TECHNICAL MEMORANDUM

TO: Jeff Morales, Executive Director, California High Speed Rail Authority

FROM: Frank S. Koppelman, Chair, Ridership Technical Advisory Panel (RTAP)

DATE: June 7, 2015

RE: Review of progress on revenue and ridership forecasting

The Ridership Technical Advisory Panel (Frank Koppelman, Chair; Kay Axhausen; Eric Miller; David Ory and Ken Small) met on April 16-17, 2015 in Sacramento to review current technical activities. Staff from Cambridge Systematics (David Kurth, Rachel Kopperman, Jason Lemp and Kimon Proussaloglou) made presentations to the Panel on work progress since the last meeting on the five topics, as reported in the briefing books created beforehand for the Panel. Also present at the meeting were Richard Donnelly and Don Emerson, Project Management Team and Boris Lipkin, High Speed Rail Authority. The key findings of the Panel, based upon their dialogue with Cambridge Systematics and subsequent discussions among themselves, are presented below, also organized by the five topics. This is the first of our reports in the technical memorandum format, as directed by the Authority.

Nomenclature
This report described the Authority's decision to maintain a Business Plan Model (BPM) to produce system level forecasts and a Planning Analysis Tool (PAT) for more localized planning analysis. The Panel found this briefing helpful, in explaining the nomenclature used in the other four books, and has no substantive comments on its content.

Constant Decomposition
The Panel likes the direction that CS is taking with respect to the decomposition of the HSR constant. The Panel strongly endorses the next steps that are outlined at the end of the briefing book.

Risk Analysis
The Panel found this briefing was also helpful, and offers several findings:

- As CS begins the risk analysis for the 2016 Business Plan, the Panel remains concerned about the reported fit of the regression models that informed the 2014 Business Plan. An adjusted R^2 value greater than 0.99 suggests that the model is being fit with too few data points (i.e. model runs) or that the range of uncertain values is too narrow to pick up nonlinearities. The Panel would like CS to investigate interactions and nonlinearities in the effects of the risk factors, by including nonlinear and interaction terms in the regression model. This will probably require substantially more model runs.

- CS asked two questions (page 10 of the briefing book) about whether the CVR, air, and auto mode specific constants should be varied. The panel believes these risk factors should be a lower priority than others discussed, including variation of the HSR constant, for two reasons: the HSR constant affects ridership more directly, and it cannot be calibrated to existing data without additional assumptions about how HSR service is viewed relative to CVR and/or air. (Such assumptions were made explicitly for the baseline forecasts of the 2014 Business Plan, and are varied implicitly in the risk analysis presented in that Business Plan and in the risk analysis currently under discussion for the 2016 Business Plan.)
- It would be useful to disaggregate the risk analysis into the component parts, as suggested by CS. This will better inform the Authority about the nature of the risks they face.
- There was considerable discussion about which distributions should be assumed for the various risk factors, as well as the range of values investigated. Absent compelling evidence for using a different distribution the Panel continues to advocate the use of a triangular distribution.

Planning Analysis Tool Version 1 (PAT v1)
In general the Panel endorses the approach presented by CS. Some specific points noted by the Panel include:

- There was considerable discussion about the path-building methods used in the model, which uses Citilabs' Public Transport (PT) module. It was apparent that CS is still learning about the nuances of this program, and should continue investigating its behavior.
- We agree with the decision to explore the impact of reducing the nesting coefficient on the station choice nest. Doing so may create effects in the access-egress model that CS should continue to monitor.
- We recommend that CS continue investigating the transfer and boarding penalties used in the access-egress path-building in order to better represent multi-link trips.
- We agree with the station choice approach implemented by CS, which corresponds to the best approach previously recommended by the Panel.
- We agree with the proposed solutions for optimizing the software implementation of the model.

Planning Analysis Tool Version 2 (PAT v2)
The approach presented is consistent with the direction we have recommended. We appreciate that CS has embraced the changes suggested by the Panel in our previous meeting. The use of alternatives sampling and elimination of the feedback loop is endorsed as useful simplifications of the model.