California High-Speed Rail Peer Review Group

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The Honorable Darrell Steinberg
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State Capitol Building
Room 205
Sacramento, CA 95814

The Honorable John Perez
Speaker of the Assembly
State Capitol Building
Room 219
Sacramento, CA 95814

The Honorable Bob Huff
Senate Republican Leader
State Capitol Building
Room 305
Sacramento, CA 95814

The Honorable Connie Conway
Assembly Republican Leader
State Capitol Building
Room 3104
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Dear Honorable Members:

The California High-Speed Rail Authority issued its Draft 2014 Business Plan, "Connecting California," on February 7, 2014. The Authority also issued its "Project Update Report to the California Legislature" on March 1, 2014. In accord with our responsibility to review and comment on reports and funding plans published by the Authority, the Peer Review Group has reviewed these documents as well as the background documents supporting the 2014 Business Plan. We met with the Authority's management team on March 14, 2014 to discuss these documents. We would like to express our appreciation for the time and effort the Authority has spent in responding to our questions and requests for information.

In overall summary, we believe that the Authority has continued to make progress in the structure and evaluation in its Business Plans. The important topics are now covered and the method for presenting risk and potential variation in outcomes (Monte Carol simulation) is much better developed. A partial solution to the financing challenge that would stabilize the

Authority's planning base is now on the table. Demand forecasting has been improved through updated data and additional model refinements. The operations and maintenance cost (O&M) model is more detailed and offers a better approach to relating costs to the volume of operations. Thus far the Authority has been able to meet the staffing challenge.

This generally favorable assessment of the 2014 Business Plan is qualified by the fact that actual experience so far is limited. One bid has been advertised and awarded below the initial budget, but the final design for that project is not complete and no construction has actually commenced. Demand forecasts are based on an improved demand model using better data, but only actual operation will show how Californians will respond to high-speed trains. Litigation beyond the control of the Authority could delay the project and cause costs to rise significantly. For all these reasons, the improved estimates and forecasts still have a significant range of uncertainty and it is not yet clear how confident we can be that the outcome will fall within the boundaries indicated by the Monte Carlo analyses. This will only be resolved with experience.

The 2014 Draft Business Plan does raise a series of issues that we will discuss in more detail below. The Authority does not yet have a source of available, committed funding that will fully close the roughly $20 billion financing gap to complete the IOS as it is currently defined, though the Governor has proposed a number of possible sources, such as use of cap-and-trade funds, which would close a part of the gap. The blended system from San Francisco to San Jose raises a number of complex issues involving the interactions among Caltrain, High-Speed Rail and freight operations that deserve continuing attention. There are plans to develop the demand modeling further for the 2016 Business Plan and the results should be appropriate for planning purposes, but more participation in model development from potential operators and investors should be invited in order reflect commercial pricing and costing issues. The Authority's business model continues to evolve, but more detail on the roles and responsibilities of the Authority, the State and the private sector will be needed if private capital is to be attracted. The Authority believes it can meet the September 30, 2017 deadline to spend American Recovery and Reinvestment Act of 2009 (ARRA) money if it is not further impeded by litigation or funding delays. The decision in the 2014 Business Plan to defer single seat service through Los Angeles Union Station to Anaheim should be revisited in the 2016 Business Plan. Attention to these issues in the near-term will be important to resolving potential future problems.

Our more detailed comments are below. Please let us know if you have any questions or need clarification on any of the discussion in this letter.

Sincerely,

Louis S. Thompson
Chairman
California High-Speed Rail Peer Review Group

cc: Hon. Mark DeSaulnier, Chair, Senate Transportation and Housing Committee
Hon. Ted Gaines, Vice Chair, Senate Transportation and Housing Committee
Hon. Bonnie Lowenthal, Chair, Assembly Transportation Committee
Hon. Eric Linder, Vice Chair, Assembly Transportation Committee
Brian Kelly, Secretary, Department of Business, Transportation and Housing
Mac Taylor, State Legislative Analyst
Ken Alex, Director, Governor's Office of Planning and Research
Dan Richard, Chair, California High-Speed Rail Authority
Jeff Morales, Chief Executive Officer, California High-Speed Rail Authority
Members, California High-Speed Rail Peer Review Group

Finance. The table below summarizes the Authority's projections for the completion and cost of the various system segments.

Segment	Location	Miles	Year of Completion	Cost (Billion 2013$)	Cost (Billion YOE$)
IOS	Merced-San Fernando	300	2022	27.8	31
Bay to Basin	San Jose to San Fernando	410	2026	42.5	51
Phase I Blended	LA Union Station to San Francisco Transbay Terminal	5250	2028	55.9	68

Source: "Connecting California," 16, 34 and 35.

Against these amounts, the Authority potentially has access to $9.95 billion from Proposition 1A and $3.479 billion in Federal grant funding ($2.551 billion from ARRA expiring if unspent by Sept 30, 2017 and $928.6 million in FY 2010 appropriations that does not expire).[1] Of the Proposition 1A money, $0.95 billion is allocated for local rail purposes and is not available for high-speed rail construction. Another $1 billion in Proposition 1A funding has been allocated for projects on the "bookends" (San Jose to San Francisco and the Los Angeles area) where advance improvements such as electrification of Caltrain or a straight-through routing at the Los Angeles Union Station will be built. Local authorities are matching the Proposition 1A money. Thus, the Authority has about $12.5 billion (of which the release of about $5 billion will depend on finding new matching sources). This leaves, according to the Authority, "uncommitted funds" of $20.934 billion needed to complete the IOS.[2]

In the Revised 2012 Business Plan, the Authority argued that the gap could partly be filled by use of funds from the Greenhouse Gas Reduction Fund (GGRF) generated from the state's Carbon emissions cap-and-trade program. This proposal has since been developed in the Governor's 2014-2015 budget proposals to include $250 million from 2014-2015 funding, plus $400 million that will be paid back from the 2013-2014 budget, plus one-third of all GGRF amounts beginning in the 2015-2016 budget year.[3]

It is difficult to estimate the amounts that the GGRF will actually yield. The Legislative Analyst's Office (LAO) stated that "[s]everal economists who have evaluated …[the] cap-and-trade program have estimated that, over the life of the program … total revenue for the program through 2020 could be roughly $15 billion."[4] This could vary significantly depending on the percentage of allowances that are given away rather than auctioned and on the market price of each permit. It is also not clear whether this is measured in YOE$ or constant $: if it is constant 2013$, the Authority would recover somewhat more of the YOE$ cost of the IOS. In addition, the LAO cites a possible range of $12 billion to $45 billion depending on a large number of

[1] An additional $16 million has been spent on PTC design and analysis in the Caltrain corridor.
[2] See "Connecting California," page 53.
[3] See http://www.lao.ca.gov/Publications/Detail/2953, accessed March 17, 2014, for a description of the Cap-and-Trade program.
[4] Legislative Analyst, "The 2014-2015 Budget: Cap-and-Trade Auction Revenue and Expenditure Plan," page 4, February 2014

assumptions. If the actual number ended up at the higher end of the range, this could also close the gap accordingly.

Authorization for the current system beyond 2020 is unclear, so projections after that date are not fully established. Based on the $15 billion estimate cited by the LAO, the total funding proposed by the Governor would reduce the IOS funding gap by $5.65 billion, leaving roughly another $15 billion that will have to come from another source of near-term funding, such as other existing or new Federal programs or added State sources. The Authority has also noted that the design and scope of the IOS is a matter of the Authority's definition and not a matter of law. If the Authority could reduce the cost or scope of the IOS, the immediate gap would also fall.

There are three established Federal programs for which the HSRA program might qualify: the Railroad Rehabilitation and Improvement Financing (RRIF) program administered by the Federal Railroad Administration; the Transportation Infrastructure Finance and Innovation Act (TIFIA) administered by the Federal Highway Administration; and, the Transportation Investment Generating Economic Recovery (TIGER) grants administered by the Office of the Secretary of the U.S. DOT.

The RRIF program makes only loans, mostly to freight railroads, though loans have been made to Amtrak or other rail passenger station projects. The total authorization of the RRIF program is $35 billion, of which $7 billion is restricted to smaller freight railroads and a total of $15 billion has been committed. Because the program consists of a large number of individual loan transactions, there is no stable annual level of funding.

The TIFIA program makes loans or guarantees loans for a part of the cost of a project, mostly for highway or intermodal programs, though the program could extend to projects that include rail components (for example, the Transbay Terminal project in San Francisco received a $171 million loan). TIFIA loans generally are less than $1 billion, though the largest was $1.6 billion for the replacement for the Tappan Zee Bridge in New York State. The President's Budget calls for an annual funding level for TIFIA of $1 billion annually through FY 2018.

The TIGER grant program has averaged around $700 million annually since its inception in 2009. One of the criteria for TIGER grants is matching funding by other agencies. TIGER grants ranged between $1 million to slightly over $20 million per project in 2013, and are widely distributed across all states. The President's budget requests TIGER funding of $1.25 billion annually through FY 2018.[5]

Finally, the President's budget requests authorization for a new grant program to support "high-performance passenger rail networks,"[6] for which the California HSR program would presumably qualify. If approved, the funding would be $1.3 billion annually through FY 2018. This funding would have to be distributed over an unknown number of applicants.

The three loan programs need annual Congressional appropriations for which the outcome is difficult to foresee with any confidence. The outcome of the high-performance passenger rail

[5] For TIFIA and TIGER, see U.S. DOT Budget Highlights for FY 2015 at page 4.
[6] U.S. DOT Budget Highlights for FY 2015 at page 29.

networks program is also unpredictable as it requires both a new authorization and appropriation. The share that the HSRA program might receive in all four programs is also unclear.

The Authority has proposed the use of private investment as a significant way of filling the longer term gap ($37 billion in YOE$ or $28 billion in 2013$) that must be filled between 2022 and 2028 in order to complete the system. The Authority's cash flow forecasts support a role for private investment in one form or another after completion of Phase I. Even assuming successful experience in proving out the Authority's forecasts, this is not likely to occur until 5 years or so after commissioning the system, or about 2027. This will also be influenced by the Authority's business model that we discuss below.

This issue has unclear prospects. **The Legislature may want to request a specific study of the funding prospects of the GGRF program and the variables that may affect it in order to have a clearer idea of the amounts that may be raised and the potential amounts that could contribute to the HSRA funding gap.**

Blended System issues. Access to San Francisco's Transbay Terminal has posed a challenge to the program from the beginning. The ideal engineering outcome – a new, four track system separating HSR from Caltrain and freight service – was problematic because of its high cost and environmental impact. An alternative approach was adopted that blends the services of Caltrain and HSR on the same two track system, mostly within the existing right-of-way but with specific additions of passing tracks where needed and with the possibility of incremental increases in capacity when justified by demand. When combined with electrification of the Caltrain lines, paid half-and-half by Caltrain and HSRA, this approach should work to serve the needs of both systems at least through the first decades of the Phase I Blended system. In a number of our previous letters, the Group has supported the blended system approach; our comments below are aimed at improving its implementation.

The blended approach will require a true joint effort by Caltrain and HSRA with full participation of other parties including the Transbay Joint Powers Authority (that has the responsibility for the connection from the current Caltrain terminus at 4th and King Streets to the Transbay Terminal) and the Union Pacific Railroad (that has freight operating rights on the same lines). There are a number of issues on which the interests of the parties must be explicitly balanced if the blending is to work:

- Currently, Caltrain uses a platform height of 8" above rail. This means that boarding/de-boarding requires stepping up/down from the floor of the train (25" above rail), which can impose delays and risks of tripping and falling, especially when the needs of disabled passengers must be accommodated. The result is longer and less reliable schedules. The low platform height is dictated by the regulations of the California Public Utilities Commission (PUC) that require platforms to be no higher than 8" on tracks that may also carry freight trains. Unless a waiver from this regulation is granted, or expensive track work is installed, Caltrain will be limited to low platforms. At its current frequency of services, the lack of level boarding is manageable (if undesirable), but it will become much less tenable when Caltrain frequencies are increased and HSR trains are added.

- Under current plans, the floor of HSR trains will be about 50" above the rails, which is typical practice for most of the world's HSR systems and consistent with Amtrak's plans in the Northeast Corridor. Caltrain is experiencing rapid demand growth, a process that will accelerate when service to the Transbay Terminal is inaugurated. Caltrain's plans call for acquiring new bi-level, electric multiple-unit rolling stock. Since the existing Caltrain coaches have a 25" floor level, consistency would suggest a 25" floor level for the new equipment. This would mean that platforms for the two systems would be at different levels, making transfers within station more difficult to arrange. This might be manageable at many common stations where Caltrain and HSR could have separate platforms, but the platform disparity would be more serious at the Transbay Terminal because the number of platforms is limited. As a result, routing of traffic into and out of the station will be more complex, and dispatchers will not have the flexibility to send either system to all platforms when delays or operating problems would otherwise dictate. One approach, turning a number of Caltrain services at 4th and King and limiting the number of Caltrain services to the Transbay Terminal, has been suggested, but would pose restrictions for Caltrain's access to the Transbay Terminal.

- The basic standards of the PUC for electric catenary wire call for a clearance of 22 feet 6 inches above the rail. One the one hand, both Caltrain and HSR may want a lower catenary height in order to reduce construction cost for which the PUC will have to grant permission: on the other hand, the Union Pacific and port interests may want to protect the hypothetical possibility of future freight cars requiring even more clearance. HSR's current electrification designs are appropriate for HSR-only operations and may not be acceptable for use in the Caltrain area. There are a number of specific locations where Caltrains's clearance is already below 22 feet 6 inches, but there is no generally agreed height limitation.

- Positive Train Control (PTC) is a requirement of Federal law. Facing this mandate, Caltrain developed its own system – CBOSS – that is now being implemented. CBOSS may not be appropriate for use by HSR trains. If so, HSR trains may have to deal with two signal systems. In addition, the Union Pacific Railroad will have to operate in the same territory so will have to have conforming signal systems in its locomotives.

None of these problems is impossible to resolve, albeit at added investment and operating cost by one or more of the parties. There is nothing unique about having multiple freight and passenger operators on a single line and there is experience in the U.S. and Europe with resolving the normal issues. All parties in the blended area are aware of the issues and there has been full cooperation among them.

We are concerned, however, that near-term decisions could be made by the parties acting separately that would ultimately compromise the performance of the system. For example, a decision by Caltrain not to plan for at least 25" platforms, which would provide an essential approach to level boarding, would lead to increased delays and uncertainty that could become

unmanageable when Caltrain frequencies increase to meet the rapidly growing demand, especially that caused by the opening of the Transbay Terminal. This problem would get worse when four HSR trains per hour are added to the blended system in 2026. Caltrain will definitely need an expanded fleet, and bi-level cars are an efficient way to meet the need. That said, a decision to buy 25" floor level, bi-level coaches would mean that Caltrain and HSR would be committed to operating on incompatible platforms, which would add rigidity to a system that will be challenged for capacity. This problem could be alleviated if Caltrain ordered coaches that can serve both platform levels or if it adopted a uniform 50" platform, but either solution would clearly add investment costs above those planned. In all cases, the design of the electrification for Caltrain will need PUC approval and will need to consider the interests of all of the operators on the line.

This is a complex issue involving technology, investment, system performance and sequencing including the interests of a number of parties. Clearly there is no perfect answer and it is actually a problem resulting from success in attracting more passengers. **We recommend that the Legislature request periodic joint reports from Caltrain, HSR and the Union Pacific Railroad that will use the tools available, including line capacity simulators, to assess the impact of alternative approaches to coach floor and platform height on capital and operating cost, capacity and reliability of both systems. This would include the impact on Caltrain if it has to construct 25" or 50" platforms. This study should also include the investment and operating cost impact of the alternative approaches to catenary height and platform clearance and should outline the decisions that the PUC will be asked to make.**

Blended operations also pose the issue of accidents at grade crossings. Even at its existing speeds and frequencies, Caltrain experiences about 20 grade crossing and intruder deaths per year and generates delays on the local streets as autos and trucks wait for passing trains. This will get worse as train frequency and road traffic both increase over time. It would be difficult to overstate the risks of more frequent, faster and quieter Caltrain service combined with 110 mph HSR trains interacting with growing road traffic in the middle of California's increasingly busy cities. **We recommend that the Legislature ask Caltrain, HSR and the communities involved to develop a joint report assessing the likely future risks of increasing train traffic and speeds on the grade crossings in the areas impacted and identifying possible approaches to resolving the issue over time.**

Demand Models. The Authority has continued to develop its demand modeling over the past few Business Plans. The latest model, "Version 2," is based on updated economic data, better transport data and surveys, and a number of revisions in the structure of the model. Version 2 also employed Monte Carlo simulations to produce a clearer view of the range and probability of outcomes. Although comparisons between the demand forecasts of 2012 and 2014 are difficult to make, the overall result has been a lower percentage of business travel and a shorter average trip. Taken together, these changes have meant that, while the number of projected riders has gone up by about 25 percent, the expected revenue has actually decreased by 10 percent.[7] In addition, the Authority has not yet attempted to include significant non-passenger revenues, such

[7] "Connecting California," page 45. The percentages shown are based on similar scenarios in the 2012 and 2014 Business Plans, but would change somewhat if other scenarios are used.

as station area rentals and leases. The net result is that the financial forecasts in 2014 are somewhat more conservative than in 2012.

The table below shows the passenger demand and revenue forecasting results:

		HSR Scenarios for Phase I in 2040			
		Low	Medium	High	
	15%	25%	50%	75%	85%
Riders (million)	21.9	25.4	33.1	44.0	49.9
Revenue (million 2013$)	1,030.6	1,195.0	1,559.4	2,050.1	2,349.8

See Ridership and Revenue Forecasting Technical Memo, pg 7-3

The Authority has defined the low scenario to be the demand and revenue levels for which there is only a 25% probability that the actual demand will fall below the forecast of 25.4 million passengers and a 75% probability that the actual demand will be above forecast. The medium forecast is one where the probability is 50% that the actual demand will be below (or above) 33.1 million riders while the high forecast has a 75% probability that the actual demand will be below the forecast of 44 million riders and a 25% probability that actual demand will exceed forecast levels. We have added the 15% and 85% levels to give an indication of greater caution on the low side and greater optimism on the high side. The critical point is that the program must be assessed not just on the medium forecast but on the range of outcomes in order to get a better picture of demand risk at this point in the program.

The Authority is now discussing plans for an improved modeling effort ("Version 3") in its 2016 Business Plan. Among other issues, a better modelling effort could: use different fares for business versus recreational travelers; reflect time of day, day of week and seasonal variations (the current model uses averages); and, adjust for the actual trip duration to allow for overnight or longer travel. There are also proposals to adopt an entirely new form of modeling more in accord with model structures that have been developed since the HSRA modeling was initiated. We support these ideas and believe that it will be appropriate to use the improved model for overall planning purposes and for assessing the Authority's goals in designing alternative management contracts or franchise proposals. An improved demand model will also permit inclusion of factors, such as demand peaking, which will have an effect on fleet size and operating costs. At the same time, there is a concern that the modeling effort will more and more put the Authority into the position of proposing operating strategies and commercial policies that it is less qualified to formulate and that would be better made by the operators. As discussed below, to the extent possible the Authority should begin to bring market and operating expertise, and potential risk capital, into the picture.

Business Model evolution. The HSRA discussion of its proposed business model has developed over time. The current view is that the HSRA will plan and build the system itself through

completion of the IOS.[8] At that point, the Authority may award a management contract for operation of the system in order to prove the potential demand in the opening five years. In this case, the Authority will need to take the lead role in determining initial service frequency, quality, fare policies, equipment design, safety controls, and all other aspects of the system other than providing management and operating skills and labor. The Authority could alternatively consider a form of gross cost franchising in which the potential operator could be brought into the planning process earlier and assist in establishing the commercial policy for the system.

The Authority is considering a longer-term concessioned operator when demand has been proven. This could include significant investment and pricing flexibility on the part of the operator. In this case, the State will need policies and an agency to regulate the operator. The Authority and its operator will also need to interact with the local operators of the blended systems in order to share scheduling, dispatching and maintenance responsibilities and costs.

We have discussed this issue in most of our letters. We believe that the Authority is making progress in defining its business model options and initial memoranda of understanding (MOU) have been developed for the blended operations. With this acknowledged, we believe that the Authority should be more and more specific about the business model options it is considering because its ability to generate interest from potential private investors and operators will clearly be improved when the private parties have a clearer view of their role. Private investors are not likely to put up significant risk capital until the demand forecasts are proven and the role and authority of the private operator has been clearly established.

As discussed above, the demand projections in the 2016 Business Plan are likely to lead the Authority into issues, such as pricing of business versus recreational travel or peak versus off-peak travel, which should have a significant input from commercial operators. In addition, the Authority has apparently had to leave significant issues undecided such as the sharing of operating costs in the Caltrain area (see "Operations and Maintenance Cost Model Documentation, page 5), which make the estimated O&M costs borne by the Authority higher than they might actually be. **We recommend that these issues be discussed in more detail in the 2014 Business Plan or in later presentations to the Legislature.**

Status of the ability to use the ARRA money that expires on September 30, 2017. The money being provided by the U.S. DOT contains a $2.5 billion component financed from ARRA funds that will expire unless the money is expended and billed to the U.S. DOT by September 30, 2017. Under the terms of the agreement, the State must match the Federal funding, but the Authority's ability to do so is currently threatened by litigation over the use of Proposition 1A bond funds.

This poses two issues; the source of the State's matching funds, and the actual ability to spend money on construction rapidly enough assuming sources of the State's match can be found. If the pending litigation is resolved in the Authority's favor, Proposition 1A bonding can provide the State's match. If the Governor's proposal to provide cap-and-trade funding to HSRA is enacted, the State match will also be available. We are assured by the Authority that, assuming

[8] It is possible that Amtrak or another operator will operate re-routed San Joaquin trains from Sacramento to Bakersfield when that section in the Central Valley is completed and before the link to San Fernando is finished.

construction can begin this summer as planned, they expect to be able to expend all of the ARRA money that would otherwise expire.

Service to Anaheim. For a number of reasons, including the high cost of constructing a new, separated high-speed line from Los Angeles to Anaheim, the Authority removed the link to Anaheim from their demand projections and program plans in the 2014 Business Plan, leaving the connection to be provided by Metrolink. While this may be appropriate for the 2014 Business Plan, we believe it should be reconsidered in the 2016 Business Plan since the demand generated by Anaheim and Norwalk in earlier demand modeling was actually greater than Los Angeles Union Station. While we understand that the issue is under discussion with Metrolink, we believe that, as with the blended service between San Jose and San Francisco, the Authority should evaluate conventional speed electrification from Los Angeles Union Station to Norwalk and Anaheim. There appears to be a reasonable possibility that single seat conventional service through to Anaheim would generate enough additional demand and revenue to justify the added investment and operating cost.