**Ridership Comments on the California High Speed Rail Program Level EIR**

**April 2010**

The below comments were included as part of comments made by Californians Advocating Responsible Rail Design (CARRD), as part of the Program Level EIR/EIS Bay Area – Merced High Speed Rail Project. The focus of the comments is specifically on those aspects of the ridership study which involved the primary policy decision in the study, which route to take.

CARRD has prepared a presentation on the concerns it has with the ridership study that it will make to interested groups, in-person or via Webex. Please contact info@calhsr.com to arrange a meeting.

The updated model coefficients, headways, travel times and other information about the ridership study is available on CARRD's website at http://www.calhsr.com/resources/ridership-forecast/ .

There are many documents referenced. A list of these is included at the end of the comments. Most of those documents are available on the California High Speed Rail Authority's website, http://www.cahighspeedrail.ca.gov/

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Californians Advocating Responsible Rail Design (CARRD) has made numerous public comments attesting to its concerns about the ridership study. We will attach a brief summary of those concerns and make Elizabeth Alexis, the CARRD founder who has focused on these issues, available for consultation.

If the High Speed Rail Authority, however, decides to continue using the current framework and model, we would offer the following comments.

As MTC and several other regional transit agencies' support for the Pacheco alternative was explicitly based on the higher ridership for Pacheco, a true accounting of the potential relative ridership of the different alignments is crucial.

One of the goals of the ridership study was to start with a given set of alternatives and then use the results to improve the alternatives, in terms of specific alignments and service attributes. The following numbers are from the Final Report:

| **Alignment** | **Alignment Description** | **Ridership** |
|---|---|---|
| **A1** | Altamont to SJ and SF | 87,910,000 |
| **A4** | Altamont to SJ only | 94,650,000 |

| | | |
|---|---|---|
| **P1** | Pacheco to SJ and SF | 93,890,000 |
| **P2** | Pacheco to SJ and SF AND Oakland | 86,080,000 |
| **P4** | Pacheco to SJ only | 80,040,000 |

A Pacheco train (P4) that only served San Jose was forecast to have 80 million riders. Adding service to San Francisco (P1) added over 13 million riders. Adding a branch from San Jose to Oakland (P2) to the San Francisco branch, which would extend service to the length of the East Bay, resulted not in the addition of millions of additional riders, but the loss of almost 8 million riders.

Altamont train alignments that only served one of the three major Bay Area destinations all had higher ridership than the main Pacheco alignment. For example, Altamont service to just San Jose had almost 95 million riders. Adding service from Fremont that would allow direct trains to San Francisco caused the loss of almost 7 million riders.

The explanation given in the Final Report and one that we would now concur with given the January 2010 release of the frequency coefficients and the very recent release of train frequencies is that the model heavily penalized train-splitting.

[Please note: in the information STILL referenced by the EIR, the frequency sensitivity is given as a very modest number with an explanation that for long distance travel, frequency is more about scheduling convenience and not about waiting for a train. In urban transit systems with frequent service, passengers will simply show up and they end up waiting, on average, half the headway for a train. This particular coefficient would not have explained the pattern of ridership in the study as being attributable to train-splitting.]

In fact these numbers suggest **that the train-splitting penalty could be as much as 20 million riders**, twice as much as the entire Northeast corridor ridership. This number is calculated by looking at the Pacheco numbers to see how many riders were gained by adding service, without train-splitting, and looking at how many riders each alternative lost by adding service with a split.

**Study an Altamont Alignment that would serve San Francisco and San Jose on one route**

While we would argue that the magnitude of this penalty is more an indication of problems with the model than an accurate representation of reality, if the Authority stands by the model, it should then have planned routes according to the data in accordance with its stated intent in the Second Peer Review report:

"For all modes, service must first be assumed, and then we can apply the models to produce demand that is produced with that service. Service can be adjusted to better match demand after initial ridership is produced; this is typically referred to as an equilibration process."

The ridership study demonstrates that the cost of lower train frequencies and the penalty for train-splitting is much greater than differences in travel times and overwhelms adding direct service to additional areas.

The ridership study examined well over 50 different alignment alternatives. The only alternative that does not seem to have been studied is an alignment that would enter the Bay Area via the Altamont Pass, stop in San Jose and then travel up the Peninsula along the Caltrain corridor to San Francisco.

CARRD is not advocating for this alignment, but the results from the ridership study imply that it would have much higher ridership than the other alignments analyzed, at a similar or lower cost.

In this case, a route up the Peninsula from San Jose should clearly have been the focus of study once the initial ridership results were in.  This would have added service without incurring the penalty and avoided environmental.

**Make adjustments to account for many options available to Bay Area travelers**

One of the reasons that the train-splitting penalty was so high was that off-peak headways were actually quite high. Mathematically, the train-splitting penalty is calculated by adding one minute of travel time for every minute of headway. Headways indicate how frequently the trains come. A schedule with 4 trains an hour would have 15 minute headways.

Thus the train-splitting penalty was a function of the absolute level of headways (one hour headways for the main Pacheco were like adding 30 minutes onto each Altamont train, two hour headways added 15 minutes of travel time to Altamont trains, 30 minute headways added 15 minutes).

CARRD recently made a site visit to MTC and was able to obtain what are believed to be the actual headways used in the analysis. These were not publicly available and the Authority has still not provided confirmation or denial that these are the headways. It is clear, however, that the headways in the publicly available documents are NOT those used in the ridership study.

These show very high off-peak headways, particularly for stations other than trains among San Diego, Los Angeles, San Francisco and San Jose stations.

| Route | Headway (minutes) |
|---|---|
| Millbrae (SFO) – Fresno via Pacheco | 2 hrs 51 minutes |
| San Jose – Anaheim via Pacheco | 1 hr 58 minutes |
| San Jose – Sylmar via Altamont | 5 hrs 4 minutes |

There are several important things to note.

In “real-life”, if frequent trains are important, people will generally shift travel to time periods with more frequent service.  In this study, everyone other than business and commute traffic had no choice but to travel during the off-peak travel period, which offered significantly lower levels of service compared to the peak travel period.

In fact, according to Table 6.3 of the Validation Report, approximately 80% of the trips currently constrained to occurring during off-peak infrequent service times take place during peak travel periods.

In addition, those living in an urban area such as the Bay Area or the Los Angeles basin have many stations and airports from which to choose.  If a plane or train is not available at a convenient time, it is reasonable to assume that a traveler would simply change their origin station/ airport.

Indeed, this dynamic is apparent in California air markets. It is such a well-known phenomenon that the ridership consultant, Cambridge Systematic, assumed that headways from any Bay Area or LA airport were half of the actual headway to account for the fact that travelers have multiple airports to choose from.

From table 2.22 in the LOS report: “Headways from San Francisco to Los Angeles region airports were assumed to be half the quoted headway because most travelers have more than one airport choice and therefore have twice as many air trips to choose from.”

For example, the model assumes someone who lives in Los Angeles who is one minute closer to the Norwalk station than Los Angeles Union Station (LAUS) will ONLY travel from the Norwalk station, even though LAUS offers significantly more frequent service.

Under the math of the current model, someone who lives in the current Norwalk station catchment area would be willing to drive several hours to get to a station with better service. Unfortunately, the current model does not allow a passenger to go one mile out of their way.

This dynamic means that the effective service differences introduced by train-splitting are exaggerated as travelers to/or from the Bay Area would be expected to overcome the very high headways that exist in the off-peak periods by traveling to/from a different station or at a different time.

***There should either be a “station selection” model or an adjustment to certain headways to apply the same reasonable logic that is used for air travel to long-distance high speed rail travel.***

**Rerun numbers with current “optimal” schedule**

The attached email from Nick Brand describes the evolution of a service schedule to an “optimal” schedule. Not surprisingly given what we now know about the frequency coefficient and the off-peak travel schedule, increasing off-peak service dramatically increases ridership.

Subsequent to the study (which was finished in July 2007) but prior to the commencement of this draft version of the Program EIR, Parsons Brinkerhoff determined that much higher levels of off-peak travel were warranted. Off peak trains were increased from 60 trains per day to 140 trains.

The intent of the study was clearly to use information learned in the study to optimize the schedules. Given that the primary learning was that headways, particularly during off-peak periods, mattered and that headways were a significant differentiator between the Altamont and Pacheco routes, it is surprising that such optimization did not occur during the course of the original study.

This more than doubling of off-peak trains significantly lowers headways, which if incorporated into the ridership study would have dramatically lowered the train-splitting penalty, which was proportional to the headways.

***The forecasts for the primary Altamont and Pacheco routes (as well as A4 and the new proposed Altamont route up the Peninsula) should be re-run with the optimized schedule***.

**Re-run Pacheco with two San Francisco stations**

The California High Speed Rail Authority board took affirmative action at its April 8, 2010 meeting to endorse a two station alignment, based on capacity constraints of Transbay Terminal. The PB Transbay Memo indicates that a second terminal would be required to handle the planned number of trains.

Presumably, such a split in San Francisco would not be required with an Altamont alignment in which some trains terminated in San Jose.

The ridership numbers should be re-run to reflect this capacity constraint and subsequent train splitting. The capital costs should also be recalculated to incorporate an additional terminal station.

**Analyze ridership potential for main Altamont and Pacheco (two SF terminal variations) for Phase 1**

Subsequent to the original Program EIR, California voters passed Proposition 1A which provided bond funding for the High Speed Rail Project.

This bond measure prioritized construction of the phase 1 route, from San Francisco to Anaheim.

There is currently no funding available for extensions to Sacramento and San Diego and the 2009 Business Plan makes clear that any system profits will go to the private investors in the system.

Thus, it is reasonable to presume that for a period of years only the Phase 1 route will be in place and it is possible that the full system is never completed.

The Program EIR should analyze the ridership potential of the main Pacheco and Altamont alignments, using the Phase 1 route.

**Provide station catchment areas for Bay Area stations**

Maps showing station catchment areas for Los Angeles area stations were produced as part of the 2009 Business Plan Addendum. The same maps should be created and included for Bay Area stations, to help understand the potential local traffic impacts as well as plausibility of forecasts.

**General concerns with the ridership model**

**Too high costs of driving.** The study used a survey in which the cost of driving was explicitly fuel costs only. The forecasts inappropriately use a multiple of fuel costs (1.6x fuel costs) as an input. According to a recent Cambridge Systematics review of another ridership study (available at http://www.fra.dot.gov/downloads/rrdev/Appendix_B_Ridership_Forecast_Review.pdf): "Usually, auto travelers will consider their cost of travel to be only their out-of-pocket gas costs. Thus, in most intercity travel models, auto costs are generally in the range of $0.10 to $0.15 per mile. While higher per mile costs are more consistent with the true costs of driving (including operating, maintenance, and ownership costs), they are generally not considered by travelers for specific travel decisions."

**Reliance on stated preference data for main mode choice model.** Stated preference data has known issues that bias estimation results. Because of this, the study design specifically stated that both revealed preference and stated preference data would be used. For some reason, only stated preference was used. In the calibration process, this resulted in very large mode specific constants that highlight the bias that in fact was present in the study sample.

**Sampling issues.** There were only 27 long distance commuters surveyed which resulted in a decision to constrain the long distance commute market to the same coefficients as the business model. This meant that long distance commuters were given a value of time of $64 as opposed to shorter distance commuters whose time was originally valued at less than $5/ hour before being constrained. In addition 96% of short term commuters were current train commuters. The sample also specifically excluded travelers to and from regions such as the AMBAG area, which end up being a significant factor in Pacheco's ridership.

**Frequency coefficient.** The frequency coefficient was arbitrarily constrained to be the same as the time coefficient. This is inconsistent with the general literature on long distance intercity travel and 3 to 4 times higher than the coefficient for frequency used in the original Charles River Associates study and 5 times higher than the original results indicated. As the study repeatedly points out, frequency represents scheduling convenience, not waiting time.

Documents incorporated by reference

Bay Area/California High-Speed Rail Ridership and Revenue Forecasting Study Findings from the First Peer Review Panel Meeting, Cambridge Systematics, Inc., July 2005.

· Bay Area/California High-Speed Rail Ridership and Revenue Forecasting Study Findings from the Second Peer Review Panel Meeting, Cambridge Systematics, Inc., July 2006. **"Second Peer Review"**

· Bay Area/California High-Speed Rail Ridership and Revenue Forecasting Study Model Design, Data Collection, and Performance Measures, Cambridge Systematics, Inc.; with Citilabs; Corey, Canapary & Galanis; HLB Decision Economics; Mark Bradley Research and Consulting; and SYSTRA Consulting, May 2005.

· Metropolitan Transportation Commission High-Speed Rail Study, Overview and Documentation of Surveys (Air/Rail/Auto Trips), Corey, Canapary & Galanis, December 2005.

· Bay Area/California High-Speed Rail Ridership and Revenue Forecasting Study Socioeconomic Data, Transportation Supply, and Base Year Travel Patterns Data, Cambridge Systematics, Inc., December 2005.

· Bay Area/California High-Speed Rail Ridership and Revenue Forecasting Study Interregional Model System Development, Cambridge Systematics, Inc., with Mark Bradley Research & Consulting, August 2006. "**Model Development**"

· Bay Area/California High-Speed Rail Ridership and Revenue Forecasting Study
Statewide Model Networks, Cambridge Systematics, Inc., July 2007.
· Bay Area/California High-Speed Rail Ridership and Revenue Forecasting Study
Statewide Model Validation, Cambridge Systematics, Inc., March 2007. **"Validation Report"**
· Bay Area/California High-Speed Rail Ridership and Revenue Forecasting Study
Levels of Service Assumptions and Forecast Alternatives, Cambridge Systematics,
Inc., with SYSTRA Consulting, Inc.; and Citilabs, August 2006. **"LOS Report"**
· Bay Area/California High-Speed Rail Ridership and Revenue Forecasting Study
Ridership and Revenue Forecasts, Cambridge Systematics, Inc., August 2007.
·Bay Area/California High-Speed Rail Ridership and Revenue Forecasting Study
Final Report, Cambridge Systematics, Inc., July 2007.**"Final Report"**
Review of Transbay Transit Center Design of March 9, 2010, Parsons Brinkerhoff "**PB Transbay Memo**"

## Jacqui Richter

**From:** Brand, Nicholas [Brand@pbworld.com]
**Sent:** Monday, October 19, 2009 1:33 PM
**To:** Carrie Pourvahidi; Daniels, Anthony; sschnaidt@hsr.ca.gov; Harrison, John; Spaethling, Dominic; 13259@pbworld.com
**Subject:** Increase in Transbay boardings

Here's a copy of what I couldn't email to Judge Kopp about his Transbay questions, but faxed per current practice… Nick

Dear Judge Kopp,

Following up on our phone call Tuesday last, here are the specifics.

Annual boardings at Transbay have increased from 12 million in August '08 to 13 million now because:

- the year under consideration changed from 2030 to 2035 in order to meet project-level EIR/EIS requirements, adding 0.6 million boardings. This increase in traffic of under1% a year is due to forecast growth in population and employment, both in the Bay Area and in the rest of the State being served by the HST.

- the service was improved by adding 14 trains in the ten off-peak hours and converting one limited-stop train an hour in the peak in each direction to a non-stop express between San Francisco Transbay and Los Angeles. (The fastest trains previously had been the hourly peak one-stops in San Jose; they were retained.) These improvements added 0.4 million boardings.

Since the Bay Area – Central Valley Programmatic EIR/EIS, the service pattern has been steadily improved to provide more trains, and to provide more direct service between more important markets. (The assumed acceleration and top speeds of the trains has remained the same, and the alignment has not been assumed to improve.) We now appear to be at a point where there is limited room to improve train frequencies, so it is likely that we are close to the maximum traffic for the current set of fare and future travel condition assumptions. The table below shows the evolution of forecast boardings at Transbay and a summary of the service improvements creating the additional traffic.

You may wonder why Phase 1 boardings are higher than Full System boardings in any given comparable scenario. This is because the ridership modeling finds that Sacramento, Stockton, and Modesto stations in the Full System are more convenient than Transbay for those who are travelling to/from the eastern edges of the Bay Area. For example, someone from Joe DiMaggio's home town (Martinez) would take the train at SF Transbay in Phase 1, but find it quicker and cheaper to drive to Stockton in the Full System. This seems reasonable to me.

Regards, Nick Brand

### History of Transbay Boarding Forecasts

| Horizon year | When made | Scenario | Boardings: Daily | Boardings: Annual | Notes | Sour |
|---|---|---|---|---|---|---|
| 2030 | Summer '07 | Full System, Programmatic EIR/EIS | 26,500 | 9.7 million | 112 peak trains & 60 off-peak trains - total 172 trains / day at Transbay | CS Draft Ex Summ |
| | Aug. '08 | Phase 1 | 32,900 | 12.0 million | 96 peak trains & 126 off-peak trains - total 222 trains / day at Transbay | CS Technic Report, Au |
| | Summer '09 | Full System Improved Operating Pattern | 31,100 | 11.4 million | 120 peak trains & 140 off-peak trains - total 260 trains / day at Transbay - added non-stop express & more limited stop trains | CS Technic Report, Jun rev Aug '09 |

| | | | | | |
|---|---|---|---|---|---|
| | | Phase 1 Improved Operating Pattern | 33,900 | 12.4 million | 96 peak trains & 140 off-peak trains - total 236 trains / day at Transbay - added non-stop express |
| 2035 | Summer '09 | Full System Improved Operating Pattern | 32,700 | 11.9 million | 120 peak trains & 140 off-peak trains - total 260 trains / day at Transbay |
| | | Phase 1 Improved Operating Pattern | 35,700 | 13.0 million | 96 peak trains & 140 off-peak trains - total 236 trains / day at Transbay |