

Technical Memorandum

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Subject: *Executive Summary of Transit Market Analysis for Highway 1 Corridor*

OBJECTIVES

The transit market study has three primary objectives:

- To identify and quantify the potential market for freeway-oriented transit services in the Highway 1 corridor; this will respond to the Santa Cruz County Regional Transportation Commission's Highway 1 HOV Project goal to encourage alternate modes of transportation.
- To determine how much of the expected transit market would likely be captured by each of the three Highway 1 HOV Lane Project Alternatives – No-Build Project Alternative, Transportation System Management (TSM) Alternative and HOV Lane Alternative.
- To determine what transit enhancements would 1) facilitate transit operations in the new HOV lanes and 2) in conjunction with ramp metering and auxiliary lanes constitute a viable lower-cost alternative to HOV lane widening. This element was performed in conjunction with the Santa Cruz Metropolitan Transit District (SCMTD) and design team to identify transit options or enhancements that would reach more transit users.

EXISTING AND FORECAST FUTURE TRAFFIC CONDITIONS

The Highway 1 corridor from Larkin Valley Road to Morrissey Boulevard in Santa Cruz is a highly traveled, heavily congested traffic corridor with up to 115,000 vehicles per day in 2005. The corridor also has high transit ridership. While comparable suburban areas would have transit ridership of about two percent of the total highway trips, the transit ridership in this corridor is about twice that, showing high existing transit demand.

Currently the corridor has average peak period travel speeds around 25 to 30 miles per hour (mph) with travel times from 23 to 27 minutes through the 8.4 mile corridor. Based on project forecasts, extended three-hour peak period congestion and travel time on Highway 1 in the study corridor will more than double by 2035. Buses and carpools will travel at about 12 mph along with other traffic. There would be no time incentive for travelers to use transit or for SCMTD to provide enhanced freeway-oriented transit services. SCMTD operating and capital costs would increase substantially just to maintain existing levels of transit service.

Travel time through the corridor under the TSM Alternative would be better than under No-Build Alternative conditions except in the southbound direction during evening peak hour, which would cause an increase in Metro operating and capital costs to maintain existing levels of transit service in the evening peak period. Adding an HOV lane in the median in each direction would provide new dedicated peak-hour capacity to buses and carpools/vanpools. With HOV lanes in place, buses and carpools would travel at free-flow speeds of 60 to 65 mph through the project limits. The HOV lanes would also improve conditions for mixed-flow traffic; the automobiles in the mixed-flow lanes would be traveling at 30 to 36 mph.

METHODOLOGY

The transit market analysis focuses on quantifying the additional market for transit services and on the potential for SCMTD to capture these additional transit riders under each alternative. The transit market analysis was conducted in three steps as described below:

- **Estimation of Current and Future 2035 Ridership:**
 - To estimate the number of existing and future daily trips that would use transit in the Highway 1 study corridor, transit trip tables from the AMBAG regional model were analyzed to review the transit ridership in the corridor and assess transit growth rates to the horizon year. AMBAG's projected future transit numbers are based on population and employment growth and a low level of transit enhancements such as expanded park-and-ride lots. While the trip tables were useful for determining growth rates, they did not capture the large low-income population using transit to commute to Santa Cruz jobs. Consequently, the transit market analysis focused on existing Metro ridership data to estimate current and future ridership.
 - The analysis used SCMTD express bus ridership for the years 2003 to 2007. Detailed bus ridership data were not available prior to 2003 because SCMTD first began using fare boxes to record ridership in July 2002. Growth rates from the AMBAG model based on adopted population and employment forecasts were used to extrapolate the current express bus ridership to the 2035 forecast year assuming a constant level of service.
- **Estimation of Latent Demand:** To give an idea of the transit ridership that could be captured above and beyond the existing ridership, latent transit demand was estimated from US DOT research on express bus and park-and-ride demand in eight other areas that included Richmond (Virginia), Louisville (Kentucky), and Hartford (Connecticut). Conditions in the Highway 1 corridor were compared with the research conditions to determine the transit potential of the local area relative to other areas.
- **Elasticity and Variation of Ridership with Travel Time and Fare Changes:** To determine the elasticity of transit ridership in the Santa Cruz corridor to cost and travel time, SCMTD ridership data over the past few years were analyzed to determine response to fare and level of service changes. Metro had three consecutive service cuts; from 2002 to 2004. Service cuts increased the most sensitive component of total travel time for a transit rider, the wait time for the next express bus. There was also a 50 percent increase in fare in 2004. The elasticity analysis of the transit ridership over this period showed that the ridership in the Highway 1 corridor is highly sensitive to travel time changes and less sensitive to fare changes.

EXPRESS SERVICES CONSIDERED FOR THE STUDY

The transit market study looked at the Santa Cruz-based express bus market that would use Highway 1 within the project limits. The express routes analyzed were 69 A, 69 W and 91 W. The peak hour trips of the Highway 17 express bus service which originate or end at the Soquel Park-and-Ride Lot were also included in the analysis. These trips use a short stretch of Highway 1 within the project limits.

Highway 17 express bus service serves a San Jose-based transit market. This express bus line started as an emergency transportation service while Highway 17 was closed to regular traffic after the 1989 Loma Prieta Earthquake. The bus service became very successful and was later expanded. This joint project of the Santa Cruz Metropolitan Transit District (SCMTD), AMTRAK, and the Santa Clara Valley Transportation Authority (VTA) has been a success since its inception.

Currently, congested conditions on Highway 1 cause delays to the Highway 17 express service that uses Highway 1. SCMTD is considering the options of extending the Highway 17 service farther south to State Park, if travel conditions for express buses on Highway 1 improve, or removing the service from the Highway 1 corridor if travel conditions continue to degrade.

RESULTS

Highway 1 through Santa Cruz is an unusual transit corridor that has high transit ridership without the dense city center usually necessary to achieve comparable levels of ridership. The high transit ridership is probably due to a high proportion of low-income service workers, but may also be due to UCSC student ridership.

Much of the express bus ridership originates at Watsonville. There is a large low-income “captive-rider” market in Watsonville commuting into Santa Cruz. “Captive” riders are transit users who use transit because they do not have access to an automobile for variety of reasons. “Choice” riders are transit users who could drive if they wished to.

Average daily express bus ridership in the corridor varied from 2,300 riders per day in 2003 to about 2,000 riders per day in 2006, excluding Highway 17 ridership. Express bus ridership declined from 2003 mostly due to the service cuts and to a lesser extent, due to the fare increase. Including the effect of Highway 17 express bus ridership (trips that originate or end at the Soquel Park-and-Ride Lot), which increased during this period, the total corridor ridership varied from 2,900 in 2003 to about 2,700 riders per day in 2006.

Projected 2035 transit ridership, without Highway 17 ridership, would be between 2,300 riders per day with current service frequency and travel times and 2,800 riders per day if transit service frequency were increased to that of 2003 (prior to the 2003 and 2004 service cuts) while maintaining current travel times. This represents a growth of about 18 to 21 percent, respectively. With Highway 17 ridership included, the future express bus ridership would vary between 3,400 and 3,700 riders per day.

Latent express bus demand in the corridor was estimated based on the results of an express bus demand study that compared the socio-economic characteristics and express bus demand of eight metro areas across the US. Comparing the characteristics of the study region to these eight regions, the latent demand for express transit in the corridor was estimated to be about an additional 40 percent of the projected future transit ridership (without Highway 17 service). The latent demand for Highway 17 service was not included in this analysis, since that express demand is driven by a San Jose based employment market.

How much of this latent demand could be captured would depend on the services provided by Metro and the actual in-vehicle travel time for express buses. The in-vehicle transit time depends on future travel conditions on the freeway under the particular project alternatives. The following subsections describe the estimated future ridership and amount of latent demand captured under each project alternative.

No-Build Alternative

The No-Build Alternative assumes no major construction on Highway 1 through the project limits other than planned and programmed improvements and continued routine maintenance. By 2035 without capacity or operational enhancements on Highway 1 capacity, congestion and travel time on Highway 1 will worsen considerably. Buses and carpools will be subjected to very congested travel conditions, traveling at about 12 mph, along with single-occupancy automobiles. Travel times would be about one hour from Larkin Valley Road to Morrissey Boulevard. These slow travel times would defeat efforts to increase transit service. There would be no travel time incentive to carpool or transit and average vehicle occupancy would remain at 1.13 to 1.24, the same as under existing 2005 conditions.

The estimated future 2035 express bus ridership quantifies the ridership that would be achieved if current traffic/transit conditions were maintained. In reality, by 2035, without highway capacity improvements, the

express buses would be subjected to very congested travel conditions on the freeway. Therefore, under the No-Build Alternative the projected growth would not be realized. None of the latent demand would be captured, and ridership may decrease compared with existing conditions. SCMTD would also experience increased operating and capital costs to maintain its current level of service due to slower bus travel times requiring more drivers and buses.

TSM Alternative

The TSM Alternative proposes ramp metering on existing interchange ramps with auxiliary lanes constructed between interchanges. The TSM Alternative also would include transit enhancements such as park-and-ride lots and Transportation Operations System (TOS) electronic equipment such as changeable message signs and vehicle detection systems. These transit enhancements would provide a slightly better scenario for increased carpooling or transit use when compared to No-Build conditions. Vehicle occupancy is estimated to improve to about 1.19 - 1.26. This alternative would not include HOV lanes or any additional through lanes on the mainline.

Travel time through the corridor under the TSM Alternative would be better than under No-Build Alternative, except in the southbound direction during evening peak hour. Continued peak hour congestion in the southbound direction with the TSM Alternative is due to the convergence of projected demand “upstream” of Morrissey Boulevard with traffic entering the corridor from the Ocean Avenue on-ramp, southbound traffic on Highway 1 from the Highway 9/River Street intersection, and traffic merging onto Highway 1 from Highway 17. In contrast, peak period congestion will be reduced because the addition of auxiliary lanes enable traffic entering and exiting the freeway to make these weaving movements out of the main flow of through traffic, which results in some minor congestion improvement.

The round trip travel times would be much worse than existing travel times, however, causing an increase in SCMTD operating and capital costs to maintain existing levels of transit service in the evening peak period. Several operational schemes were considered to improve express bus service in the corridor under the TSM Alternative. Discussions between SCMTD and the design team confirmed that there is no practical way to use auxiliary lanes to enhance freeway-oriented transit bus operations. Express bus service would consequently encounter similar conditions as the rest of the general traffic.

Transit enhancements such as expanded park-and-ride lots, more peak period express service, and connecting shuttle buses or expanded express routing to serve local destinations, would be generally supportive of transit, but do not offer any real time savings. Even under an enhanced TSM Alternative, therefore, the projected growth would likely not be realized, and the ability of SCMTD to capture any of the latent demand would be substantially degraded.

HOV Alternative

The HOV Lane Alternative would widen the existing highway configuration of four through lanes to a six-through-lane facility by adding an HOV lane in the median in both the northbound and southbound directions. This HOV Lane Alternative would modify or reconstruct nine interchanges. It also would include ramp metering and TOS electronic equipment along the entire corridor, and auxiliary lanes between interchange ramps where necessary and appropriate. Transit improvements would include park-and-ride lots and bus pads. Bus pads are bus stops on freeway ramps for freeway oriented express buses. Bus pads with pedestrian access to local streets would be constructed at some highway ramps to facilitate faster and easier highway access for buses.

With the addition of HOV lanes, buses and other high-occupancy vehicles would receive a high level of service and would travel at free-flow speeds of about 60 to 65 mph through the project limits, while the automobiles in the mixed-flow lanes would experience some congestion relief but would still be traveling at 30 to 36 mph, well below free-flow speeds. This compares to speeds as low as 11 mph under the No Project Alternative.

Under the HOV lanes Alternative, the projected future transit ridership and more can be realized. Since the transit market is very sensitive to changes in travel time, the introduction of HOV lanes to improve transit travel times would be extremely important to capture additional riders (latent demand), especially choice riders. Half of the latent ridership could be captured by improvements in travel time due to the addition of HOV lanes. If the six runs that were cut back from the three express routes in the past few years were added back or comparable express service were added in the corridor, the rest of the latent demand could be captured.

Capture of latent express transit demand would also depend on other factors such as adequate corridor park-and-ride lot capacity.

- The Park-and-Ride Study (Wilbur Smith Associates, 2007) conducted as part of the proposed project estimates future park-and-ride occupancy to be about 235 percent by year 2035, or 205 available spaces trying to serve a future demand of 481 vehicles. In total, there would be 16 additional spaces required for increases in Metro ridership on Routes 17 Express, 69A, 69W, 91, and 71, and 412 spaces required for new carpoolers taking advantage of the future HOV lanes. To meet the projected demand the study recommends adding additional spaces where the future occupancy rates would be highest, such as at the Soquel Drive/Paul Sweet Road and the Resurrection Church lots. When considering new park-and-ride facilities, the study recommends adding facilities in the southern segment of the corridor, such as a park-and-ride lot near the Freedom Boulevard exit.
- Capture of the latent market for transit also assumes bus pads at strategic corridor locations to improve rider access to the express buses and a pedestrian and bike friendly environment with access to/from park-and-ride lots and bus pad locations. The bus pad locations under consideration are at Park Avenue, Bay/Porter Avenue, and at 41st Street.

Introduction of HOV lanes would also facilitate extension of the Highway 17 express bus service farther south in the corridor to park-and-ride lots on Highway 1 as far south as State Park. This extension would help capture additional choice riders. Daily Highway 17 transit ridership using Highway 1 would increase from approximately 1,080 to 1,500, an increase of about 40 percent.

OTHER ISSUES

- One main factor that impedes SCMTD from running more express bus service is the severe congestion on the freeway, which increases in-vehicle time as well as transit operating costs. The lack of operational and maintenance (O&M) funds is also an impediment to running express buses and was the cause of the service cuts. Adding buses and operations support as part of the traffic management plan (TMP) during the construction phase of the Highway 1 HOV Lane project would improve the O&M issue near term. Reducing congestion within the project limits by adding HOV lanes would help make express bus travel times competitive with the automobile in the long term.
- Meetings with the SCMTD staff to date suggests that SCMTD is interested in and would be supportive of this approach to enhancing transit services in the Highway 1 corridor.
- Even with the HOV lanes, increased transit would not be a complete solution to the congestion related problems in this corridor.
 - Because there is very high auto use in this corridor, the improvements to transit would capture only a small portion of the total auto traffic. Maximizing the transit market above current levels would remove perhaps an additional 50 to 100 vehicles per hour from Highway 1 in the peak hour. However, this captured ridership in addition to the existing transit ridership in the corridor would be high compared to similar suburban areas.
 - Without HOV lanes, buses would be stalled along with other automobiles in highly congested mixed-flow lanes; transit service costs would increase and transit ridership would likely decline.

Improvements to transit in the corridor, such as improving in-vehicle travel time by adding HOV lanes, would increase transit ridership and make service costs more manageable by improving level of transit service.

- Without the HOV lanes, transit performance will degrade and the corridor will face an ever shrinking transit market, particularly from choice riders.
- Introduction of HOV lanes would facilitate the capture of additional riders. Additional service should be aimed at both the choice rider market and the captive rider market, first as construction mitigation and then as ongoing service utilizing the HOV lanes.