LAW OFFICES OF STUART M. FLASHMAN
STUART M. FLASHMAN (SBN 148396)
5626 Ocean View Drive
Oakland, CA 94618-1533
TEL/FAX (510) 652-5373
e-mail: stu@stuflash.com

Attorney for Petitioners and Plaintiffs Town of Atherton *et al.*
(Exempt from filing fees – Gov. Code §6103)

IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA

IN AND FOR THE COUNTY OF SACRAMENTO

TOWN OF ATHERTON *et al.*,
Petitioners and Plaintiffs
v.
CALIFORNIA HIGH SPEED RAIL AUTHORITY, a public entity, and DOES 1-20,
Respondents and Defendants

No. 34-2008-80000022 filed 8/8/08
Judge Assigned for All Purposes:
HONORABLE MICHAEL P. KENNY
Department: 31

DECLARATION OF ELIZABETH GOLDSTEIN ALEXIS IN SUPPORT OF PETITION FOR WRIT OF ERROR *CORAM NOBIS*

Date:	August 20, 2010
Time:	9:00 AM
Dept.	31
Judge:	Hon. Michael P. Kenny

I, Elizabeth Goldstein Alexis, declare as follows:

1. I am a resident and citizen of the City of Palo Alto in Santa Clara County. I am a certified financial planner and a founding member of Californians Advocating Responsible Rail Design ("CARRD"), a group of professionals living on the San Francisco Peninsula with an interest in promoting open and rational discussion of rail service options for California. I have personal knowledge of the facts set forth in this declaration and am competent to testify as to them if called as a witness.

2. I received my BA degree from Yale University in 1991 with a joint major in Mathematics & Economics and History. I attended graduate school at Stanford University from 1997 to 2001 in a Ph.D. program focused on Econometrics and Industrial Organization.

3. Between 1991 and 1998, I was employed by Bankers Trust Company doing financial work relating to its investment and trading activities. From 2004 to the present, I have been

employed by Alexis and Palmer Financial Advisors LLC providing investment advisory and portfolio management services to clients. In both of these jobs, I have had extensive experience in developing, evaluating, and working with mathematical models used in the financial services industry.

4. The models used in my field of study, microeconomics, are conceptually very similar to those used in transportation planning. In particular, the methodologies used in testing and evaluating models are essentially the same, regardless of what is being modeled.

5. I first became aware of the high-speed rail program in January 2009 through participation in a local neighborhood group. As a consequence of my familiarity with mathematical modeling, I took a particular interest in the modeling being done in connection with the California High-Speed Rail Project in California. Beginning in September 2009, I began studying the ridership and revenue modeling being done for the California High-Speed Rail Authority ("Authority"). My initial review of the publicly available ridership and revenue model information led me to have some concerns about the studies.

6. I attempted to follow up on these concerns through contacts with the Authority and the California Department of Transportation ("Caltrans"). Based on information in the minutes of the August 2009 CHSRA Board meeting, I believed that Caltrans was working a new ridership study as part of a Statewide Travel Model that was being developed by UC Davis, under a Caltrans sponsored program.

7. I contacted Professor Mike McCoy, the principal investigator for the modeling effort at UC Davis, and learned from him that UC Davis was not moving forward with the modeling study. However, his comments about the high-speed rail modeling study deepened my concerns about that study.

8. On November 2, 2009, I sent a brief summary of my concerns via email to Mr. Chad Baker, the person heading that effort at Caltrans. A true and correct copy of that e-mail is attached hereto as Exhibit A. Mr. Baker forwarded my concerns to Mr. Dan Leavitt at the Authority.

9. When the Authority released its 2009 Business Plan in December 2009, I discovered that the business plan contained new ridership estimates, presumably using the same model. At that point, I decided to make my concerns public, because it appeared the Authority was continuing to rely on a model that I thought had serious deficiencies.

10. On or about December 22, 2009, I contacted Mr. George Mazur, the lead person on the ridership modeling project at Cambridge Systematics, Inc. ("CS"). Through my review of Authority documents, I had learned that CS had actually developed the ridership model under contract with the Authority and the Metropolitan Transportation Commission ("MTC"). While Mr. Mazur was already familiar with my concerns and had apparently received copies of my prior e-mails to the Authority, he refused to provide me with copies of his responses to those e-mails, indicating that I would have to seek those responses from the Authority.

11. On or about December 23, 2009, I contacted Mr. Nick Brand, a consultant to the Authority, to see if I could obtain Mr. Mazur's responses. We discussed meeting in person after the holidays to talk about modeling and cost issues. I also sent Mr. Brand an e-mail requesting a copy of Mr. Mazur's response to my earlier comments. A true and correct copy of that e-mail is attached hereto as Exhibit B.

12. On or about December 30, 2009 I was contacted by Mr. Jeffrey Barker, a deputy general manager at the Authority. Mr. Barker asked that we meet to discuss my concerns. Approximately one week later, I discussed a meeting with Mr. Barker by phone and I again expressed to Mr. Barker that I wanted to receive a copy of Mr. Mazur's e-mail comments, as well as a copy of the final model coefficients, and made that a condition on my willingness to meet with the Authority and CS.

13. As I continued to review the published information on the ridership modeling, I came to realize that the results could not have been obtained with the model included in the Authority's published reports. Among other things, my attempts to recreate a key data table in one of the modeling reports based on the published model information failed. In particular, some of the table values differed from my calculations by a factor of ten, indicating that the figures had been entered by hand, allowing typographical errors to occur. This also meant that data manipulation could have occurred. In addition, the high degree of headway sensitivity shown in the results did not appear explainable based on the published model parameters.

14. On or about January 14, 2010, I sent an e-mail to Mr. Barker, again requesting Mr. Mazur's responses to my comments on the model, as well as a copy of the model itself. A true and correct copy of that e-mail is attached hereto as Exhibit C. On or about January 20, 2010 I sent another e-mail renewing my requests or, in the alternative, asking that the Authority direct

CS to provide the requested documents. A true and correct copy of that e-mail is attached hereto as Exhibit D.

15. On or about January 19, 2010, the Authority released a public statement indicating that it was participating in a new statewide travel demand modeling effort sponsored by Caltrans and to be conducted at UC Davis. The following day, upon learning of this statement, I sent an e-mail to Mr. Barker, as well as several legislative staff members, indicating that, to my knowledge, based on my conversations with Professor McCoy, the Authority's statement was not accurate and that UC Davis was not planning to address high-speed rail passenger demand in any study. I also noted in that e-mail my inability to obtain CS's responses to my earlier comments on the Authority's model and the continued unavailability of the model itself for public review. A true and correct copy of that e-mail is attached hereto as Exhibit E.

16. On January 21, 2010, I received an e-mail from Jeffrey Barker in which he indicated he was, "gathering that information for you," and promised that he would, "ensure your request is responded to within the 10 days allotted by state public records request law." A true and correct copy of that e-mail is attached hereto as Exhibit F. On that same day, I received another e-mail from Mr. Barker that had attached to it Mr. Mazur's responses to my initial comments on the model, which I had initially requested a month earlier. In that same e-mail, Mr. Barker indicated, responding to my request for the final model coefficients, that, "there is no document that responds to your request, but we're having Cambridge Systematics put together the information for you, and believe we'll be able to get it to you by next week." A true and correct copy of that e-mail is attached hereto as Exhibit G.

17. Upon reading Mr. Mazur's comments, I felt it imperative to respond to what I felt were confusing, and in some cases possibly inaccurate, characterizations. I therefore sent an e-mail to Mr. Mazur and Mr. Brand, with copies to Mr. Barker, Mr. McCoy, and Mr. Baker, asking for further details about how the survey results were incorporated into the modeling effort. A true and correct copy of that e-mail is attached hereto as Exhibit H. I never received a response to this e-mail.

18. After continuing to follow up with Mr. Barker, I received the final model on January 31, 2010, along with a transmittal memo from Mr. Mazur to the Authority that stated that the revised model coefficients had been provided to MTC, but that MTC had, "elected not to include the

information in the final report." A true and correct copy of the model information as received, and of the transmittal memo from Mr. Mazur are attached hereto as Exhibit I.

19. Upon reviewing the model coefficients and comparing them with the published model coefficients, I concluded that the model had been significantly changed after the peer review process had ended, and that the new model coefficients were highly questionable. At this point, I contacted, among other people, Mr. Stuart Flashman, the attorney representing the plaintiffs in the *Town of Atherton* lawsuit against the Authority. I explained my concerns about the model and, at his request, forwarded to him the modeling coefficient information, and Mr. Mazur's cover letter.

20. In reviewing the model coefficient file I received, I noticed that one of the parameters had changed by an extraordinarily high amount. Recalling my observations on other CS-prepared tables, I suspected there might have been a typographical error. I immediately contacted both the Authority and CS and asked whether this coefficient change could be a typographical error. A week later, I received an e-mail response confirming that the one coefficient I had identified had, indeed, been erroneously increased by a factor of ten. So far as I am aware, neither CS nor the Authority has identified any other errors in the coefficients that were transmitted to me.

I have personal knowledge of the above facts, and I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct. Executed on May 5, 2010 at Palo Alto, California.

Elizabeth Goldstein Alexis

Exhibit A

Elizabeth Alexis <ealexis@gmail.com>
To chad.baker@dot.ca.gov
11/03/2009 03:53 cc PM
Subject Issues and concerns about existing ridership model
Please respond to elizabeth@alexispalmer.com

I have many issues and concerns which range from the review process to quite nit-picky things about inflation. Below are my top concerns with the current ridership model.

1) Non random sampling used to estimate model parameters. The stated preference survey used to estimate mode choice was highly biased, and the source of bias (mode choice) is highly correlated with the dependent variable (mode choice). This is a no-no under econometrics 101. You can compare table 2.1 on page 17 from this document which describes the actual mode choices of survey participants vs table 2.2 on the next page which was a truly random sample of California residents. An extreme example is that for short (less than 100 miles) inter-regional commute trips, the model was estimated using 6 people who commute via car and 159 who commute via rail. This compares to the random sample in which 854 who commute similar distances did so by car and only 9 by rail. This is not a typo - the SP survey data used 96% of current rail passengers to estimate the market segment which is responsible for the highest number of inter-regional trips when in real life only 1% of people commute that way.
2) Overly simplistic treatment of Value of Time. It covers the door to door trip travel time. It is a linear function. It does not account for different income levels other than estimating a different parameter for business travelers NOR differentiate between line haul time and access times. Table 3.15 on page 75 of the document I previously linked to has the regression results. Professor Cervero from Berkeley as well as the seminal studies on transit demand done by Professor Dan McFadden for the Bart project have documented the important distinction that travelers use between line haul time and travel time to and from a station.
3) Extreme traffic conditions in 2030 are used for forecasting. The model has a simplistic methodology - all business and commute travel happens during peak time and all other travel happens during off-peak time.
4) Model more or less fails when it comes to induced trips.
5) Model uses several different existing regional transportation models for urban travel estimates. These are mostly old style gravity models and virtually no information is included for evaluation.
6) There is NO statistical output concerning confidence intervals for the actual forecasts. What limited statistical output there is from estimations suggests quite wide confidence intervals....
7) There needs to be much more extensive sensitivity analysis wrt the many assumptions (population growth, auto traffic costs, highway/transit network etc.).

Exhibit B

From: **Elizabeth Alexis** <elizabeth@alexis-palmer.com>
Date: Wed, Dec 23, 2009 at 4:34 PM
Subject: Re: your call yesterday
To: "Brand, Nicholas" <Brand@pbworld.com>
Cc: 13259@pbworld.com, "Spaethling, Dominic" <Spaethling@pbworld.com>

We can all touch base after the holidays but it would be great if I could get a copy of the email that Cambridge sent in response to my comments. I am working on something and I would like to make sure I've got all my facts straight.

Regards,
Elizabeth

Exhibit C

From: Elizabeth Alexis [ealexis@gmail.com]
Sent: Thursday, January 14, 2010 3:38 PM
To: Jeffrey M. Barker
Subject: Requests

Jeff,

As per our conversation yesterday, I am requesting a number of items for review.

First, I would like the response from the consultant to my concerns.

Second, I would like the final parameters used to forecast the mode choice and egress/ingress models.

I am looking for the numbers used in application that in tinyurl.com/hsrmodel were in tables 3.12, 3.13 and 3.15

Regards,

Elizabeth Goldstein Alexis

Exhibit D

From: Elizabeth Alexis [ealexis@gmail.com]
Sent: Wednesday, January 20, 2010 12:46 PM
To: Jeffrey M. Barker
Subject: Ridership analysis items - 2nd request

Jeff,

Can I please either be forwarded the information I requested (the response from the consultant to my comments and the final model used for mode share forecasts) or can you authorize the consultant to provide me with the information I requested?

Regards,
Elizabeth

--

Exhibit E

From: ealexis@gmail.com on behalf of Elizabeth Alexis [elizabeth@alexis-palmer.com]
Sent: Wednesday, January 20, 2010 12:59 PM
To: Art Bauer; Ojakian, Ryan; Jeffrey M. Barker; Gardner, Junay
Cc: ed.imai
Subject: Clarification: Caltrans/ UC Davis NOT doing ridership forecast

Officials from the High Speed Rail Authority yesterday said that a new ridership forecast will be done as part of the statewide travel demand modeling effort sponsored by Caltrans and being done by a center at UC Davis, headed by Professor Mike McCoy. This is not accurate.

At one point, that was the plan. Because of the issues with the data from the High Speed Rail surveys that I have discussed ad naseum, they were unable to do so. Professor McCoy will NOT be producing a ridership model, although he has agreed to help write the scoping documents for whoever does end up doing so, as well as help provide some data for the inputs.

At this point, I am unclear if any ridership model is actually moving forward, although I would be more than happy to be involved with those discussions.

If you would like any more details on Davis's involvement, I would suggest contacting Professor McCoy directly.

On a related note, the project he is undertaking to be able to provide a model robust enough to provide insights into the relationship between transportation and land use seems immensely important, yet at this point not fully funded.

I would just close by saying that I have requested a copy of the response that the Authority's consultants provided to them regarding comments I have made and am still awaiting this. The final model used for forecasting demand has also not been released.

Regards,
Elizabeth

Exhibit F

From: Jeffrey M. Barker [jbarker@hsr.ca.gov]
Sent: Thursday, January 21, 2010 11:18 AM
To: elizabeth@alexis-palmer.com
Subject: RE: Items I've requested

Elizabeth,
I'm in the process of gathering that information for you and will ensure your request is responded to within the 10 days
allotted by state public records request law.
Looking forward to this evening's hearing.
--barker

From: Elizabeth Alexis [mailto:ealexis@gmail.com]
Sent: Thursday, January 21, 2010 11:14 AM
To: Jeffrey M. Barker
Subject: Items I've requested

Jeff,

I have no interest in using my speaking time tonight to rant and rave about my reasonable requests having been stonewalled but if I don't get over getting a copy of the email and the model information asap but I will no have choice but to do so. Please get me the items I've requested.

Regards,
Elizabeth

Fax: 650-989-4089
--
Elizabeth Goldstein Alexis

Exhibit G

From: Jeffrey M. Barker [jbarker@hsr.ca.gov]
Sent: Thursday, January 21, 2010 4:28 PM
To: elizabeth@alexis-palmer.com
Cc: Rachel Weninger
Subject: ridership email you requested
Importance: High

Elizabeth,

I'm finally back in front of a computer after travelling all day yesterday and today.

Below is the email you requested from George Mazur commenting on your email. You should be able to see the comments in green embedded in your email's text.

On the second item you've requested, on the final model parameters, there is no document that responds to your request, but we're having Cambridge Systematics put together the information for you, and believe we'll be able to get it to you by next week.

--barker

From: George Mazur [mailto:gmazur@camsys.com]
Sent: Tuesday, December 22, 2009 5:25 PM
To: Brand, Nicholas; dleavitt@hsr.ca.gov
Cc: David Kurth; Ronald West
Subject: Elizabeth Alexis
Importance: High

Nick/Dan - I just received a phone call from Elizabeth Alexis. You might remember that we were forwarded an e-mail that Ms. Alexis sent to Chad Barker (Caltrans) on 11/3/09, and I sent a response to both of you on November 9. I have copied her e-mail and our response below.

She indicated that her group was beginning a "road show" (her words) [as indicated] in her 11/3 e-mail. [Q] Ms. Alexis called to offer me the "courtesy of getting my side of the story" out, and of reviewing the report that they plan to release. I politely declined her offer and requested that she contact Nick. She indicated that she had not received a response to her 11/3 e-mail from Caltrans or the Authority. I indicated that I have seen her e-mail and we have discussed it internally. Without going into any details, I did mention to her that the 11/3 e-mail had many inaccuracies; this seemed to pique her interest [Q].

Ms. Alexis suggested a meeting in the near-term between her group, the Authority, and the R&R team (CS & Nick) to discuss her questions. The decision to hold such a meeting is yours, but I am available and quite willing to participate in such a meeting if a decision is made to hold it. She indicated that she will be in contact with Nick in the near future. Let me know if you would like me to get back in touch with her to schedule a meeting.

Regards,

George

----- Forwarded by Chad Baker/HQ/Caltrans/CAGov on 11/04/2009 09:12 AM -----

Elizabeth Alexis <ealexis@gmail.com> To chad.baker@dot.ca.gov 205 11/03/2009 03:53 PM cc Subject Issues and concerns about existing Please respond to ridership model elizabeth@alexispalmer.com

I have many issues and concerns which range from the review process to quite nit-picky things about inflation. Below are my top concerns with the current ridership model.

1) Non random sampling used to estimate model parameters. The stated preference survey used to estimate mode choice was highly biased, and the source of bias (mode choice) is highly correlated with the dependent variable (mode choice). This is a no-no under econometrics 101. You can compare table 2.1 on page 17 from this document which describes the actual mode choices of survey participants vs table 2.2 on the next page which was a truly random sample of California residents.
<<GDM – Actually, all surveys were conducted using random sample or stratified random sample techniques. Tables 2.1 and 2.2 report response distributions from two different surveys, both of which were used in our model estimation. Table 2.2. is not a "truly random sample of California residents" as stated; it is a cross-tab from the 2001 Caltrans household survey.>>
An extreme example is that for short (less than 100 miles) inter-regional commute trips, the model was estimated using 6 people who commute via car and 159 who commute via rail. This compares to the random sample in which 854 who commute similar distances did so by car and only 9 by rail. This is not a typo - the SP survey data used 96% of current rail passengers to estimate the market segment which is responsible for the highest number of inter-regional trips when in real life only 1% of people commute that way.
<<GDM – Actually, as noted above, one needs to add Tables 2.1 and 2.2 to find the correct number of surveys in each strata. Using Ms. Alexis' example of short-distance commute trips, model estimation was done using 860 observations from auto (6 + 854) and 168 from rail (159 + 9).>>
2) Overly simplistic treatment of Value of Time. It covers the door to door trip travel time. It is a linear function. It does not account for different income levels other than estimating a different parameter for business travelers NOR differentiate between line haul time and access times. Table 3.15 on page 75 of the document I previously linked to has the regression results. Professor Cervero from Berkeley as well as the seminal studies on transit demand done by Professor Dan McFadden for the Bart project have documented the important distinction that travelers use between line haul time and travel time to and from a station.
<<GDM – Actually, Ms. Alexis is only looking at regression results for the main mode choice model (Table 3.15); she missed the implications of the nesting coefficients for the access & egress log-sums in the main mode choice model. The access and egress logsums (Table 3.12 and 3.13) explicitly include drive time to/from the stations and out-of vehicle time. The main mode choice model also includes line-haul headway. Terminal time and wait time were also separately estimated but ultimately bundled into the mode specific constants since we had no plans to test alternate values. Income levels, household size, auto ownership, trip purpose and trip distance are all explicitly included as variables in the six different logit models in the HSR model.>>
3) Extreme traffic conditions in 2030 are used for forecasting. The model has a simplistic methodology - all business and commute travel happens during peak time and all other travel happens during off-peak time. **<<GDM – Actually the 2030 traffic conditions in the travel model are consistent with those produced by MPOs throughout California; they are not "extreme". Assertion regarding "all business and commute travel..." is also incorrect. The model is daily in nature, and uses peak travel times in the logit models for business/commute trips and off-peak travel times in the logit models for other trips. The model makes no assumption or conclusion regarding when within a day different trip purposes will occur.>>**
4) Model more or less fails when it comes to induced trips. **<<GDM – Actually, the model predicts limited potential for induced travel, pointing to the fact that California travel markets are relatively well-served by existing travel options.>>**
5) Model uses several different existing regional transportation models for urban travel estimates. These are mostly old style gravity models and virtually no information is included for evaluation. **<<GDM – True, but the vast majority of urban travel demand model are "old style gravity models", and such models are in worldwide use for a variety of passenger travel forecasts.>>**
6) There is NO statistical output concerning confidence intervals for the actual

forecasts. What limited statistical output there is from estimations suggests quite wide confidence intervals.... **<<GDM - We agree on the first sentence. Confidence intervals for ridership/revenue forecasting are a function of changes in the input variables (e.g. economic & demographic conditions, fuel and parking costs, fares and operating plan for air/rail, etc.). However, since alternate variables have not been developed or tested in the model, there is no evidence to suggest that "wide confidence intervals" exist.>>**
7) There needs to be much more extensive sensitivity analysis wrt *[sic]* the many assumptions (population growth, auto traffic costs, highway/transit network etc.). **<<GDM - We agree, and this sensitivity analysis will be addressed in the investment-grade analysis.>>**

Exhibit H

From: **Elizabeth Alexis** <elizabeth@alexis-palmer.com>
Date: Thu, Jan 21, 2010 at 6:31 PM
Subject: Re: ridership email you requested
To: "Brand, Nicholas" <Brand@pbworld.com>, gmazur@camsys.com
Cc: "Jeffrey M. Barker" <jbarker@hsr.ca.gov>, mcmccoy <mcmccoy@ucdavis.edu>, Chad Baker <chad_baker@dot.ca.gov>, chad.baker@dot.ca.gov

I appreciate your comments. It may be worthwhile having at least a phone call to go through the methodology.

Off the top, though, I do have some questions about the assertions about the data set used for the main mode choice model. On page 3-35 (tinyurl.com/hsrmodel), it states that:

The main mode choice models are based on stated-preference choice data, with each respondent making a choice for four separate scenarios.

Only Table 2-1 was stated-preference data (with each respondent making a choice for four separate scenarios). Table 2-2 was revealed preference data - and when I say random I mean in relation to mode choice. In addition, the observations listed correspond closely to something under 4x the numbers in table 2-1 (except business-other). For example the number of commuters (<100 miles) surveyed in table 2-1 is given as 165. The number in table 2-2 for this segment is 879. The total number of observations in the model is 564, which is close to 4 x 165.

Is the documentation incorrect? Did you also incorporate the revealed preference data into this part of the model?

Also, what statistical techniques were used to re-weight the data to account for the difference between the population distribution and the sample distribution (by mode choice)?

Any clarification you could give me on this topic would be greatly appreciated.

Regards,
Elizabeth

Exhibit I

Table 3.2. Trip Frequency Models - Long Trips

			Trip Purpose							
			Business		Commute		Recreation		Other	
Variable	Acronym	Definition	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
1	regacc	Regional accessibility	-0.217	Constr	-0.217	Constr	-0.217	Constr	-0.217	Constr
2	slogsum	Short trip logsum								
3	llogsum	Long trip logsum	0.123	Constr	0.123	Constr	0.123	Constr	0.123	Constr
4	hhsizen	Household size								
5	onephh	One person household? (0/1)							-0.424	-2.0
6	threephh	Three person household? (0/1)					-0.482	-3.9	-0.378	-2.8
7	medinc	Medium income household? (0/1)	0.527	1.5	0.188	0.8				
8	highinc	High income household? (0/1)	1.139	3.0	0.291	1.1	-0.246	-1.3	0.393	2.1
9	missinc	Missing income household? (0/1) (used for model estimation only)	0.955	2.3	0.340	1.1	0.282	1.3	0.158	0.7
10	nocars	Zero car household? (0/1)								
11	carsltw	Fewer autos than workers? (0/1)	-0.412	-1.0	-0.457	-1.6	-0.922	-2.4	-0.915	-2.2
12	wkrspps	Workers / household size	0.537	1.9	1.274	5.8				
13	sacog	Resident in SACOG region? (0/1)	0.234	Constr	0.011	Constr	1.807	Constr	4.080	Constr
14	sandag	Resident in SANDAG region? (0/1)	-0.174	Constr	-0.342	Constr	1.286	Constr	3.685	Constr
15	mtc	Resident in MTC region? (0/1)	-0.683	Constr	-1.421	Constr	3.002	Constr	4.676	Constr
16	nowkrs	No worker household? (0/1)	-2.098	-3.4	-2.668	-3.7			0.372	2.4
17	scag	Resident in SCAG region? (0/1)	-0.274	Constr	-0.948	Constr	1.571	Constr	3.899	Constr
21	const1	Constant for 1 trip	-4.611	Constr	-2.674	Constr	-4.518	Constr	-8.510	Constr
22	const2	Constant for 2 or more trips	-5.247	Constr	-4.110	Constr	-6.081	Constr	-9.840	Constr

Table 3.3. Trip Frequency Models - Short Trips

			Trip Purpose							
			Business		Commute		Recreation		Other	
Variable	Acronym	Definition	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
1	regacc	Regional accessibility	-0.176	Constr	-0.176	Constr	-0.176	Constr	-0.176	Constr
2	slogsum	Short trip logsum	0.262	Constr	0.262	Constr	0.262	Constr	0.262	Constr
3	llogsum	Long trip logsum								
4	hhsizen	Household size					-0.136	-3.5		
5	onephh	One person household? (0/1)					-0.401	-2.6		
6	threephh	Three person household? (0/1)								
7	medinc	Medium income household? (0/1)	0.331	1.2	1.045	6.0	0.355	2.5		
8	highinc	High income household? (0/1)	0.835	3.1	1.523	8.6	0.432	2.8		
9	missinc	Missing income household? (0/1) (used for model estimation only)	0.446	1.4	0.696	3.4	0.137	0.8		
10	nocars	Zero car household? (0/1)					-1.270	-2.5	-0.736	-1.6
11	carsltw	Fewer autos than workers? (0/1)	-0.947	-2.4	-0.225	-1.6				
12	wkrspps	Workers / household size	1.153	5.0	1.570	13.0				
13	sacog	Resident in SACOG region? (0/1)	-0.653	Constr	-0.816	Constr	-2.365	Constr	-3.181	Constr
14	sandag	Resident in SANDAG region? (0/1)	-0.121	Constr	-1.673	Constr	-1.767	Constr	-1.157	Constr
15	mtc	Resident in MTC region? (0/1)	-0.898	Constr	-2.216	Constr	-1.834	Constr	-3.306	Constr
16	nowkrs	No worker household? (0/1)	-0.863	-2.5	-2.163	-5.9	-0.493	-4.8		
17	scag	Resident in SCAG region? (0/1)	-2.002	Constr	-2.406	Constr	-0.879	Constr	-0.467	Constr
21	const1	Constant for 1 trip	-4.614	Constr	-3.062	Constr	-2.958	Constr	-3.798	Constr
22	const2	Constant for 2 or more trips	-5.182	Constr	-3.890	Constr	-3.864	Constr	-4.575	Constr

Table 3.9. Destination Choice Models for Long Trips

Variable	Acronym	Definition	Trip Purpose: Business / Commute Coefficient	Business / Commute t-stat	Recreation / Other Coefficient	Recreation / Other t-stat
Accessibility Variables						
1	mlogsum	Mode choice logsum	0.053	Constr	0.053	Constr
2	distance	Distance (miles)	-0.024	-8.5	-0.031	-11.7
3	distsqu	Distance squared	0.000	8.9	0.000	10.8
4	distcub	Distance cubed	0.000	-8.0	0.000	-9.5
Area Types						
6	durban	Urban destination? (0/1)	0.724	6.7	0.810	9.5
7	drural	Rural destination? (0/1)	0.222	2.0	0.607	6.8
8	urburb	Urban to urban movement? (0/1)	-0.010	-0.1	-0.096	-0.8
9	subsub	Suburban to suburban movement? (0/1)	-0.185	-1.5	-0.029	-0.3
10	rurrur	Rural to rural movement? (0/1)	-0.112	-0.7	-0.036	-0.3
Destination District						
41	AMBAG	AMBAG	-0.242	Constr	0.183	Constr
42	CC	Central Coast	-0.255	Constr	1.334	Constr
43	FN	Far North	-1.728	Constr	-0.839	Constr
44	FM	Fresno	-0.685	Constr	-0.150	Constr
45	Kern	Kern	0.476	Constr	0.522	Constr
46	Merced	Merced	-0.855	Constr	-0.094	Constr
47	SSJ	S. San Joaquin	-0.144	Constr	0.547	Constr
48	SACOG	SACOG				
49	SANDAG	SANDAG	-5.072	Constr	-4.395	Constr
50	SJ	San Joaquin	-0.108	Constr	-0.375	Constr
51	Stan	Stanislaus	-1.043	Constr	-1.426	Constr
52	WSN	W. Sierra Nevada	-0.134	Constr	0.407	Constr
53	MTC	Alameda	-0.678	Constr	5.000	Constr
54	MTC	Contra Costa	0.226	Constr	5.000	Constr
55	MTC	Marin/Sonoma/Napa	0.149	Constr	5.000	Constr
56	MTC	San Francisco	-0.847	Constr	5.000	Constr
57	MTC	San Mateo	-0.687	Constr	5.000	Constr
58	MTC	Santa Clara	-0.710	Constr	5.000	Constr
59	MTC	Solano	0.800	Constr	5.000	Constr
60	SCAG	Los Angeles	-1.810	Constr	5.000	Constr
61	SCAG	Orange	-2.945	Constr	5.000	Constr
62	SCAG	Riverside	0.096	Constr	5.000	Constr
63	SCAG	San Bernardino	-4.416	Constr	5.000	Constr
64	SCAG	Ventura	-3.831	Constr	5.000	Constr
65	SCAG	Destination district	-3.001	Constr	5.000	Constr
Regional Interactions						
71	mtcscag	MTC to SCAG	-1.123	Constr	-6.400	Constr
72	mtcsandag	MTC to SANDAG	1.142	Constr	3.632	Constr
73	sacogscag	SACOG to SCAG	-1.736	Constr	-1.274	Constr
74	sacogsand	SACOG to SANDAG	0.368	Constr	8.000	Constr
75	scagmtc	SCAG to MTC	-1.123	Constr	-6.400	Constr
76	scagsacog	SCAG to SACOG	-1.736	Constr	-1.274	Constr
77	sandagmtc	SANDAG to MTC	1.142	Constr	3.632	Constr
78	sandagsac	SANDAG to SACOG	0.368	Constr	8.000	Constr
79	mtcsacog	MTC to SACOG	0.770	Constr	0.532	Constr
80	sacogmtc	SACOG to MTC	0.770	Constr	0.532	Constr
81	scagsanda	SCAG to SANDAG	5.403	Constr	8.098	Constr
82	sandagsca	SANDAG to SCAG	5.403	Constr	8.098	Constr
Size Variables						
0	L_S_M		1.000	Constr	1.000	Constr
101	loincret	Retail employment - low income	1.061	2.1	-0.041	-0.1
102	loincsvc	Service employment - low income	0.547	1.5	-1.250	-3.6
103	mdincret	Retail employment - medium income	2.232	4.9	-0.163	-0.4
104	mdincsvc	Service employment - medium income	0.829	1.8	-0.985	-3.3
105	hiincret	Retail employment - high income	1.993	5.6	0.326	0.8
106	hiincsvc	Service employment - high income	0.926	2.8	-0.933	-2.4
107	msincret	Retail employment - missing income (model estimation only)	12.991	0.1	-6.851	-0.1
108	msincsvc	Service employment - missing income (model estimation only)	12.343	0.1	-0.836	-1.4

Table 3.10. Destination Choice Models for Short Trips

			Trip Purpose							
			Business		Commute		Recreation		Other	
Variabl	Acronym	Definition	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
Accessibility Variables										
1	mlogsum	Mode choice logsum	0.332	Constr	0.332	Constr	0.332	Constr	0.332	Constr
2	distance	Distance (miles)	-0.130	-3.7	-0.130	-6.1	-0.166	-7.9	-0.104	-4.0
3	distsqu	Distance squared	0.002	2.3	0.001	2.7	0.001	3.3	0.001	1.1
4	distcub	Distance cubed	0.000	-1.7	0.000	-1.8	0.000	-1.2	0.000	-0.3
Area Types										
6	durban	Urban destination? (0/1)	0.760	3.8	0.872	7.4	0.502	3.8	0.419	2.3
7	drural	Rural destination? (0/1)	0.036	0.2	0.126	1.1	0.081	0.6	0.190	1.1
8	urburb	Urban to urban movement? (0/1)	-0.499	-1.6	-0.019	-0.1	-0.142	-0.7	0.457	1.9
9	subsub	Suburban to suburban movement? (0/1)	0.253	1.1	-0.055	-0.4	0.051	0.3	-0.016	-0.1
10	rurrur	Rural to rural movement? (0/1)	-0.505	-1.8	-0.075	-0.5	0.336	1.9	0.245	1.0
Destination District										
41	AMBAG	AMBAG	-0.245	Constr	-5.730	Constr	5.366	Constr	6.909	Constr
42	CC	Central Coast	-2.553	Constr	-11.136	Constr	-4.168	Constr	-0.469	Constr
43	FN	Far North	4.294	Constr	0.805	Constr	11.121	Constr	15.867	Constr
44	FM	Fresno	-0.441	Constr	-7.272	Constr	2.226	Constr	4.798	Constr
45	Kern	Kern	0.274	Constr	-12.241	Constr	-5.457	Constr	-0.586	Constr
46	Merced	Merced	-1.435	Constr	-7.268	Constr	2.332	Constr	2.307	Constr
47	SSJ	S. San Joaquin	-0.008	Constr	-2.153	Constr	3.938	Constr	3.948	Constr
48	SACOG	SACOG								
49	SANDAG	SANDAG	-3.182	Constr	-13.230	Constr	-3.518	Constr	-2.171	Constr
50	SJ	San Joaquin	0.556	Constr	0.474	Constr	4.412	Constr	4.915	Constr
51	Stan	Stanislaus	0.244	Constr	-0.352	Constr	4.894	Constr	4.152	Constr
52	WSN	W. Sierra Nevada	1.634	Constr	0.386	Constr	5.284	Constr	4.601	Constr
53	MTC	Alameda	-0.275	Constr	0.816	Constr	1.601	Constr	2.174	Constr
54	MTC	Contra Costa	0.265	Constr	1.254	Constr	2.294	Constr	2.311	Constr
55	MTC	Marin/Sonoma/Napa	0.118	Constr	1.129	Constr	2.831	Constr	1.166	Constr
56	MTC	San Francisco	-0.109	Constr	0.447	Constr	0.878	Constr	1.140	Constr
57	MTC	San Mateo	-0.010	Constr	0.961	Constr	1.288	Constr	1.588	Constr
58	MTC	Santa Clara	-0.244	Constr	0.325	Constr	2.296	Constr	2.010	Constr
59	MTC	Solano	-0.218	Constr	1.453	Constr	1.525	Constr	2.398	Constr
60	SCAG	Los Angeles	-2.226	Constr	-9.274	Constr	4.265	Constr	4.549	Constr
61	SCAG	Orange	-3.617	Constr	-10.991	Constr	2.931	Constr	2.665	Constr
62	SCAG	Riverside	-3.139	Constr	-1.875	Constr	-1.207	Constr	-2.258	Constr
63	SCAG	San Bernardino	-3.764	Constr	-9.920	Constr	2.438	Constr	2.456	Constr
64	SCAG	Ventura	-2.226	Constr	-9.274	Constr	3.274	Constr	4.437	Constr
65	SCAG	Destination district	-3.072	Constr	-9.405	Constr	3.663	Constr	3.749	Constr
Regional Interactions										
71	mtcscag	MTC to SCAG								
72	mtcsandag	MTC to SANDAG								
73	sacogscag	SACOG to SCAG								
74	sacogsand	SACOG to SANDAG								
75	scagmtc	SCAG to MTC								
76	scagsacog	SCAG to SACOG								
77	sandagmtc	SANDAG to MTC								
78	sandagsac	SANDAG to SACOG								
79	mtcsacog	MTC to SACOG	2.700	Constr	-0.467	Constr	7.140	Constr	10.368	Constr
80	sacogmtc	SACOG to MTC	2.700	Constr	-0.467	Constr	7.140	Constr	10.368	Constr
81	scagsanda	SCAG to SANDAG	-1.079	Constr	0.095	Constr	0.746	Constr	-2.362	Constr
82	sandagsca	SANDAG to SCAG	-1.079	Constr	0.095	Constr	0.746	Constr	-2.362	Constr
Size Variables										
0	L_S_M		1.000	Constr	1.000	Constr	1.000	Constr	1.000	Constr
101	loincret	Retail employment - low income	0.038	0.0	2.285	3.7	0.149	0.3	-10.195	0.0
102	loincsvc	Service employment - low income	1.228	2.1	1.106	1.7	-2.674	-1.0	-1.478	-2.4
103	mdincret	Retail employment - medium income	0.718	1.2	1.162	4.1	-0.108	-0.2	-11.112	0.0
104	mdincsvc	Service employment - medium income	-0.057	-0.1	0.057	0.2	-0.716	-2.0	-0.987	-2.2
105	hiincret	Retail employment - high income	3.146	3.1	2.328	6.1	-0.157	-0.2	1.007	1.8
106	hiincsvc	Service employment - high income	1.002	0.9	1.114	2.9	-1.778	-1.4	-1.002	-0.8
107	msincret	Retail employment - missing income (model estimation only)	0.567	0.6	0.811	1.3	0.630	0.8	0.286	0.4
108	msincsvc	Service employment - missing income (model estimation only)	-1.592	-0.7	-0.249	-0.4	-1.167	-0.8	-11.537	-0.1

Table 3.12. Access Mode Choice Models

			Coefficient / Constant Applied for Mode						Long Trip				Short Trip					
									Business / Commute		Recreation / Other		Business		Commute		Recreation / Other	
Variab	Acronym	Definition	Drive/ Park	Rental Car	Pick-up/ Drop-off	Taxi	Transit	Walk	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
Level of Service Coefficients																		
1	ivt	In-vehicle time (minutes)	x	x	x	x	x		-0.060	Constr	-0.030	Constr	-0.040	Constr	-0.030	Constr	-0.025	Constr
2	cost	Cost ($)	x	x	x		x		-0.075	Constr	-0.120	Constr	-0.050	Constr	-0.100	Constr	-0.100	Constr
4	aivt-pkup	Pick-up/drop-off auto in-vehicle time (minutes)			x				-0.014	-2.5	-0.031	-3.1					-0.003	-0.7
5	adis-taxi	Pick-up/drop-off auto distance (miles)				x			-0.084	-4.8	-0.070	-3.8	-0.041	-0.8			-0.014	-2.4
12	ovt	Walk and wait time (minutes)					x	x	-0.147	-6.4	-0.083	-2.5	-0.100	-2.9	-0.060	Constr	-0.061	-2.5
17	carused	Car access to transit in transit access to main mode? (0/1)					x		-4.836	-4.6	-1.807	-1.9	-1.469	-1.1			-3.345	-3.6
21	railused	Rail used to access main mode? (0/1)					x		3.689	5.2	1.727	2.4	3.313	2.7			3.271	4.2
Constants																		
101	dp-acc	Access constant	x						4.923	Constr	4.356	Constr	4.166	Constr	5.000	Constr	3.232	Constr
102	dp-egr	Egress constant	x															
103	dp-cvr	To/from conventional rail? (0/1)	x															
104	dp-hsr	To/from high speed rail? (0/1)	x															
105	dp-alone	Traveling alone? (0/1)	x								-1.925	-3.0						
106	dp-nocars	Zero car household? (0/1)	x															
107	dp-carsltw	Fewer autos than workers? (0/1)	x						-1.547	-2.2	-1.903	-2.8			-3.775	-1.9	-1.166	-3.2
108	dp-lowinc	Low income household? (0/1)	x						-2.741	-1.8	-1.960	-2.8	-2.017	-1.2			-0.493	-1.6
109	dp-hiinc	High income household? (0/1)	x						0.709	1.6	0.339	1.4						
110	dp-misinc	Missing income household? (0/1) (for model estimation only)	x															
111	dp-laxacc	Access LAX airport? (0/1)	x						-3.128	-3.8	-1.275	-1.7						
112	dp-sfoacc	Access SFO airport? (0/1)	x						-4.082	-4.4	-3.036	-2.6						
113	dp-oakacc	Access OAK airport? (0/1)	x															
114	dp-sjcacc	Access SJC airport? (0/1)	x								-1.479	-2.1						
115	dp-sanacc	Access SAN airport? (0/1)	x						-1.410	-2.3	-1.370	-2.3						
116	dp-buracc	Access BUR airport? (0/1)	x															
201	rc-acc	Access constant		x					-5.547	Constr	-5.000	Constr						
202	rc-egr	Egress constant		x														
203	rc-cvr	To/from conventional rail? (0/1)		x					-3.000	Constr	-5.000	Constr						
204	rc-hsr	To/from high speed rail? (0/1)		x														
205	rc-alone	Traveling alone? (0/1)		x														
206	rc-nocars	Zero car household? (0/1)		x					5.110	3.2								
207	rc-carsltw	Fewer autos than workers? (0/1)		x														
208	rc-lowinc	Low income household? (0/1)		x														
209	rc-hiinc	High income household? (0/1)		x					2.953	2.4								
211	rc-misinc	Missing income household? (0/1) (for model estimation only)		x														
301	sp-onephh	One person household? (0/1)			x													
302	sp-hhsize	Household size			x				0.606	2.9	0.478	2.8			0.672	1.4	0.273	2.6
401	tx-acc	Access constant				x			1.771	Constr	-2.155	Constr	-1.682	Constr	-4.104	Constr	-0.024	Constr
402	tx-egr	Egress constant				x												
403	tx-cvr	To/from conventional rail? (0/1)				x			-2.827	-2.6	-2.265	-2.4						
404	tx-hsr	To/from high speed rail? (0/1)				x					-1.092	-2.1						
405	tx-alone	Traveling alone? (0/1)				x					-0.877	-1.8						
406	tx-nocars	Zero car household? (0/1)				x												
407	tx-carsltw	Fewer autos than workers? (0/1)				x												
408	tx-lowinc	Low income household? (0/1)				x			-3.010	-1.9								
409	tx-hiinc	High income household? (0/1)				x					0.849	1.9						
411	tx-misinc	Missing income household? (0/1) (for model estimation only)				x												
501	tr-acc	Access constant					x		4.390	Constr	-1.908	Constr	5.000	Constr	5.000	Constr	1.052	Constr
502	tr-egr	Egress constant					x											
503	tr-cvr	To/from conventional rail? (0/1)					x											
504	tr-hsr	To/from high speed rail? (0/1)					x											
505	tr-alone	Traveling alone? (0/1)					x				1.569	2.3						
506	tr-nocars	Zero car household? (0/1)					x				1.439	1.7						
507	tr-carsltw	Fewer autos than workers? (0/1)					x		1.480	2.1							1.985	2.6
508	tr-lowinc	Low income household? (0/1)					x				0.846	1.0						
509	tr-hiinc	High income household? (0/1)					x										0.000	Constr
511	tr-misinc	Missing income household? (0/1) (for model estimation only)					x											
601	wk-acc	Access constant						x	5.000	Constr	4.696	Constr	5.000	Constr	5.796	Constr	1.391	Constr
602	wk-egr	Egress constant						x										
603	wk-air	To/from airport? (0/1)						x	-3.000	Constr	-2.634	-1.0						
98	mlogsum	Logsum							0.387	5.9	0.451	3.3	0.570	4.3	0.458	2.0	1.000	Constr
99	hscale	Scale on hypothetical choices							0.682	15.9	1.000	Constr	1.000	Constr	1.000	Constr	1.000	Constr
Implied Value of Time									$48.00		$15.00		$48.00		$18.00		$15.00	
Ratio OVT/IVT									2.45		2.76		2.51		2.00		2.43	

Table 3.13. Egress Mode Choice Models

			Coefficient / Constant Applied for Mode						Long Trip				Short Trip					
									Business / Commute		Recreation / Other		Business		Commute		Recreation / Other	
Variable	Acronym	Definition	Drive/ Park	Rental Car	Pick-up/ Drop-off	Taxi	Transit	Walk	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
Level of Service Coefficients																		
1	ivt	In-vehicle time (minutes)	x	x	x	x	x		-0.060	Constr	-0.030	Constr	-0.040	Constr	-0.030	Constr	-0.025	Constr
2	cost	Cost ($)	x	x	x		x		-0.075	Constr	-0.120	Constr	-0.050	Constr	-0.100	Constr	-0.100	Constr
4	aivt-pkup	Pick-up/drop-off auto in-vehicle time (minutes)			x						-0.015	-3.9						
5	adis-taxi	Pick-up/drop-off auto distance (miles)				x			-0.126	-7.9	-0.052	-6.6	-0.230	-3.1			-0.096	-3.5
12	ovt	Walk and wait time (minutes)					x	x	-0.139	-6.2	-0.060	Constr	-0.117	-3.1	-0.075	Constr	-0.050	Constr
17	carused	Car access to transit in transit access to main mode? (0/1)					x						-5.118	-4.3	-4.466	-6.2		
21	railused	Rail used to access main mode? (0/1)					x				2.960	5.0					2.570	3.5
Constants																		
101	dp-acc	Access constant	x															
102	dp-egr	Egress constant	x						1.751	Constr	-5.418	Constr	-0.635	Constr	-0.723	Constr	5.000	Constr
103	dp-cvr	To/from conventional rail? (0/1)	x						-9.490	-2.5								
104	dp-hsr	To/from high speed rail? (0/1)	x						-2.251	-1.8								
105	dp-alone	Traveling alone? (0/1)	x															
106	dp-nocars	Zero car household? (0/1)	x															
107	dp-carsltw	Fewer autos than workers? (0/1)	x															
108	dp-lowinc	Low income household? (0/1)	x						-18.006	-2.5	-1.263	-1.1						
109	dp-hiinc	High income household? (0/1)	x															
110	dp-misinc	Missing income household? (0/1) (for model estimation only)	x															
111	dp-laxacc	Access LAX airport? (0/1)	x															
112	dp-sfoacc	Access SFO airport? (0/1)	x															
113	dp-oakacc	Access OAK airport? (0/1)	x															
114	dp-sjcacc	Access SJC airport? (0/1)	x															
115	dp-sanacc	Access SAN airport? (0/1)	x															
116	dp-buracc	Access BUR airport? (0/1)	x															
201	rc-acc	Access constant		x														
202	rc-egr	Egress constant		x					5.979	Constr	1.827	Constr	-0.988	Constr	-5.000	Constr	5.000	Constr
203	rc-cvr	To/from conventional rail? (0/1)		x					-3.522	-2.4	-1.176	-3.1						
204	rc-hsr	To/from high speed rail? (0/1)		x							-0.552	-2.4						
205	rc-alone	Traveling alone? (0/1)		x							-2.588	-4.7						
206	rc-nocars	Zero car household? (0/1)		x														
207	rc-carsltw	Fewer autos than workers? (0/1)		x														
208	rc-lowinc	Low income household? (0/1)		x					-2.082	-0.9	-1.891	-3.7						
209	rc-hiinc	High income household? (0/1)		x														
211	rc-misinc	Missing income household? (0/1) (for model estimation only)		x														
301	sp-onephh	One person household? (0/1)			x													
302	sp-hhsize	Household size			x				0.974	2.8								
401	tx-acc	Access constant				x												
402	tx-egr	Egress constant				x			5.000	Constr	1.055	Constr	4.653	Constr	-1.425	Constr	5.000	Constr
403	tx-cvr	To/from conventional rail? (0/1)				x												
404	tx-hsr	To/from high speed rail? (0/1)				x			2.507	3.6								
405	tx-alone	Traveling alone? (0/1)				x					-2.768	-4.6						
406	tx-nocars	Zero car household? (0/1)				x												
407	tx-carsltw	Fewer autos than workers? (0/1)				x												
408	tx-lowinc	Low income household? (0/1)				x			-3.002	-2.3	-1.038	-2.3						
409	tx-hiinc	High income household? (0/1)				x											1.499	2.8
411	tx-misinc	Missing income household? (0/1) (for model estimation only)				x												
501	tr-acc	Access constant					x											
502	tr-egr	Egress constant					x		5.000	Constr	-3.655	Constr	5.000	Constr	5.000	Constr	5.000	Constr
503	tr-cvr	To/from conventional rail? (0/1)					x		3.580	5.2	1.830	2.8						
504	tr-hsr	To/from high speed rail? (0/1)					x		0.592	0.7	1.032	1.9						
505	tr-alone	Traveling alone? (0/1)					x											
506	tr-nocars	Zero car household? (0/1)					x											
507	tr-carsltw	Fewer autos than workers? (0/1)					x											
508	tr-lowinc	Low income household? (0/1)					x				1.216	1.9					1.948	2.2
509	tr-hiinc	High income household? (0/1)					x								-0.581	-1.1		
511	tr-misinc	Missing income household? (0/1) (for model estimation only)					x											
601	wk-acc	Access constant						x										
602	wk-egr	Egress constant						x	5.000	Constr	3.076	Constr	5.000	Constr	5.000	Constr	5.000	Constr
603	wk-air	To/from airport? (0/1)						x	-2.074	-2.0								
98	mlogsum	Logsum							0.280	6.9	0.470	5.3	0.649	2.9	0.487	2.6	0.758	4.1
99	hscale	Scale on hypothetical choices							0.516	9.8	1.000	Constr	0.412	3.0	0.334	5.2	0.610	4.8
Implied Value of Time									$48.00		$15.00		$48.00		$18.00		$15.00	
Ratio OVT/IVT									2.32		2.00		2.92		2.50		2.00	

Table 3.15. Main Mode Choice Models

			Coefficient / Constant Applied for Mode				Long Trip				Short Trip					
							Business / Commute		Recreation / Other		Business		Commute		Recreation / Other	
Variable	Acronym	Definition	Car	Air	Conv. Rail	High Speed Rail	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
Level of Service Coefficients																
1	cost	Cost ($)	x	x	x	x	-0.017	-12.8	-0.035	-18.5	-0.109	Constr	-0.148	-11.3	-0.108	-8.1
2	time	In-vehicle time (minutes)	x	x	x	x	-0.018	Constr	-0.011	-14.2	-0.050	Constr	-0.025	Constr	-0.014	-5.2
3	reli	Reliability (Percent on time)	x	x	x	x	0.023	Constr	0.005	1.9	0.023	1.8	0.007	0.7	0.004	0.7
4	freq	Service headway (minutes)		x	x	x	-0.179	-191.0	-0.011	-14.7	-0.050	-18.1	-0.025	-12.7	-0.014	-8.4
5	accls	Access mode choice logsum					0.136	3.4	0.204	3.7	0.463	Constr	0.330	Constr	0.303	3.4
6	egrls	Egress mode choice logsum					0.171	3.9	0.399	7.1			0.330	Constr		
7	accls<-5	Access mode choice logsum less than -5? (0/1)														
8	egrls<-5	Egress mode choice logsum less than -5? (0/1)														
9	freq>60	Service headway greater than 60 minutes? (0/1)														
10	reli>90	Reliability greater than 90 percent? (0/1)														
Constants																
104	c-group	Traveling in a group? (0/1)	x				1.086	4.6	1.430	9.1						
105	c-nocars	Zero car household? (0/1)	x													
106	c-carslt2	Fewer than 2 cars for household size greater than 1? (0/1)	x						-0.308	-2.3	-1.114	-1.2	-1.824	-1.3	-0.728	-2.3
107	c-hhsize	Household size	x				0.182	1.2	0.296	4.4			0.877	1.7		
108	c-hiinc	High income household? (0/1)	x								-1.232	-2.3	-1.180	-1.6		
200	a-const	Mode constant		x			-10.269	Constr	-4.683	Constr						
207	a-loinc	Low income household? (0/1)		x												
208	a-hiinc	High income household? (0/1)		x			1.180	4.6								
209	a-msinc	Missing income household? (0/1) (for model estimation only)		x												
210	a-group	Traveling in a group? (0/1)		x			-0.356	-2.8	-0.505	-3.7						
211	{lax-sfo}	Airport interchange served? (0/1)		x			5.000	Constr	5.000	Constr						
212	{sfo-lax}	Airport interchange served? (0/1)		x			5.000	Constr	5.000	Constr						
213	{lax-oak}	Airport interchange served? (0/1)		x			5.000	Constr	5.000	Constr						
214	{oak-lax}	Airport interchange served? (0/1)		x			5.000	Constr	5.000	Constr						
215	{lax-sjc}	Airport interchange served? (0/1)		x			5.000	Constr	5.000	Constr						
216	{sjc-lax}	Airport interchange served? (0/1)		x			5.000	Constr	5.000	Constr						
217	{lax-sac}	Airport interchange served? (0/1)		x			5.000	Constr	5.000	Constr						
218	{sac-lax}	Airport interchange served? (0/1)		x			5.000	Constr	5.000	Constr						
221	{bur-sfo}	Airport interchange served? (0/1)		x			4.151	Constr	4.151	Constr						
222	{sfo-bur}	Airport interchange served? (0/1)		x			5.363	Constr	5.363	Constr						
223	{bur-oak}	Airport interchange served? (0/1)		x			2.032	Constr	2.032	Constr						
224	{oak-bur}	Airport interchange served? (0/1)		x			4.145	Constr	4.145	Constr						
225	{bur-sjc}	Airport interchange served? (0/1)		x			3.757	Constr	3.757	Constr						
226	{sjc-bur}	Airport interchange served? (0/1)		x			5.000	Constr	5.000	Constr						
227	{bur-sac}	Airport interchange served? (0/1)		x			5.602	Constr	5.602	Constr						
228	{sac-bur}	Airport interchange served? (0/1)		x			1.421	Constr	1.421	Constr						
231	{ont-sfo}	Airport interchange served? (0/1)		x			5.000	Constr	5.000	Constr						
232	{sfo-ont}	Airport interchange served? (0/1)		x			5.000	Constr	5.000	Constr						
233	{ont-oak}	Airport interchange served? (0/1)		x			2.233	Constr	2.233	Constr						
234	{oak-ont}	Airport interchange served? (0/1)		x			2.269	Constr	2.269	Constr						
235	{ont-sjc}	Airport interchange served? (0/1)		x			3.263	Constr	3.263	Constr						
236	{sjc-ont}	Airport interchange served? (0/1)		x			5.000	Constr	5.000	Constr						
237	{ont-sac}	Airport interchange served? (0/1)		x			5.907	Constr	5.907	Constr						
238	{sac-ont}	Airport interchange served? (0/1)		x			3.787	Constr	3.787	Constr						
241	{sna-sfo}	Airport interchange served? (0/1)		x			4.652	Constr	4.652	Constr						
242	{sfo-sna}	Airport interchange served? (0/1)		x			2.409	Constr	2.409	Constr						
243	{sna-oak}	Airport interchange served? (0/1)		x			-0.231	Constr	-0.231	Constr						
244	{oak-sna}	Airport interchange served? (0/1)		x			-2.852	Constr	-2.852	Constr						
245	{sna-sjc}	Airport interchange served? (0/1)		x			4.348	Constr	4.348	Constr						
246	{sjc-sna}	Airport interchange served? (0/1)		x			2.963	Constr	2.963	Constr						
247	{sna-sac}	Airport interchange served? (0/1)		x			3.571	Constr	3.571	Constr						
248	{sac-sna}	Airport interchange served? (0/1)		x			-1.996	Constr	-1.996	Constr						
251	{san-sfo}	Airport interchange served? (0/1)		x			5.000	Constr	5.000	Constr						
252	{sfo-san}	Airport interchange served? (0/1)		x			5.000	Constr	5.000	Constr						
253	{san-oak}	Airport interchange served? (0/1)		x			1.704	Constr	1.704	Constr						
254	{oak-san}	Airport interchange served? (0/1)		x			1.952	Constr	1.952	Constr						
255	{san-sjc}	Airport interchange served? (0/1)		x			5.000	Constr	5.000	Constr						
256	{sjc-san}	Airport interchange served? (0/1)		x			5.000	Constr	5.000	Constr						
257	{san-sac}	Airport interchange served? (0/1)		x			5.000	Constr	5.000	Constr						
258	{sac-san}	Airport interchange served? (0/1)		x			5.686	Constr	5.686	Constr						
300	h-const	Mode constant				x	-6.757	Constr	-0.713	Constr	-7.530	Constr	-6.964	Constr	-5.685	Constr
307	h-loinc	Low income household? (0/1)				x										
308	h-hiinc	High income household? (0/1)				x	1.147	4.8								
309	h-msinc	Missing income household? (0/1) (for model estimation only)				x										
400	r-const	Mode constant			x		-4.620	Constr	1.272	Constr	-6.232	Constr	-7.126	Constr	-5.541	Constr
407	r-loinc	Low income household? (0/1)			x											
408	r-hiinc	High income household? (0/1)			x		0.613	1.4								
409	r-msinc	Missing income household? (0/1) (for model estimation only)			x											
99	Theta0099	Nesting coefficient	x	x		x	0.692	10.4	0.738	13.0	0.516	Constr	0.420	3.9	0.689	6.1
Implied Value of Time							$63.64		$18.45		$27.60		$10.12		$7.95	

Memorandum

TO: Nick Brand

FROM: George Mazur

DATE: January 29, 2010

RE: Final Coefficients and Constants in HSR Ridership & Revenue Model

---

The seven (7) attached tables provide the final coefficients and constants in the high-speed rail (HSR) ridership and revenue model, which was developed by Cambridge Systematics under contract to the Metropolitan Transportation Commission (MTC). These tables supersede information presented in the Task 5a report (*Interregional Model System Development*), dated August 2006.

The Task 5a report listed the model coefficients and constants as they existed after the preliminary estimation and calibration effort. As is normally the case, additional calibration and validation efforts led to changes in model structure, variables, and the values of coefficients and constants. These changes continued until the model structure was finalized in April 2007. There have been no changes to these model elements since April 2007. The client, MTC, elected not to update the Task 5a report nor to include the final coefficients and constants in the final project report.

555 12th Street, Suite 1600
Oakland, CA 94607
tel 510 873 8700 www.camsys.com **fax** 510 873 8701