined) are served by a single access point and consist of parking stalls located along the east and west boundaries with a single two-way drive aisle in the middle of the garage. These three garages have dead end aisles. Dead end aisles are normally undesirable because drivers can enter the aisle, and upon discovering that there is no available parking, must back out or conduct three-point turns. For this type of development, however, where parking spaces are designated and in and out traffic is limited, dead end aisles are less problematic.

The third surface parking lot would have right-in and out access only via driveway 4. Maneuvering through this parking lot would be difficult, due to the limited space and a dead end. Traffic driving into the parking lot to find there are no spaces available would have to manage making a U-turn out of the parking lot.

In addition to the break in the center median at Cherry Street, a break in the center median at Olive

Street (between Cherry Street and Arroyo Avenue) is shown on the site plan. At this location, a second driveway would provide access to the south parking lot. With the median break, and the new northbound and southbound left-turning lanes at this proposed median break, the driveway at Olive Street would be a full access driveway. Both driveway 5 and the new driveway at Olive Street would provide access to the south parking lot, which would extend from the train depot to south of Olive Street. All parking stalls in this surface parking lot, south of Cherry Street, are shown to be 90-degree stalls along the east and west sides of the lot, with a single two-way drive aisle between the rows of parking. A turn-around area at the southern end of the parking lot would be provided. North of Cherry Street, the parking lot consists of a single parking aisle in the middle of the lot surrounded by a two-way drive aisle, and a small (9 spaces) parking area southwest of the parking aisle. Therefore, circulation within the parking lot is expected to be satisfactory, due to the simple layout of the parking stalls and the two proposed full access driveways.

With the elimination of several of the vehicular movements at the intersection of El Camino Real and San Carlos Avenue, in addition to the proposed enhancements to pedestrian facilities, pedestrian circulation to and from the project site would be adequate.

All internal roadways, parking lots, and parking garages must be designed to conform to City of San Carlos standards. The following recommendations should be taken into consideration:

- The access driveways and all drive aisles within the parking garages and surface parking lots should be designed to allow easy vehicle access and circulation. The parking aisles should be wide enough to allow for vehicle circulation, including emergency vehicles, and adequate turning radii should be provided for easy maneuvering.
- Easily accessible and clear pedestrian connections from the parking structures/parking lots and project area to existing and proposed pedestrian facilities should be provided.
- A clear travel path for other service vehicles, such as garbage and delivery trucks, should be defined, in particular around the residential units.

## **Parking**

The proposed number of parking spaces was compared to the required parking supply estimated using two parking rate sources: the parking requirements described in the City of San Carlos' Municipal Code and the ITE *Parking Generation*, third edition, publication. These two sources were used to verify whether the proposed number of parking spaces would be adequate to serve the project.

Based on the City's parking requirements, the project would have to provide approximately 590 and 120 parking spaces for the residential and the retail/office portions of the project, respectively, for a total of 710 parking spaces. This figure is approximately 185 parking spaces more than the 525 parking spaces being proposed. However, the Municipal Code also lists exceptions to the requirements that allow new development to provide less parking supply than that prescribed in the Municipal Code. Various exceptions are applicable to the project, such as new residential units in commercial areas, transit oriented development, developments that utilize underground parking structures, among others.

Using the ITE parking rates, it was estimated that the proposed residential portion of the project would require approximately 337 parking spaces, while the retail portion would require approximately 106 parking spaces, for a total of 443 parking spaces. Compared to the estimated parking required using ITE rates, the proposed project would provide more (approximately 82 spaces more) than what is required.

In addition, it has been expressed that a 4,000 s.f. restaurant could potentially be part of the retail portion of the project. For this reason, the required number of parking spaces for a restaurant also was estimated. Based on the City of San Carlos parking requirements, it was estimated that a 4,000 s.f. restaurant would require 32 parking spaces. Using ITE rates, a 4,000 s.f. (family) restaurant would require approximately 54 parking spaces.

### ***Simulation Analysis***

The results of the queue analysis show that at the intersection of El Camino/Holly the northbound through traffic currently extends to the south intersection of El Camino/San Carlos during the PM peak hour. Under both project and cumulative conditions, the northbound through queue would continue to extend beyond the south intersection during both the AM and PM peak hours. Additionally, the southbound left-turn queue storage capacity is shown to be inadequate for the expected queue length under project and cumulative conditions. With implementation of the San Carlos Avenue improvements and the shift in eastbound traffic from San Carlos Avenue to Holly Street, the eastbound queue at El Camino/Holly would extend beyond the western intersection of Laurel/Holly under cumulative conditions.

The westbound through traffic on Holly Street at Old County Road is projected to extend beyond the east intersection of Industrial/Holly during the PM peak hour under both project and cumulative conditions. As the main gateway for the City of San Carlos to and from US 101, Holly Street serves a relatively large amount of traffic. The projected deficiency is due to the increase in future traffic for a movement that is currently reaching capacity.

At the intersection of El Camino/San Carlos, the maximum queue during the AM peak hour on the eastbound approach is shown to be longer than the existing queue storage capacity, causing it to extend back beyond the western intersection of Laurel/San Carlos. Under cumulative conditions, this capacity would be reduced by half with the elimination of one of the eastbound lanes, and although the volume is also projected to decrease by approximately half, this movement would continue to extend beyond the western intersection. The east leg of the intersection is shown to be inadequate to serve the existing queue. However, this leg would be eliminated with the development of the project.

The queue analysis shows extended queues for various movements under project and cumulative conditions. This is expected due to the projected increase in traffic as a result of future growth, including the proposed project, for movements that are currently at or close to be at capacity.

For informational purposes only, a queue analysis of the existing traffic volumes under the proposed future roadway network (with the San Carlos Avenue improvements in place) was performed. This analysis showed that if the San Carlos Avenue improvements were to be implemented today, traffic conditions would slightly improve for some of the movements analyzed, such as the northbound through movement along El Camino Real. This is due to the reduced traffic on northbound El Camino Real as a result of the elimination of the northbound left-turn and one of the northbound right-turn lanes at El Camino/Holly. However, the eastbound movements at El Camino/Holly would extend beyond the western intersection, as projected under cumulative conditions, and the eastbound movement at El Camino/San Carlos also would continue to extend beyond the western intersection.

The simulation analysis provides a good tool to help understand and visualize traffic conditions on a future roadway network. However, it should also be noted that the results obtained from the simulation analysis are not absolute or final, but simply an illustration of potential traffic conditions under the given parameters. The results obtained from the simulation analysis, in conjunction with other results presented in this traffic study, should be used as a guideline for future planning. Overall, the simulation analysis

shows that with carefully planned traffic signal timing and phasing, the proposed roadway network could accommodate the future traffic and pedestrian demand within the area.

# **Caltrain Transit Village Technical Appendices**

May 26, 2009

## **Appendix A**

### **Level of Service Calculations**

**Appendix B**  
**Traffic Counts**

## **Appendix C**

### **Cherry Street Reassignment**

## **Appendix D**

### **Volume Summary Tables**

## **Appendix E**

### **Signal Warrant Sheets**

## **Appendix F**

### **Poisson Probability Calculation Sheets**

## **Appendix G**

### **San Carlos Avenue Improvements Reassignment**

## **Appendix H**

### **TDM and Trip Reduction Plan**