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Ms. Cynthia T. Brown
Chief, Section of Administration
Office of Proceedings
Surface Transportation Board
395 E. Street SW
Washington, DC 20423-0001

ENTERED March 7, 2014
Office of Proceedings
March 7, 2014
Part of
Public Record

Re: California High Speed Rail Authority's Petition for Exemption of Fresno to Bakersfield HST Section. (STB Finance Docket No. 35724 (Sub-No. 1))

Subject: This is an Opposition and Protest Reply to the California High Speed Rail Authority's Petition for Exemption

Dear Ms. Brown:

Regarding this submission for Docket Number FD35724 (Sub-Number 1):

- a) I have previously filed, by January 21, 2014, as a party of record with the Surface Transportation Board with a notice of intent to participate in this proceeding.
- b) I intend to exercise my right as an individual private citizen to have the service requirements under 49 C.F.R. § 1104.12(a) waived
- c) My Filing ID Number is 235331.
- d) This filing's accompanying documents contain color graphics.

I provide the following information for the Surface Transportation Board as it considers the California High Speed Rail Authority's (CHSRA's) Petition for Exemption of the Fresno to Bakersfield HST Section.

Overview and conclusions from the accompanying documents – One of the major issues for the California's High Speed Rail Authority's (CHSRA) future system is its inability to meet the legislative requirements of AB3034's Section 2704.08 (c) (2) (J) and Section 2704.08 (d) (2) (D) to not need an operating subsidy. After assuring voters in 2008 that no operating subsidy would be needed, the Authority attempted during 2009 and 2010 to secure a 'revenue guarantee' for its program. A revenue guarantee would have allowed the system's private operator to assure themselves of profits, the *sine qua non* of not needing an operating subsidy. While the status of that effort is hazy, a revenue guarantee request has not been broached publically in the past three years.

Profitability is based on a simple, two step formula – ridership x fares = revenues. Then revenues – operating expenses can equal profits. When revenues don't exceed operating expenses, the train will need a legally prohibited operating subsidy. While there may be social benefits to California having a high-speed rail (HSR) system, it's first benefit to its investors, the people of California and the United States, is to be profitable.

The first third of the ability to have revenues exceed expenditures is embodied in

ridership forecasts, which have been extremely controversial for the California high-speed rail (HSR) project for many years. In 2008 the Authority said demand for its Phase 1 between the downtowns of Los Angeles and San Francisco was about 100 million. By 2012, that had dwindled to CHSRA's Phase 1 Blended System's (2027 – 2029) ridership with a low of 16.1million to a high of 26.8 million by 2030. That is at most a quarter of what the Authority's told voters before the 2008 vote.

To justify an ever-growing number of skeptics, including the statutorily required independent Peer Review Group, the Authority hired an in-house panel and named it the Ridership Peer Review Group. Even they have been hesitant to bless the assumptions underlying the ridership model, despite one member having been consultant to Cambridge Systematics, the firm that supplies the ridership forecasts.

Over the past five years, efforts to challenge the ridership modeling community's assumptions, data inputs or algorithms that still produce still-questionable estimates have seemed like a fool's errand. Similarly, even the efforts of macroeconomic modeling experts, and the CA Senate-commissioned California Institute for Transportation Studies (ITS) to plumb the internal workings of Cambridge Systematics' forecasting model were rebuffed by the Authority; claiming the proprietary nature of the software, its data and its deployment.

Consequently, rather than getting embroiled in a no-win ridership forecasting controversy, my co-author and I have accepted the Authority's figures for our profit calculations – albeit with extremely serious reservations. This is a fundamental assumption in the first two of my three submissions; the third's data is solely from the Authority's Plans and publically available data.

A second part of the profitability equation is revenues. Revenues derive entirely or almost entirely from fares. The accepted measurement of revenues is Revenue Per Passenger Mile (PPM), calculated by dividing total revenues by the number of passenger miles. The other key metric is the Load Factor, which is the number of passenger miles divided by the number of seat miles. It is also possible to calculate Revenue Per Seat Mile, by dividing total revenues by the number of passenger miles.

Revenue PPM and Operating Expenses (OpEx) PPM have been the baseline measurements used in all our publications to predict profitability. Until the end of 2011, the Authority used seat miles as its baseline to measure OpEx, but never compared revenue or Operating Expenses on either a Per Passenger Mile or on a Per Seat Mile basis. In 2012, and in their 2014 Draft Business Plan, the Authority has started to shift to PPM. However, unlike the Load Factors used by Amtrak, or existing high-speed rail systems with 50-65% Load Factors, in 2012 the Authority assumed a 76% Load Factor, and this year an 85% Load Factor. It is not difficult to understand the revenue-positive enhancements of that choice.

As the accompanying document To Repeat: The CHSRA's Train Will Need A Subsidy Forever (August 2012) shows, the Authority's fares PPM are seriously out of line with both the international HSR experience and Acela Express. [See Section 3 or the figures on pages 7 and 9 of the To Repeat report.] Between the downtowns of San Francisco and Los Angeles, the Authority proposes to charge about 22-23¢ PPM, while the international experience reflects PPM fares at around 45¢ PPM. Acela Express (2009), which may be a profitable semi-HSR system, has fares nearly three times PPM what CHSRA plans to set its fares.

Revenue of 22-23¢ PPM, indefensible in California's transport market of (relative to the world's prices) inexpensive gasoline and airline fares, is the result of a decision the Authority made early on. That was – its fares would always be either 50% or 83% of the average annual PPM fares of airlines operating between the San Francisco Bay Area and the Los Angeles Basin. Even now, the 83% tautology is what drives the \$86 HSR fare between the city centers. Clearly the Authority, after admitting in its 2012 Business Plan that : "*Fare levels are . . . somewhat below current airfares in the longer distance travel markets and well above the out-of-pocket cost of driving in the shorter distance travel markets.*" [Found in California High-Speed Rail Program Revised 2012 Business Plan, April 2012, page 5-11 [PDF 119]] are targeting the airline market.

But this fare pricing policy has two fatal flaws. The first is it does not reflect real-life Operating Expenses (OpEx) plus profits; the second is that it doesn't hold well in the cold waters of consumer market choice realities.

Through considerable effort, our team has developed estimates of the operating expenses of European HSR system; again exhibited in To Repeat: The CHSRA's Train Will Need A Subsidy Forever (August 2012) and graphically represented in both Section 3 and on pages 7 and nine. Because the Authority in 2012 claimed a 50% gross operating margin, it followed from calculating their LA-SF fares, that operating expenses had to be around 10-11¢ PPM. When calculated from the source data publically available from the European HSR systems, the Authority's OpEx was between a third and a quarter of those systems' OpEx (32¢-45¢). More strikingly, the Authority proposes to have a PPM OpEx a sixth of Acela's, although it will likely have the same or very similar labor, benefits, power and maintenance costs.

The Authority has refused to release details of its OpEx data or calculations. The GAO's Director of Infrastructure testified before Congress in December 2012 that, despite requests to the CHSRA, they had scant OpEx data upon which to judge the system's profit potential. In November 2011, we showed the Authority's present Board Chair, Vice Chair and its CEO an early version of the graphic on pages 7 and 9 of the To Repeat report, and were promised a response, which has not been forthcoming. In late 2013, a colleague made a Public Records Request for access to the Authority's model and data used to compute its OpEx and profits. Our colleague received an answer, largely consisting of "*This is trade secret information pursuant to Evidence Code section 1060, incorporated into the California Public Records Act through Government Code section 6254(k) and, therefore, will not be provided.*"

Our research has also shown that European HSR systems, all government-owned and operated, do not account for their full OpEx. This is possible because of EU Resolution 91/440, which allows multiple accounts for multiple government agencies to calculate their rail systems' costs by separating OpEx for the rolling stock from OpEx accounts for the maintenance of fixed infrastructure and other OpEx. Neither of those accounts include the bulk of either pension or health care costs, as these are benefits are in the national accounts, not the rail operators' accounts. These additions to OpEx were not put into the equations underlying the graphics on pages 7 and 9 of the To Repeat report. If they had been, the Operating Expenses of those European national systems would increase by at least a quarter. In part, this explains why Acela, using the FRA's requirement of a single accounting system, has OpEx that is at least half again as high as the European HSR systems.

The report Fleecing Local Riders While Big City Executives Ride Cheaper (January 2014) is testimony to the probable discovery by the CHSRA that they needed considerably more revenue than pre-2012 profitability calculations suggested. Like riders on short-hauls of any public transport mode, the CHSRA's fares are higher per passenger mile (PPM). But in the case of CHSRA, those PPM charges in both the Central Valley and the 'Bookends' (the parts of CHSRA's Blended System that are coterminous with Metrolink in Southern California and Caltrain on the San Francisco Peninsula) can be 3-4 times as much PPM as those for passengers between the two metropolitan centers.

Pragmatically the scheme of such disparities makes no economic sense because, despite seriously greater PPM fares, the Authority continues to forecast annual double digit increases in ridership of their HSR system in the Central Valley and the 'Bookends.' High school economics teaches that price increases, particularly such drastic ones as local riders will face, drive would-be customers either out of the market or to competitors – in this case auto or bus options or the *status quo* of using Metrolink and Caltrain on the same routes where HSR is offered.

Morally disturbing however is that, while claiming there is not bias in fare calculations, their own technical memorandum shows that there is strong bias. Such a disparity might have been an oversight in the 2012 Business Plan [See: Footnote 12 in the Fleecing Local Riders report that refers to Cambridge Systematics' (CS) final technical memorandum on ridership and revenues of April 12th 2012]. After all managing such a large, data-driven project can produce errors. However, since the bias is repeated in the Draft 2014 Business Plan [See; Table 3.1, PDF 28 of Cambridge Systematics Draft Technical Memorandum on ridership and revenues] one can only deduce that either continued poor management or duplicity is the culprit.

By using still-questionable ridership projections, increasing the system-wide annual Load Factor to a stratospheric 85%, and using local riders higher PPM fares to underpin (aka cross-subsidize) the LA to SF PPM fares, the Authority aspires to profitability. But the latest of our more than 40 reports, If You Build It They Will Not Come (March 2014), shows that while the computers may produce glowing statements of profits from questionable and protected ridership, and revenue calculations; basic economic choices show that few travelers will select the CHSRA's offerings in its first seven years.

Figure 4 and Figure 5 of the If You Build It report shows the CHSRA's offerings have no travel time or cost of traveling advantages over driving, taking the Megabus or flying in the first five years of the Initial Operating Systems' existence (2022-2026). Even when the Bay to Basin (B2B) opens in 2027, HSR's only a time advantage over driving for travelers between the SF Bay Area and the LA Basin is because the HSR link between the Central Valley and San Jose has been constructed for another, unidentified \$20 billion. In no case over the first seven years can the HSR-based system compete on an elapsed travel time basis with airline-based traveler's choice – the exact customers that the Authority has set its fares to capture during those seven years.

California's proposed HSR system from 2022 through 2028 (the IOS and B2B phases) IS high-speed rail in the United States. If it can't show a clear advantage in time or total costs over driving, flying or taking the bus during those years, as the If You Build It report shows, it is likely to not only fail financially, but also to destroy the potential future that such systems might have in other US metropolitan markets.

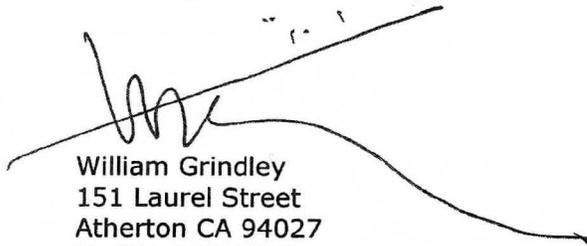
In short, the California project will become a national liability for high-speed rail proponents.

Finally, the Authority's 2014 Draft Business Plan admits that the first three years (2022-2024) of a private company running the 300-mile IOS route, may require an operating subsidy of \$50 Million. [See: California High-Speed Rail Draft 2014 Business Plan, Exhibit 6.1, page 52 [PDF 52]]. In the course of six business plans and draft plans, this is the first mention of operating expenses exceeding operating revenue. There is no provision in AB3034 for a temporary operating subsidy. Such an annual subsidy is a burden Californians – and probably all Americans – would have to bear; despite promises to the contrary since 2008.

What will happen then? After spending \$51 billion on a project (up through B2B) that bears little resemblance to what voters approved in 2008 and that only gets riders to the edges of LA and SF's downtowns, there is little choice except to continue to spend unknown billions more to complete the promised Phase 1. That's because, as the report If You Build It shows, there are few, if any time or cost advantages for travelers to select a journey that uses high-speed rail and to make the HSR system competitive, unknown billions more must be spent.

When the discovery is made that promises on capital costs, on fares and travel times were all broken, the greatest danger is that the public will have another, very expensive in this case, example that will corrode trust in government.

Sincerely,



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Accompanying documents:

To Repeat: The CHSRA's Train Will Need A Subsidy Forever (August 2012)

Fleecing Local Riders While Big City Executives Ride Cheaper (January 2014)

If You Build It They Will Not Come (March 2014)

Nb. All reports in which I was co-author can be found on the web at www.sites.google.com/site/hsrcaiff

Second Edition
– December 17th 2012 –

– To Repeat –
The CHSRA's Train Will Need
A Subsidy Forever

– from the Authors of –

The Financial Risks Of California's Proposed High-Speed Rail Project

The March 17th 2012 paper *'The CHSRA Knows Their Proposed High-Speed Train Will Forever Need An Operating Subsidy'* was a call to California's Administration and Legislature to verify the projected operations and maintenance (O&M) costs in California's proposed high-speed rail project. To date, the call goes unanswered. This report brings further evidence to the argument that the proposed high-speed train will continually need a legally forbidden operating subsidy.

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PUBLICATIONS

All available at www.sites.google.com/site/hsrcliffr and at www.cc-hsr.org, then go to Financial Reports

Major Reports on High Speed Rail by the Authors:

- The Financial Risks of California's Proposed High Speed Rail Project (Oct 2010)
- A Financial Analysis Of The Proposed California High-Speed Rail Project (Jun 2011)
- Revisiting Issues In the October 2010 Financial Risks Report (Sep 2011)
- Twelve Misleading Statements on Finance and Economic Issues in the CHSRA's 2012 Draft Business Plan (January 2012)
- California High-Speed Rail Authority's 2012 Draft Business Plan – Assessment: Still Not Investment Grade (January 2012)
- The CHSRA Knows Their Proposed High-Speed Train Will Forever Need An Operating Subsidy (March 2012)

Briefing Papers:

- Dubious Ridership Forecasts (Oct 2010)
- Six Myths Surrounding California's High-Speed Rail Project (Jan 2011)
- Seven Deadly Facts For California's High-Speed Rail Authority (Jan 2011)
- A Train To Nowhere But Bankruptcy (Feb 2011)
- Big Trouble For California's \$66 Billion Train (Mar 2011)
- Will The Train Benefit California's Middle Class? (Apr 2011)

Brief Notes: Twenty-three one page, single subject papers on various aspects of financial issues related to the proposed high-speed rail system, Oct 2010 - Aug 2011

Any fault found in this report is solely the responsibility of the Authors.

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Preface

This report, posted shortly after California's government authorized starting construction of its high-speed rail (HSR) project, is a sequel to 'The CHSRA Knows Their Proposed High-Speed Train Will Forever Need An Operating Subsidy' (the 'Forever' report).¹ That report showed how little was known about the California High-Speed Rail Authority's (CHSRA) Operating and Maintenance (O&M) expenses, and held that the Authority knew their O&M estimates should be higher.² It also pointed out that, if the Authority's estimated revenues are too low relative to its O&M estimates, AB3034's prohibition on an operating subsidy will be violated.³ Only the LAO's May 4th letter, and the May 18th Peer Review Group (PRG) findings question the CHSRA's projections.⁴

While the CHSRA will spend an average of \$6Million per working day over the next five years on California's HSR project, there is no independent answer on AB3034's key financial question – will the California HSR train's revenues cover its O&M costs?⁵ While investigating that key question, this report follows a business analysis format, first analyzing revenues, then O&M costs, then whether the former exceeds the latter.

Throughout this report, revenues and O&M costs are calculated in the common denominator of per passenger mile (PPM) – DOT/FRA's preferred metric to determine whether existing HSR systems and California's HSR's project are financially viable.

Revenue from fares is easily attainable. But any company is resistant to public scrutiny of its O&M costs, and the Authority is no exception. As will be shown, it is difficult to precisely estimate O&M costs from publically available data, but the DOT/FRA's guidelines for ARRA grants required a ". . . *reasonableness of revenue and operating and maintenance cost forecasts*"⁶ Reasonableness sets the standard for this report; that is, CHSRA's projected revenues and O&M costs on a per passenger mile (PPM) basis might differ from the findings herein, and still be considered reasonable by different independent analysts.

Is it unreasonable to demand the State find the political resolve to independently assess what could be a very large financial risk? Without verifying what will be demonstrated as low revenue and even lower O&M cost estimates on a PPM basis, Californians run the high risk of having to illegally subsidize the train's operations. Billions of dollars are at risk. Forever.

¹ The 'Forever' report was posted on March 17th 2012 and can be found at www.sites.google.com/site/hsrcliffr and at www.cc-hsr.org and go to Financial Reports.

² The basis for this claim is two separate references to Spanish data sources; both in the 'Forever' report. The two BBVA Foundation reports, and the RENFE presentation given to the Authority's Board in June 2011 showed high-speed rail operating costs were multiples of those projected in the CHSRA's Draft 2012 Business Plan (November 2011). The Authority has challenged all of the O&M data in the BBVA reports. That data came from the Union Internationale des Chemins des Fer/International Union of Railways. Despite repeated requests to verify the CHSRA's claim of 'flawed data', the UIC/IUR has neither officially verified that claim, nor produced the 'correct' data.

³ Section 2704.08 (c) (2) (J) and Section 2704.08 (d) (2) (D) of AB3034 demand no operating subsidy. The 'Forever' report said the CHSRA's unverified O&M costs are a serious problem.

⁴ See Appendix 1 and Appendix 2

⁵ In July 2012 California's Legislature authorized spending \$7.27 Billion (SB1029) and another \$819.3 Million (AB1464 and AB1497) on HSR plus local transit capital improvements – a total of \$8.046 Billion. With 250 working days per year, and the requirement to spend the HSR funds by 30 September 2017, or within 1,292 working days, the daily expenditure will be \$6,229,431

⁶ See ARRA HSIPR Requirements Federal Register/Volume 74, No. 119/Tuesday, June 23, 2009/Notices, Section 1.5 (page 28)

A Glossary of Some Terms Used In This Report

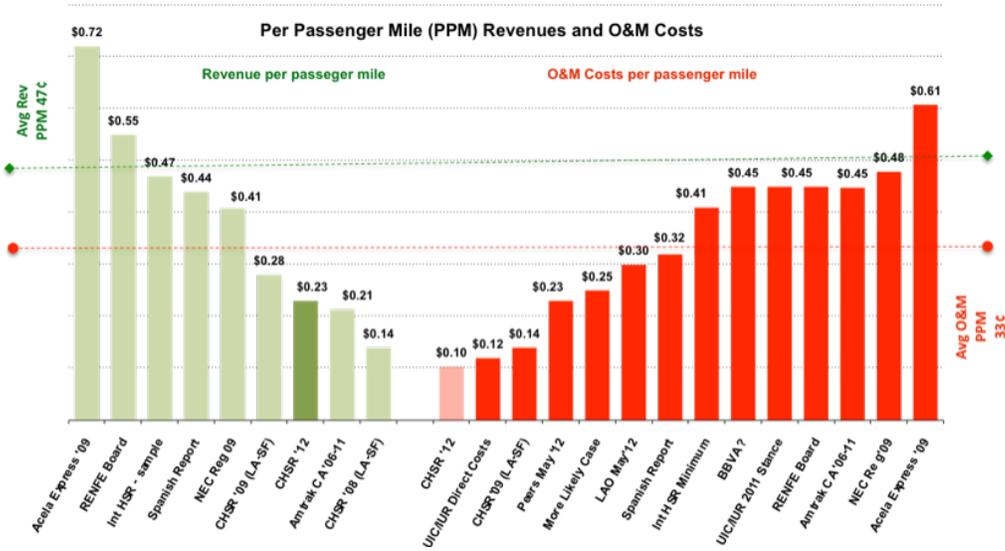
- Acela Express** – Amtrak’s high-speed rail service in the Northeast Corridor
- Adif** – Administrador de Infraestructuras Ferroviarias, Spain’s track ownership and track maintenance agency
- Amtrak** – the USA’s National Railroad Passenger Corporation
- ARRA** – American Recovery and Reinvestment Act of 2009 – source of about half the existing funding for the Central Valley section of the HSR project.
- BBVA** – the Spanish bank, Banco Bilbao Vizcaya Argentaria
- CC-HSR** – Community Coalition On High-Speed Rail
- CHSRA** – California High-Speed Rail Authority
- DOT** – US Department of Transportation
- FRA** – Federal Railroad Administration
- GAAP** – Generally Accepted Accounting Principles
- HSR** – high-speed rail
- ICE** – InterCity Express, Germany’s high-speed rail brand
- IOS** – Initial Operating Segment
- LAO** – Legislative Analyst’s Office
- O&M** – Operating and Maintenance
- PPM** – per passenger mile
- PRG** – Independent Peer Review Group
- PSM** – per seat mile
- NEC** – The Northeast Corridor Region of the USA
- Rail Network** – the UK’s rail owners and maintenance agency
- RENFE** – the Spanish rail operator, Red Nacional de los Ferrocarriles Españoles
- SNFC** – Société Nationale des Chemins de fer français; France’s conventional and high-speed rail operator
- TGV** – Train à Grande Vitese; one division of France’s high-speed train system
- UIC/IUR** – Union Internationale des Chemin des Fer/International Union of Railways

An Overview

Will California's HSR train's revenues cover its O&M costs? Unlikely. Why? Because the CHSRA's train is in the untenable position of having to compete in California's extremely cheap transportation marketplace while simultaneously meeting AB3034's requirement to be profitable.

Study the left side of figure below – revenue per passenger mile. To compete against the low costs of driving and cutthroat intra-California airfares, the state's HSR operator must keep the per passenger mile (PPM) fares somewhere in the 20¢ PPM range. The average PPM fare for existing HSR systems is more than twice what CHSRA projects – 47¢ versus 23¢.

Figure 5 from Section Three (in 2010 \$'s)



Study the right side of figure above – operating and maintenance (O&M) costs per passenger mile (PPM). The CHSRA's latest O&M costs, 10¢ PPM, are less than a third of the average O&M costs of existing HSR systems. And they're a sixth of Acela's, the nearest equivalent because that Northeast Corridor train has similar labor, power and maintenance costs as will the California HSR system.

Both CHSRA's revenues and O&M costs are 'outliers' when compared with actual HSR operations. Even disregarding that some, if not much, of European HSR systems' O&M costs don't land on their operators' accounts, the CHSRA's revenues and O&M costs are unreasonably low. In short, the CHSRA 'low balled' both revenues and O&M expenses – revenues to seem to be competitive with airline fares, and O&M costs to seem to produce profits.

Once the IOS South is built, there will be strong political pressure to operate it, whether or not that segment proves profitable. But even if the voter approved HSR project is built with no capital servicing requirements, operating losses could run from over \$125 Million to nearly \$3 Billion per year. Whatever that loss is, it will last forever.

Summary Of The Report

This report brings together previous and new revenue data, plus operating and maintenance (O&M) data of existing rail systems as benchmarks to measure the financial viability of California's proposed high-speed rail system.⁷ It finds that both CHSRA's estimated revenue and O&M costs for the proposed system are out of line with the experiences of operating high-speed rail systems in Europe, Japan and in the USA.

Section One is based on two separate sources of revenue data. First it analyzes Europe, Japan and the USA's HSR web-based fares on a per passenger mile (PPM) basis. Second it discusses nine data sources on revenues, six of which come from reports on existing rail systems. Then it compares existing operations with CHSRA's projected revenues on a per passenger mile (PPM) basis.⁸ Appendix 3 analyzes relationships between revenues and costs per seat mile, Load Factors, and revenues and costs per passenger mile. This section shows that five of the six per passenger mile revenues are higher than the two CHSRA estimates. Even the most proximate PPM revenues, Amtrak's conventional rail in the NE Corridor, are about twice as high as those in the CHSRA's April 2012 Revised Draft Plan.

Section Two discusses O&M costs from eleven sources based on actual operators' data. Five are from operating rail systems; including Acela Express, the USA's 'cousin' to HSR, as well as Europe and Japan's high-speed rail systems. Every actual O&M cost data benchmark is higher than the CHSRA's 2012 O&M expense estimates. The difference is striking – varying from a minimum of three times (Peer Review, May 2012) per passenger mile to four times higher (the UIC/IUR Letter of 2011).⁹ In the US that climbs to Acela Express' six times the CHSRA's projections.¹⁰

Section Three compares and contrasts revenue and O&M data. Even acknowledging non-GAAP accounting methods, the discrepancies between what the Authority proposes and actual operating realities are clear. From these analyses, and the sixteen appendices' detailed explanations of how

⁷ This report includes sixteen appendices and thirteen attachments. Most appendices are referenced in the course of the analytical text - one is not. Appendix 15 asks, as in the 'Forever' report, for complete and publically-accessible information on both the direct and indirect O&M variables used in the CHSRA's O&M calculations, and what values were assigned to those. Attachments largely document the submissions of information to CHSRA's directorate and the Governor, as well as the Peer Review Group's report and the LAO's letter to Assembly Members. Appendix 15 is referenced in Appendix 8.

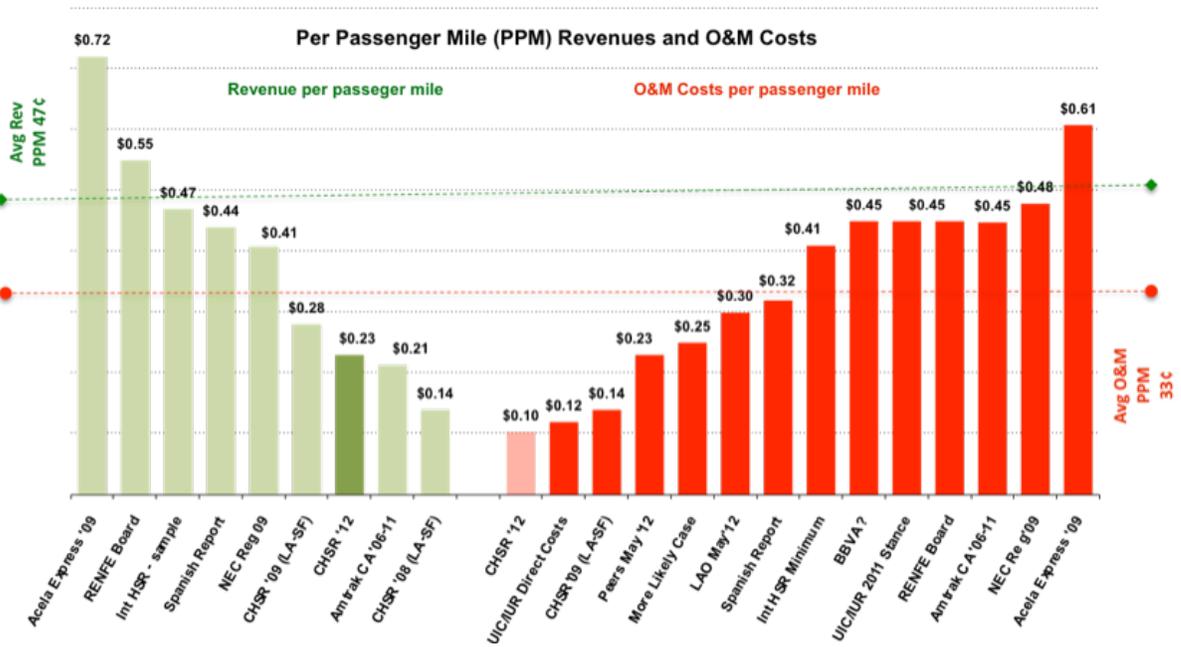
⁸ Appendix 3 describes why per passenger miles (PPM) is the financial metric used universally in the rail and airline industries and is recommended by the DOT/FRA. Also see Appendix 16 for DOT/FRA guidance on this subject.

⁹ See Appendix 2 for a summary of the Peer Review Group Report. Their entire May 18th 2012 report is found at <http://www.cahighspeedrail.ca.gov/> Discussions of the UIC/IUR's O&M expenses are in Appendices 12 and 14.

¹⁰ See Appendix 11 for an analysis of CA Amtrak's Operational Results.

such calculations were made, it is extremely difficult to conclude that the proposed high-speed train can operate without a legally prohibited subsidy.

The following figure, also Figure 5 in Section 3, displays findings on revenues and O&M costs on a PPM basis. Appendix 7 discusses the sources of these revenues and O&M costs. [This report's data is in 2010 non-inflated dollars.]

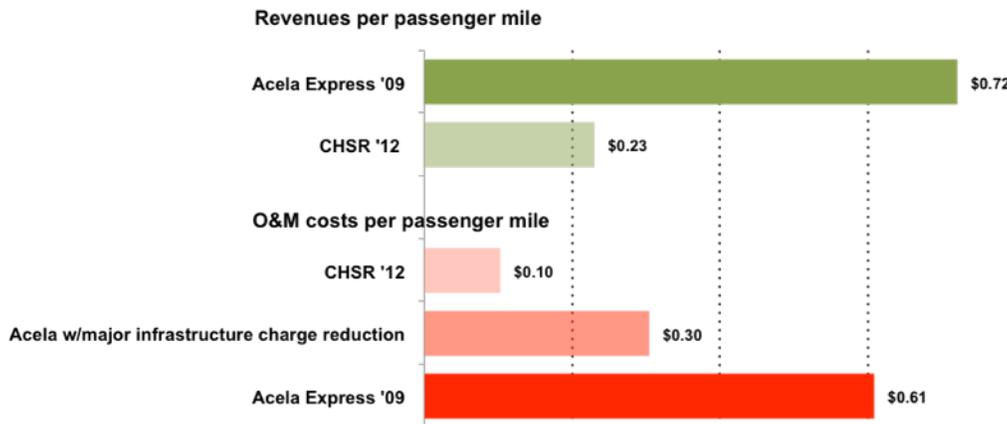


A USA analogy hiding in plain sight – For nearly a dozen years Acela Express has collected fares and paid O&M expenses.¹¹ The Peer Review Group thought the Acela Express experience analogous to CHSRA's plans when it said; "the overall results of the [CHSRA's O&M] model appear optimistic by comparison with readily available data on the closest comparable U.S. HSR operations (Amtrak's operations in the Northeast Corridor)"¹² The figure below shows how disconnected CHSRA's projected revenues and O&M costs are from Acela Express', even with large reductions of Acela's O&M costs.

¹¹ While there is controversy as to whether Acela Express absorbs all the indirect costs it should from shared Amtrak services, or is overcharged by the owners of some of the infrastructure it uses, that is largely moot when compared with the overall differences with CHSRA's planned revenues and O&M costs – even if non-applicable infrastructure use charges may represent a large part Acela's total O&M costs

¹² See Appendix 2, or see pgs 7-8 of the May 18th 2012 Peer Group Report found at http://www.cahsrprg.com/files/bus_plan.pdf

**– Acela Express versus CHSRA –
Revenues and O&M Expenses Per Passenger Mile**



Facing similar labor, energy, tax, and insurance cost structures; in similarly competitive airline markets, Acela Express charges more than three times CHSRA's estimated fares and pays six times the CHSRA's estimated O&M costs. Acela's revenues and costs represent USA reality.

The alternative to continuous subsidies – CHSRA could choose to meet the strictures of AB3034 and not require a subsidy. It's a simple formula: charge passengers the fares that will fully cover realistic O&M costs. That choice would violate the promise to 2008's Prop1A voters to transport them one way between LA to San Francisco for "about \$50" and it would probably put the HSR train out of competition with airline fares. But it would avoid eternal subsidies.

What might an unsubsidized, one-way inter-metropolis fare be? Based on analyses in Section 2 and international HSR operators' experience, a one-way LA-SF fare would be around \$200, about 50¢ per passenger mile (PPM); more than double CHSRA's present estimated PPM fare of 22¢ PPM.¹³ If CHSRA's O&M expenses reflected Acela Express' NY-Washington experience, the one-way fare would be nearly \$340, at 90¢ per passenger mile (PPM) is nearly that of Japan's Shinkansen PPM charge.

¹³ This 50¢ PPM fare would be very close to that charged on the London-Edinburgh route, £121 or US\$189: and the driving distances are similar – 404 and 383 miles for London-Edinburgh and SF-LA respectively. See: Oliver Smith; Planes cheaper than trains on half of routes, The Telegraph, August 16th 2012 found at <http://www.telegraph.co.uk/travel/travelnews/9479994/Planes-cheaper-than-trains-on-half-of-routes.html>

What would be the market's reaction? Immediately the train becomes the purview of the affluent and the high-end business traveler. That's already the case in Europe. In a mid-2012 book, two noted European HSR analysts described not only what Section 3 discusses as accounting legerdemain, but also that HSR trains' passengers are not traveling families.

“. . . if we keep in mind that the public resources used in high-speed rail imply a regressive transfer of income, in that taxpayers are subsidizing journeys realized above all by users belonging to the upper-middle and upper income brackets, who usually travel for business reasons and whose ticket (the amount of which is far from covering the total cost of the service) is paid for by their employers.”¹⁴

This report's authors earlier explored the same, skewed HSR passenger demographics.¹⁵ That 2011 Briefing Paper concluded that California's middle class would only infrequently be able to afford to use the HSR train between the state's metropolises if fares are priced to cover O&M costs. Given such a rise in the price of tickets – doubling or more as shown in Figure 1 – would lower the CHSRA's ridership forecasts dramatically, possibly by a third to a half. The Authority is stuck in a conundrum of their own making – charging too little while 'low balling' O&M costs on a PPM basis.

The Authority's position on revenues and O&M costs is clear and official. According to then-CEO van Ark, CHSRA had spent time; *“. . . cross checking to all the [HSR] systems in the world . . . including the Acela system in the Northeast Corridor . . .”¹⁶* With such inordinately low projected per passenger mile fares and O&M costs, and the above assertion by independent European investigators that even much higher PPM fare do not cover costs; the probability of the need for ongoing subsidies is extremely high. Couple these facts with the 'disconnect' between the CHSRA's projections and Acela's realities examined above, and the only conclusion to be made is that subsidies will be required. The only question remaining is how big the annual subsidy will be?

Section Four addresses the cumulative financial impacts if revenues fall short of O&M costs. Figure A14-3 (repeated below) shows the dynamics of

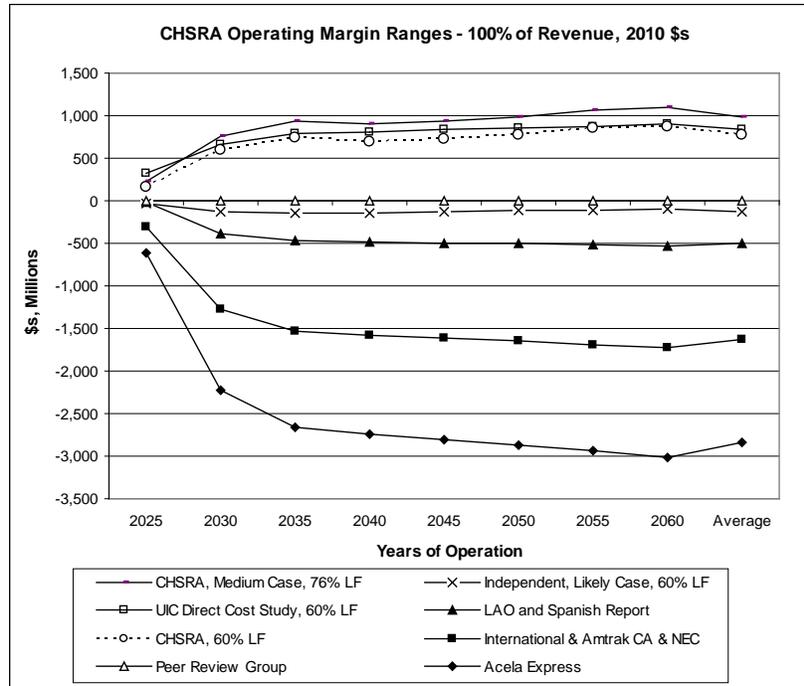
¹⁴ See: Albalade, Daniel and Bel, Germa; [The Economics and Politics of High-Speed Rail: Lessons From Experiences Abroad](#); Lexington Books, 2012, page xiii.

¹⁵ 'Will High-Speed Rail Benefit California's Middle Class'; April 4th 2011, A Briefing Paper, posted at www.sites.google.com/site/hsrcaliffr and at cc-hsr.org, then go to Financial Reports.

¹⁶ See Attachment 12. CHSRA's then-CEO, Roloef Van Ark, stated before the Congress on December 15th 2011, six weeks after the release of the Authority's Draft 2012 Business Plan. While Mr. Van Ark left that position in early 2012, no change was made in either CHSRA's forecasted per seat mile or per passenger mile revenues or its O&M costs in the Draft Revised Business Plan of April 2012. The ex-CEO's claim is also not supported by the Peer Review Group's May 2012 finding that Acela's O&M costs seem to not have been analyzed.

the potential magnitude of financial losses if CHSRA's revenues per passenger mile are as presently forecasted, but O&M costs are much closer to existing operators' reality.

The Peer Review Group concluded that, at best, revenues and costs would be equal. But if the CHSRA (with their 76% Load Factor), the IUC/UIR, and CHSRA (at a more reasonable 60% Load Factor) O&M cost models' results aren't realistic, the HSR train's operations could lose between \$4Billion and nearly \$100 Billion over the Authority's 35-year forecasting period (2025-2060).¹⁷



That would be \$123 Million to \$2.8 Billion per year that must be financed from some as yet unknown source.

What happens when the CHSRA's operating expenses exceed the train's revenues? – Losses will be unavoidable and recur annually once they begin. And once the State 'steps across the line' for even a single year to subsidize HSR operations; the die will be cast. There will be no incentive for the operator to lower those losses. Amtrak's history is replete with

¹⁷ See Appendix 14. See Figure A14-2; this shows the average annual profits and losses under eight scenarios of financial models for the HSR train. For example, in the Phase 1 Blended pair of columns, the left column shows average yearly losses or gains, the independent Likely Case estimate projects a \$123 million annual loss, while the Acela Express comparison shows a \$2.8 billion annual loss. These results are shown in Figure A14-3 (above). The cumulative losses for the 35 years of the forecasting period results in the figures quoted are shown in Figure A14-6.

unsuccessful efforts to tame its operating deficit, undermined by Congress' continued willingness to subsidize its operations.

By law and by the 2008 promise to voters that *"the users of the system pay for the system"* California's HSR train cannot have an operating subsidy.¹⁸ Whether the State's Legislature and Administration see fit to abrogate that provision remains to be seen; but there is no escape from subsidizing losses once they are started.

The impact on the State's financial position will be substantial, if not dangerous in any of the cases where losses occur. This is even more accurate if the difference between Acela's actual financial picture and the Authority's forecasts becomes the reality. The only known way to fund such negative impacts on the General Fund are additional taxes and fees, dramatic reductions in other State functions, such as education, public and social services; or both.

Hopefully that choice never arises, but the potential for losses seems very real. If California's leadership continues to abrogate its fiduciary responsibility and prefers spending on a project that appears to demand a 'cash feeding tube' once built, they will not only have broken the State's law, but will put the State on a collision course with more financial difficulties.

In Conclusion – HSR supporters' oft-repeated claim is that 'all HSR Systems are profitable; therefore California's HSR system will be profitable.' The claim about California's HSR system's profitability is challenged by recent Congressional Research Service findings.¹⁹

"The organizational structure of passenger rail is not conducive to a market environment in which competition among carriers exerts downward pressure on operating costs. The "low-cost carrier" phenomenon in the airline and intercity bus industries, in which multiple carriers compete with one another over the same infrastructure, is not practicable in the passenger rail industry."

There are several existing international HSR routes that may cover their operating costs; but there are no known HSR systems that cover all of their O&M costs without government assistance. And there is no evidence that existing HSR systems earn profits equal to 50% of their revenues. Yet this is CHSRA's claim for the state's HSR system.

¹⁸ See The Official Voter Information Guide of the Tuesday, November 4, 2008 California General Election at <http://www.voterguide.sos.ca.gov/past/2008/general/argu-rebut/argu-rebutt1a.htm>

¹⁹ Peterman, D. R., Frittelli, J., Mallett, W.; Congressional Research Service; The Development of High Speed Rail in the United States: Issues and Recent Events; June 28, 2012, 7-5700 R42584. Found at <http://www.hsdl.org/?view&did=715491>

HSR proponents' false-premised, *post hoc ergo propter hoc* argument misses the fundamental challenge to any new transport system in California: that the marketplace will not allow California's HSR system to generate revenues that are comparable with existing HSR revenues on a PPM basis because air transport prices and driving costs are so low.²⁰ To seemingly avoid that conundrum, the CHSRA's forecasts its per passenger mile (PPM) revenues at half the worldwide PPM revenue rate. Simultaneously, it seems highly improbable that California's HSR train will attain O&M costs PPM dramatically lower than current HSR systems O&M costs on a per passenger mile (PPM) basis. It's a trap of CHSRA's own making.

In short, unless worldwide HSR systems are profitable, to the tune of about 50% of revenues, the CHSRA's train's O&M costs will exceed their revenues. And there is no solid evidence that existing HSR Systems are that profitable!

Because more than half the present HSR capital development funds come to California as a 'gift of the people of the United States', it's important to know that those Federal grants were based on "*The quality and reasonableness of revenue and operating and maintenance cost forecasts for the benefiting Intercity Passenger Rail service(s).*"²¹ The vast majority of the DOT/FRA-ARRA grants were based on CHSRA's 2008 Business Plan, which was not only discredited by the LAO, the Peer Review Group, the State Auditor, but also the State's Office of Inspector General established to oversee ARRA grants. Equally important, in 2010 a CHSRA Board member admitted the substandard quality of that Plan.²²

Yet Federal funding and support continued alongside the State's. To this report's authors, CHSRA's claim that their HSR train will earn a 50% profit while charging half the PPM fares and incurring operating costs at a third or less PPM than the worldwide evidence is not reasonable: and it's a prelude to serious fiscal trouble.

²⁰ Europe, with higher PPM fares than California is finding similar market-driven conditions can apply there. According to Google maps, the London to Edinburgh distance is 404 driving miles, similar to the San Francisco to Los Angeles HSR corridor. A recent UK news article said the fare is £121, about US\$189 in mid-2012. That's about 47¢ PPM for a rail ticket, near what Figure 1 and Figure 5 show for other European HSR systems PPM fares. For three of twelve intra-UK air segments reviewed in the article, airlines are discounting their fares up to 50% for advance bookings, ie. 'cherry picking' the first routes. Competition has entered the UK market, as it will eventually in Europe and in California if the CHSRA's train ever gets built. See: Oliver Smith; Planes cheaper than trains on half of routes, The Telegraph, August 16th 2012 found at <http://www.telegraph.co.uk/travel/travelnews/9479994/Planes-cheaper-than-trains-on-half-of-routes.html>

²¹ See pg. 20 Federal Register/Volume 74, No. 119/Tuesday, June 23, 2009/Notices – 299229929.

²² CHSRA Board member Lynn Schenk said that the 2008 Business Plan was "...pulled together with Scotch tape and hairpins because we had to get something to the Legislature, but we didn't have the money, the resources, the people to pull together, so there were a lot of errors" View a YouTube of the statement at <http://www.youtube.com/watch?v=iGyUxBnoVpc>. Also note that Federal ARRA grants were supposedly for 'shovel ready' construction projects, which three years later appears to be a hollow phrase.

Section One

Further Findings On High-Speed Rail's Revenues

Based on two different sets of data, this section addresses whether the CHSRA's proposed high-speed rail ticket prices or revenues are credible. Proving that the train's revenues would be greater than its operating and maintenance (O&M) costs is the *sine qua non* of the project's financial viability. Unless the Authority can demonstrate that the system doesn't require an operating subsidy, both AB3034's Section 2704.08 (c) (2) (J) and Section 2704.08 (d) (2) (D) will be violated. In short, California's HSR train must be profitable or it is illegal.

Half of the profitability equation lies with the level of fares collected, probably its entire revenue source. Since there are so few operational high-speed rail (HSR) systems, one surrogate for revenues must be conventional passenger rail data. Whatever the database, it is vital to know if the CHSRA's per passenger mile revenue projections are anchored in reality. If they aren't, Californians are at risk to subsidize the HSR train's operations.

1.1 The Authority's questionable method of calculating fares produced fluctuating fares, probably based on its changing marketing strategy; which produced an impossible financial position – First, in 2008 California's voters were promised they could travel from LA to SF “. . . for about \$50 a person.”²³ This may be described as a low price/high volume strategy to capture riders.²⁴

After Prop1A passed and the 2008 Plan was released, operating cost projections perhaps showed that the additional marginal costs associated with moving about 100 million passengers per year was greater than the additional marginal revenue.²⁵ Hence, in 2009 the CHSRA seems to have opted for a higher price/lower volume strategy, and a one-way LA to SF fare more than doubled to \$105.²⁶

But by 2011 the Authority must have realized that the \$105 fare was not competitive with average airfares, so the strategy was revised and a one-way LA to SF train ticket was adjusted downward to \$83 – strangely without a

²³ See: the Official Voter Information Guide at <http://voterguide.sos.ca.gov/past/2008/general/argu-rebut/argu-rebutt1a.html> (pg.1).

²⁴ In 2008 the Authority produced what it considered “*investment-grade forecasts of ridership, revenue, cost and benefits of the system*” for 800 miles of high-speed rail “*designed to carry over 100 million people a year by 2030.*” See: California High-Speed Train, Business Plan, November 2008; pg.1. The 50% discount factor, from air fares, comes from page 17 of the same document.

²⁵ “*A high-speed train system . . . will carry more than 90 million passengers . . .*” See: California High-Speed Train, Business Plan, November 2008; pg.10.

²⁶ California High-Speed Rail Authority “Report to the Legislature; December 2009; pg. 65.

significantly increased or decreased passenger volume.²⁷

Second, the Authority doesn't have a convincing argument that a 17%-cheaper-than-airfare ticket price will attract millions of passengers. Why not a higher or lower percent of the airfare? A marketing plan solely based on 'cheaper than airfare' is a thin rationale to conquer the LA-SF long-haul transport marketplace. Using a percent of other suppliers' prices is an exercise in tautology. In theory, that pricing strategy always wins. But it results in competitive responses, aka fare wars, from established competitors (airlines) with multiple revenue sources. It's a recipe for financial trouble for a new supplier with one revenue source; ie the SF-LA rail corridor.²⁸

Third, public skepticism of the rail project only increased over time. The 2008 Business Plan fare was set at 50% of the average airline fare.²⁹ Choosing 50% of airlines' average fares for computing 2008's ticket price, then doubling the fare a year later by choosing 83% of average air fares, then lowering the actual fare amount in 2011 could have led the public to believe that the promised 2008 fare was part of a 'bait and switch' strategy to win Prop1A votes.³⁰

Finally, CHSRA put itself in a self-inflicted, impossible marketing position. In Europe, short haul (300-600 miles) air fares are high; and Europe's gasoline cost twice or more than California's. Consequently, European HSR providers can charge more per passenger mile than California's HSR's operator would be able to, since Californians don't pay gasoline or airfare prices like in Europe.³¹ For these reasons the ticket price per passenger mile in California must be lower than in Europe, as implied it is in Figure 1.

Conversely, there doesn't appear to be a 'magic ingredient' that would allow California's HSR to operate at substantially lower operating and maintenance costs than in Europe, whether the metric of financial performance is per seat

²⁷ California High-Speed Rail Authority; Draft 2012 Business Plan' dated November 1 2011; page ES-8. In the April 2012 Plan, the average one-way fare was \$81 – see page ES-14. But \$83 remained in the technical documents.

²⁸ For shorter distances, such as within the Central Valley (CV), and from the CV to SF or LA, CHSRA has a much higher price per passenger mile plan in place, as explained in Appendix 5. However it is not clear if people will get out of their cars at the CHSRA's proposed ticket prices as they are dramatically higher than the current San Joaquin Amtrak route's fares.

²⁹ See: pg. 65, 2009 Business Plan. *"The fare is calculated in the same manner as the 50 percent, but is anchored by an LA-SF HST fare at 83 percent of the air fare, or in 2009 dollars a high-speed train fare of \$105 vs. a \$125 air fare, and a \$118 cost to drive."*

³⁰ See: California' Business and Professions Code, Section 17500–170. In 2009, then-Attorney General Edmund G. Brown sued Midas's misrepresentation of final prices for its services. See: http://www.consumeraffairs.com/news04/2009/06/ca_midast.html. In 2010, then-Attorney General Brown sued on the issue of false presentations in home re-financing. See: <http://livinglies.wordpress.com/2010/06/11/calif-atty-general-brown-goes-after-bait-and-switch-efi-fraudsters/>

³¹ Figure 1 presents the average European HSR fares of about 40¢ per passenger mile, compared with 23¢ the CHSRA projects it can successful charge.

mile (PSM) or per passenger mile (PPM).³² The CHSRA's approach to revenues and O&M costs is not a recipe for a financially sustainable venture.

Clearly in both the 2012 Draft Plan and the Revised Draft Plan, CHSRA chose to not employ a 'top down' reality check which would have used the per passenger mile ticket prices of existing high-speed rail carriers as benchmarks. Had they crossed-checked their \$50, or \$105 or \$83 fare between LA and SF with existing per passenger mile charges such as shown in Figure 1 and Figure 2, they might have promulgated a different, and considerably higher, average per passenger mile fare. However, that would have made their proposal uncompetitive in California's transport market. Hence the 'box' the Authority finds itself in.

1.2 Figure 1 speaks clearly about actual fares and their costs on a per passenger mile (PPM) basis – Over the course of the first half of 2012, fourteen data sources on revenues were identified from publically available sources. This Section uses six sources, yielding fourteen different per passenger mile fares, based on web-quoted ticket prices and distances.³³ Figure 1, and its 2011 antecedent, Brief Note #14, should be a wake-up call for the Authority.³⁴ All existing HSR systems charge more on a per passenger mile (PPM) basis than the CHSR's pricing model intends to charge.

For short haul trips, existing HSR systems, and the proposed California system, charge more per passenger mile than for long haul trips. In general terms, existing operators in Figure 1 charge about a quarter more per passenger mile for short haul fares than for their long haul fares. CHSRA plans to charge short haul passengers at least 60% more (35¢ PPM) in general, and over twice as much (48¢ PPM) per passenger mile, between Fresno and Bakersfield.³⁵

³² See Appendix 12 on the direct O&M costs of European HSR operators.

³³ For Figure 1, driving distances (versus air mile distances) were chosen to calculate per passenger mile fares between European, USA and Japanese's city pairs. These are on a city center-to-city center basis using Google Maps, Driving Distances. See: http://www.google.com/ig/directory?type=gadgets&url=www.google.com/ig/modules/driving_directions.xml. Ticket prices for European systems are from Rail Europe; <http://www.raileurope.com/index.html>. Prices are in US\$ at an exchange rate of US\$=0.79Euros. Acela Express ticket prices can be found at: <http://tickets.amtrak.com/itd/amtrak>. Distance and fare prices (\$US=79.3 ¥en) for Shinkansen are from East Japan Railway Company; at <http://www.jreast.co.jp/e/charge/index.asp>

³⁴ Brief Note #14 posted, in July 2011, is available at www.sites.google.com/site/hsrcliff and at www.cc-hsr.org, go to Financial Reports.

³⁵ Appendix 5 discusses this in depth. To compete with the airlines with a low fare, the Authority established a two-tier-pricing plan. For the long haul markets their fares are about 20¢ PPM. CHSRA estimates this to produce about 40% of their 2030 revenue, but only about 30% of their passenger volume. For the shorter haul markets aimed at the auto users, and where there is no airline competition (eg. the Central Valley), CHSRA's fares range between 30¢-40¢ per passenger mile. This market will produce about 70% of all their passengers, but only about 60% of their revenues, as these shorter trips are higher priced. CHSRA 2012 Business Plan, Final Technical Memorandum-Ridership and Revenue Forecasting, Section 5.3 pages 5-5 to 5-7 and Table 5.16, page 5-32.

Figure 1						
Fares On Existing High Speed Rail Operations Compared With CHSRA's Planned One Way Fare						
EXISTING HIGH-SPEED RAIL SYSTEM SEGMENTS³⁶	From – To	To – From	Center to Center Driving Miles	One Way Lowest Adult Fare (\$US)	Lowest Class of Adult Fare (PPM)	A One Way LA-SF Fare Would Therefore Be (at 382 miles)
Italy – Trenitalia	Rome	Milan	363	\$107	29¢	\$113
Italy – Trenitalia	Milan	Turin	89	\$42	47¢	\$180
France – TGV	Paris	Marseille	481	\$151	31¢	\$120
France – TGV	Paris	Le Mans	131	\$53	40¢	\$153
France – TGV	Paris	Lyon	289	\$97	34¢	\$128
Spain – AVE	Madrid	Seville	331	\$83	25¢	\$96
Spain – AVANT	Madrid	Toledo	55	\$17	31¢	\$117
USA Acela Express	Boston	NYC	217	\$123	57¢	\$218
USA Acela Express	NYC	WDC	227	\$200	88¢	\$337
USA Acela Express	WDC	Philadelphia	139	\$106	76¢	\$291
Germany – ICE	Berlin	Frankfurt	341	\$176	52¢	\$197
Germany – ICE	Fulda	Frankfurt	64	\$42	66¢	\$251
Japan-Shinkansen	Tokyo	Osaka	318	\$177	56¢	\$213
Japan-Shinkansen	Tokyo	Takasaki	69	\$61	88¢	\$338
Average of 14 high-speed rail fares PPM and Equivalent one way SF-LA fare					51¢	\$196
Average short-haul fare per passenger mile (<150 miles)					58¢	na
Average long-haul fare PPM and Equivalent one way SF-LA fare (>150 miles)					47¢	\$178
AS PLANNED BY THE CALIFORNIA HIGH-SPEED RAIL AUTHORITY (CHSRA) ³⁷						
2008 Plan	LA	SF	382	\$55 est.	14¢	na
2009 Plan	LA	SF	382	\$105 est.	28¢	na
2012 Draft Plan	LA	SF	382	\$83 est. ³⁸	22¢	na
2012 Draft Plan	Fresno	Bakersfield	109	\$52 est.	48¢	na

³⁷ Google Maps says the shortest driving distance from the present day SF Caltrain station to LA's Union State is 382 miles. The shortest city center to city center driving route, is to follow I-80 to I-580, then via the Altamont Pass to I-205, connecting with I-5 to I-110. This is only 13% above the 338 air miles and evidence that driving by using Highway I-5 is a relatively fuel-efficient route. See: <http://maps.google.com/maps?saddr=4th+and+Townsend%2C+san+francisco&daddr=union+station+los+angeles+ca>. This report uses the 382 miles driving distance throughout as the consistent benchmark for comparing fares on a per passenger mile basis as it is the best reflection of the travel consumer's decision process.

However, the Draft 2012 Revised Plan is based on 540 rail miles between SF and Anaheim for the Full Phase 1; or 505 rail miles for Blended Phase 1. Subtracting the 20 rail miles of the Y spur to Merced brings the distance from SF Transbay Terminal to LA Union Station to 485 miles. The Authority's rail miles distance is more than 100 miles, or about 27% longer than the 383 driving miles. Two problems arise from the Authority's plans to build those extra miles. First, if using the 382 miles were technically possible, as is the *de facto* case with the highway distances, CHSRA could probably save over 20% of the proposed \$100-\$117Billion Phase 1 construction budget; a savings of \$20-\$26Billion (measured in YOE dollars). In addition, because the Authority's plan is for 485 miles, there are more track miles to maintain, and more highly expensive running time and repairs for high-speed train equipment on those extra 103 miles. Therefore annual O&M costs will be higher with 485 miles rather than 382 miles.

The situation gets even more confusing with the Authority's website claiming (as of June 16th 2012) the SF-LA distance is 432 miles. That SF-LA routing is the same as the 485 miles' routing in the Revised Draft. Apparently the 432 miles was correct when the route south of Bakersfield ran parallel to Highway I-5. However, the Draft Revised 2012 Plan's route runs much more eastward to encompass Palmdale. Choosing this added on about 50 miles, while some small routing changes near Hanford and Madera added a few more.

³⁸ The Authority's Pricing Plan, as defined on pages 5-5 and 5-6 of the 'CHSRA's Revised 2012 Business Plan, Ridership and Revenue Forecasting Memorandum' (April 2012). The \$83 result is shown on Table 5.3 on page 5-6, in terms of the planned prices between different city pairs. However, the Draft Revised 2012 Business Plan (April 2012) Executive Summary (pg. ES-14) says; "The average ticket fare between San Francisco and Los Angeles will be \$81 (83 percent of anticipated airline ticket prices)." This inconsistency is unexplained. Note that this specific segment, LA-SF, fare is 22¢ PPM, very close to the average projected revenue of 23¢ PPM during the entire Phase 1 Blended period of operations. To minimize confusion, the average revenue of 23¢ PPM is used throughout this report, except when specific fares (ticket prices) PPM are being compared.

The average charge of existing long haul HSR operations' trips is 47¢ per passenger mile, more than twice the Authority's proposed SF-LA long haul fare of 22¢ per passenger mile. This ranges from AVE's 25¢ PPM to Shinkansen's long haul fares at two and a half times (56¢) the CHSRA's long haul fares.

Slightly over half the California HSR train's riders will be long haul (SF-LA) passengers from the Los Angeles Basin and San Francisco Bay Area, so it's relevant to look at a more realistic ticket price for those long haul passengers. Using the average of the eight existing long-haul fares' rates, 47¢ PPM, the least expensive, one-way, LA to SF ticket would cost about \$178. That is more than twice the one-way \$83 quoted in the CHSRA's two most recent draft plans. More importantly, the \$178 fare would be far more than three times the "about \$50" promised to 2008's voters.³⁹

The Authority is in a trap of their making. If CHSRA is to it meet AB3034's statutory requirement and keep its promises to 2008's voters about no operating subsidies, no new taxes, and only "users of the system pay for the system", then the CHSRA's fares must be much higher.⁴⁰ To reflect HSR actual operators' experience with O&M costs, CHSRA must raise its revenue PPM to remain profitable – and legal. But a higher train fare would violate the Authority's marketing strategy of 83% of average airfares to set the train's long haul fares. More importantly, higher fares will make the train's ticket price uncompetitive in their prime long haul market, the LA-SF route.

1.3 A second set of data sources on revenues gives further evidence that CHSRA's estimated fares are 'outliers' to actual high-speed rail fares – In addition to the data in Figure 1, five other data sources on revenues were identified from publically available sources to cross check CHSRA's assertions about its proposed revenues on a passenger mile basis.

The CHSRA's two most recent estimates of per passenger mile revenues, referred to in Figure 2 as CHSR'09, and CHSR'12, are 28¢ and 23¢ per passenger mile respectively. Actual revenues from operators on a per passenger mile (PPM) basis, are listed here in ascending order as labeled in Figure 2:

³⁹ See: Official Voter Information Guide at <http://www.voterguide.sos.ca.gov/past/2008/general/argu-rebut/argu-rebutt1a.htm>

⁴⁰ Ibid.

- 1) **Amtrak CA '06-11** – The average ticket revenues (before subsidies) of three Amtrak California (CA) lines: the Pacific Surfliner, San Joaquin and Altamont Corridor (ACE) routes between 2006 and 2011 was estimated at 21¢ per passenger mile.⁴¹ [An unsubsidized price would be over 40¢ per passenger mile.]
- 2) **NEC Reg '09** – The Northeast Corridor Region's Amtrak routes' fares for 2009 was estimated to be 41¢ per passenger mile.
- 3) **Spanish Report** – The 'Relationship Between Rail Service Operating Direct Costs and Speed' study, released in December 2010 was on AVE's revenues. It is the underlying data source of Table 2 of the Authority's May 4th 2012 letter. Analysis showed revenues to be 44¢ per passenger mile.⁴²
- 4) **International HSR Minimum** – These are revenues for HSR systems in operation. This is estimated at 47¢ per passenger mile, from Figure 1.
- 5) **RENFE Board** – Spain's high-speed rail operator, RENFE, gave a presentation to the Authority's Board of Directors in June 2011 on the AVE system. The revenues were found to be 55¢ per passenger mile.⁴³
- 6) **Acela Express '09** – The North East Corridor's (NEC) Acela Express' revenues for 2009 were found to be 72¢ per passenger mile. The May 2012 Peer Review Group noted this example of a high-speed operation had been overlooked by the CHSRA.

Figure 2 is based on analyses of six separate databases plus the Authority's 2009 and 2012 business plans.⁴⁴ With the exception of Amtrak California' subsidized fares, CHSRA's proposed average 23¢ per passenger mile fares are about half the average of what six present-day operators charge on a per passenger mile fares.⁴⁵

⁴¹ Appendix 9 and Appendix 10 discuss the relevance of using Amtrak's conventional rail revenues. While the comparisons are not strictly apples-to-apples, the two appendices conclude that HSR's O&M costs are, by any measure, at least as high as conventional rail's, if not greater.

⁴² See Appendix 6.

⁴³ See: RENFE Company Profile and Development of High Speed Rail Services, presented to CHSRA Board June 2, 2011, see pages 17, 33, 34, 36, and 50. Available at:

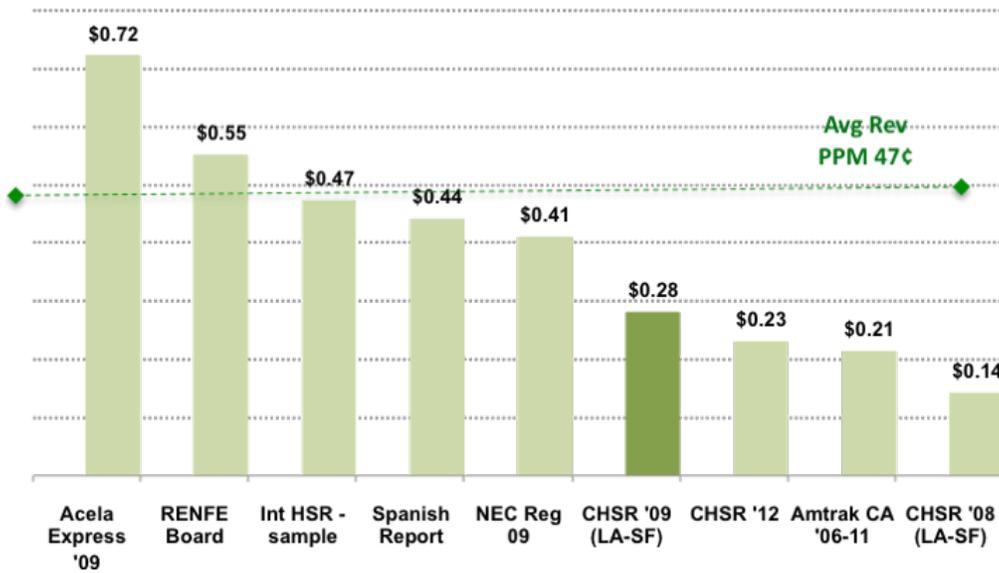
<http://www.cahighspeedrail.ca.gov/assets/0/152/232/f8663924-d330-4abf-ba2d-e295d2546db7.pdf>

⁴⁴ Figure 1 data's origins are in ticket prices and driving distances. Analyses of fares in Figure 2 are based on track mile data leading to revenues per passenger mile.

⁴⁵ Figure 2 summarizes the findings of the revenues on a PPM basis. The sources for each of these sets of information are contained in Appendix 7.

CHSRA's proposed fares fall far short of either the June 2011 RENFE presentation to the CHSRA Board, or the composite of several HSR systems' fares.⁴⁶ Appendix 6 points out that even the 44¢ of revenue per passenger mile of the 'Spanish Report' – referred to in Table 2 of the CHSRA's letter of May 4th – is nearly twice the Authority's present 23¢ estimate of ticket prices per passenger mile. International fares are about twice those proposed by the CHSRA on a per passenger mile (PPM) basis.

Figure 2 – Revenues Per Passenger Mile (PPM)



For the USA, CHSRA's proposed fares are less than the per passenger mile revenues of Amtrak's conventional rail system in the NE Corridor, a subsidized system on a route where rail has been a standard conveyance for over 100 years. However, the largest difference is Acela Express' fares at 72¢ per passenger mile – more than three times what CHSRA proposes to charge.

The two revenue data sets in Figure 1 and Figure 2, from actual HSR operating entities, show that Authority's fare estimations are at least less than half of what actual operators charge – including Acela Express. Together they demonstrate the impact of the California transportation marketplace and low PPM fares the CHSR has to conform with. Put another way, the two figures show how far out of line the CHSRA's proposed fares for

⁴⁶ See: RENFE Company Profile and Development of High Speed Rail Services, presented to CHSRA Board June 2, 2011, see pages 17, 33, 34, 36, and 50. Available at: <http://www.cahighspeedrail.ca.gov/assets/0/152/232/f8663924-d330-4abf-ba2d-e295d2546db7.pdf>

both short and long haul trips are. If California's transport marketplace fare pricing demands the low fares CHSRA now plans to offer, subsidies are unavoidable.

1.3.1 If CHSRA's estimated fares (ticket prices) reflected actual worldwide rates, that might help meet AB3034's prohibition of an operating subsidy – As explained by a Figure 1 footnote, the shortest driving distance between downtown LA and downtown SF is 382 miles. Based on CHSRA's 83% formula, in 2008 the Authority's ticket price would have been 14¢ per passenger mile (PPM). By 2009, that rose to 28¢ PPM, closer to the international experience, while the 2012 Draft plans' \$83 one-way fare equates to 22¢ per passenger mile.

Based on fourteen actual operating HSR systems' fares for both short and long hauls, the average per passenger mile fare is 51¢ PPM: whereas the average for the six short haul routes is slightly higher (58¢). For short haul fares, Shinkansen's 88¢ PPM is the highest; for long haul fares, the cheapest is Madrid to Seville (25¢ PPM).

Which HSR routes are profitable? The Director of High-Speed Rail for the Union Internationale des Chemins des Fer (UIR/IUR) said that two routes – Paris to Lyon and Tokyo to Osaka – are profitable.⁴⁷ Both routes are long distance and charge 34¢ and 56¢ respectively per passenger mile (PPM). That makes those profitable routes ticket charges PPM nearly twice (France) to three times (Japan) more per passenger mile than the Authority's planned 22¢ per long-haul passenger mile between Los Angeles and San Francisco.

Figure 1 also shows the possibly-profitable Acela Express' fares being nearly three to four times, 57-88¢ PPM, what CHSRA plans for long haul fares. The higher of those PPM fares is the lucrative New York to Washington DC route. The lower of those per passenger mile fares is about 20% more than even CHSRA's proposed short haul route for Fresno to Bakersfield at 48¢ PPM.

The Authority's 22¢ per passenger mile for long haul fares looks great on paper. But today's reality is very different; particularly when both existing average long and short haul HSR per passenger mile fares – 47¢ and 58¢ – are at least twice as much as the Authority's forecasts it will charge in the California marketplace.

The significant difference between actual USA and international HSR experiences of around 40¢ to 50¢, and CHSRA's planned average Phase 1

⁴⁷ See: Victoria Burnett, "Spain's High-Speed Rail Offers Guideposts For U.S." Statement by Iñaki Barrón de Angoitia NY Times, May 29, 2009 at www.nytimes.com/2009/05/30/business/energy-environment/30trains.html

Blended 23¢ per passenger mile pricing plan – is irrefutable. This difference should be a very large ‘red flag’ for those charged with the fiduciary duty to protect California’s financial wellbeing.

1.4 How can HSR’s fares be four-fifths of airlines charges and still make the train profitable? – CHSRA could also learn much by comparing airlines’ per passenger mile charges with airlines’ minimal profit margins. From LAX to SFO is about 350 air miles. According to CHSRA, the average air fare is about \$100, making the average metropolis-to-metropolis airline ticket approximately 29¢ per passenger mile (PPM), about a third more per passenger mile than CHSRA plans to charge for the same trip.⁴⁸

Certainly the “*about \$50*” fare promise to 2008’s voters (14¢ PPM) could never have made the train profitable. Nor does the present 22¢ PPM Los Angeles to San Francisco fare, or the average Phase 1 Blended 23¢ PPM system-wide estimates seem able to do that.⁴⁹ Ironically, Figure 3 shows that had the Authority continued with its 2009 fare of \$105 (28¢ PPM) it might have had a better chance to meet AB3034’s no subsidy mandate.

To dispel the notion that airlines are highly profitable, and that the HSR can charge only 83% of what airlines charge and still breakeven financially, consider the following. Last year Southwest, the largest LA-SF air carrier, had a 2.46% profit margin.⁵⁰ US Airways had a 1.47% profit margin, while United Continental lost 5.21%. United Continental still exists because, like California’s government, it can still borrow.⁵¹ Excluding bankrupt American Airlines, US airlines showed a razor thin 0.3% profit margin during 2011.⁵²

Airlines no longer attract investors looking for good returns. Last year it would have paid better to earn a 5.5% profit from investing in a fund tracking the Dow Jones Index.⁵³ While the Authority probably assumes that, unlike the airline industry, their capital plant will be granted to them without debt servicing costs, there’s no commitment to that scenario. The ‘cutthroat

⁴⁸ Distances between LA and SF are in air miles on a city center-to-city center basis using Google Maps. See: <http://www.daftlogic.com/projects-google-maps-distance-calculator.htm>. For airline fares see: Exhibit 5-6, page 5-9 of the Draft Revised 2012 Business Plan (April 2012).

⁴⁹ The “*about \$50*” quotation is on page 1 of the Official Voter Information Guide at <http://voterguide.sos.ca.gov/past/2008/general/argu-rebut/argu-rebutt1a.html>

⁵⁰ See: http://ycharts.com/companies/LUV/profit_margin. Profit margin represents the percentage of revenue that a company keeps as profit after accounting for fixed and variable costs: calculated by dividing net income by revenue.

⁵¹ US Airways earnings can be found at http://ycharts.com/companies/UAL/profit_margin. United Continental’s losses can be found at http://ycharts.com/companies/UAL/profit_margin

⁵² ‘US airlines earned \$390 million in 2011 on 0.3% profit margin’. In *Air Transport World*; February 29, 2012. Found at <http://atwonline.com/airline-finance-data/news/a4a-us-airlines-earned-390-million-2011-03-profit-margin-0228>

⁵³ See: ‘Dow ends 2011 up 5%; S&P finishes flat’ found at <http://money.msn.com/market-news/post.aspx?post=7a929e98-4d99-44cb-98c9-a0ef1c3151c4>

world' of airline competition doesn't produce much if any profit: yet the Authority claims their transport alternative will. That remains to be seen.

Figure 3 – San Francisco to Los Angeles PPM Fares ⁵⁴



If the airlines in California's competitive market charge a third more than the CHSRA plans to charge per passenger mile (PPM), and have only 0-2% profit margins, how can the high-speed train be legally profitable at four-fifths the airlines' per passenger mile rate? What secrets does the Authority know that airlines don't know that will have CHSRA's high-speed train not require a forbidden operating subsidy? How the CHSRA is planning to account for its total O&M costs, other than in some part of the State's budget, is not clear.

1.5 Conclusions on CHSRA's projected fares – The two separate sets of data on revenues remarkably converge when translated into the DOT/FRA's preferred metric, per passenger mile (PPM).⁵⁵ CHSRA is attempting to do something that seems to defy the laws of competitive economics – producing a profit in a market by charging fares that are half or less what the worldwide, established HSR operators realize per passenger mile. Even in the USA's marketplace, the Authority's projected fares are a third of what the USA's Acela Express charges, and only four-fifths what the barely profitable US airlines charge for their SF-LA routes.

⁵⁴ Air distance were computed by using Google Maps Distance Calculator; found at <http://www.daftlogic.com/projects-google-maps-distance-calculator.htm>. The SFO-LAX air mile distance is 338 miles. CHSRA's uses a benchmark of \$97 for its average SFO-LAX airline fare, from which it derives its \$83 one-way ticket estimate for 2012. Therefore the airfare PPM is 28.69¢ per mile.

⁵⁵ Appendix 16 discusses the DOT/FRA's preference for per passenger miles as the metric for measuring transportation modes' financial performance.

Section Two Further Findings On Operations & Maintenance (O&M) Costs

The other half of the profitability equation lies with the harsh realities of operations and maintenance (O&M) costs. Over the course of the first half of 2012, eleven O&M data sets were identified from publically available sources to cross check CHSRA's assertions about Operating and Maintenance costs.⁵⁶ This section compares and contrasts these findings.

2.1 Sources of existing O&M data – The CHSRA's model for Operating and Maintenance costs expenses was based on route miles and train miles (and thereby seat miles) but needed to be reconciled with the industry's standard for financial performance, passenger miles.⁵⁷ In Figure 4 the CHSRA's projected O&M expenses, referred to as CHSR'09, and CHSR'12, are both 10¢, per passenger mile. The actual O&M costs from operators on a per passenger mile (PPM) basis, are listed here in ascending order:

1) UIC/IUR Direct-Only Costs – This is an international study of HSR data by the Union Internationale des Chemins de Fer (UIC/International Union of Railways) as referenced in a May 4th 2012 CHSRA letter (Table 2).⁵⁸ This data, converted from seat miles to per passenger miles, with a 60% Load Factor, yields direct-only O&M costs of 12¢ PPM.⁵⁹

As detailed in Appendix 12, the UIC/IUR Study's O&M costs only cover some direct O&M costs, and not all of the costs of; *"maintaining the infrastructure and related equipment such as safety, control-command and signaling, etc."*⁶⁰ While it is a

⁵⁶ At least two other sources on O&M data are inaccessible. In September 2009, the French TGV operator, SNCF, made a proposal to the CHSRA that, on page 41/211, included; 'Table 15 – Operation and maintenance expenditures in current values and with productivity factors.' But Table 15 is redacted, and the report carries the caution "Confidential and Proprietary – Do Not Disclose Outside Government". Such government secrecy may be permitted in France, but is doubtful if legal in California. The second inaccessible O&M data set is Taiwan HSR's O&M, cited in Table 2 of the May 4th 2012 letter to the authors called – Taiwan HSR Corporation, "Year End Financial Report 2010 & 2009", March 31, 2010. Repeated efforts to find this citation on the web failed. CHSRA has yet to post the document on its web site.

⁵⁷ The model is described and reconciled using various Load Factors in Appendix 9. For more information on Load Factors, see Appendix 3.

⁵⁸ Attachment 8 is a copy of the CHSRA 's May 4th 2012 letter and its accompanying Table 2.

⁵⁹ An analysis of the UIC/IUR study of direct data on Operations and Maintenance costs is found in Appendix 12.

⁶⁰ Appendix 14 discusses a February 8th 2011 letter from UIC/IUR's Director General to the CHSRA's CEO. The letter says *"Generally speaking Operating Costs can be covered by farebox revenues. ."* The conditional phrase 'Generally speaking' is not a convincing argument that farebox collections and other non-government revenues cover O&M costs, let alone infrastructure maintenance. That UIC/IUR letter is found in Attachment 11 and also at <http://www.calhsr.com/wp-content/uploads/2010/02/IUR-Officials-Letter-to-CHSRA-CEO.pdf>

good starting point to understand some of the direct costs, it is clearly not broad enough in scope to use as the full set of O&M costs a private sector HSR operator will incur in California.

While UIC/IUR's study was limited to only direct O&M costs related to speed, Figure 12-1 (Appendix 12) shows there is not a significant difference in total costs among elements of O&M cost between speeds that would be similar to the Acela Express (the left side of Figure 12-1) and the CHSRA's HSR system (on the right side of Figure 12-1). Likewise, while the UIC/IUR speed-cost study includes a component called 'Train Ownership Costs' to reflect the costs of 'consuming' these capital assets; this crucial element of O&M cost is not included in the CHSRA's O&M model, as discussed in Appendices 9, 12 and 13.

2) Peers May'12 – A May 2012 analysis of the CHSRA's O&M costs by the Independent Peer Review Group, referred to as Peers May'12, were found to be 23¢ per passenger mile.⁶¹

3) LAO May '12 – The Legislative Analyst's Office's letter of May 2012 estimated international O&M costs to be about 30¢ per passenger mile.⁶²

4) Spanish Report – The 'High Speed Railways in Spain' report, released in December 2010 showed AVE's O&M expenses. That data underlies Table 2 of the Authority's May 4th 2012 letter. Analysis found AVE's O&M costs to be 32¢ per passenger mile.⁶³

5) International HSR Minimum – These are O&M costs for six systems in operations, based on the assumption that all existing systems' revenues are equal to or do not exceed their O&M costs. The UIC/IUR's letter and policy statement of February 2011 reinforces this assumption. The policy statement says that operating costs are "*generally covered by farebox revenues*" which is far from reassuring they do.⁶⁴ Figure 1 shows this group of revenues at 45¢ to 50¢ per passenger mile.⁶⁵ For reasonableness, 41¢ of O&M cost per passenger mile is used.⁶⁶

⁶¹ See Appendix 2.

⁶² See Appendix 1.

⁶³ See Appendix 6.

⁶⁴ See Attachment 11.

⁶⁵ See Appendix 14.

⁶⁶ See Appendix 14. The 41¢ PPM was chosen. At about 90% of the lowest of the several international HSR operators' revenues PPM (45¢), 41¢ seems reasonable for the PPM calculation since; as discussed in Section Three of this report, all O&M variables included in international HSR operators' accounts are not known.

6) BBVA? – In March 2012, this report’s authors posted ‘*The CHSRA Knows Their Proposed High-Speed Train Will Forever Need An Operating Subsidy.*’⁶⁷ The cited BBVA report, and three prior ones, used the same O&M data from the Union Internationale des Chemins de Fer, or International Union of Railways (UIC/IUR). According to the CHSRA, this data set is allegedly ‘flawed’, yet the allegation has never been confirmed, withdrawn or corrected by the UIC/IUR.⁶⁸ The BBVA Report’s O&M costs were found to be 45¢ per passenger mile. Since the UIC/IUR Direct Cost Study (Point 1 above) data covers only some, not all direct O&M costs, this UIC/IUR Direct Cost Study understates the real O&M costs a California HSR operator, who will have to pay both full direct and indirect O&M costs.⁶⁹

7) RENFE Board – Spain’s high-speed rail operator, RENFE, gave a presentation to the Authority’s Board of Directors in June 2011 on the AVE system. These O&M costs were found to be 45¢ per passenger mile (PPM) and are roughly the range of the ‘High Speed Railways in Spain’ report’s O&M estimates, (Point 4 above). Both data sources show higher O&M costs than AVE’s O&M expenses reported in Table 2 of the Authority’s May 4th 2012 letter.⁷⁰

Two analyses of comparable Amtrak conventional passenger rail O&M costs were extrapolated to ‘bracket’ the possible range of HSR costs per mile compared to conventional passenger rail. Appendix 10 and Appendix 11 discuss the relevance of Amtrak’s conventional rail O&M costs to this analysis. While the comparisons are not strictly apples-to-apples, the two appendices conclude that HSR’s O&M costs may be by any measure, at least as high as conventional rail’s, if not greater. Those data sets are:

8) Amtrak CA ‘06-11 – The average O&M costs of three Amtrak California (CA) lines: the Pacific Surfliner, San Joaquin

⁶⁷ Data for the ‘Forever’ report was found in the CHSRA’s Draft 2012 Business Plan of November 2011; available at www.sites.google.com/site/hsrcaiff and at www.cc-hsr.org, go to Financial Reports. This included a report from the BBVA Foundation from 2007. Additional information was found in a 2009 BBVA report, plus at least another 2009 report from some of the same authors called ‘Some stylized facts about high-speed rail: A review of HSR experience around the world.’ This latter publication is available through Elsevier publications at www.elsevier.com/locate/tranpol.

⁶⁸ See Appendix 8 for a discussion of the CHSRA’s charge that the BBVA data is ‘flawed’ and the status of clarifying what should be the correct O&M data and other costs.

⁶⁹ For a discussion of the narrow scope of UIC/IUR data on O&M costs, refer to Appendix 12.

⁷⁰ See: RENFE Company Profile and Development of High Speed Rail Services, presented to CHSRA Board June 2 2011, see pages 17, 33, 34, 36, and 50. Available at: <http://www.cahighspeedrail.ca.gov/assets/0/152/232/f8663924-d330-4abf-ba2d-e295d2546db7.pdf>

and Altamont Corridor (ACE) routes between 2006 and 2011 were estimated at 45¢ per passenger mile.

9) NEC Reg'09 – The Northeast Corridor (NEC) Region's Amtrak routes' O&M costs for 2009 was estimated to be 48¢ per passenger mile.

Finally, HSR's closest cousin, Acela Express delivers some astounding conclusions about O&M costs.

10) NEC Acela Express '09 – Not mentioned in the CHSRA's O&M documents for the 2012 Business Plan, but highlighted by the Peers in their May 2012 report, Acela Express' O&M costs for 2009 were found to be 61¢ per passenger mile.⁷¹

2.2 High-speed rail operators' average O&M costs are at least three times and up to six times the CHSRA's – The material from the Union Internationale des Chemin des Fer (UIC/IUR) on Direct O&M Costs is the closest approximation to the CHSRA's estimated O&M expenses. But, unlike the Authority's O&M data, it's very clear the UIC/IUR's O&M data includes only operating and maintenance costs that affect the speed of the train.⁷² That report clearly states that some direct and non-direct costs are not considered. Since all HSR systems to date are government owned and run, costs could be, and seem to often be, allocated to another government account, leaving the UIC/IUR database with only direct costs.

Figure 4 illustrates actual HSR operators' O&M costs compared with the CHSRA's projections of O&M costs.⁷³ Data in that UIC/IUR study, called 'Relationship Between Rail Service Operating Direct Costs and Speed,' is a benchmark, and used in Figure 4. But it is clear, that their definition of O&M costs is narrow in scope and not the whole O&M cost picture. Unlike the UIC/IUR's cost data, the CHSRA's train will need to absorb both direct and indirect O&M costs. Consequently, the CHSRA's calculations need to project a more realistic system-level O&M cost.⁷⁴

The lowest per passenger mile O&M costs from a single HSR operator comes from the 'High Speed Railways in Spain' report.⁷⁵ This report was referenced

⁷¹ The Peer Review Group's May 2012 report pointed out that Acela Express' revenues and O&M costs should be relevant to the CHSRA's projections. See Appendix 2.

⁷² See Appendix 12.

⁷³ Figure 4 summarizes the findings of O&M costs for the ten different data sets on a PPM basis. The sources for each of these sets of are discussed in Appendix 7.

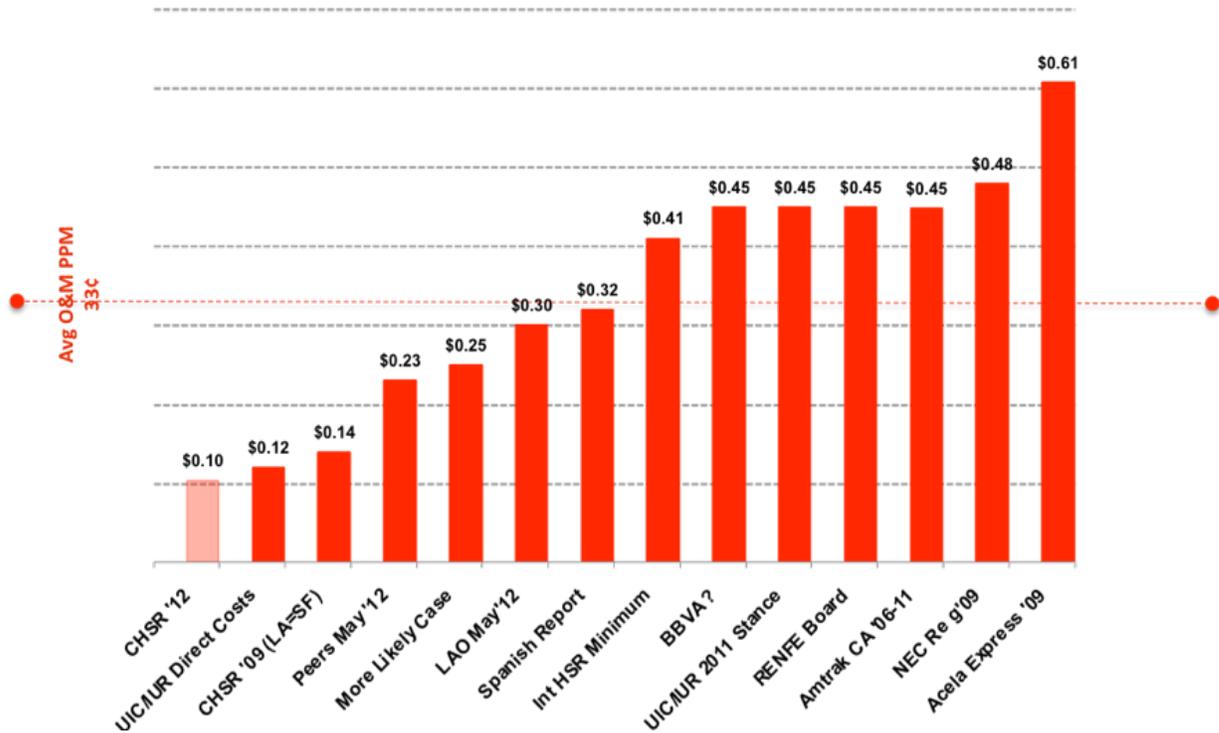
⁷⁴ For a more complete analysis of the definition of the scope of the UIC/IUR's O&M data and how to utilize it to help predict actual operating costs in the US or California, see Appendix 12 and Appendix 13.

⁷⁵ See Appendix 6. A PDF of that report can be found at:

<http://trb.metapress.com/content/1783390k6737971/?p=43e43340740c43c4bf34eae35e5c3400&pi=4>

in Table 2 of a May 4th 2012 letter from the CHSRA.⁷⁶ Translating the data from seat miles to per passenger miles, as explained in Appendix 6, results in an O&M cost of 32¢ – three times CHSRA’s and the UIC/IUR’s O&M costs.

Figure 4
CHSRA’s Projected And Existing Operators O&M Costs (PPM)



In June 2011 RENFE presented to the Authority’s Board.⁷⁷ The presentation revealed that the same government agency that operates its AVE system, reported revenues, profit margins and Load Factors that led to O&M costs of 45¢ per passenger mile.⁷⁸ This is at least 40% more than the translated data from the ‘High Speed Railways in Spain’ report, and more than four times the Authority’s projections and UIC/IUR’s direct-only cost estimates. The allegedly ‘flawed’ O&M data in the BBVA Foundation reports also register 45¢ per passenger mile. That cluster of O&M costs, between 41¢ and 45¢ PPM, suggests more than coincidence.

⁷⁶ A copy of that letter and the Press Release of the same day containing that letter can be found at <http://www.cahighspeedrail.ca.gov/> under the PDF file called: CHSRA Responds to Flawed Report: Corresponds with Authors. A redacted copy of the letter and tables is Attachment 8.

⁷⁷ See: ‘RENFE Company Profile and Development of High Speed Rail Services’ at the CHSRA web site, or <http://www.cahighspeedrail.ca.gov/assets/0/152/232/f8663924-d330-4abf-ba2d-e295d2546db7.pdf>.

⁷⁸ See page 6 of the ‘Forever’ Report, at www.sites.google.com/site/hsrcaiffr and at www.cc-hsr.org, then go to Financial Reports.

It also may not be coincidental that Amtrak data from California and the Northeast Corridor (NE) shows a similar narrow band, 45¢-48¢, of O&M costs per passenger mile: and that too cannot be dismissed. As Appendices 10, 11 and 12 discuss, there are trade-offs between conventional and HSR rails' O&M costs that, in total, produce similar results.

Acela Express has the highest O&M costs. The USA's cousin to the proposed HSR project's O&M costs are six times (61¢) the Authority's 10¢ PPM claims. In part this may be from paying profits, as well as infrastructure 'rent' expenses to others for their ownership of rail right of ways. But even if these excess profit charges amounted to half of Acela's 61¢ O&M costs, Acela's O&M costs would still be three times the projected CHSRA O&M costs.

These are O&M expenses the CHSRA claims it will avoid by adopting a management system more like Taiwan's.⁷⁹ However, according to the May 2012 Peer Review Group's analysis of the CHSRA's proposed management structure, *"The Authority tentatively plans to award and manage a contract for track maintenance and charge the operator(s) a fee to cover costs."*⁸⁰ If the Peers are right, then CHSRA's O&M costs may be closer to Europe's ±40¢ PPM; or Acela's 61¢ PPM, which includes trackage right-of-way, maintenance fees and operator profits and taxes, than they would be to Taiwan's.

The Authority may also argue that labor, power and other O&M costs in Europe and Japan are higher than in the USA – and therefore California's O&M costs will be lower. But in 2009, Amtrak's Office of Inspector General's (OIG) report found that Amtrak's labor costs are higher than in Europe – 2.3 times higher than the average European rail worker.⁸¹ And a 2010 Office of the Inspector General (OIG) report found that an overrun in a LA maintenance facility was due to *"Higher labor costs in the Los Angeles region."* which suggests California's labor costs are higher still.⁸²

Finally, in the Authority's own work, US labor costs are cited as significantly higher than Europe and Japan's.⁸³ These cost recipe ingredients widen the

⁷⁹ On April 30th 2012 Board Member Mike Rossi said ". . . they [European HSR operators] have the classic Genin (?) organization that results in a series of profit centers taking money from one profit generator. The more appropriate comparison would be to Taiwan, even though it's smaller, it is run the same way we would run ours." The text of Mr. Rossi's April 30th statement is part of Appendix 8 and can be viewed at <http://youtu.be/yWU9uKUuHII>

⁸⁰ See: California High-Speed Rail Peer Review Group; Comments on Revised Business Plan; May 18 2012; page 4.

⁸¹ Base wages were only 30% greater, but Amtrak's fringe benefits were 4.25 times as much in Europe. See Amtrak: Office of Inspector General REPORT E-09-01; Comparison of Amtrak Infrastructure Labor Costs to European Railroad Averages; March 24, 2009 (available to the public on 23 April 2009)

⁸² *Assessment of Project Risks Associated with Key Engineering Projects*; Report No. 912-2010; May 14, 2010; Audit Report Issued By: National Railroad Passenger Corporation Office of Inspector General; pg. 14.

⁸³ While emphasizing the challenge to keep construction costs low, the Authority's November 2011 Draft Plan (pg 3-13) noted; *"US labor and construction costs are 30 – 75% higher than in other developed countries with existing HSR systems such as France, Germany, Italy, the Netherlands, the UK and Japan."* The Authority's possible argument

cost gap with Europe and Japan, again suggesting a serious underestimation of the likely O&M costs for the California HSR system.

The faster-than-Europe California train perhaps will use on-board labor more productively, and therefore have lower unionized labor and benefits costs because labor would be deployed over more trains per day.⁸⁴ Conversely, Acela Express and the already-operating HSR systems need less scheduled maintenance because they go slower. Slower speeds create less wear and tear and use less power than the 220mph California train; both these parts of the cost equation being major factors in operating a high-speed train.⁸⁵

There is no way to explain why the Acela Express' O&M costs are six times the Authority's O&M projections on a per passenger mile basis. On the basis of per seat costs, Acela Express' costs are still about 4.4 times higher. As Appendix 11 shows, even if half of Acela Express' costs are unreasonable infrastructure charges, Acela's costs would still be 2.2 times higher on a per seat mile basis, and three times higher on a per passenger mile basis than CHSRA's projections. Such a difference in O&M costs is unreasonable and unexplained.

2.3 Conclusions on Operations and Maintenance Costs – Based on the ten non-CHSRA data sources in Figure 4, there is no reason to believe that the proposed California high-speed train's O&M costs will be less than 30¢ per passenger mile, and most probably 40¢ or higher per passenger mile. Appendix 13 presents two independent projections of revenues and costs, a 'Best Case' and 'Most Likely Case.' To move forward under the Authority's proposed planning assumption of 10¢ per passenger mile of O&M expenses is to assure the project's operations will require a statutorily forbidden subsidy.

that they might operate with lower labor costs than existing HSR systems – and that their O&M projections are justifiably lower – seems contradicted by their own document.

⁸⁴ For a more complete discussion of the trade-offs between labor productivity and speed, see Appendix 10.

⁸⁵ DOT's Inspector General believes that about half of all HSR O&M costs come from keeping the equipment 'operations ready.' See: 'HSIPR Best Practices: Operating Costs Estimation'; June 2011; prepared for: Prepared for: Office of Inspector General, US Department of Transportation; by Steer Davies Gleave, Boston MA, subcontracted by Charles River Associates; page 3. Also, see Figure A12-1 in Appendix 12, for an analysis of the UIC/IUR study's information on this subject.

Section Three

When Revenues Meet Operating And Maintenance (O&M) Costs

This section brings together publically available data on both per passenger mile revenues and O&M costs. It analyzes which HSR systems appear to be profitable, and compares actual operating data with the CHSRA's projections. Prior to that analysis, and mindful that California's HSR train is statutorily prohibited from having an operating subsidy, this section explores both interpretations of profitability, and how many, if not most, of the existing HSR systems try to make the claim they are profitable.

3.1 A primer on defining the 'profitability' of high-speed rail systems – Over the past four years, California's legislators and HSR promoters have proclaimed the profitability of existing HSR systems. AB3034's sponsor, Assembly Member Cathleen Galgiani said; *"The high-speed rail system in France runs with a profit margin of 25 percent and the one in Japan at 50 percent."*⁸⁶ Since the CHSRA's per passenger mile (PPM) revenues are forecasted to be a fraction of France's TGV and Japan's Shinkansen per passenger mile revenues, this statement is not reassuring.

But, as most independent analysts conclude, HSR systems conform to what the US Congressional Research Service (CRS) said of high-speed rail: *"Typically, governments have paid the construction costs, and in many cases have subsidized the operating costs as well."*⁸⁷ As France has found out; each segment built after the possibly profitable Paris-Lyon segment has proven more difficult to justify financially. As the commercial director of the Train à Grande Vitese (TGV) said; *" . the TGV Est [East] is an important commercial success, but it isn't profitable."*⁸⁸ Italy's Public Private Partnership (PPP) masks public subsidies; Taiwan's privately built HSR system went bankrupt due to construction cost overruns, Spain can never recover its capital costs, and Japan's government had to absorb Shinkansen's debt equivalent to 7% of the nation's GDP.⁸⁹ Even Germany's Inter-City Express runs operating deficits.⁹⁰

⁸⁶ Assembly Member Galgiani said this during June 2nd 2011 hearings on AB145. See: http://www.smdailyjournal.com/article_preview.php?type=bnews&id=160156&title=Assembly%20acts%20to%20end%20independent%20rail%20authority&eddate=

⁸⁷ See: Peterman, Frittelli, and Mallett, W.; High-Speed Rail (HSR) in the United States; Congressional Research Service, December 8 2009 CRS 7-5700, pg.1

⁸⁸ Derived from conclusions in: Albalade, Daniel and Bel, Germa; The Economics and Politics of High-Speed Rail: Lessons From Experiences Abroad; Lexington Books, 2012, pg 65.

⁸⁹ Ibid.

⁹⁰ Dunn, James and Anthony Perl. "Policy Networks and Industrial Revitalization: High-Speed Rail Initiatives in France and Germany." *Journal of Public Policy* 14, no. 3 (1994) pgs. 311-43.

As this report's first and second sections have explained, the CHSRA's fare pricing plan, which on a per passenger mile (PPM) basis is about 50% of international pricing experiences, is not a good way to achieve profitability.

3.1.1 Why are there such different views of HSR's profitability? – The answer depends on what calculation methods and variables are used to measure profits. In the US, the ruling doctrine that defines profitability is Generally Accepted Accounting Principles (GAAP).⁹¹ Because California's Prop1A voters were promised "*the users of the system pay for the system*" in 2008, because a private operator will run it, and because AB3034 demands no operating subsidy, GAAP will be an important parameter in measuring whether California's HSR train meets those standards.⁹² Equally important will be the State's actions to enter into (or not enter into) agreements with the operator(s), or annually adjust the existing contract(s), so that State places the risk of true operating losses on the operator or operators and not the General Fund. Or, the State may take actions to 'mask' the reality of operating losses by shifting the losses to other departments, and therefore to the General Fund.

In practice there seems to be at least three different ways to 'move the goal posts' beyond the concept and practice of GAAP that will be demanded of California's HSR operator(s).

- The first non-GAAP approach is the declaration that HSR is a social good and its capital and operating funding should depend on incorporating a wide range of variables in its 'profit' equation. For example, Europe counts 'social profitability' as part of their HSR systems' profit equation. Social profitability is, ". . . *the net social return, in terms of economic welfare of the society of an investment project.*"⁹³ Needless to say, benefit-cost calculations of social profitability may or may not purposely include all the revenues and O&M costs associated with a project (as the UIC/IUR admits), may use Internal Rates of Return (IRR) that discount debt servicing costs at favorable (or unfavorable) rates, stretch (or shorten) the tenor of debt servicing, and include or exclude 'externalities' such as social, environmental, traffic

⁹¹ GAAP is common set of accounting principles, standards and procedures that companies use to compile their financial statements. GAAP are a combination of authoritative standards (set by policy boards) and simply the commonly accepted ways of recording and reporting accounting information. While not without its weaknesses, GAAP standards are required of private rail operators in the USA, the venue for California's high-speed train.

⁹² For the ballot claim, see The Official Voter Information Guide of the Tuesday, November 4, 2008 California General Election: <http://www.voterguide.sos.ca.gov/past/2008/general/argu-rebut/argu-rebutt1a.htm>. For the citation of AB3034, see Section 2704.08(J) which says the high-speed train cannot have an operating subsidy. Also see: see Official Voter Information Guide says (pg 1) that the system will relieve congestion "without raising taxes"

⁹³ Op cit, Albalate, Daniel and Bel, Germa, pg. 76.

congestion, job creation benefits – with some or all in concert to produce the ‘right’ answer.

In theory such benefit cost analyses also measure the proposed project’s virtues and costs compared with all other uses of the funds for social purposes. In reality, that’s not generally done, and this method of calculating profits can be open to manipulation by political decisions or direct beneficiaries’ interests (eg. land speculators, equipment makers, construction and engineering companies and labor unions).

Clearly the California HSR’s private operator(s) will not be able to influence their profit and loss statements based on ‘social profitability.’ Although illegal according to AB304, the State might later elect to absorb O&M costs that the operator would otherwise have to absorb. Or the State could provide benefits, such as bulk ticket purchases, or pay the health insurance and pensions of HSR labor as done in some European systems. Those actions lower operating costs or increase the operator’s revenues. Such actions might be deemed within GAAP guidelines if the operator’s contract with the State permitted such. But any of these actions would likely materially affect the State’s General Fund. Therefore, the full complement and analysis of the need for an illegal subsidy must be expanded to include not only the operator’s full financial results, but also all State entities that may have a financial role in the HSR program.

- Second in the same manner, but under the guise of ‘policy decisions’ there can be blatant, direct cash payment by the State to the operators to make them profitable – or at least not bankrupt. Eurostar, after the original company was financially rescued in 1992 by the UK government, is a good example.⁹⁴ A 2005 Beijing conference on European financing for HSR, pointed out that; “. . . the British government guarantees an income to the company (Channel Tunnel Rail Link) by paying the costs for passenger train operator Eurostar for using the line at a guaranteed minimum level of frequency.”⁹⁵ Additionally, the UK Government further guarantees the Eurostar’s operations by; “. . . contributing up to 100 million pounds of Eurostar’s track access payments to Network Rail [Brittan’s rail infrastructure owners] from 2010 to 2020, and underwrote payments up to 360 million pounds should Eurostar earn less revenue than forecast.”⁹⁶ Just for keeping the service running, Eurostar is like the ill-fated Concorde: a sexy

⁹⁴ In 1998 the LCR (the PPP) asked government for an additional 1.2 billion pounds (€1.8 billion) subsidy. This was refused but bankrupting LCR would have cost the government 800 million pounds in guarantees it had provided on pre-flotation bank loans. A new financial package was negotiated based on more realistic traffic projections with increased subsidies. See: The Role of Government in European Railway Investment and Funding, Beijing, China; 20 September 2005, page 25. Found at:

<http://www.internationaltransportforum.org/IntOrg/ecmt/railways/pdf/SPbeijing05.pdf>

⁹⁵ Ibid.

⁹⁶ Ibid.

national prestige symbol, but expensive for the patrons and for all Britons.

Direct government cash payments, or write offs, are not unknown elsewhere in the rail industry. For example, in 1997 under an EU edict, the French government split its national rail carrier, SNCF, in two parts, creating a new government-controlled company, Réseau Ferré de France (RFF), which then absorbed SNCF's existing debt. But by 2003, RFF had nearly €27 billion of debt, which the central government, just as the Japanese government had earlier, then took responsibility for.⁹⁷

By 2007, Spain's RENFE, the government agency operating its AVE system, had allocated \$55Billion for construction of high-speed lines and another \$1.8Billion annually for operations and maintenance.⁹⁸ RENFE's lack of subtlety in subsidizing Spain's high-speed lines violated even Europe's broad definition of profitability, and the European Commission declared such subsidies illegal.⁹⁹

- Third, some or much of an HSR system's profitability depends on what the HSR operators' accounts include or exclude. If a California contract allows the State to absorb some of these costs, the operator will be in compliance with their GAPP requirement, and may report a profit, but California's taxpayers would subsidize a true operating loss. As the UIC/IUR readily admits, not all O&M costs land on the HSR train's operators' accounting books.¹⁰⁰ For example, the Beijing conference also pointed that; *"Many [HSR systems] enjoy extremely high credit ratings as a result of implicit government guarantees that the State will take over debts in case of need. . ."*¹⁰¹

How much indirect subsidy is accounted for in, for example, European government agencies' track ownership accounts? EU Directive 91/440 separated the Government rail infrastructure organizations; for example RFF (France), Rail Network (UK) and Adif (Spain) from national rail operators. While France's RFF charges SNCF for track usage for conventional and high-speed trains, there is great room for financial legerdemain because while; ".

⁹⁷ See: Réseau Ferré de France (RFF) History at <http://www.fundinguniverse.com/company-histories/Reacute;seau-Ferreacute;-de-France-company-History.html>

⁹⁸ See: International High-Speed Rail Systems: a Hearing before the Subcommittee on Railroads, Pipelines and Hazardous Materials of the Committee on Transportation and Infrastructure, House of Representatives; April 18, 2007, at http://frwebgate.access.gpo.gov/cgibin/getdoc.cgi?dbname=110_house_hearings&docid=f:34799.pdf.

⁹⁹ Op. cit. Albalade, and Bel; pg 104.

¹⁰⁰ *"The public authorities/society generally bear the costs of investing in new infrastructure, constructing and maintaining the infrastructure and related equipment such as safety, control-command and signalling, [sic] etc."* See: letter from Director General of UIC to CHSRA CEO Roelof van Ark of 8 February 2011, found in Attachment 11 of this report or at <http://www.calhsr.com/wp-content/uploads/2010/02/IUR-Officials-Letter-to-CHSRA-CEO.pdf>

¹⁰¹ Op.cit The Role of Government in European Railway Investment and Funding, pg. 29.

*.the RFF contracts with the SNCF for its railroad building and maintenance operations, most of the company's revenues are ultimately returned to the SNCF."*¹⁰²

If all O&M costs are included in the operator's accounts, then recycling government money between government agencies does not seem to fit with the GAAP standards this state's HSR private operator must meet. Again, the need for an all inclusive 'roll up' of all HSR O&M costs throughout California's agencies and department is needed to measure the probable subsidy's size.

Less visible, but no less important to an operator's profitability, is the central government's portion of costs covered by national health and retirement systems. These probably vary among national systems, but in France the government grants SNCF \$2-\$3Billion annually for "*tariff and public service contributions, concessionary fares and various other services*" and pays a retirement supplement to SNCF "*which is not shown on SNCF's income statement*".¹⁰³ While not all of that flows to the Train à Grande Vitesse (TGV) operations, if only the Paris-Lyon service is profitable, some portion does.

In sum, while profitability claims are part of the lore and lure for California's HSR project, there is no proof from the international community of HSR operators – all of which are governments – that any of those systems could meet the standards of Generally Agreed Accounting Principles on a 'see through basis' that included all private operator and State agency financial transactions. The Authority hasn't proven it, UIC/IUR hasn't, nor has SNCF, ICE or RENFE. Conversely, many of the hidden subsidies from parallel government rail-owning agencies to operators have now come to light. This questions whether even under the concept of 'social profitability' in places where revenues per passenger mile are twice that CHSRA proposes, the existing HSR operations could prove themselves to be financial sustainable.

3.2 Exploring the possibility of whether CHSRA's revenues will be greater than their O&M costs – This analysis assumes that all revenues and O&M costs are recognized by the private operator's accounts, and that there are no contract arrangements between the State and the private operator(s) that will trigger cash payments or credit allowances by the State to the operator.

Figure 5 suggests that not only is Acela Express profitable, charging 72¢ and operating at 61¢ per passenger mile, but also that both data sets from RENFE, Spain's rail operator, infer the Spanish system's costs are below their

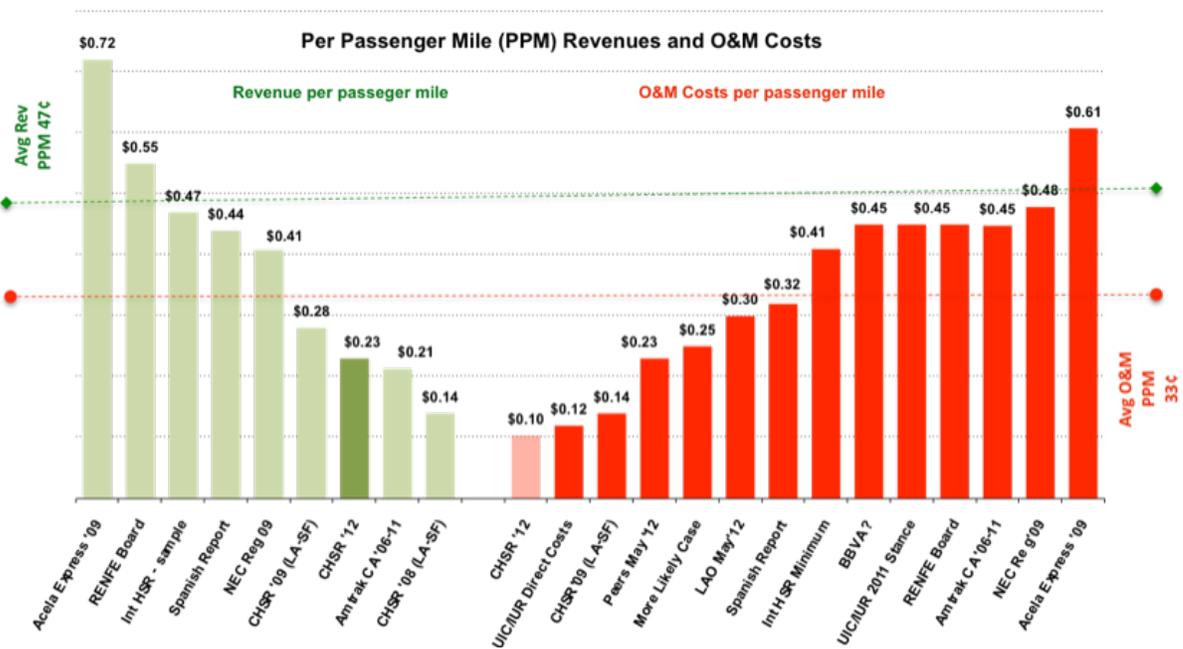
¹⁰² Op. cit, Réseau Ferré de France (RFF) History.

¹⁰³ Op. cit. International High-Speed Rail Systems: a Hearing before the Subcommittee on Railroads, Pipelines and Hazardous Materials of the Committee on Transportation and Infrastructure.

revenues per passenger mile.¹⁰⁴ And just possibly, the composite sample of international HSR routes may have revenues higher than their O&M costs.

But, as this report's preface states, the computations that produced Figure 5 and conclusions of this report are based on limited, publically available data. While revenues can be calculated with some accuracy based on published fares and miles, there is a 'dark side' to O&M data. In no case presented here are all direct and indirect O&M costs publically available. Better findings on revenues and O&M costs are contingent on access to closely held data in the UIC/IUR, the operators and public agencies' files.

Figure 5 – Revenues & O&M Costs Per Passenger Mile (PPM)



However, what really 'jumps off the page' is the disproportionately low revenues and O&M costs proposed by the Authority. The center part of Figure 5 shows that the CHSRA's proposed per passenger mile (PPM) ticket price data are half the average of actual operators' ticket price data, and less than a third of Acela Express' PPM ticket prices. How is it possible that this new HSR rail service's fare structure could be so low, and still be profitable compared with actual HSR systems that have thirty or more years of operating experience?

¹⁰⁴ Figure 5 summarizes the findings of the revenues and costs on a PPM basis. The sources for each of these data sets are discussed Appendix 7.

On the other side of the equation, O&M expense forecasts by the CHSRA are miniscule when put alongside those of in-place HSR operations. Present day data suggests that O&M expenses are somewhere on the order of 39¢ per passenger mile¹⁰⁵. That's nearly four times what CHSRA projects their costs will be. Add to the fact that CHSRA's O&M cost projection is one sixth of its Acela Express 'cousin' and something is amiss in the CHSRA's O&M expense equations.

Appendix 13 illustrates an alternative view to the Authority's view of achieving low O&M costs. It starts with the CHSRA's O&M Model and builds a profitability model that reveals the fully visible revenues and O&M costs in each portion of the organization – known in private business as a 'see through' operating model. Two cases are presented: a 'Best Case' and a 'More Likely Case.' Its Figure A13-1 compares the current CHSRA O&M Model to the UIC/IUR's study, as discussed in Appendix 12. Figure A13-1 shows that the CHSRA's O&M Model lacks realistic infrastructure and administration charges. It is also not clear as to what 'fringe benefits' are included in the hourly labor rates. More seriously, that O&M model has no elements of O&M costs for 'train ownership costs' as well as no provisions for allocating operating profits and taxes.

Both the 'Best Case' and the 'More Likely Case' in Appendix 13 show that unless the CHSRA achieves its Revised Business Plan's remarkably high Load Factor (76%) assumption, the risks of a subsidy being required is very high.¹⁰⁶ Figure A13-2 demonstrates graphically how, in this report, the CHSRA's O&M model was expanded to incorporate a broader, 'all inclusive' O&M cost structure' in the two cases. Those two cases are shown in Figure A13-3 and Figure A13-4, in costs per seat mile terms. Three figures (A13-5, A13-6, and A13-7) compare the CHSRA O&M Model, and the two cases discussed above, in costs per passenger mile terms. They compare the results of the Authority's projected revenues per passenger mile (at a 76% Load Factor) with 50% to 60% to 70% Load Factors.

The dreaded, illegal subsidy appears highly probable. CHSRA projects a 23¢ PPM average ticket price; only slightly above what Amtrak California charges today – before a nearly equal subsidy. If California's HSR is subsidized only as deeply as California's three Amtrak routes now are, a subsidy of 20¢ per passenger mile (PPM) would be required. This would bring the total of the CHSRA's projected per passenger mile fares up to 43¢ PPM (23¢ PPM, plus

¹⁰⁵ This 39¢ average comes from the eleven right-hand-most data points on the O&M cost side of Figure 5. The first three on the left side were excluded as the two CHSRA projections should logically not be included in the comparison – and the UIC/UIR data is excluded because of its narrowly defined set of O&M costs. Including the CHSRA projections and the UIC study lowers the overall average cost to about 33¢ PPM.

¹⁰⁶ For an analysis of ridership, revenue and costs in the CHSRA's Revised Draft Plan, see Appendix 4.

the 20¢ PPM subsidy) and reflect actual O&M costs of about 40¢ to 45¢ PPM – within a reasonable range of present HSR international operators' fares and O&M costs. But even a 20¢ PPM subsidy would not be sufficient if California's HSR train's O&M costs are even near Acela Express' 61¢ PPM O&M costs.¹⁰⁷

3.3 Conclusions on CHSRA's mismatches with existing revenues and operating costs – The CHSRA's Draft 2012 Business Plan states that O&M cost projections were around 10¢ PPM, and revenues ranged from 20¢ to 25¢ PPM.¹⁰⁸ This official stance was reaffirmed on December 15th 2011, when then-CHSRA CEO Roelof Van Ark responded to a question from Representative Gary Miller of California of the US House Subcommittee on Railroads, Pipelines and Hazardous Materials. He said that all of the price and cost projections in the 2012 Draft Business Plan had been checked and cross checked against all HSR systems.¹⁰⁹

However, as Attachment 12 shows, Mr. Van Ark's specific answer to the question regarding O&M costs is not consistent with:

1. The UIC/IUR's February 2011 letter to Mr. Van Ark, and its Official UIC/IUR stance on profitability where HSR revenues and operating cost were roughly equated to one another. For example, if revenues are about 40¢ PPM, O&M costs are in the range of 40¢ PPM.¹¹⁰
2. Spain's RENFE presentation to Mr. Van Ark and the CHSRA Board in June 2011. When AVE's revenues, profit margins, load factors, ticket prices and distances were analyzed, revenues and costs per passenger mile could be estimated to be 55¢-45¢ per passenger mile, as shown in the right hand column of Figure A6-1.¹¹¹
3. The 2007 BBVA Report referenced in the 2012 Business Plan Operating Cost document, produced by Parsons Brinckerhoff for the Authority's 2012 Business Plan. This Plan was presented to the CHSRA Board and management in November 2011.¹¹² When Mr. van Ark testified in

¹⁰⁷ In Federal Fiscal Year 2010-11, the Pacific Surfliner route required a 43% subsidy for each ticket, the San Joaquin route 46% and the Capitol Corridor route 53%. Source: "Amtrak Operating Results, Amtrak Invoice (Actual and Contract Results) at 100%. Together these routes required taxpayers to pay an average of 47% of the O&M costs. That means for every dollar of revenue, the subsidy must be 87% ($47/53 = 87\%$) Taking CHSRA's 23¢ PPM as the future revenues, then the subsidy will be about 20¢ PPM ($87\% \times 23 = 20$) This means the total of the revenue and the subsidy will be 43¢ PPM.

¹⁰⁸ These assertions were restated in the Revised 2012 Draft Business Plan of April 2012, and are analyzed in Appendix 4.

¹⁰⁹ See US House testimony of Mr. Van Ark; a video at: http://www.youtube.com/watch?v=IXDeu_4-AXs&feature=youtu.be

¹¹⁰ See Attachment 11

¹¹¹ See Appendix 6. Discussed in detail on page 6 of the 'Forever' report, available at www.sites.google.com/site/hsrscaliff and at www.cc-hsr.org, then go to Financial Reports.

¹¹² See Appendix 8 and Appendix 14.

December 2011 there was no indication then that some of the O&M cost data, 45¢ to 50¢ (PPM), might be flawed.

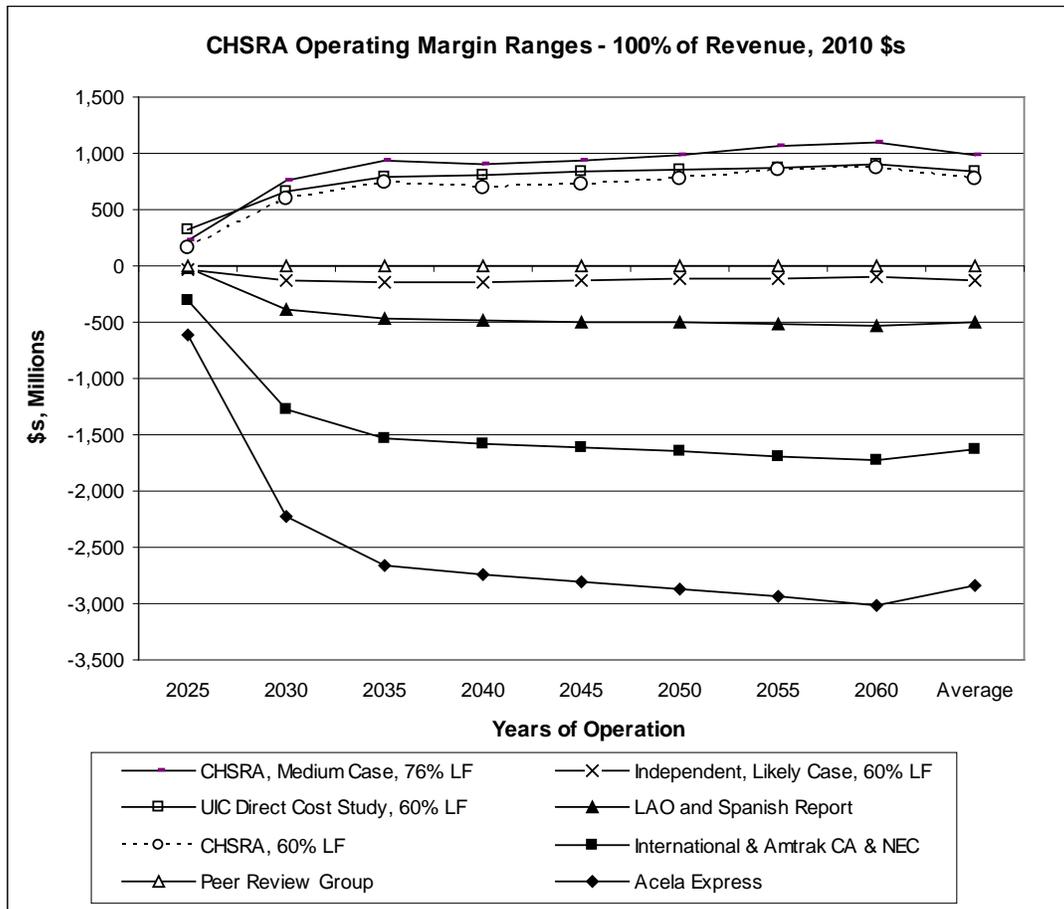
How could these significant data points, all pointing to costs and revenues in the 40¢ to 50¢ PPM range, be set aside in CEO Van Ark's testimony? This paradox remains unexplained, yet the Authority continues to plan with the same revenues and costs as CEO Van Ark defended as "*cross checked.*"

Is it to be the case that, with CHSRA's 'outlier' revenue and O&M costs, the California HSR train will require an even deeper subsidy per passenger mile than the state's conventional rail systems of about 20¢ per passenger mile? It is imperative to know now how realistic the Authority's forecasted revenue projections and total expense projections are. There is no room for errors or a Beta test once billions of construction dollars have been spent.

Section Four The Financial Impacts Of CHSRA's O&M Costs Exceeding Revenues

Figure 6 summarizes the financial consequences of the projected annual operating margins (positive and negative) for eight different cases, developed in detail in Appendix 14. O&M costs equal or exceed the CHSRA's (and the UIC/IUR's) projected revenues in five of these eight cases.

Figure 6 – Potential Financial Impacts Of California HSR System



As the top curves of Figure 6, a reproduction of Appendix 14's Figure A14-3, shows, CHSRA's current O&M cost projections are nearly the same as the UIC/IUR study of 'direct-only' O&M costs, as discussed in both Appendix 12 and Appendix 13. That could be coincidental, or possibly designed to include only some of the O&M cost factors used by the UIC/IUR.

Figure A14-2 (Appendix 14) shows the Operating Margins for the six cases, based on the costs per passenger mile as discussed in this report's Sections

Two and Section Three, and the (April 2012) CHSRA Revised Business Plan's revenue per passenger mile discussed in Section One. Those existing per passenger mile revenues and O&M costs are consolidated into six different groups of similarly characteristic data to build charts such as Figure 6.

While displayed in Figure 6, the UIC/IUR costs are unrealistically low, because of the narrow scope of the UIC/IUR speed-cost relationship study. This is re-enforced by the UIC/IUR's statement that some of these types of costs are normally the responsibility of the state (ie. government) with only some part being passed to the operator and therefore to the ticket prices.¹¹³ As Appendix 13 discusses, unlike the UIC/IUR's Direct Cost Study, the California HSR operator won't be able (or should not be allowed under the operating contract) to pass on any indirect infrastructure and related equipment maintenance and replacement costs to the State of California.

Appendix 14 finds that the HSR project could add an additional \$28Billion to the State's accounts over the 35 year forecast period of CHSRA's financial model if all of CHSRA's revenue and cost projections occur as planned. This is shown in Figure A14-6. However, when a broader view of existing European HSR operations, and when Amtrak's passenger services and independent projections are considered, the risks of large operating losses become very apparent.

The loss potential is very large if the CHSRA's, or even the Peer Review Group's or the UIC/IUR's O&M estimates do not reflect reality. Starting with the most benevolent scenario, the Independent Case (60% Load Factor) would lose about \$430 Million over the 35-year forecasting period. This is the 'More Likely Case' of Appendix 13, reflected in Figures A13-4 and A13-7. Calculations for these figures start by using the CHSRA's O&M model, then increase the infrastructure costs, operating costs, and administration costs above the current CHSRA projections; thereby creating line item cost projections for 'train operating costs,' operator profits (or losses), and taxes.

But that loss would grow to be about \$18 Billion if the resulting O&M costs were closer to the financial performance equation using O&M data from the LAO and the two reports from Spain's HSR system. When using the same financial performance equation, losses over 35 years using the O&M data based on the international HSR experience and the two Amtrak zones (CA and NEC) would add up to \$57 Billion – annual losses of \$1.6 Billion. (These

¹¹³ The UIC/IUR letter of February 2011 reported that *"The public authorities/society generally bear the costs of investing in new infrastructure, constructing and **maintaining the infrastructure and related equipment** such as safety, control-command and signaling, etc."* [Emphasis added.] See Attachment 11 and the UIC/IUR letter found at <http://www.calhsr.com/wp-content/uploads/2010/02/IUR-Officials-Letter-to-CHSRA-CEO.pdf>.

cumulative loses are shown in Figure A14-6 in Appendix 14) This is very worrisome.

The largest operating loss, because the Acela Express' revenue and O&M cost data are so at odds with the CHSRA's, would be nearly \$100 Billion over the forecast period, or \$2.8 Billion per year.

4.1 Conclusions about courses of action – As the Summary states, CHSRA could choose to meet the strictures of AB3034 and not require a subsidy. That choice would violate the promise to 2008's Prop1A voters to transport them one-way between LA to San Francisco for "about \$50" and it would probably put the HSR train out of competition with airline fares. But it possibly could avoid an eternal subsidy. It's a simple formula; charge passengers what will cover realistic O&M costs.

If the disconnect between CHSRA's revenues and O&M costs to the existing HSR systems revenues and costs is allowed to remain as the 'elephant in the room' the consequences will be greater than the prohibited subsidy of AB3034 and Prop 1A. That's because CHSRA's current Revised Business Plan assumes that future 'positive' operating margins allows future revenue streams to be sold to a private investor or investors. This 'profit' supposedly produces cash to fund the construction of future HSR corridors, such as to Sacramento and to San Diego. But according to this report, the operating margin will not be positive; therefore no future 'profits' will be available to be sold to raise cash to extend the HSR infrastructure.

What might an unsubsidized, one-way inter-metropolis fare be? As shown in Section 2, a LA-SF fare based on international HSR operators' experience would be around \$200, about 50¢ per passenger mile (PPM); more than double CHSRA's present estimated PPM fare of 23¢ PPM. That suggests the great unknown is what the effect will be on the train's ridership when HSR fares are nearly double airline fares – 50¢ PPM versus 29¢. At that price difference, California's HSR train would only attract the same; ". . . *upper-middle and upper income brackets, who usually travel for business reasons* ." that European and Asian HSR systems depend on.¹¹⁴

Is the purpose of spending tens of billions of dollars on infrastructure and annually subsidizing California's HSR train to offer upper income and business expense account passengers a taxpayer-subsidized ride?

¹¹⁴ See: Albalade, Daniel and Bel, Germa; The Economics and Politics of High-Speed Rail; Lessons From Experiences Abroad; Lexington Books, 2012, page xiii.

Appendix One

A LAO Letter to Members of the Legislature

The Legislature Analysts' Office (LAO) sent a letter in May to four members of the Legislature¹. This letter was in response to a request that the LAO examine the cost structures of existing HSR systems and assess the reliability of the CHSRA's cost projections and the CHSRA's conclusion that they would not require an operating subsidy.

The LAO's letter made several points:

1. That based on the CHSRA's projection, their costs are in the range of 10¢ per passenger mile. This is consistent with the findings in this report as discussed in Appendix Three.

2. That based on the CHSRA's revenues projection and this 10¢ per passenger mile cost projection, it is possible for the CHSRA to operate without a subsidy. This is consistent with the conclusions in Appendix Thirteen, where the Baseline CHSRA projection shows a positive operating margin under these conditions. (See Figure A14-2 or 3)

3. That the O&M cost for the existing HSR operators is in the range of 30¢ per passenger mile. This is below the 40¢ per passenger mile projected in the March 2012 "Forever" report, but substantially above the CHSRA's projection.

4. That the LAO had not been able to reconcile the difference between the CHSRA's projection of 10¢ and the existing HSR operators O&M cost of 30¢. While the LAO acknowledged that one of their inputs was material contained in the supposedly "flawed" BBVA reports, they have not altered their report.

The LAO says O&M costs in the market appear to be higher by a factor of three. If the LAO is correct and the CHSRA O&M costs actually come close to this 30¢ range, a subsidy will be required, as revenues per passenger mile are projected to be in the range of 23¢ during the Phase 1 Blended period of operations.

¹ See Attachment 9 for a copy of the LAO May 4th, 2012 letter.

Appendix Two

A Review of the California High-Speed Rail Peer Review Group's Comments of May 18, 2012 On The Revised Draft Business Plan

The following (in italics) was extracted from the Independent Peer Review Group's (PRG) comments of May 18th 2012 (pgs. 7-8).¹ The full text of that report can be found at http://www.cahsrprg.com/files/bus_plan.pdf

Operations and Maintenance (O&M) Cost Model We are concerned about the current stage of development of the O&M cost model, because the results of the O&M model are a critical determinant of the ability of the system to generate positive cash flow for use in financing future parts of the system beyond the IOS. Our experience with HSR elsewhere and our review of the demand and cost sensitivity analyses performed by the Authority indicate **that the HSR operator should be able to cover operating costs from revenues** and thus not need a subsidy as defined in Prop 1A. **Performance beyond the break-even point is less clear.** (emphasis added)

The existing model is relatively simple and **does not reflect the relationship between costs and the level of operations as well as it could.** (emphasis added) The checks we have been able to perform on the elements of the O&M model do not reveal major errors in the individual components, but **the overall results of the model appear optimistic by comparison with readily available data on the closest comparable U.S. HSR operations (Amtrak's operations in the Northeast Corridor).** (emphasis added) The Authority's comparisons with international operators tend to support the Authority's position, but **the data are not fully subject to detailed verification** and, in any event, there is no experience anywhere with the extremely high speeds that the Authority plans to operate. If the Authority's model is optimistic, the private sector will be less able to augment public investment in the Bay-to-Bay and Phase I Blended stages of the project. The Authority did perform a series of sensitivity tests at the request of the Group. These tests suggest that the financial performance of the project is robust over a reasonable range of assumptions; but, again, there is **no fully comparable and documented experience available to resolve the issue.** (emphasis added)

Brief Comments On the Peer Review Group's May 2012 Report – The Peers certainly do not unequivocally endorse the Authority's O&M model, its conclusions, or seemingly their own conclusion. Immediately after stating;

¹ Note that the Peer Group did not use the BBVA reports' allegedly 'flawed' data. Also note that the Peer Group's report focused on the stage of development of the O&M model, neither saying the model was preliminary nor highly advanced and predictive.

"the HSR operator should be able to cover operating costs from revenues . . . " the Peer Review Group 'hedges.' Instead of supporting the CHSRA O&M model or the model's conclusions, the Peers equivocate, saying; *"Performance beyond the break-even point is less clear."*

Analyzing the Authority's O&M model to understand its financial implications revealed it has no embedded revenue parameter.² This makes it insensitive to revenues greater or less than the CHSRA's projected O&M costs for a given combination of route miles and train miles. Conclusions from this finding, and the Peer's view that the train may barely reach the financial breakeven point, are very revealing.

When the Peers seem to conclude that *"operator should be able to cover operating costs from revenues and thus not need a subsidy as defined in Prop 1A."* that is understood to mean that if CHSRA's revenues are in the range of 23¢ per passenger mile, then the Peer Review Group would project that operating costs are in the range of 23¢ per passenger mile, as compared to the current CHSRA projection of about 10¢ per passenger mile³. The 23¢ revenue = O&M cost equation is nothing more than a possible breakeven position. That's at least twice as high as the Authority's 10¢ per passenger mile projection; a dramatic difference.

Assuming a high Load Factor of 70%, that would say the Peer Review Group is projecting that O&M costs would be in the range of 16¢ per seat mile. To put this in perspective, the current CHSRA projection is about 8¢ per seat mile. The current CHSRA operating cost projections, by their own seat mile metric, are 50% of the Peer Review findings. As the PRG says; *"Performance beyond the break-even point is less clear"*. This sounds as if the PRG is not sure that O&M costs can ever be less than about 23¢ per passenger mile (16 ¢ per seat mile).

In the subsequent paragraph the Peers equivocate four times, first around the central issues of the 'Forever' report. Twice they acknowledge that, like the 'Forever' report that also depended on data that could not be independently certified, the Peers also had to work with *"data are not fully subject to detailed verification"* and had *"no fully comparable and documented experience available to resolve the issue."* In short, the Peers had to deal with what the Authority gave them to deal with, plus what they could find from publically available documents – just as the 'Forever' report's authors did.

² See Appendix 9 for an analysis of the CHSRA O&M Model

³ See the chart of Revenues and Costs, Medium CHSRA Case, in Appendix 4

Twice the Peers seem to question the Authority's quality of work product, both by saying it; *"does not reflect the relationship between costs and the level of operations as well as it could."* and *"the overall results of the model appear optimistic."* As Flyvbjerg, Bruzelius and Rothengatter, as well as many others have pointed out, optimism is what has consistently underestimated costs and overestimated ridership for megaprojects such as this.⁴

Most notable, it took the Peers to point out to the Authority that they could have used *"readily available data on the closest comparable U.S. HSR operations (Amtrak's operations in the Northeast Corridor)."* But no such check on whether the CHSRA's O&M data were within the realm of reality seems to have been done; otherwise the Peers would have known. Even if the Northeast Corridor Amtrak costs are high, it would have been prudent to show these US cost structures; and show how, and why, the CHSRA costs structure is projected to be lower. Did Parsons Brinckerhoff and its highly paid consultants disdain from using actual US operating data from existing rail services as benchmarks; or were these data simply inconvenient truths?

⁴ See Flyvbjerg, Bent; Bruzelius, Nils and Rothengatter, Werner: Megaprojects And Risk, An Anatomy of Ambition; Cambridge University Press, 2003.

Appendix Three On Per Passenger Miles And Converting Seat Miles To Passenger Miles Using Load Factors

The Department of Transportation stresses the use of per passenger miles as the measure of financial performance for passenger rail and airline operations. In reporting financial results for Amtrak and for Acela Express, per passenger miles (PPM) are used as the financial metrics, not seat miles. Attachment 10, Amtrak data on the California routes, is a case in point.

Per passenger mile (PPM) is the DOT/FRA's official metric to understand the financial performance of a passenger rail or airline system. Instead of using the recommended metric, the Authority used per seat miles (PSM) to measure their train's profitability.¹ But financial performance calculations only start by being measured in dollars per seat mile (PSM). Revenues and O&M costs should be, and in this report are, measured in dollars (or fractions of dollars) per passenger mile.

Load Factors allow costs measured in per seat miles (PSM) to be converted to passenger miles (PPM). The formula is:

$$\text{\$s (PPM)} = \text{\$(PSM)} \times \% \text{ Load Factor}^2$$

[PSM = PPM only when the Load Factor = 100%]

Using the per passenger mile (PPM) metric leads to a 'top down' financial view and the ability to compare revenues and costs for any air or rail system, whether in the USA or elsewhere.

CHSRA uses seat miles – Financial calculations start with seat miles, which assumes every train is 100% full.³ This is not a defensible assumption given the DOT/FRA's position on the subject. Load Factors are the conversion link between seat miles and per passenger miles. The Research and Innovative Technology Administration (RITA) of U.S. Department of Transportation (US DOT) says:

¹ The CHSRA's criticism of the 'Forever' report for using PPM versus PSM is both in an Assembly Transportation Committee statement given by Board Member Mike Rossi on April 30th 2012; found at <http://youtu.be/yWU9uKUuHII> and in a May 4th 2012 letter and CHSRA Press Release. The letter and Press Release can be found at <http://www.cahighspeedrail.ca.gov/> under the PDF file called: "CHSRA Responds to Flawed Report: Corresponds with Authors."

² The US DOT (RITA) description puts the conversion process as: "Load factor measures usage by capacity. It is calculated by dividing passenger miles (the aggregation of trip lengths for individual passengers) by seat miles (the sum of the products of total seats available and total miles traveled for individual trains)". RITA is the Research and Innovative Technology Administration (RITA) of U.S. Department of Transportation See: <http://www.rita.dot.gov> and <http://www.dot.gov/>

³ A CHSRA Board member's letter to the authors dated May 4th 2012, Table 2 claims that financial performance for the proposed high-speed rail system are solely based in seat miles. A copy of that letter and the Press Release of the same day containing that letter can be found at <http://www.cahighspeedrail.ca.gov/> under the PDF file called: CHSRA Responds to Flawed Report: Corresponds with Authors

*“Load factor measures usage by capacity. It is calculated by dividing passenger miles (the aggregation of trip lengths for individual passengers) by seat miles (the sum of the products of total seats available and total miles traveled for individual trains)”.*⁴

For a practical example of how converting from costs per seat mile to costs per passenger mile, and why mixing revenues with costs, are both appropriate, follow this logic. Certainly the starting point is the metric, cost in seat miles, as shown in Figure 1 (page 14) of the ‘Forever’ report.⁵ Revenues from passengers should be shown in passenger miles, because that is what a passenger’s ticket bought them and what the railroad operator is collecting for each mile they carry that passenger. The key is to be able to compare these two different measurements – cost per seat miles and revenue per passenger miles.

It is a classic cost accounting problem. The for-profit operator and its evaluator (the State in this case) have one of two choices: either (1) take the dollars collected from passengers and spread them over all the seat miles, or (2) take all the costs and allocate them to only the miles the passengers rode. You can’t have it both ways.

The outcome of that choice is best shown in a simple example. A railroad has only one track, 100 miles long. It cost \$10 to run its train from one end of the 100 miles to the other end. In effect this is an operating expense of US10¢ per seat mile. If the railroad has only one passenger, who buys one ticket to go 50 miles for \$10, in effect that is revenue of US20¢ per passenger mile. All this sounds good, revenues of US20¢ per mile and costs of US10¢ per mile – operating profit of 50%!

But that comparison is apples to oranges. The CHSRA’s critique of the per passenger mile metric excludes using the Load Factor which the DOT/RITA recommends. The railroad in the example had a Load Factor of 50%, because their one seat that went 100 miles was only filled for 50 miles, ie. 50%.

The two choices for financial analysis are:

(1) Spread the \$10 of ticket revenues over all 100 miles of available seats, not the 50 miles the passenger actually road, yielding revenue of 10¢ per seat mile. That can then be compared to the operating cost of 10¢ per seat mile. This is done by multiplying the revenues of 20¢ per passenger mile by the Load Factor of 50%, resulting in a revenue of 10¢ per seat mile; or

⁴ See: <http://www.rita.dot.gov> and <http://www.dot.gov/>

⁵ Available at www.sites.google.com/site/hsrcaliffr and at www.cc-hsr.org, go to Financial Reports

(2) Reallocate all the operating costs over just the seats that were actually used. In this choice the operating cost is 20¢ per passenger mile that can be compared to the revenue of 20¢ per passenger mile. This is done by dividing the costs of 10¢ per seat mile by the Load Factor of 50%, resulting in an operating cost of 20¢ per passenger mile.

What sounded good before, with 20¢ in per passenger mile revenues being compared to 10¢ in per seat mile costs, is, in fact, a situation where the railroad only breaks even (not a 50% operating margin) because it took in \$10 and spent \$10. No profit in fact.

Figure A3-1 is the practical result of converting costs in seat miles to per passenger miles and converting revenues in passenger miles to per seat mile, using either the actual Load Factors of operating rail lines or the projected seat miles to passenger miles of the CHSRA's April Revised Plan.

Figure A3-1

	CHSRA 2035	Acela '09	NE Corridor Reg. '09	Amtrak Cal '06	Amtrak Cal '09	Amtrak Cal '11
Seat Revenue	\$0.18	\$0.40	\$0.18	\$0.05	\$0.07	\$0.07
Seat Cost	\$0.08	\$0.34	\$0.21	\$0.10	\$0.17	\$0.12
Load Factor	75%	56%	44%	26%	32%	27%
Passenger Revenue	\$0.23	\$0.72	\$0.41	\$0.18	\$0.21	\$0.25
Passenger Cost	\$0.10	\$0.61	\$0.48	\$0.37	\$0.52	\$0.45

Revenue per seat mile will always be lower than revenue per passenger mile (because the revenues are being spread over empty seats), and O&M costs per passenger mile will always be higher than costs per seat miles (because the costs are being allocated to just the seats that passengers have filled).

All data in this report are shown in passenger miles, and seat miles when appropriate. CHSRA should follow industry standards and directives of the Federal Railroad Administration and measure its proposed train's financial performance, of revenues and costs, using passenger miles, not seat miles. Using seat miles as a starting point for operational reporting is appropriate, but not for financial reporting purposes. The Load Factor must be used to convert seat costs to cost per passenger mile for financial analysis purposes.

Appendix Four Defining and Computing CHSRA's Ridership, Miles, Revenues and Costs

This analysis and Figure A4-1 compare CHSRA's projected financial results for their three cases (high medium and low) of ridership, miles, revenues and costs, as supplied in the Revised Draft 2012 Business Plan (April 2012). All dollars are 2010 \$s.

Figure A4-1, RIDERSHIP, MILES, REVENUES & O&M COSTS, covers the period of the IOS South in 2025, the transition from the Bay to Basin period to the Phase 1 Blended period in 2030, and then the Phase 1 Blended period which truly begins in 2035. It also includes a set of averages for the entire Phase 1 Blended period from 2035 to 2060.

In addition to providing the Plan's projections, Figure A4-1 introduces a series of key measurements that are referred to in other parts of this Report.

Key Physical Parameters – this discussion focuses on the Medium case, since it is the one used in the financial part of the Revised Business Plan. It compares the High and Low cases as appropriate.

Note that ridership, after starting in 2022 with the IOS South at 4Million passenger per year, grows to 8Million passengers by 2025, then to 26M passengers by 2035 – growth of over 12% compounded annually, as trackage is added. The average ridership for the period of the Phase 1 Blended operation between Los Angeles and San Francisco is about 27M passengers per year.

There are five key parameters in calculating the physical movements of passengers and trains.

1) Defining Trainset Miles – The cumulative miles all trains operate each year grows from 7M in 2025 to an average of 22M for the Phase 1 Blended period. This is a critical planning parameter in determining the operations' degree of operational and financial efficiency. Because direct operating costs are largely driven by trainset miles, if the Authority's train system is successful in achieving a very high degree of efficiency, it will have a material impact on lowering the operating costs on a per seat basis. A planning parameter of 450 seats per train is held constant by the CHSRA and assumed to be available in each trainset.

2) Defining Passenger Miles –The next operational measurement, passenger miles, is the cumulative number of miles traveled by all the revenue paying passengers. This grows from 2Million passengers in 2035 to an average of 7.5Million during the Phase 1 Blended period.

Figure A4-1 - RIDERSHIP, MILES, REVENUES & O&M COSTS (2010 US\$\$s)

Corridor In Use	IOS	B to B	Phase1 B					Phase1 B	
	2025	2030	2035	2040	2045	2050	2055	2060	Average
High									
Ridership, in Ms	10.47	26.76	31.78	32.59	33.41	34.25	35.12	36.00	33.86
Trainset Miles, in M of miles	8.87	21.14	25.34	25.34	25.64	27.14	27.70	27.70	26.48
Passenger Miles, in M of miles	2,484	7,438	8,833	9,056	9,285	9,519	9,760	10,006	9,410
Seat Miles, in M of miles	3,992	9,513	11,403	11,403	11,538	12,213	12,465	12,465	11,915
Load Factor, Pass M/Seat M	62.2%	78.2%	77.5%	79.4%	80.5%	77.9%	78.3%	80.3%	79.0%
Mile per Pass, Pass M/Ridership	237	278	278	278	278	278	278	278	278
Revenue, in \$M	733	1,743	2,070	2,122	2,176	2,231	2,287	2,345	2,205
O & M Cost, in \$M	373	709	850	888	921	956	929	903	908
Revenue per Pass Mile, R/Pass M	0.295	0.234	0.234	0.234	0.234	0.234	0.234	0.234	0.234
O & M Cost per Pass Mile, C/Pass M	0.150	0.095	0.096	0.098	0.099	0.100	0.095	0.090	0.096
Revenue per Seat Mile, R/Seat M	0.184	0.183	0.182	0.186	0.189	0.183	0.183	0.188	0.185
O & M Cost per Seat Mile, C/Seat M	0.093	0.075	0.075	0.078	0.080	0.078	0.075	0.072	0.076
Medium									
Ridership, in Ms	8.14	21.44	25.71	26.36	27.02	27.71	28.41	29.12	27.39
Trainset Miles, in M of miles	6.95	17.58	20.89	21.00	21.66	22.53	22.89	23.11	22.01
Passenger Miles, in M of miles	1,922	5,905	7,079	7,258	7,441	7,629	7,822	8,019	7,541
Seat Miles, in M of miles	3,125	7,909	9,398	9,448	9,747	10,136	10,301	10,400	9,905
Load Factor, Pass M/Seat M	61.5%	74.7%	75.3%	76.8%	76.3%	75.3%	75.9%	77.1%	76.1%
Mile per Pass, Pass M/Ridership	236	275	275	275	275	275	275	275	275
Revenue, in \$M	564	1,380	1,655	1,687	1,740	1,784	1,829	1,875	1,762
O & M Cost, in \$M	334	627	724	776	802	805	766	778	775
Revenue per Pass Mile, R/Pass M	0.294	0.234	0.234	0.232	0.234	0.234	0.234	0.234	0.234
O & M Cost per Pass Mile, C/Pass M	0.174	0.106	0.102	0.107	0.108	0.106	0.098	0.097	0.103
Revenue per Seat Mile, R/Seat M	0.180	0.174	0.176	0.179	0.179	0.176	0.178	0.180	0.178
O & M Cost per Seat Mile, C/Seat M	0.107	0.079	0.077	0.082	0.082	0.079	0.074	0.075	0.078
Low									
Ridership, in Ms	5.80	16.12	19.63	20.13	20.63	21.16	21.69	22.24	20.91
Trainset Miles, in M of miles	5.02	14.01	16.43	16.65	17.68	17.91	18.08	18.52	17.55
Passenger Miles, in M of miles	1,359	4,371	5,324	5,459	5,597	5,738	5,883	6,031	5,672
Seat Miles, in M of miles	2,259	6,305	7,394	7,493	7,956	8,060	8,136	8,334	7,895
Load Factor, Pass M/Seat M	60.2%	69.3%	72.0%	72.9%	70.3%	71.2%	72.3%	72.4%	71.8%
Mile per Pass, Pass M/Ridership	234	271	271	271	271	271	271	271	271
Revenue, in \$M	395	1,019	1,241	1,272	1,304	1,337	1,371	1,405	1,322
O & M Cost, in \$M	251	518	611	655	705	708	672	656	668
Revenue per Pass Mile, R/Pass M	0.291	0.233	0.233	0.233	0.233	0.233	0.233	0.233	0.233
O & M Cost per Pass Mile, C/Pass M	0.185	0.119	0.115	0.120	0.126	0.123	0.114	0.109	0.118
Revenue per Seat Mile, R/Seat M	0.175	0.162	0.168	0.170	0.164	0.166	0.169	0.169	0.167
O & M Cost per Seat Mile, C/Seat M	0.111	0.082	0.083	0.087	0.089	0.088	0.083	0.079	0.085

Notes: : 450 seats per trainset per Table 9, page 9 of O & M Report for Revised Draft Business Plan, April 2012. For High & Low Cases - Ridership, Trainset and Passenger Miles from April 19, 2012 PB Memo regarding Green House Gases. For the Medium Case - Ridership, Trainset and Passenger Miles is an average of the High and Low Cases. Revenue and O & M Costs, in \$M, from page 12 of O & M Report for Revised Draft Business Plan, April 2012.

3) Defining Seat Miles – This operationally oriented (not financially oriented) measure is the cumulative miles that all on-board passenger seats (empty or full) in all trains cover each year. The seat miles number is a derivative of the number of trainset miles (discussed above) multiplied by the 450 seats per train. The number of seat miles starts at 3Million per year and averages 10Million per year over the period of the Phase 1 Blended operations.

4) Defining the Load Factor: relating passengers and seats – This key financial measurement is based on the ratio of revenue paying passenger miles to all the seat miles provided in any measured year. This is recognized as the Load Factor. A Load Factor is calculated by dividing Passenger Miles by Seat Miles. The Authority projects in 2025, during the IOS South period, that the Load Factor will be 62%, and over the Phase 1 Blended period of operations will average 76%.

This means that the Authority is projecting that during the Phase 1 Blended period, three quarters of all the seat miles will be filled with revenue producing passengers all of the time. This very high level of utilization; and along with more seats per train, allows that fewer trains and fewer seats to move roughly the same number of passengers.

5) The average number of miles per passenger – This last parameter starts out at 236 miles while just the IOS South is in operation, and grows to 275 for the remaining years. On a corridor of 500 miles, this average length of a trip of 275 miles, plus a Load Factor of 76%. This says the trains will be very full.

Key Financial Parameters – While the Authority projects revenues of \$0.56B in 2025, it triples to \$1.65B in 2035 – a compound average growth rate of 12% per year, as trackage is added. During the Phase 1 Blended operations revenues average \$1.8B. However to produce this revenue stream, the Authority's projects costs of only \$0.33B in 2025, and O&M costs averaging \$0.78B in the period of Phase 1 Blended operations. [The model the Authority uses to produce these costs projections will be discussed in another section of this Report.] The key financial parameters determining the train's potential profitability are:

Measuring By Per Passenger Mile – There are two key financial parameters. The first is revenue per passenger mile, which conceptually is the average price per mile of all the tickets purchased for the year. This is computed by dividing all the ticket revenues by the number of miles the paying passengers traveled.

Note that during the IOS period, the Authority is projecting 29¢ of revenues per passenger mile. This appears to be due to the Authority's pricing model

that sets ticket prices in the Central Valley higher than the long haul ticket prices. Since there are no long haul tickets during the IOS South period, higher revenues per passenger mile is projected. [The ticket-pricing model will be discussed in another section of this Report.] Once the long haul market can be served in the Bay to Basin and Phase 1 Blended periods of operations, revenue drops to about 23¢ per passenger mile.

The other key financial parameter is the cost per passenger mile. This is calculated by dividing the costs by the number of passenger miles, thereby allocating all of the costs to just the seats that were filled with revenue paying passengers.

During the IOS South period, the O&M costs are about 17¢ per passenger mile, but the Authority's projected O&M costs drop as the longer corridor becomes available, averaging about 10¢ per passenger mile over the period of Phase 1 Blended operations.

Measuring By Seat Mile – These two measurements are from the point of view of rail operations. The revenue per seat mile calculation takes all of the revenue from the passengers and spreads it over all of the seats that are moved in all of the trains. This can then be compared to the cost to move each seat for each year.

The Authority projects 18¢ of revenue per seat mile over the entire period of operations. This is only about one fourth lower than the 23¢ projected for revenues per passenger mile over the period of Phase 1 Operations. This is because of the Authority's Load Factor projection of 76%.

The last operational measurement is the cost per seat mile. The Authority's projection of 11¢ per seat mile during the IOS South period drops to about 8¢ per seat mile for the periods of the Bay to Basin and Phase 1 Blended operations.

Are These Measurements Consistent? – One of the important messages in this set of data is that the measurements lead to the same conclusions. For example for the average data for the Phase 1 period of operations, if one measures the costs as a percent of revenues it is 44%. Put another way, the cost per passenger mile as a percent of revenue per passenger mile is 44%. Or it can be said that the cost per seat mile as a percent of passenger revenue per seat mile it is 44%. The results are exactly the same.

What Are The Differences Between The High, Medium, and Low Cases? – In effect, the High and Low cases show the financial consequences with larger volumes of passengers. Nothing else. Note that in Figure A4-1 for the Average column for the period of Phase 1 Blended operations, that the Medium case shows the revenue per passenger at 23¢. Note also that for the High and Low cases the revenue per passenger mile is also 23¢. So

there is no variation in pricing structure between the three (high, low, medium) cases, as the price per passenger mile is equal.

Also note that the cost per seat mile is relative fixed, at 7.8¢ in the Medium case, down just 2.5% to 7.6¢ in the High case in spite of a fairly large increase in passenger volumes of about 24%, and up 10% to just 8.5¢ in the Low case with a fairly large drop in passenger volumes of 24%.

This means the Authority's O&M model is structured so that most of the O&M costs vary directly with trainset mile volumes. Also note that the Load Factor of 76% in the Medium case increases to 79% in the High case, which seems to be extraordinarily high. The Load Factor only drops to 72% in the Low case.

The Issues That Need Additional Examination – It may be that, as the Authority has stated, their projected costs are just direct operating and maintenance costs. Therefore, there must be other non-direct (indirect) costs components which are not in the Authority's cost projections and which do not vary directly with traffic volumes. Another section of this report will provide our independent projection of these additional costs.

The ability to achieve Load Factors that average around 76% seems highly unlikely. During peak hours it may be possible to achieve this level of efficiency but not over the entire operating schedule which is about 16 hours per day seven days per week. Overall this seems to be better than airlines do when they have control of the passenger from the beginning of their corridor to the end. Airlines are clearly not faced with the challenge of one customer hopping off and having to resell the seat at least one more time before the train gets to the end of the corridor. Our independent projections, mentioned above, will also look at the impact of lower Load Factors.

Attempting to reconcile these differences should be a very high priority for the Administration and the Legislature, because if the CHSRA "total" seat costs, as opposed to just "direct" seat costs, were to range between 17¢ - 18¢, as opposed to the current 8¢, they would equal the CHSRA's projected revenues per seat mile. This means the Authority would, at best, have a breakeven financially operation, as revenues per seat mile are projected to be in about 18¢.

Inspecting the problem from the point of view of cost per passenger mile, the Authority's projected "total" cost per passenger mile would rise to the range of the projected revenues of 23¢. This would again bring the operation to a financial breakeven status.

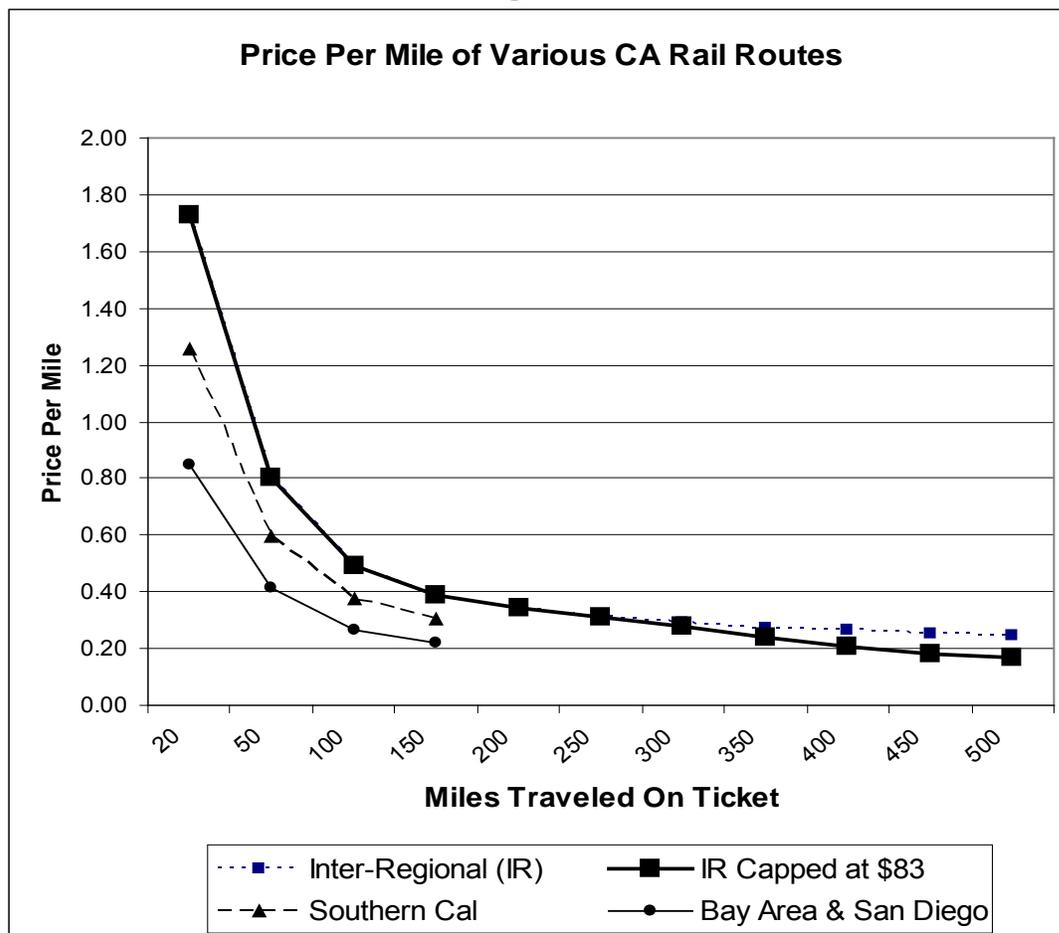
Both of these relationships of revenues and costs per seat mile and per passenger are driven by three fundamental parameters: the cost to move a seat one mile, the price a customer will pay to travel one mile, and the percentage of the seats that are filled with revenue paying passengers during that mile the train is moving down the tracks.

Appendix Five On CHSRA's Short and Long Haul Pricing Plan, Prices per Mile, And Prices In The Central Valley

A critical component of the CHSRA's Business plans is the definition of its pricing program, as it drives the revenues generated from ridership projections. The Authority's Pricing Plan is defined on pages 5-5 and 5-6 of the CHSRA Revised Draft 2012 Business Plan, Ridership and Revenue Forecasting Memorandum (April 2012). The results are shown on Table 5.3 on page 5-6, in terms of the planned prices between different city pairs.

The purpose of Figure A5-1 is to illustrate CHSRA's proposed two-tier Pricing Plan. Doing so shows the impact on the average revenues per passenger mile that projected in other parts of this Report.

Figure A5-1



The Interregional formula drives the pricing outside major metropolitan areas. It is shown on the chart as the dashed line with square blocks. However there has to have been a marketing decision to 'cap' very long haul ticket prices between the Bay area and the Los Angeles at \$83 – most probably to be competitive with current airline fares.¹ This cap, in effect, pulls down the price per passenger mile for passengers traveling between 350 and 500 miles. These results are in the solid line with square lines.

But this Interregional formula leads to very high per passenger mile fares in very short Intraregional (commuter) market segments. As a result, specific pricing plans were set up for the Bay Area and San Diego, as shown on the solid line with the black circles. A similar pricing plan was set up for the Southern California market, as shown with the solid line with black triangles. Apparently the lower-priced fare plans are not available in the Central Valley. [Several international HSR operators also use a two-tier pricing strategy.]

The results of the CHSRA's pricing plans are:

- 1) For the long haul passengers, the prices will be in the range of 20¢ per passenger mile; and
- 2) For shorter haul (commuter) passengers the prices will be in the range of 35 to 45¢ per passenger mile.

This leads to projected average revenues per passenger mile of about 23¢, during the periods of the Bay to Basin, and Phase 1 Blended operations. During the IOS South period, the average prices are in the range of 29¢ per passenger mile, as there are no long haul passengers, with lower price per mile tickets, to decrease the average revenue per passenger mile.

CHSRA's Fares And Price Per Mile In The Central Valley –

This analysis, as shown in Figure A5-2, highlights ticket prices in the Central Valley commencing with the IOS South period of operation, focused on the higher prices between the Central Valley cities, and to the Los Angeles basin.

For a passenger in Bakersfield who wishes to travel the 109 miles to Fresno, it appears that the price of the ticket will be \$52, which works out to be about 48¢ per mile. However the current pricing on the Amtrak San Joaquin is in the range of \$21 to \$29 depending when the ticket is purchased. These prices work out to between 19¢ - 27¢ per mile. It is not clear from the Authority's Business Plan if the Amtrak service will be discontinued once CHSRA operations commence, or if this lower cost alternative will be continued.

¹ See page 5-6, Table 5-2, "Notes", CHSRA Revised Draft 2012 Business Plan, Ridership and Revenue Forecasting Memorandum (April 2012)

Figure A5-2

Ticket Price and Price Per Mile (PPM)

From: Bakersfield				CHSRA	Amtrak		
	Miles			Anytime	Today Thursday 6/7/12	Tomorrow, Friday	One Week from now
	<i>Note 1</i>			<i>Note 2</i>	<i>Note 3</i>		
To: Fresno	109	List Price, \$		\$52.00	\$21.00	\$29.00	\$21.00
		Price per Mile, \$		\$0.48	\$0.19	\$0.27	\$0.19
To: Merced	164	List Price, \$		\$63.00	\$25.00	\$35.00	\$25.00
		Price per Mile, \$		\$0.38	\$0.15	\$0.21	\$0.15
To: LA Union	114	List Price, \$		\$52.00			
		Price per Mile, \$		\$0.46			
via Palmdale	161	List Price, \$		\$52.00			
		Price per Mile, \$		\$0.32			
	<i>Note 4</i>						

CHSRA Pricing Plans

Bakersfield	to Fresno	Interregional	\$51.13
		SCAG Region (LA)	\$39.52
		MTC & SANDAG Region (SF & SD)	\$27.91
Bakersfield	to Merced	Interregional	\$61.33
		SCAG Region (LA)	\$48.02
		MTC & SANDAG Region (SF & SD)	\$34.72

Note 1 Google Driving Miles, city to city

Note 2 Table 5.2, page 5-6, and page 5-5 of CHSRA 2012 Business Plan, Ridership and Revenue Forecasting Memorandum

Note 3 Amtrak Web site, as of 6/7/2012 at <http://www.amtrak.com/servlet/Satellite/Page/1237405732505/1237405732505>

Note 4 Page 5-5 and 5-6, of CHSRA 2012 Business Plan, Ridership and Revenue Forecasting Memorandum

A similar example exists for a Bakersfield to Merced ticket, where the CHSRA ticket will be \$63 and the Amtrak ticket is between \$35 and \$25.

Once the connection is made between Bakersfield and the Los Angeles Basin, the price of a ticket will be \$52. If one considers the actual mileage via Palmdale of 161 miles, the price is about 32¢ per mile. To put these various

prices per passenger mile in perspective, the average revenue per passenger mile during the Phase 1 Blended period of operation is projected to be 23¢.

Therefore, the pricing strategy appears to have three components:

- First, a low per mile price between the San Francisco Bay Area and the Los Angeles Basin to compete with the airlines.
- Second, a low per mile price within the three metropolitan areas to offer higher speed- higher priced commuter services.
- Third, a higher per mile price between the cities of the Central Valley and between the Central Valley and the Los Angeles Basin where there is less competition, especially if the Amtrak San Joaquin is discontinued.

It is clear that the reason Central Valley prices are so high is because CHSRA rail traffic between cities in the Central Valley does not qualify for the commuter pricing plans that are defined and are in place for just the Bay Area, San Diego and the Los Angeles Basin². If Los Angeles Basin prices were in place in the Central Valley, the price from Bakersfield to Fresno would drop from \$52 to \$40. If San Francisco Bay area or San Diego area pricing were in effect in the Central Valley, the price would drop to \$28.

The Amtrak San Joaquin carries about one million passengers per year (FY 2009). The goal is for the IOS South to carry eight million passengers in 2025. It is not clear that the documented CHSRA pricing plan, with its resulting "higher than Amtrak" pricing consequences, is consistent with growing the rail traffic at the rate that is needed to achieve that goal.

² See Section 5.3 and Table 5.2 on pages 5-5 and 5-6 of CHSRA Revised Draft 2012 Business Plan, Ridership and Revenue Forecasting Memorandum (April 2012)

Appendix Six Analyzing HSR Revenues and O&M Costs From The 'High Speed Railways in Spain' Report And The Issue Of Marginal Versus Average Charges For Infrastructure Use

In the May 4th letter from the CHSRA to the authors, Table 2 shows the Spanish AVE's O&M costs per seat mile to be only 2.4-3.4¢ per seat mile.¹ Figure A6-1 analyzes the data in that referenced report 'High Speed Railways in Spain' (the Spanish report). It shows that, on a per passenger mile basis, AVE's total O&M costs are much higher than implied in Table 2 of the May 4th letter by the use of per seat miles as the metric.²

Figure A6-1 converts from European standards to US benchmarks – The figure shows AVE's ticket prices on a per passenger kilometer for the major corridors from Madrid to five cities. Converting from Euros per passenger kilometer to \$US dollars per passenger mile (or US¢ PPM) indicates ticket prices around US40¢-50¢ PPM for Economy and 50¢-80¢ PPM for Preferential (Business) and Club (First Class) seats. Using a proportional mix of 85%, 15%, and 0% for the three ticket classes, results in a US40¢-50¢ range for average ticket prices on a per passenger mile basis.

This is similar to findings in Brief Note #14 of July 2011, but lower than the 'Forever' report's US55¢ PPM estimate based on the RENFE's June 2011 presentation to the CHSRA Board.³

The 'High Speed Railways in Spain' report also shows AVE's range of operating Benefits (Profit Margins) ranging from 9% up to 35% for the various corridors. A weighted average of those margins is 22%, higher than the 19% stated in the RENFE June 2011 presentation as cited in the 'Forever' report.

Using these corridors' profit margins to understand O&M costs results in US32¢-42¢ per passenger mile. While this is less than the 'Forever' report's projection of US40-50¢ per passenger mile from the allegedly 'flawed' BBVA data, it is still substantial.

¹ A copy of that letter and the Press Release of the same day containing that letter can be found at <http://www.cahighspeedrail.ca.gov/> under the PDF file called: CHSRA Responds to Flawed Report: Corresponds with Authors

² A PDF of that report "High Speed Railways in Spain" can be downloaded from: <http://trb.metapress.com/content/1783390k673797lj?p=43e43340740c43c4bf34eae35e5c3400&pi=4>

³ These and all of the authors' reports can be found at www.sites.google.com/site/hsrcaiffir and at www.cc-hsr.org, go to Financial Reports

Analyzing the 'High Speed Railways in Spain' report based on two references to a 70% Load Factor – RENFE reported a 70% Load Factor in their June 2011 presentation to the CHSRA. The 'High Speed Railways in Spain' report also references a 70% Load Factor. Converting those reports' O&M costs per Passenger Mile (PPM) to O&M Costs per Seat Mile, using the 70% Load Factor, yields a US23-30¢ range of O&M cost per seat mile. That stands in stark contrast with Table 2 of the May 4th letter which says AVE's operating costs are US2.4-3.4¢ per seat mile. There does not appear to be a plausible explanation for the tenfold difference in O&M costs when measured in per seat miles.

To detail this conclusion, it would be necessary to have an extremely low Load Factor – around 10% – to rationalize the difference between the CHSRA projections of US2.4-3.4¢ per seat mile, and this AVE projection made from the data in the 'High Speed Railways in Spain' report.

First, even doubling the CHSRA's O&M cost projections for the Spanish AVE of about US3¢ per seat mile, to account for indirect costs would still suggest per seat mile costs in the range of US6¢.

Second,, if one assumed a worst case of the trains being only a fifth full (a 20% Load Factor, not 70%), the seat mile costs, from the data in the report, would all be in the range of 6¢ to 8¢ per seat mile.

How is it that the same government organization, RENFE, which operates Spain's entire high-speed rail network can, within a year, be the source of such disparate information between its June 2011 presentation to CHSRA's Board, and the May 4th 2012 CHSRA letter, unless indirect costs are not included and the Load Factors are closer to 15% to 25%, as opposed to the reported 70%?

A Look At Marginal Versus Average Charges for Infrastructure Use – The inclusion (or exclusion) of infrastructure charges, and whether those are marginal or average charges in accounting for HSR's financial performance, appears to be a hotly debated issue.

At issue is the amount of extra charges that might be placed on HSR operators by the legal organization which owns the Infrastructure, i.e. – the rail lines, the switching systems, etc. They can increase the cost per seat mile or per passenger mile as cash is taken from operations to benefit the infrastructure's owner; whether or not the cash taken from the operator is justified by the owner's expenses. The EU has taken a position on this issue.

The 'High Speed Railways in Spain' report referred to in the CHSRA's Table 2 of their May 4th 2012 letter says:

“According to European Directive 2001/14/EC, rail charges should consist of a basic charge set at the marginal cost (MC) of infrastructure (in the railway field, MC corresponds to the variation of infrastructure costs when a unit of additional traffic uses the tracks). The basic charge may also include a charge to internalize external costs if this is practiced by the modes competing with railways; a scarcity charge for specific sections at specific time periods; and some markups above MC, aimed at recovering costs, when the market can bear them.”⁴

It appears that, the Spanish report’s baseline charges for O&M infrastructure costs are marginal costs. If the Spanish report had used the average O&M infrastructure costs charged to the AVE’s operator, those would have been higher.⁵ Then additional charges might be acceptable if certain conditions apply. The ‘High Speed Railways in Spain’ report reported that, on average, about €10 (Euros) per train kilometer was levied on the Spanish operators above marginal costs (MC) by the Spanish government’s track owner, Adif.⁶

To put this charge in perspective, assume each train carries about 350 seats; that works out to be 0.03€s per seat kilometer. Converted to dollars and miles shows that the extra costs the Spanish operator is being charged, over the marginal cost, is about US6¢ per seat mile. As the Spanish AVE report showed that seat costs per mile were in the US23¢ to 30¢ per seat mile range, these charges may ‘unfairly’ increase costs by 20-25%. On the other hand, if the direct costs per seat mile are about US3¢ per seat mile, as reported in the May 4th letter, and these are doubled to 8¢ per seat mile to account for indirect costs; the 6¢ per seat charge over the marginal costs become an overwhelming percentage of the AVE system’s operating costs.

This clearly needs to be better understood. These costs may be a ‘fair’ charge over a marginal costs baseline (for example getting the operator back to an average cost charge, which would be higher than only the marginal costs), or they may be partially excessive and not totally justified from a ‘see through’ financial perspective, which accounts for costs in all divisions or departments of the Adif.

As California’s HSR’s operator will need to absorb 100% of the infrastructure costs on its corridor, the use of a marginal cost approach would understate

⁴ See pages 44 to 47. A PDF of that report “High Speed Railways in Spain” can be downloaded from: <http://trb.metapress.com/content/1783390k673797lj/?p=43e43340740c43c4bf34eae35e5c3400&pi=4>.

⁵ AVE, Alta Velocidad Española is the brand name for high-speed rail operations by RENFE, the government-owned and operated rail system in Spain.

⁶ Adif, *Administrador de Infraestructuras Ferroviarias*, is Spain’s state-owned company under the responsibility of the Ministry of Public Works and Transport. Adif is charged with the management of most of Spain’s railway track, signaling and station infrastructure. Adif’s formation in 2005 responds to EU requirements to separate monopoly of national rail infrastructure management from the competitive operations of running train services.

its long-term financial exposure. At the same time, European charges over the marginal costs may be excessive if they take the costs beyond an average cost point of view, and these excessive charges need to be eliminated from any comparison between CHSRA's projections and European HSR's operating results.

Appendix Seven Sources Of Revenues And Operating And Maintenance (O&M) Costs Per Passenger Mile Discussed In The 'To Repeat' Paper

This list references where revenue and cost data can be found in either an Appendix, or a citation in this report.

Revenue per Passenger Mile

Acela Express 2009 – discussed in Appendix 11

RENFE Board - a presentation discussed in Appendix 6 and in the 'Forever' Report, March 2012, page 6. Found at www.sites.google.com/site/hsrcaliffr and at www.cc-hsr.org, go to Financial Reports.

International HSR sample – shown in Figure 1 with footnotes

Spanish Report – discussed in Appendix 6

NEC Reg. '09 – discussed in Appendix 11

CHSRA '09 (LA-SF) – shown in Figure 1 with footnotes. Originally from Brief Note 14, July 2011. See at www.sites.google.com/site/hsrcaliffr and at www.cc-hsr.org, go to Financial Reports. Updated to 28¢ PPM, based on new mileage for San Francisco to Los Angeles. Note that as this is pricing for a specific segment, one should be cautious about drawing general conclusions from this data point.

CHSRA '12 – discussed in Appendix 4

Amtrak CA '06-'11 – discussed in Appendix 10 and Appendix 11

CHSRA '08 (LA-SF) – shown in Figure 1 with footnotes. Originally from Brief Note 14, July 2011. See at www.sites.google.com/site/hsrcaliffr and at www.cc-hsr.org, go to Financial Reports. Updated to 14¢ PPM, based on new mileage for San Francisco to Los Angeles. Note that as this is pricing for a specific segment, one should be cautious about drawing general conclusion from this data point.

Cost per Passenger Mile

CHSRA '12 – discussed in Appendix 4

UIC/IUD Direct Costs – a study discussed in Appendix 12

CHSRA '09 – Originally from Brief Note 14, July 2011. See at www.sites.google.com/site/hsrcaliffr and at www.cc-hsr.org, go to Financial

Reports. Updated to 14¢ PPM, based on new mileage for San Francisco to Los Angeles. Note that as this is costing, based on an operating margin of 50% and pricing for a specific segment, one should be cautious about drawing general conclusions from this data point.

Peers May '12 – discussed in Appendix 2

Most Likely Case– discussed in Appendix 13

LAO May '12 – discussed in Appendix 1

Spanish Report – discussed in Appendix 6

International HSR Minimum – Brief Note 15, July 2011. See at www.sites.google.com/site/hsrcaiff and at www.cc-hsr.org, go to Financial Reports. Updated to be about 10% below the International HSR Revenues PPM

BBVA ? – discussed in the Forever Report, March 2012. See at www.sites.google.com/site/hsrcaiff and at www.cc-hsr.org, go to Financial Reports. Also discussed in Appendix 14

UIC/IUR 2011 Stance – discussed in Appendix 14

RENFE Board – a presentation discussed in Appendix 6 and in the 'Forever' Report, March 2012, page 6. Found at www.sites.google.com/site/hsrcaiff and at www.cc-hsr.org, go to Financial Reports.

Amtrak CA -'06-'11 – discussed in Appendix 10 and Appendix 11

NEC Reg. '09 – discussed in Appendix 11

Acela Express '09 – discussed in Appendix 11

Appendix Eight

Response to CHSRA's Statements Of April 30th and the Subsequent Letter and Press Release Of May 4th 2012

This Appendix responds to comments made, and a letter written by CHSRA Board Member Mike Rossi to the authors dated May 4th 2012.

1. Response to the May 4th letter's introductory comments and prior comments – The May 4th letter's introductory comments noted;

"Had the Authority been given the opportunity to discuss or review your report prior to your press conference, we likely could have avoided this misunderstanding."

There never was a press conference. That statement is neither a correct representation of what occurred before the 'Forever' report was posted – nor afterwards prior to the issue of this report.

An incorrect comment in the LA Times – There was a previous wrong impression given by the Authority. In late April 2012, The Los Angeles Times attributed Mr. Rossi as saying; *"We have met with the authors of the report in an attempt to correct their flawed assumptions and conclusions."*¹ This statement is also not correct.

Our only meeting with CHSRA officials or staff or consultants was on November 17th 2011, four months before the 'Forever' report allegedly containing 'flawed' data was prepared. Nor did we discuss the 'Forever' report at that meeting or subsequently with the Authority.

Correcting the record – Because these statements by a CHSRA Director are incorrect, the following is a recap of interactions between the 'Forever' report's authors and the Authority from July 2011 to April 2012.

1. In July 2011 Mr. Warren and Mr. Grindley delivered copies of *Brief Notes Number 14 and Number 15* to over fifty members of the Legislature (Members and the LAO) and the Administration (Treasurer and Finance).² These *Brief Notes* raised, for the first time, apparent discrepancies between existing international revenues and costs and those projected by the CHSRA – both based on a passenger mile basis.

2. In September 2011 Mr. Warren and Mr. Grindley delivered copies of that month's report *"Revisiting Issues In the October 2010 Report: The*

¹ See the April 24th LA Times article, 'Bullet train authority underestimates operating costs, study says' by Ralph Vartabedian found at: <http://articles.latimes.com/2012/apr/24/local/la-me-0423-bullet-subsidy-20120424>

² All Brief Notes, including Brief Notes Number 14 and Number 15, can be found at www.sites.google.com/site/hsrcliffr and at www.cc-hsr.org, go to Financial Reports.

Financial Risks Of California's Proposed High-Speed Rail Project" to CHSRA's Sacramento offices, as well as to over fifty members of the Legislature (and LAO), the Governor's Office, the State Treasurer and Department of Finance.³ The 'Revisiting' report (Section 2.6.1) summarized the two earlier Brief Notes (14 and 15), restating the same apparent discrepancies noted above. The CHSRA did not respond to either its existence or the substance of that sixty-seven page report.

3. In September and October of 2011 Mr. Warren and Mr. Grindley delivered copies of a PowerPoint-based presentation "*The Financial Aspects of California's Proposed High Speed Rail System*" to CHSRA's Sacramento office.⁴ It was also given to more than fifty members of the Legislature, the LAO, the State Treasurer and Department of Finance. Later, several meetings were held with elected officials and their staff, as well as staff in Administration agencies to review this presentation. The presentation summarized the findings of the September 2011 'Revisiting' report. Page 7 spoke directly to discrepancies mentioned above between actual operators' revenue and cost issues (on a per passenger mile basis) and the CHSRA's projections.⁵ There was no response from the CHSRA regarding the presence or contents of this fifteen-page presentation.

4. In mid-October 2011 a copy of the "*The Financial Aspects of California's Proposed High Speed Rail System*" PowerPoint presentation was mailed to the Governor's Office.⁶

5. On October 28, 2011, then-Board (now Chairman) Member Dan Richard contacted Mr. Warren and Mr. Grindley, at the suggestion of the Office of the State Treasurer. A series of e-mails and brief introductory meetings led to a meeting of about two hours on November 17, 2011.

6. On November 17th 2011 Mr. Warren and Mr. Grindley met with now-CHSRA Board Chairman Dan Richard and Mr. Jeff Morales of Parsons Brinckerhoff (appointed CHSRA's CEO in May 2012) in the Authority's Sacramento offices, with Mr. Rossi on the speakerphone. The discussion centered on the PowerPoint presentation "*The Financial Aspects of California's Proposed High Speed Rail System*". While this presentation covered many aspects of the proposed high-speed rail program and its finances, one key chart (page 7) generated considerable dialogue. This chart showed the apparent inconsistencies between existing high-speed rail operations' revenues and operating costs (on a passenger mile basis),

³ 'Revisiting Issues In the October 2010 Report: The Financial Risks Of California's Proposed High-Speed Rail Project' of September 2011 is available at www.sites.google.com/site/hsrcaiff and at www.cc-hsr.org, go to Financial Reports

⁴ Available at www.sites.google.com/site/hsrcaiff and at www.cc-hsr.org, go to Financial Reports

⁵ Available at www.sites.google.com/site/hsrcaiff and at www.cc-hsr.org, go to Financial Reports

⁶ See Attachment 1

and the proposed California high-speed rail program's projections.⁷ The Authority's representatives, specifically Mr. Rossi, said they would investigate this inconsistency and reply.

7. The following day, Mr. Warren sent Mr. Rossi an e-mail with Brief Notes numbers 14 and 15 attached. These were the original source documents for the chart discussed the prior day.⁸ This was done to assist the Authority prepare a response since Mr. Rossi had not been in the office with Mr. Richard and Mr. Morales.

8. Two and a half months later (February 3, 2012), Mr. Warren sent a follow-up message to Mr. Rossi and Mr. Richard inquiring about the lack of response to the perceived inconsistencies.⁹

9. On March 21, 2012, not having heard from anyone of the CHSRA concerning their November 17th statement to investigate the inconsistencies, Mr. Warren sent copies of three of our most recent reports to Chairman Dan Richard.¹⁰ This included the most recent publication regarding findings of actual revenues and operating costs on operating high-speed rail systems. This report was '*The CHSRA Knows Their Proposed High-Speed Train Will Forever Need An Operating Subsidy.*'¹¹ It may be this report that the Los Angeles Times' Mr. Vartabedian asked Mr. Rossi to comment on.

The points discussed above that occurred in the period from November 2011 to March 2012 period were the basis of a letter sent to Mr. Rossi on April 25, 2012.¹² This letter reiterated that the 'Forever' report (see Attachment 5 above- letter to Chairman Richard in March 21st 2012) was substantially based on new information uncovered from the CHSRA's own web site.

The 'Forever' report was initiated and prepared nearly four months after Mr. Warren and Mr. Grindley's meeting with Mr. Richard, Mr. Morales and Mr. Rossi. Neither Mr. Warren nor Mr. Grindley had any contact with the Authority, other than through unanswered correspondence to the Authority, since that sole November 17th 2011 meeting.

Mr. Rossi's statement before of the Assembly Transportation Committee occurred on Monday, April 30th 2012, five days after the letter to him.¹³ The Authority's Press Release occurred the following Friday, May 4th 2012, and

⁷ See Attachment 2

⁸ See Attachment 3

⁹ See Attachment 4

¹⁰ See Attachment 5

¹¹ Available at www.sites.google.com/site/hsrcliff and at www.cc-hsr.org, go to Financial Reports

¹² See Attachment 6

¹³ The text of Mr. Rossi's April 30th statement is Attachment 7. The statement can be viewed at <http://youtu.be/yWU9uKUuHII>

included letters addressed Mr. Warren and Mr. Grindley's homes as part of the press release.¹⁴

Conclusions on comments in the press, the May 4th letter and Press Conference – If Mr. Rossi, or anyone from the CHSRA believes he or anyone from the Authority met with Mr. Warren and/or Mr. Grindley since November 17, 2011 on the subject of the inconsistencies in the revenue and cost per passenger mile findings presented to the CHSRA in the November meeting, or on any aspect of revenues, or O&M costs, the details of such a meeting need to be made public. Mr. Warren and Mr. Grindley have no record or recollection of such a supposed event.

To repeat, there never was the alleged press conference, nor a request by the Authority for a meeting, nor any meeting where the Authority could; “. . . attempt to correct their flawed assumptions and conclusions.” Simply put, those statements by an Authority Board member are not correct.

2. Response To The Authority's May 4th Letter And CHSRA's Press Release Of That Day: This part of the report follows the structure of the letter from CHSRA Board Member Mike Rossi on a point-by-point basis.

Concerning Point 1 of the May 4th Letter – Mr. Rossi's letter and the CHSRA Press Release point out that data from Table 1.3 (page 18) of the 2007 BBVA Foundation report is incorrect because;

*“ . . . the (BBVA report's) authors had cited the UIC (Union Internationale de Chemins de Fer or International Union of Railways) incorrectly, using rolling stock acquisition costs as operating costs.”*¹⁵

That is the basis used by Mr. Rossi and in the Authority's Press Release to deduct the 'Forever' report was 'flawed.'

The 'Forever' report was based largely on documents referenced in the footnotes of the CHSRA's Draft 2012 Business Plan (November 2011) – The work to ferret out independent estimates of O&M costs was wholly based on publically available information and data. As such, the 'Forever' report was, *inter alia*, based on two (the 2007 report footnoted in the CHSRA Business Plan and a subsequent 2009 report) BBVA Foundation reports. The same database was also used in the 2009 paper 'Some stylized facts about high-speed rail: A review of HSR experience around the world.'¹⁶ All three documents' discussions of O&M expenses

¹⁴ See Attachment 8

¹⁵ The 2007 BBVA used the same data source on operating costs as the 2009 BBVA report. The 2007 report is at www.fbbva.es/TLFU/dat/inf_web_economic_analysis.pdf; the 2009 BBVA report is at <http://www.fbbva.es/TLFU/tlfu/ing/publicaciones/informes/fichainforme/index.jsp?codigo=424>

¹⁶ This is available through Elsevier publications at www.elsevier.com/locate/tranpol.

were based on the same set of operating cost data supplied by the Union Internationale de Chemins de Fer (UIC) or International Union of Railways (IUR) in English.

The CHSRA footnoted the 2007 BBVA Report in the Operating and Maintenance document (produced by Parsons Brinkerhoff) in support of the November Draft 2012 Business Plan.¹⁷ The following statement on operating costs appears on page 6, Section (b) of that document.

*“For the 2012 business plan, these items were compared to results reported for other high speed rail systems in Europe and Japan. European . . . **information was drawn from** the International Union of Railways (UIC), a worldwide railroad association headquartered in Western Europe . . . , **published work by Spanish researchers** (3), and a feasibility study of HST in Brazil conducted for the Inter-American Development Bank by a British/Chilean engineering and economics consortium. (highlighting added)”*

Since the CHSRA information ‘was drawn’ from UIC data and the “published work by Spanish researchers”, (ie. the BBVA reports), it seemed that the CHSRA had actually looked at the data in this 2007 BBVA Report. Therefore the ‘Forever’ report authors did not seem to need to investigate further as to whether O&M costs from the UIC/IUR and in the BBVA report were validated. If it was good enough for the CHSRA to draw from, it should have been good enough for the ‘Forever’ report. The Authority also made the same references to the BBVA Report in support of the April Revised Draft 2012 Business Plan’s Operating and Maintenance document (produced by Parsons Brinkerhoff).

But five months after the Draft 2012 Business Plan, six weeks after release of the ‘Forever’ report, and a month after the Revised Draft 2012 Business Plan, Mr. Rossi’s May 4th letter (page 2) said: ¹⁸

*“**The Business Plan did not utilize data from the BBVA report.** Rather, the reference to the BBVA report in the Plan was only made to highlight other efforts to benchmark costs. There was no citation or use of BBVA data, so your suggestion that our Plan relied on the same flawed data as your report is inaccurate.”*

How can the November Draft 2012 Business Plan state that it was based on “. . . information drawn from . . . ” the UIC/IUR, while the letter of May 4th asserts that “*The Business Plan did not utilize data from the BBVA report.*”

¹⁷ See on page 6, footnote 3 in ‘Operating & Maintenance Cost for the CA HSR 2012 Business Plan’, April 2012, found at: <http://www.cahighspeedrail.ca.gov/assets/0/152/431/fe25ce4-056f-4262-9a2e-ca3c8fb15724.pdf>.

¹⁸ A copy of that letter and the Press Release of the same day can be found at <http://www.cahighspeedrail.ca.gov/> under the PDF file called: CHSRA Responds to Flawed Report: Corresponds with Authors

Those claims contradict each other. And the letter contradicts the Authority's use of the same data in the April Revised 2012 Business Plan.

Is the Authority eschewing its November 2011 Draft 2012 Business Plan, the source of the 'Forever' report's UIC/IUR data on O&M costs and its April Revised Draft? After the Authority has spent about half a billion dollars, its consultants would probably have been paid well enough to be consistent from report to report – particularly if the span between the two reports is five months.

In sum, the authors of the 'Forever' report are only as guilty of having **"drawn from"** the UIC/IUR's supposedly 'flawed' data as the CHSRA's Draft Plan's authors.

The 'Forever report's conclusion; that the Administration and the Legislature need to validate results in the 'Forever' report, or the CHSRA projections, remains a strong, reasonable, yet currently unimplemented, recommendation.

Still no official word from UIC/IUR on what is or was correct or 'flawed' O&M data – About one minute into Mr. Rossi's Transportation Committee statement of April 30th, when referring to the BBVA reports' "flawed data" in the 'Forever' report, he said:

"And the UIC has in fact said that was a mistake . . . and the BBVA said they're going to correct it." In closing he says: "They can go directly to the UIC and pull it up. As I say, it wasn't their fault. The compilation by the Spanish authors and the BBVA report, and they picked up the wrong column. I think it was column 42." ¹⁹

The May 4th letter (page 2) quoted an email from a consultant to, not an official of, the UIC/IUR, Gianfranco Cau.²⁰ But it would be much more authoritative to have an official, written record confirming the claims of the April 30th hearing that the UIC/IUR and the BBVA data was a mistake and it would be corrected. It would also help to know more about what the comment about "column 42" meant.

In the three and a half months following the CHSRA's claims, neither the BBVA Foundation nor the UIC/IUR have confirmed the "mistake" or corrected the data as Mr. Rossi said they had agreed to.²¹

¹⁹ The text of Mr. Rossi's April 30th statement is Attachment 7. The statement can be viewed at <http://youtu.be/yWU9uKUuHII>

²⁰ A copy of that letter and the Press Release of the same day can be found at <http://www.cahighspeedrail.ca.gov/> under the PDF file called: CHSRA Responds to Flawed Report: Corresponds with Authors

²¹ In the period May 2nd to 15 August, Mr. Grindley authored seven emails to Mr. Iñaki Barrón de Angoití of the UIC/IUR who acted as author, with [Ginés de Rus](#), et al. of several reports containing supposedly 'flawed'

Without corrected data, no conclusions about BBVA reports' O&M costs can be drawn from any differences between the supposedly 'flawed' data and yet unreleased 'corrected' data. If there is a such a place where: *"They can go directly to the UIC and pull it up."* and have that O&M data verified by financial experts independent of the CHSRA and the UIC/IUR, that place also remains unidentified.

Conclusions about O&M data from the UIC/IUR – It's important to note that the O&M data in both BBVA Foundation reports and the 'Stylized Facts' paper was provided by one of those reports' authors, Iñaki Barrón de Angoiti. Mr. Barrón is also Director of High-Speed Rail at the International Union of Railways (UIC/IUR - International Union of Railways).²² If the 2007 and 2009 authors thrice cited incorrect data, Mr. Barrón is the person who needs to both officially confirm that his contribution to the BBVA reports was 'flawed' and to publically provide the correct set of O&M costs in his official capacity. Repeated emails to his office as well as telephone calls to Paris, plus inquiries by his fellow authors to Mr. Barrón are unanswered more than three months after the initial inquiries.

There is still no 'second source' to verify the CHSRA's claims regarding the BBVA reports' O&M costs being 'flawed' and no 'corrected' set of data. The CHSRA May 4th Press Release's claim of a 'flawed' report remains based on an email from a UIC/IUR consultant. To repeat a prior conclusion from analysis of the November 2011 Draft Plan, the authors of the 'Forever' report are only as guilty of having **"drawn from"** the UIC/IUR's supposedly 'flawed' data as the CHSRA's Draft Plan's authors.

3. A second O&M data set, part of a presentation to the CHSRA, formed the other database for the 'Forever' report – In June 2011, RENFE presented data on the AVE to the CHSRA Board. As discussed in Section Two of this report, ticket prices varied between US45¢ and US65¢ per passenger mile, while operating costs ranged between US40¢ and US50¢ per passenger mile. That RENFE data, when coupled with the finding that the CHSRA had drawn upon the UIC/IUR data, was a good benchmark on the validity of both sources, especially since both projections were in the same range, on a US cents per passenger mile basis.

O&M data. Those emails were sent on May 2nd, May 22nd, June 1st, June 19th, July 2nd, July 25th and August 14th 2012. See Attachement 13 for a copy of Mr. Grindley's email of July 25th 2012. Mr. Warren authored an email to Mr. Barrón on June 1st 2012 requesting more detailed data. Mr. Grindley also spoke with Mr. Barrón's office on both May 2nd and June 1st and on both occasions was told by his assistant, Ms. Cabel (pronounced 'Kabul') that Mr. Barrón was unavailable. As of the posting date of this report, no answer has been received from Mr. Barrón, or any executive or director of the Union. Internationale des Chemins de Fer (UIC/IUR) verifying or denying Mr. Rossi's claims of April 30th or May 4th.

²² Mr. Barrón contact information at the UIC/IUR offices is 16 Rue Jean Rey. 75015 Paris; Tel: 011 33 1 44 492020; email address is barron@uic.org

In 2012 RENFE supplied a second, competing set of O&M data for Spain's AVE (Alta Velocidad Española) – As Section 2 analyzes, approaching the data in 'High Speed Railways in Spain' by converting figures into a per passenger mile basis produces O&M cost estimates between US32-42¢ per passenger mile (ppm) and US23-30¢ per seat mile.²³ While these O&M costs in per passenger mile are lower than the RENFE presentation or the 'Forever' reports' US40¢ and US50¢ per passenger mile, they are still significantly more than the May 4th letter's Table 2 claims.

The May 4th letter's Table 2 AVE costs for O&M diverge so greatly from the analysis of the June 2011 RENFE presentation and the analysis of the 'High Speed Railways in Spain' report that it calls into question which, if any, to believe. Is it possible to believe the same agency can report a ten-fold difference in O&M cost. Either the officials presenting RENFE's data in June to the CHSRA Board must have been mistaken, or the per seat mile costs in Table 2 of the May 4th letter are incorrect. Both can't be correct. .

Conclusions about Point 1 of the May 4th letter – We find it strange that the CHSRA only recognized the supposedly 'flawed' UIC/IUR data more than five years after the first report using that data, and five months after they footnoted it in their November version of the 2012 Business Plan, from which *"information was drawn"* (as noted above). One set of flawed UIC/IUR data should lead to considerable skepticism about any other data provided to the CHSRA from the UIC/IUR on O&M expenses.²⁴

4. Concerning Point 2 of the May 4th Letter – Mr. Rossi's letter and the CHSRA press release said the authors had stated that the *"Authority relied on the BBVA report to produce certain estimates in the Business Plan."* This report's authors never said that. The 'Forever' report only said that the 'Forever' report, not the CHSRA, had used the data because it was cited in the CHSRA's November 2012 Draft business plan.

However, consider what was mentioned above: the Authority also seems to have used the same 'flawed' UIC/IUR data in their April Revised 2012 Draft Plan. The April Plan also footnotes (page 6-9) the 2009 'Some Stylized Facts' paper mentioned above. This paper was prepared by two of the same authors of the BBVA reports, and uses (page 24, Table 2) the same UIC/IUR data their 2007 and 2009 BBVA reports used. The April 2012 CHSRA footnote on using that data comes from a statement (page 6-2) as follows: *"International O&M data was derived from 2009 data . . . separate HSR analyses for Spain . . ."* (highlighting added).

²³ Appendix 6 is a more complete financial analysis of this report

²⁴ As discussed in Appendix 12, the data that was also mentioned in the May 4th letter (Table 2, row 4) regarding O&M costs provided by the UIC/IUR was also 'flawed' and had to be corrected before Appendix 12 could be completed.

Conclusions about Point 2 of the May 4th letter – Webster’s says that to “derive” is “to take or receive from a specified source.” So, when the CHSRA’s April Revised Plan authors used the word ‘derived’ that strongly implies they too used the ‘flawed’ UIC/IUR data in the April Draft Plan.

The CHSRA should review its November Draft 2012 Plan’s O&M costs and admit that, like the authors of the ‘Forever’ report (and the LAO as shall be shown), they “*derived*” their O&M data from sources that were ‘flawed’ – if such sources are actually flawed. And they seemed to have continued to use that ‘flawed’ data in the April Revised Draft 2012 Plan.

5. Concerning Point 3 of the May 4th Letter – In Mr. Rossi’s May 4th letter, and mentioned in his Assembly Transportation Committee statement, was an assertion that using per passenger miles as a metric for O&M costs was; *“not only contrary to standard industry practice, but incorrect and misleading . . . and that neither the airline nor passenger rail industry relies on cost per passenger-mile as the measure of operating costs.”*

Two Federal Railroad Administration directives say that per passenger miles is the metric to gauge financial performance – Contrary to the May 4th letter’s assertion, per passenger miles is the standard metric for measuring financial performance in the transport business.

It’s use and how to convert from seat miles to passenger miles is discussed in detail in Appendices 3, 4 and 16 of this report.

The State-supported Amtrak California data shows costs per passenger mile is used to evaluate the passenger rail industry’s performance in California. In addition, the U.S. Department of Transportation (the US DOT) document, ‘Federal Subsidies to Passenger Transportation’ of December 2004 by the Transportation Bureau of Transportation Statistics has examples (see pages 1, 5, 8, 10, and Tables 3 and 4) of using per passenger mile as the metric of performance across a wide range of passenger modes.²⁵

Finally, The Congressional Research Service (CRS) in its December 2009 report, ‘High Speed Rail (HSR) in the United States’ said; *“Comparing costs on a per-mile basis is not as useful as comparing costs on a per passenger-mile basis, which is the cost of moving one passenger one mile.”*²⁶ These Federal Government sources point to per passenger miles, not seat miles, as the correct metric when measuring financial options’ performance – which is part of the Legislature’s fiduciary responsibility.

²⁵ Available at http://www.bts.gov/publications/federal_subsidies_to_passenger_transportation/

²⁶ Available at: www.fas.org/sqp/crs/misc/R40973.pdf

The per passenger mile metric measures financial performance and is why analysts and the Legislature must use it –

Can the CHSRA's proposed project live up to AB3034's demand that there cannot be an operating subsidy? To answer this question, both revenues and costs need to be on the same basis, eg. dollars per passenger mile. To convert the cost per seat mile data, collected by operations personnel to cost per passenger mile, the cost per seat mile is divided by the Load Factor to arrive at costs per passenger mile. Load factors are the crucial catalyst to understand whether the project is financially viable. A Load Factor of 100% – where passenger miles equal seat miles – is not a practical assumption or a measure of cost performance. As a baseline for comparison, Amtrak's Load Factors vary between 55% and 65%. Airlines' Load Factors have to be about 75% to remain even nominally profitable.²⁷

The 'Forever' report actually started with cost per seat-mile as exhibited at the top of its Figure 1; but to understand the financial impacts of that data the cost structure required going 'deeper.' We knew the cost per seat mile metric was not a measure of relative financial performance, which was critically important to have, if the Legislature's fiduciary responsibility was to show that the train's financial performance does not require an operating subsidy (as per Section 2704.08 (c) (2) (J) of AB3034).

The 'Forever' report's objective was to point out that, on the basis of various assumptions, including Load Factors, that operating costs per passenger mile fluctuate – ie. a greater number of passengers on a train set produce a lower per passenger mile cost. The link between the two metrics is the DOT/RITA's Load Factor. While the operating costs per passenger mile will vary as the Load Factor varies, the revenue per passenger mile will also vary as choices by the operator on ticket prices occur – ie. price increases, discounts, or free passes. Assuming a steady state pricing strategy, an excellent predictor of financial viability will be the cost per passenger mile, driven by: 1) the Load Factor projection and, 2) the costs per seat mile projections.

Does the CHSRA's O&M cost estimates include all indirect costs as well as direct operating and maintenance costs? –

Based on the US6.5¢ shown in the May 4th letter's Table 2 as 'per seat costs', one needs to look at load factors more realistic than 100%. If the CHSRA had assumed 50%, the train's direct operating costs would be US13¢ per passenger mile. If the load factor were 66% - above Amtrak's but below airlines – the train's direct operating costs would be US10¢ per passenger mile. Based on the most recent Business Plan data, the CHSRA's Load Factor seems to be in the very optimistic, range of 76%.²⁸

²⁷ A study of rail and airline load factors can be found in Section 2 of CHSRA's Ridership and Revenue Forecasting document at http://www.cahighspeedrail.ca.gov/Business_Plan_reports.aspx

²⁸ See Appendix 4 for an analysis of the CHSRA financial and operational data on a per seat and a per passenger miles basis, and the resulting Load Factors based on the passenger and train traffic projections.

What is not known from CHSRA documents is what else should be added to the Authority's direct operating cost equation – eg. General & Administrative (G&A), infrastructure, maintenance, or leasing charges, operator profits, Federal and State taxes, insurance, pensions, health care, etc. It is quite conceivable that these charges could more than double the direct operating expense charges. As yet we don't know what the "fully loaded costs" (direct and indirect costs) for the CHSRA program will be.²⁹

Conclusions about Point 3 of the May 4th letter – Since AB3034 does not allow an operating subsidy; the per passenger mile metric is proper and critical to use for a financial due diligence effort. It is not clear to the authors why the per passenger mile metric is not used in the CHSRA's business plans or their supporting documents.

The per passenger mile metric needs to be used to understand both direct operating costs (perhaps about US6.5¢ per seat mile), and 'fully loaded' costs (perhaps about US13¢ per seat mile) that can be adjusted by the Load Factor (about 76% in CHSRA's projections), leading to a fully loaded operating cost per passenger mile of about US20¢ or more, if the Load Factor were to be closer to 66%. This projection could then be compared to revenue projections to determine the financial viability of the project.

6. Concerning Point 4 of the May 4th Letter – said; *"As we have noted in the past, comparisons with European systems are misleading because of the very different business structures they utilize."* Yet accompanying that same letter, Table 2 compares the CHSRA's projected O&M costs with not only Union Internationale de Chemins de Fer (UIC/IUR) data which is largely from European high-speed operators, but also specifically the O&M costs for AVE, Spain's high-speed rail system.

If the 'Forever' report's operating and maintenance (O&M) cost comparisons with European systems are held to be misleading, then perhaps the CHSRA should not have put into its Revised 2012 Draft Business Plan (page 6-2) the following;

"International O&M information was derived from 2009 data generated by the International Union of Railway, separate analyses for Spain and Brasil; a review of O&M costs by the Japan Railway Construction, Transport and Technology Agency, and a comparison with Amtrak's Next-Gen published HSR operating costs."

The CHSRA's rejections on both April 30th and May 4th of; *"International O&M*

²⁹ See Appendix 13 for two independent projections of this "fully loaded cost" structure and the implications of various Load Factors.

material” also seems strange because on page 7-2 of their November Draft 2012 Business Plan, the text describes;

*“Seven respondents – Belgium, China, France, Italy, Japan, Korea, and Spain – provided the Authority with comprehensive **commentary that helped shape and validate the Authority’s methodologies . . .** The Authority continues to consult with these and other members of the international high-speed rail community, especially within the European Union, Japan and Taiwan, **to learn from their experience and to help ensure that California’s system is based on sound, proven technology and operating principles.**”* (highlighting added)

If the Authority was consulting with “other members European Union . . .” in late 2011; then why, five months later (November 2011 to April 2012), do they state “**comparisons with European systems are misleading.**” (highlighting added) One assertion seems to contradict the other.

Infrastructure charges appear to be a prime example; this seems to be a hotly debated issue. Contested charges are the amount of excess charges that might be placed on HSR operators by the organization which legally owns the Infrastructure, eg. the rail lines, the switching systems, etc. This point is discussed in detail in Appendix 6, where the ‘High Speed Railways in Spain’ report addresses this in detail. Also see Appendix 12 and Appendix 13 where the implications of these charges for CHSRA’s program are discussed, based on the UIC/IUR information referenced in the May 4th 2012 letter.

Conclusions about Point 4 of the May 4th letter – The Authority seems to ‘cherry pick’ when it uses, or chooses not to use, European and Asian high-speed rail O&M data. Consistency should be the CHSRA’s watchword, otherwise critiques of others’ work using existing operators’ O&M data is hypocritical.

7. Despite claims to the contrary, the Authority presently plans to have a multiple cost center operational structure – In his closing remarks to the Assembly Transport Committee on April 30th, in defense of the Authority’s apparently low O&M cost, Mr. Rossi said:

*“. . .when you look at the comparisons to how we intend to run high-speed rail and the way its run in Europe, there’s no comparison. The Europeans have built an **operating structure that has a series of charges that we don’t have; they have a series of management companies that we don’t have;** they have the classic Genin [?] organization that results in a series of profit centers taking money from one profit generator.
.”*

According to the Peer Review Group's analysis of the proposed management structure, *"The Authority tentatively plans to award and manage a contract for track maintenance and charge the operator(s) a fee to cover costs."*³⁰ The Peers statement certainly makes it sound like the Authority is planning to build an *" . . . operating structure that has a series of charges . . ."*³¹

In the April Draft Revised 2012 Business Plan, the Authority reinforces the Peers' findings about a multi-tiered organization by separating the track and infrastructure management from the train's operations.

*"The management and maintenance of systems and other infrastructure to support high-speed operations will be retained under one or more long-term infrastructure maintenance and management contract(s). The Authority will seek to use availability-based contracts that will be paid for from track access fees paid by operators (as described below)."*³²

Contrary to Mr. Rossi's statement, that's very much like *"the way its run in Europe"*. And the Spanish situation is worthy of keeping in mind. Certainly, that layer of management costs must be accounted for in the O&M equation; but that's not yet publically available data.³³

Mr. Rossi's closing remark on April 30th about the planned organizational structure was; ***The more appropriate comparison would be to Taiwan. . . it is run the same way we would run ours.***³⁴ The Taiwan system went bankrupt because it couldn't meet its capital servicing demands. It was taken over by and is operated by Taiwan's government.

But the Authority seems to be planning for a private entity to operate the system once the IOS has proven profitable. That's the claim in the April Revised Draft: *"international experience illustrates that disciplined management through a private-sector operator leads to stronger financial performance."*³⁵ Unless the Authority eschews that lesson, the California train's operations are supposedly to be run by a private sector entity. Additionally, the track system will be managed and maintained by a different private sector entity.

³⁰ See: California High-Speed Rail Peer Review Group; Comments on Revised Business Plan; May 18, 2012; page 4.

³¹ The text of Mr. Rossi's April 30th statement is Attachment 7. The statement can be viewed at <http://youtu.be/yWU9uKUuHII>

³² See: Draft Revised 2012 Business Plan; April 2, 2012; page 4-9.

³³ We have attempted to address this issue in Appendix 13.

³⁴ The text of Mr. Rossi's April 30th statement is Attachment 7. The statement can be viewed at <http://youtu.be/yWU9uKUuHII>

³⁵ See: Draft Revised 2012 Business Plan; April 2, 2012; page ES-16.

Therefore, California's operations are not likely to be comparable with Taiwan's organizational structure, despite Mr. Rossi's statement. Clearly a *pro-forma* Profit and Loss statement needs to be prepared that shows all of the costs, each properly allocated to the Operator, the Track Manage, and the Authority.³⁶

What happens after spending more than \$30Billion of public money on the FCS/IOS and the system is not profitable? Then it will be another government owned and run railroad, like Amtrak and Taiwan's HSR system. Will the restriction in AB3034 prohibiting and subsidy have been broken? Yes. Will the taxpayers be responsible for funding this subsidy? Yes. The State Auditor raised this specifically, saying that there was no plan to deal with a rail operation that requires a subsidy. Clearly, some form of a revenue source would need to be created to fund this subsidy, whether a 'tax' on passengers or on the taxpayers?

Conclusions on the paucity of data to determine Operations and Maintenance Costs – For the moment, the authors don't know – nor to the best of our knowledge does anyone other than the CHSRA and its consultants know – what constitutes the detailed inputs and methods of calculating the CHSRA's O&M costs, nor how these O&M costs differ from those of experienced international operators on a per seat mile or per passenger mile basis. It also appears that the LAO is concerned with its inability to resolve the differences between the CHSRA projections of costs per seat mile, that must be converted to a range of US10¢ to 12¢ per passenger mile (based on Load Factors which are not documented in the 2012 Business Plan) and the range of the US30¢ to 40¢ projections that came out of the LAO's work and the 'Forever' report.

While the Revised Draft says that more than 300 items were used in building their operating cost model (page 3-6) the public has access only to sketchy 'top line' O&M data, which comes partially from international data or not, depending on the unrevealed judgment of the Authority as to when to use international comparative data that it deemed to be correct.³⁷

As discussed in detail on page 10 of the 'Forever' Report, there are two ways to do a cost estimate – 'bottom up', which the Authority maintains it has done, and 'top down', which the Authority has not done. A 'top down' estimate would be to start with the known international data and add to, or remove cost items for reasons that make sense. When the 'bottom up' approach and the 'top down' approach converge, and both are reasonable, well documented, and available to the potential investors (i.e. the citizens of California), then there may be believable O&M cost projections.

³⁶ See Appendix 13 for initial, independent projections on this topic.

³⁷ Appendix 15 discusses what information is needed from the CHSRA to better understand the nature of their current projections.

Appendix Nine Explaining California's HSR O&M Model For The Phase 1 Blended Plan in 2035

The accompanying Figure A9-1 shows the relationship of costs per seat mile and cost per passenger mile using the CHSRA's assumptions in their April 2012 Revised Draft 2012 Business Plan.

Figure A9-1's top block of cells were developed in discussion with Lou Thompson of the Independent Peer Review Group. On the first row these cells show the data assumptions used by the Authority in their model to arrive at the projected 2035 "Medium" ridership estimates for Operating Costs. The following three rows show the variations to be analyzed in the "Cost/Train mile, in \$" and the variations in the "Cost/line mile, in \$". Clearly the model shows a higher impact when the costs per train mile are varied than when costs per mile of track are varied.

The second block of cells, also developed in discussion with Lou Thompson of the Independent Peer Review Group, shows the variation in operating costs per the number of train miles. O&M costs increase in the High case and decline in the Low case of the aforementioned Plan, under increased and reduced ridership projections.

A reduction of 21% in ridership (from the Medium to the Low cases) and therefore train miles, leads to a 13% reduction in operating costs. This would mean that about 33% of the cost projections are fixed. The other 67% are variable costs that are driven by passenger traffic.

The third block of data shows a projection of costs per seat, based on 450 seats per train, which is made under the three different Plan assumptions for passenger volumes, Low Medium, and High (the columns) and the variations in O&M costs parameters as defined in the bottom three rows.

This block of data shows that the Authority's current cost per seat ranges between 7¢ and 9¢ per seat mile for the different Business Plan passenger volume cases. If O&M expenses turn out to be much higher, as shown on the fourth row, the cost will increase to 14¢- 16¢ per seat mile.

With the objective of comparing costs and revenues per mile, on an 'apples-to-apples' basis, it is necessary to convert costs per seat mile into cost per passenger mile. This is the standard way to report financial performance, as shown in various Amtrak reports referenced herein, as well as the directives of DOT/RITA and the Congressional Research Service.¹ The key to conversion is the Load Factor.

¹ The Congressional Research Service (CRS) in its December 2009 report, 'High Speed Rail (HSR) in the United States' said; *"Comparing costs on a per-mile basis is not as useful as comparing costs on a per*

When evaluating the financial conditions of existing operating rail systems, the number of revenue miles is well known through the revenue and ticket reporting system, as each ticket is for a specific number of miles between two points on the route of the train. This number of passenger revenue miles can be compared to the number of seat miles that are moved across the route. Only if every seat on every train were occupied by a paying passenger for the entire route, would the number of passenger miles equal the number of seat miles. In this extreme case the Load Factor, which is the number of passenger miles divided by the number of seat miles, would be 100%. If 75% of the seats were empty on average, the Load Factor would be 75%. Therefore when projecting revenues for an operating plan it is important to understand and vary the Load Factor that may occur in the future, just as it is important to understand variations in passenger volumes and costs per unit of labor and material costs.

The bottom most block of cost projections translate the cost per seat mile to cost per passenger mile using three different Load Factor projections – 70%, 60%, and 50%. By definition, if the Load Factor was 100%, every seat would be full all of the time and the cost per passenger mile would equal the cost per seat mile, as shown in the block of seat mile costs above.

A 'best practical case' Load Factor assumption of 70% was used because the airline industry objective is about 75% and the airline industry does not have the challenge of passengers getting off or on at the number of stops the railroad operators must contend with. Additionally no references were found to HSR operators having Load Factors as high as 75%. The low case of 50% was selected because it would seem that if the objective is to operate a breakeven, or even profitable, operation, train schedules would be changed to offer fewer trains per day if Load Factors dropped below the range of 50%. This would reduce the number of train miles, which, as shown is the largest cost variable, and it would increase the Load Factor on the remaining trains. The middle case of a 60% Load Factor seems like a good compromise.

- The Medium case used in the Business Plan shows revenues per passenger mile of 23¢ once the Bay to Basin corridor is in operation. It also is based on a Load Factor of about 76%. Varying the Load Factor, by changing the number of train miles (and seat miles), does not change the projection of revenue per passenger miles of 23¢. Therefore the revenue per passenger miles of 23¢ is the baseline against which to measure different cost and Load Factor assumptions.

passenger-mile basis, which is the cost of moving one passenger one mile.” Available at: www.fas.org/sqp/crs/misc/R40973.pdf

- If the CA high-speed train can maintain a Load Factor of 70% (the left most set of results) the O&M costs under the April 2012 Revised Draft Plan, will range from 10¢ to 12¢ per passenger mile. The bottom row, with O&M cost parameters much higher, projects the cost per passenger mile will be 20¢ to 22¢ per passenger mile.
- If the Authority maintains a 60% Load Factor (the center set of results) the O&M costs under the current Plan will increase to 12¢ to 14¢ per passenger mile. The bottom row, with much higher O&M cost parameters, projects a 23¢ to 26¢ per passenger mile.
- If the Authority can only maintain a 50% Load Factor (the right most set of results) under the current Plan, the cost will increase to 15¢ to 17¢ per passenger mile. The bottom row, with much higher O&M cost parameters, projects a 27¢ to 31¢ per passenger mile.
- If the Authority can achieve their projected 76% Load Factor (on the right side, just above the 50% Load Factor cases) under the current Plan for their Medium case, the cost will be about 10¢ per passenger mile. For the Low case they project a Load Factor of 72% and this will result in a cost of 12 cents per passenger mile. For the High case they project a Load Factor of 79% and this will result in a cost of 9¢ per passenger mile. The bottom row, with much higher O&M cost parameters, projects a range of 17¢ to 22¢ per passenger mile.,

The shaded cells are costs of 20¢ and higher per passenger mile. As the revenues are also 23¢ per passenger mile, some of these cases will clearly lead to operating losses. The part of this analysis that stands out most is the projection of the cost elements that make up the “Cost/ train mile” of \$20 per train mile. An obvious recommendation is to focus on these specific assumptions, as they determine whether or not a subsidy is needed. These cost parameters are discussed in more detail in Appendix 13.

The overall conclusion is that, if the only costs the CHSRA will need to deal with are the costs defined in the top row in each block, the CHSRA will have a positive Operating Margin (profit), even if the Load Factor dropped as low as 50%. If the costs increase over the \$20 per train mile and 20¢ per line (track) mile, no operating margin will occur, especially if the Load Factor drops to 60% or below. [See Appendix 13 for more analysis of these cost parameters.]

Figure A9-1

The CA HSRA O&M Cost Model For Phase 1 Blended in 2035

(Presumably line miles can be adjusted to reflect other levels of operation)

Cost/Train mile \$	Train-miles M	Cost/line mile M\$	Line miles	Cost/Station \$M	Number of Stations	Admin & Support	Liability Insurance M\$	Sub - Total M\$	Contingency	Operating Cost M\$
\$20	20.89	\$0.2	505	\$4.1	13	10%	\$25	\$654	10%	\$720
\$40	20.89	\$0.2	505	\$4.1	13	10%	\$25	\$1,114	10%	\$1,225
\$20	20.89	\$0.4	505	\$4.1	13	10%	\$25	\$765	10%	\$842
\$40	20.89	\$0.4	505	\$4.1	13	10%	\$25	\$1,225	10%	\$1,347

Table above developed in discussion with Lou Thompson of the Peer Review Group. The top row matching Plan Numbers.

Other three rows vary the Cost assumptions for Train Miles and Line Miles. All include a 10% contingency

Source: Model math on page 8 of Estimating HS Train Operating and Maintenance Cost for Draft Revised 2012 Business Plan Train Set Miles for 2035, used below, taken from "Ridership, Miles, Revenues and Costs Table"

Operating Costs, Under Train Mile assumptions, in M\$

		Low	Medium	High
	Train-miles (millions)	16.43	20.89	25.34
Operating Cost under the initial conditions	\$20 and \$0.2	\$627	\$720	\$827
Operating Cost at \$40/train-mile	\$40 and \$0.2	\$1,036	\$1,225	\$1,441
Op Cost at \$20 and track at \$0.4	\$20 and \$0.4	\$753	\$842	\$950
Op Cost at \$40 and track at \$0.4	\$40 and \$0.4	\$1,162	\$1,347	\$1,563

Table above developed in discussion with Lou Thompson of the Peer Review Group.

Source: pg 6-5 of Draft Revised 2012 Business Plan

COST PER SEAT MILE in \$

		Low	Medium	High
	Assumed seats per train = 450			
	Seat Miles (Millions)	7,394	9,401	11,403
Operating Cost under the initial conditions	\$20 and \$0.2	\$0.085	\$0.077	\$0.073
Operating Cost at \$40/train-mile	\$40 and \$0.2	\$0.140	\$0.130	\$0.126
Op Cost at \$20 and track at \$0.4	\$20 and \$0.4	\$0.102	\$0.090	\$0.083
Op Cost at \$40 and track at \$0.4	\$40 and \$0.4	\$0.157	\$0.143	\$0.137

COST PER PASSENGER MILE in \$

Business Plan Load Factor		
72%	76%	79%
Low	Medium	High
\$0.118	\$0.101	\$0.092
\$0.195	\$0.172	\$0.160
\$0.141	\$0.118	\$0.105
\$0.218	\$0.189	\$0.173

COST PER PASSENGER MILE in \$

		Load Factor of 70%			Load Factor of 60%			Load Factor of 50%		
	Assumed Load Factor=	Low	Medium	High	Low	Medium	High	Low	Medium	High
Operating Cost under the initial conditions	\$20 and \$0.2	\$0.121	\$0.109	\$0.104	\$0.141	\$0.128	\$0.121	\$0.170	\$0.153	\$0.145
Operating Cost at \$40/train-mile	\$40 and \$0.2	\$0.200	\$0.186	\$0.180	\$0.234	\$0.217	\$0.211	\$0.280	\$0.261	\$0.253
Op Cost at \$20 and track at \$0.4	\$20 and \$0.4	\$0.145	\$0.128	\$0.119	\$0.170	\$0.149	\$0.139	\$0.204	\$0.179	\$0.167
Op Cost at \$40 and track at \$0.4	\$40 and \$0.4	\$0.225	\$0.205	\$0.196	\$0.262	\$0.239	\$0.228	\$0.314	\$0.287	\$0.274

Note: Shaded cells highlight costs per passenger mile that exceed 20 cents.

Appendix Ten Conventional Rail Versus High-Speed Rail's O&M Costs

This appendix discusses using Amtrak as a benchmark to validate CHSRA's O&M costs. Although much criticized, Amtrak is America's only sizeable, conventional passenger rail operation. Amtrak California is the system's portion that the State subsidizes. Six years ago, the State subsidized three operations: the Pacific Surfliner, the San Joaquin route and the Capitol corridor. By 2011, only the first two routes were subsidized.

Figure A10-1 shows what it cost in Federal Fiscal Years 2005-06 and FFY2011-12 to run a conventional passenger train per mile and per seat mile, and 1,000-miles in California – approximately the round trip distance between LA and SF.

Figure A10-1

O&M Costs By Percent, Cost Of Category And Totals for CA Amtrak ¹				
	Specific O&M Expense Item	Percent Share of O&M	O&M \$s per 1,000 Miles (±LA-SF-LA distance)	O&M \$s per Train Mile – per Seat Mile
1	Maintenance Of Equipment*	19%	\$7,778	
2	Train and Engine Crews*	17%	\$6,887	
3	Transportation (Access charges, etc)	14%	\$5,614	
4	Station Services	13%	\$5,111	
5	Train Fuel & Power *	11%	\$4,680	
	Subtotal – largest 5 O&M costs	74%	\$30,070	\$30.07 - \$0.094
6	Information and Reservations	5%	\$1,947	
7	On-Board Service-Labor	4%	\$1,735	
8	Insurance	3%	\$1,408	
9	Maintenance of Way	3%	\$1,292	
10	On-Board Service-Supplies	2%	\$837	
	Subtotal – largest 10 O&M costs	91%	\$37,289	\$37.29 - \$0.117
11	Marketing and Other Advertising	2%	\$672	
12	General Support	2%	\$884	
13	Commissions	1%	\$471	
14	Route Advertising	1%	\$422	
15	RR Performance Pmts	1%	\$407	
16	Commissary	1%	\$252	
17	Crew Base	1%	\$219	
18	Other Railroad	>1%	\$137	
19	Sales	>1%	\$77	
20	Rolling Stock Rental	>1%	\$11	
	Total O&M Expenses FFY2005-06	100%	\$40,841	\$40.84 - \$0.128
	<small>FFY = Federal Fiscal Year</small>			
	Total O&M Expenses FFY2011-12²		\$69,203	\$69.20 - \$0.217

¹ Source is 'Operating Performance From Amtrak Billings – FFY 2005-06 Summary.'

² Source is the CalTrans data series 'Data and Statistics for the State Sponsored Amtrak California Federal Fiscal Year 2011-12; Operating Performance From Amtrak Billings' 2011-12 Summary' and averaging the Total Expenses for both the Pacific Surfliner (\$99.66M) and the San Joaquin Route (\$69.83M) trains.

These 2005-2006 costs represent the cost to operate a train with an average of about 319 seats, leading to a cost per seat mile of $40.84/319 = 13\text{¢}$. The Load Factor is only about 26%, so on the average about 83 passengers ride each train. This would lead to a cost per passenger mile of about 49 cents per passenger mile.

These results are consistent with the Amtrak analysis in Appendix 11 in terms of costs per seat mile increasing over time.

**Figure A10-2
Growth of Cost per Seat Mile in Amtrak California Service**

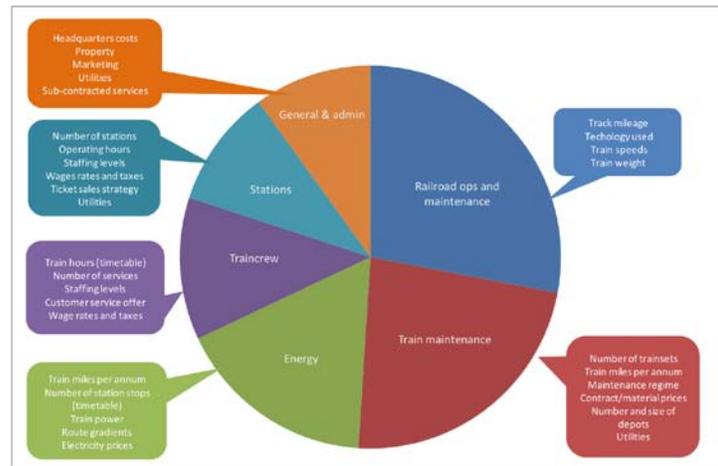
See Appendix:	Fiscal Year Reported	Cost per Seat Mile
Appendix 10	2005 - 2006	13¢
Appendix 11	2009 – 2010	17¢
Appendix 10	2011 - 2012	22¢
CHSRA's projection		8¢

AB3034 requires the HSR train to not need an operating subsidy. 2008's Prop1A voters were promised to that "the users of the system pay for the system." California's HSR operations must at least financially break even annually from the day the IOS is operational. The central financial question for this analysis then becomes whether the proposed high-speed train can operate at equal or less O&M expense than Amtrak California can, despite Amtrak's more than twenty-year local operating history. Clearly it would be reasonable to expect that the CHSRA labor cost to move a train the 1000 miles would be less than Amtrak, as the time to cover the distance is less, but the costs of energy and maintenance will surely be higher, due to the increased speed. Additionally, one would hope the Load Factor turns out to be in the 60% range, not the 25% range.

Relative proportions of high-speed rail O&M seems to shift the critical cost variables – A 2011 DOT/OIG study to benchmark and standardize reporting on High-Speed Intercity Passenger Rail (HSIPR) O&M costs says: *"It can be seen that energy, railroad operations & maintenance and train maintenance account for around 66% of the total annual operating cost, with the later two elements forming around half of the total."*³ See Figure A10-3. That's very different from the 47% these three O&M cost variables represent for conventional rail in California. (These three variables are marked with an asterisk in Figure A10-1)

³ See: 'HSIPR Best Practices: Operating Costs Estimation'; June 2011; prepared for: Prepared for: Office of Inspector General, US Department of Transportation; by Steer Davies Gleave, Boston MA, under subcontract to Charles River Associates; page 3.

Figure A10-3



Train and engine crew costs for HISPR moves from second to fourth highest cost variable; while station costs, number three in conventional rail, falls to fifth place in HISPR. The proportions of O&M expenses between conventional and high-speed rail do seem different.

But the DOT/OIG study concludes by expressing some of the same frustrations others have encountered when trying to get verifiable O&M costs. No operating agency seems willing to ‘open the books’ to public inspection, leaving investigators to deal with Panglossian statements that qualify their conclusions, such as that from the UIC/IUR; *“Generally speaking Operating Costs can be covered by farebox . . .”*⁴ The ‘Generally speaking’ phrase coupled with qualifying that O&M ‘can be’ covered by fares – not a ‘does cover’ phrase – is not reassuring. It is also not clear what costs are not considered as Operating Costs, and are therefore not covered by farebox revenues.

Also note that this statement is being made with respect to international and Amtrak’s Acela Express systems which have farebox revenues that are about US40 to 70¢ per passenger mile, not the US20-25¢ that are supposed to occur in the California marketplace. This should be a huge warning flag to those performing due diligence on the train’s finances. With airline ticket prices and lower automobile fuel costs placing a severe cap (about 50% less) on the revenue per passenger mile possible within the CHSRA’s Business Plan’s marketplace, the risks of costs exceeding revenues is very high.

We are left to depend on the comparing whether each component of high-speed rails O&M costs is likely to be a lower or higher cost than the same or a similar component of conventional rail.

⁴ See the letter to then-CHSRA CEO Roelof van Ark from Msr. Jean-Pierre Loubinoux, Director General of the International Union of Railways, February 8th 2011; found at <http://www.calhsr.com/wp-content/uploads/2010/02/IUR-Officials-Letter-to-CHSRA-CEO.pdf>

Studying Amtrak’s O&M categories suggests the CA HSR train is likely to cost more to operate and maintain than conventional passenger rail – Figure A10-1 shows twenty different categories of expenses incurred to operate and maintain conventional passenger rail in California. Maintenance of Equipment on California’s conventional passenger rail is one-fifth of total O&M costs.

In all likelihood it will be more expensive to maintain HSR equipment than conventional diesel equipment. That’s because keeping high-technology equipment ‘tuned up’ when running at speeds in excess of 200 mph most probably will exceed the costs of maintaining 80 mph conventional rail equipment. Formula One pit crews know something about equipment challenges generated by 200 mph speeds for sustained periods. Maintaining high-speed rail equipment is to conventional rail maintenance as Formula One is to highway driving at posted limits. That means higher, not lower costs for HSR on this most expensive O&M category.

The second most expensive category, Train and Engine Crews, takes more than one in every six dollars of O&M expenses. It’s practical to assume that the high-speed rail operation will have as many drivers and perhaps more monitors as conventional rail, given the greater safety hazards of operating at higher speeds. All will be unionized employees whose wage and benefit packages are substantial. While the on-board and station labor cost per passenger mile will drop due to the increased speeds, these costs may also go up as the number of on-board and station personnel increases. HSR rail will not find savings over conventional rail’s O&M costs there.

The 2011 DOT/OIG study says; *“Approximately 50% of the total cost of an HSIPR train service is accounted for by staff costs.”*⁵ If allowed by union rules, faster trains may use fewer personnel per thousand passengers, but staff costs will be closer to half the O&M expense, not a less than a fifth as in conventional rail.

The third most expensive category, Transportation, includes on-line rail inspections, track access, switching charges, etc. In Europe these “Infrastructure” charges are based on, at a minimum, marginal costs.⁶ If the CA HSR train ran on completely dedicated tracks, there may be some savings in that category. But the ‘Blended’ plan runs HSR trains partially on shared tracks and the CHSRA has yet to resolve what they may be charged for those track portions

The fourth most expensive category, Station Services, is probably less than high-speed rail’s equivalent category should be. That’s because presently

⁵ See: ‘HSIPR Best Practices: Operating Costs Estimation’; June 2011, page 3.

⁶ .For a detailed discussion of these charges in Europe, see Appendix 12 and Appendix 13 of this report.

the CHSRA's budgets do not include operating security systems that will be needed to thwart acts of terrorism. It is naive to think this expense will not become part of the HSR train's O&M equation.

The fifth category, Fuel and Power, costs about \$4,700 per 1,000 miles. Despite being electricity-driven; the higher the speed, the more fuel is consumed, and at an accelerating rate per mile an hour traveled. China slowed its HSR trains due to their high fuel consumption. California's train operator can't do that, because slowing the state's HSR would make impossible to meet the 2 hour 40 minutes promised 2008's voters. Clearly a higher-than-conventional rail cost per mile of Fuel and Power O&M cost should be expected.

The HSR train's costs are predictably higher for most of the fifteen remaining O&M expense categories. Unlike conventional Amtrak, HSR's primary customer base is not vacationers or rail buffs – it's those who want the speed and convenience similar to what airlines offer. To attract its projected 40 or 20 millions of customers per year away from the airlines and out of automobiles, the CHSRA will have to spend considerably more per customer on marketing, advertising, sales, sales commissions, information and reservations than conventional rail. To retain those customers, on board services will have to be geared to business and more affluent riders, and therefore superior to Amtrak's. All of which suggests that getting and keeping riders will cost more than Amtrak's current expenses in this category.

Given the 'tight' tolerances required of track beds, and the almost daily repair and maintenance of catenary power supplies required of high-speed rail, the high-speed rail operator's Maintenance of Way costs will surely be considerably higher than conventional, diesel-powered passenger rail. Rail grinding, recalibration of horizontal tolerances to compensate for the effects of high-speed induced centrifugal forces, and laser-realigned track beds are the costs of operating a system that will transverse the San Andreas and other earthquake-inducing faults. While conventional rail has some of those O&M costs, keeping the supporting infrastructure 'tuned up' surely carries costs in excess of conventional rail.

On balance it's hard to understand where the HSR train's O&M costs would be equal to or lower than present day conventional Amtrak's O&M costs. Given the above evidence, it seems those costs could be higher, considerably higher in some, if not most O&M cost categories.

How much more might be the HSR's O&M costs over conventional Amtrak rail? The most recent data on CA Amtrak's O&M expenses, shown in Figure A10-2 indicates a nearly 70% increase in five years. That is greater than an 11% annual growth rate; significantly rapid growth, but documented

by Caltrans Rail Division data.⁷ Figure A10-4 calculates five scenarios' impacts on the costs of operations if O&M expenses are greater than today's conventional rail in the state.

Figure A10-4 Actual CA Amtrak O&M Costs And 5 Scenarios of Cost Increases For CA HSR			
Scenario		O&M Costs for 1,000 miles	O&M Costs per train mile and seat mile
	CA Amtrak Total O&M Expenses FFY2011-12-Actual	\$69,203	\$69.20 - \$0.22
1	If CA HSR O&M Expenses are 10% >FFY 2011-12	\$76,123	\$76.12 - \$0.24
2	If CA HSR O&M Expenses are 20% >FFY 2011-12	\$83,044	\$83.04 - \$0.26
3	If CA HSR O&M Expenses are 30% >FFY 2011-12	\$89,964	\$89.96 - \$0.29
4	If CA HSR O&M Expenses are 40% >FFY 2011-12	\$96,884	\$96.88 - \$0.31
5	If CA HSR O&M Expenses are 50% >FFY 2011-12	\$103,805	\$103.80 - \$0.33

Figure A10-4 indicates what those higher operating costs might lead to on a per train and seat mile basis. Until there is more detail on O&M costs available for public scrutiny, the actual accounting by the CHSRA for their projected O&M costs will remain a mystery. However, it is very plausible that the HSR train's O&M costs are 10-30% higher per mile than conventional passenger rail operating in California. It might be much more.

What are the prospects for California's HSR's operations to at least break even? Referring to Appendix 4, Medium case (used in the Revised Draft Business Plan), the Revenue per seat mile is 18¢ throughout all the periods of operations. The CHSRA projects their O&M costs will be about 10¢ per seat mile during the IOS period of Operation: dropping to about 8¢ per seat mile for the subsequent periods.

Farebox Recovery Ratios are the fraction of operating expenses that are met by fares paid by passengers. It is computed by dividing the system's total fare-based revenues by its total O&M expenses. If the CHSRA's O&M costs were able to match CA's Amtrak 2011 costs per mile of 22¢ per seat mile, their Farebox Recovery Ratio would be about 82% (18¢ of revenue/22¢ of O&M costs per seat mile).

Referring to the Appendix 4, Medium case, the average revenue during Phase 1 Operations is \$1,762M per year (in 2010 \$s). Even with an 82% Farebox Recovery Ratio, their costs will be \$2,148M and the annual subsidy required will be about \$390M per year.

If the CHSRA's O&M costs were to be 50% more than the CA Amtrak costs per seat mile of 22¢, ie. 33¢ per seat mile, their Farebox Recovery Ratio would be about 55% (18¢ of revenue/33¢ of O&M costs). With average Phase 1 revenues of \$1,762M per year (in 2010 \$s), and a 55% Farebox Recovery Ratio, their costs will be \$3,204M and the annual subsidy required will be about \$1,442M.

⁷ See the CalTrans Rail Division data series 'Data and Statistics for the State Sponsored Amtrak California Federal Fiscal Year 2011-12; Operating Performance From Amtrak Billings' 2011-12 Summary'

Appendix Eleven Comparing Amtrak and CHSRA's Ridership, Miles, Revenues and Costs

Figure A11-1 compares the projected CHSRA financial results for 2035 with the actual, FY2009 results of different Amtrak Corridors. All CHSRA dollars are 2010 \$s.

From Figure A4-1, the CHSRA's Ridership, Miles, Revenues and Costs for the Medium case were selected for the year 2035. This is in the first years the Blended Phase 1 Corridor is to be in operation. The same parameters of operational and financial measurements that were used in Figure A4-1 are presented in Figure A11-1 starting with the projected ridership of 26Million passengers and ending with the Operations and Maintenance (O&M) cost per Seat Mile of 7.7¢.

After FY2009 Amtrak changed their reporting systems and more recent and detailed data is unavailable. Fortuitously, FY2009 was a good year to employ, as there are significant parallels between Amtrak in FY2009 and the CHSRA's projections for 2035.

Key Physical Measurements – Figure A11-1 shows that in the entire United States Amtrak system, there were 27M passengers in FY 2009, striking similar to the projection for the CHSRA 26M passengers between Los Angeles and San Francisco in 2035. Thirty-seven percent (10M) of Amtrak's 27Million passengers were in the Northeast Corridor (NEC). About a third of these, 3 Million, were Acela Express passengers. The other 7Million NEC passengers were on the slower Regional services in the same Boston to Washington corridor, but these Regional trains make more stops than Acela Express.

The last noteworthy comparisons are the three Amtrak services that operate in California; the San Joaquin, the Capitol Corridor, and the Pacific Surfliner. The San Joaquin carried about 1Million passengers, or about 20% of the 5Million rail passengers in California, the Capitol Corridor carried about 30%, and the Pacific Surfliner carried about 50%. Perhaps the San Joaquin service will be terminated, once the CHSRA IOS South corridor is operational.

Note the difference in the number of Trainset Miles in Figure A11-1. This is the cumulative number of miles all the Amtrak trains operate in the year. Amtrak system reported 37M miles, whereas the CHSRA's projection is 21Million miles in 2035. Both Amtrak and CHSRA's direct O&M costs are driven largely by trainset miles. If the Authority is successful in achieving this higher degree of efficiency, it will have a material impact of lowering their cost on a per seat basis.

Figure A11-1
AMTRAK and CHSRA COMPARISON - RIDERSHIP, MILES, REVENUES and COSTS (2010 \$s)

Key Measurements	AMTRAK Results, FY2009					CHSRA Phase 1 Blended 2035 Medium Case
	System	Acela	NEC Reg	Total NEC	Three Calif's	
Annual Ridership, in Millions	27.20	3.02	6.92	9.94	5.12	25.71
Annual Trainset Miles, in Millions of miles	37.30	3.20	7.45	10.65	4.41	20.89
Annual Passenger Miles, in Millions of miles	5,897	571	1,057	1,628	451	7,079
Annual Seat Miles, in Millions of miles	11,909	1,021	2,379	3,400	1,408	9,398
Load Factor, Millions of Pass M/Seat M(Mile)	50%	56%	44%	48%	32%	75%
Mile per Pass, Millions of Pass/Ridership	217	189	153	164	88	275
Annual Revenue (Rev), in \$M	\$1,600	\$409	\$431	\$841	\$97	\$1,655
Annual Operations & Maintenance (O&M) Cost, in \$M	\$2,593	\$347	\$507	\$854	\$235	\$724
Revenue per Pass Mile, Rev/Pass M	\$0.27	\$0.72	\$0.41	\$0.52	\$0.21	\$0.23
O&M Cost per Pass Mile, Cost/Pass M	\$0.44	\$0.61	\$0.48	\$0.52	\$0.52	\$0.10
Revenue per Seat Mile, Rev/Seat M	\$0.13	\$0.40	\$0.18	\$0.25	\$0.07	\$0.18
O&M Cost per Seat Mile, Cost/Seat M	\$0.22	\$0.34	\$0.21	\$0.25	\$0.17	\$0.08
O&M Costs as % of Revenues	162%	85%	117%	102%	243%	44%
O&M Costs as % of Revenues, per Pass Mile	162%	85%	117%	102%	243%	44%
O&M Costs as % of Revenues, per Seat Mile	162%	85%	117%	102%	243%	44%

Notes: CHSRA Seats per Trainset = 450 Per Table 9, page 9 of O & M Report for Revised Draft Business Plan, April 2012
 CHSRA Medium Case - from Ridership, Miles, Revenues, and Costs Chart
 Amtrak data taken from 2010 Amtrak Annual Report and Monthly Performance Report of September 2009
 Amtrak Trainset miles at corridor level is a ratio taken from System level, has no effect of calculations

Breakout of Expenses	\$2,593		
Salaries, wages, and benefits	\$1,699	66%	
Fuel, power, and utilities	\$273	11%	
Operations	\$246	9%	Unknown amount of Right of Way Usage Fees
These three items		86%	

The next operational measurement in Figure A11-1 is the cumulative number of miles traveled by all the revenue paying passengers, again roughly similar: the Amtrak system's is 6Billion, the Authority's a 7Billion projection.

Another similar measurement that is very operationally oriented is the cumulative number of miles all the seats in all the trains cover in a year, or seat miles. In 2009 this was 12Billion for Amtrak, while the Authority projects 9Billion. Amtrak averaged about 320 seats per train set, whereas the Authority is planning to have 450 seats per train set, allowing for fewer trains per year to provide roughly the same number of seat miles. Note the dramatically fewer number of train set miles, discussed above.

Relating Passengers and Seats – The key financial measurement is the ratio of revenue paying passenger miles to all the seat miles provided per year. This is recognized as the Load Factor. For the Amtrak system the Load Factor was 50% while the Authority projects 75%. This means that only half of the seat miles that are provided by Amtrak have revenue-producing passengers in them. In comparison, the Authority forecasts that three fourths of all the seat miles will be filled with revenue producing passengers.

The CHSRA's estimated level of utilization (a 75% Load Factor), along with more seats per train, allows for fewer trains and fewer seats to move roughly the same number of passengers. Compare that with the Acela Express route with a Load Factor of 56%, in the Northeast Corridor – one of the most efficient corridors in the Amtrak system. Looking at the Load Factor for the 15 long-haul Amtrak routes, the Load Factor averages about 60%. The three Amtrak routes in California have very poor Load Factors, around 30%, which says, on the average, Amtrak trains on these three routes are only 30% full.

Financial Parameters – The Authority projects revenues of \$1.65Billion in 2035. This is almost equal to Amtrak's 2009 revenues of \$1.6B. However to produce this \$1.6Billion in revenues, Amtrak spent \$2.6B, as opposed to the Authority's projection of \$0.7Billion of O&M costs.

Because of the extremely large difference between these two cost numbers, the Authority's projections being about 25% of Amtrak's actual spending, it is worth analyzing the composition of the \$2.6Billion of Amtrak's costs. The bottom of Figure A11-1 shows that labor and fuel/power represent almost 80% of these Amtrak costs. Clearly the amount of labor cost per train mile will drop due to the increased speed of the train, but the amount of power cost per train mile will increase due to the increased speed of the train.

As discussed in Appendix 12, the Union Internationale des Chemins des Fer (UIC/IUR) study of high-speed trains only showed a minor overall reduction in cost per seat mile as average speeds moved from trains in the average speed category of Acela Express to trains in the average speed category proposed by the CHSRA system.

Measuring Financial Performance By Passenger Miles – The next two measurements in Figure A11-1 are the key financial metrics. The first is the revenue per passenger mile, which is conceptually the average price, per mile, of all the tickets purchased for the year. This is computed by dividing all the ticket revenues by the number of miles those passengers traveled. Amtrak reported 27¢ per passenger mile, while the Authority projects slightly less, 23¢ per passenger mile.

What is striking is that the NEC Regional trains and Acela Express per passenger mile charges are between 41¢ and 72¢. This is nearly twice to more than three times higher than the Authority's projection of 23¢. Note that the Authority's projection of 23¢ is much closer to the average for the three California routes of 21¢ per passenger mile.

The other key financial parameter is the operating and maintenance (O&M) cost per passenger mile. This is calculated by dividing the costs by the number of passenger miles, thereby allocating all of the costs to just the seats that were filled with revenue paying passengers.

Amtrak reports 44¢ per passenger miles in costs, as opposed to the Authority's projection of 10¢ per passenger mile. Why the dramatic difference? The much lower CHSRA operating costs projection plus the substantially higher load factor, in effect, supposedly puts a paying passenger in a seat 75% of the time. Note that in the Northeast corridor, the O&M cost is 52¢ per passenger mile. The Acela Express portion of the Northeast Corridor O&M expenses is 61¢ per passenger mile [with a passenger in a seat only 56% of the time]. Compare this with the Authority's projection of 10¢ per passenger mile – a six-fold difference.

Measuring By Seat Mile – The last two measurements are from the point of view of operations. The revenue per seat mile calculation takes all of the revenue from the passengers and spreads it over all of the seats that are moved in all of the trains. This can then be compared to the cost to move each seat for the year.

When Amtrak spreads all of its revenue over all of its seats, it reports 13¢ per seat mile in revenues. Note this 13¢ is half of the 27¢ it reports in revenues per passenger mile. The difference is because the Load Factor is 50%, i.e., half of the seats are, on average, empty. By comparison, the Authority projects 18¢ per seat mile, about 25% lower than its 23¢ projected for revenues per passenger mile. This is because their Load Factor projection is 75%. In another comparison, Acela Express reports higher revenue per seat mile (40¢) because of its moderate Load Factor (56%) and its much higher ticket price per passenger mile (72¢).

The final operational measurement is the cost per seat mile. Amtrak reports costs per seat mile of 22¢, compared with the Authority's of 8¢ per seat mile

projection. Note both the high cost per seat mile on Acela Express of 34¢, and the average conventional rail cost in the Northeast Corridor of 25¢ per seat mile. If Acela Express and the Northeast corridor are supposed to represent the closest operation to HSR in the United States today, it is hard to understand the difference between Acela Express' 34¢ and 8¢ per seat mile for the Authority's train. This difference is more than 4 to 1.

Are These Measurements Consistent? – One of the important messages in this data set is that the various types measurements lead to the same conclusions. If one measures the costs as a percent of revenues, or the cost per passenger mile as a percent of revenue per passenger mile, or the cost per seat mile as a percent of passenger revenue per seat mile – the results are exactly the same. By all three standard measurements, the Amtrak NEC and California systems had O&M costs that were 102% and 243% of revenues. Acela Express' costs were 85% of revenues. The Authority's projected costs supposedly will be 44% of revenues.

What Are The Differences Between Amtrak, Acela Express and the CHSRA? – What is the most important message to be seen from this massive amount of data? A closer look at comparing Acela and the Authority's plans may be helpful. The cost per seat mile for Acela Express is 34¢, compared to the Authority's projected cost of 8¢ per seat mile.

What is the driving this significant difference? One factor is the difference in the speed on the two routes. Because the CHSRA system will be about twice the speed of the current Acela system, the number of hours to transport passengers is cut in about half or more, thereby reducing direct labor costs associated with operating the trains.

The current scheduled Acela time from Boston to Washington (448 driving miles) is about 6 hours and 30 minutes. To that add 30 minutes to prepare the train for the return trip. The total is 7 hours. The CHSRA's best time from Los Angeles to San Francisco (382 driving miles, but about 485 train track miles, via Palmdale) is projected to be 2 hours and 40 minutes. But with stops, the average schedule is more in the range of 3 hours. Add 30 minutes to prepare for the return trip. Total – 3 hours and 30 minutes.

The three and a half hours are half of the Acela's time for about the same number of miles. If the Acela Express' speed could be doubled, to the speed of the CHSRA trains, the hours of on board labor, and therefore on board labor costs could be cut in half, approximately. If on board labor were the only determining factor in the cost per seat mile of 34¢, it would be cut to about 17¢. The increased speeds would increase costs, such as electric power, and if the number of Acela Express seats per train were also increased to the Authority's 450 seats per train, this change would reduce costs. If these two factors cancelled themselves out, the new 'faster' Acela

Express O&M costs would be in the range of 17¢ per seat mile, still more than double the Authority’s projected costs of 8¢ per seat mile.

We see the same disparity in the costs per passenger mile. If the Acela’s O&M costs were cut in half by the labor savings, discussed above, the 61¢ would be cut to about 30¢ per passenger mile. This is still dramatically higher than the projected CHSRA costs of 10¢ per passenger mile.

A Look At How Great Differences Are – Figure A11-2 brings together these financial parameters into a simple table. Data from Appendix 10 that analyzes Amtrak California in 2006 and 2011 has also been added to this figure. The differences, on a per mile basis, between what the operating conventional and Acela Express system’s actually charge and pay for O&M costs are dramatically different from what the CHSRA plans to charge or assumes it will operate with during 2035, in the early years of Phase 1 Blended operations, as shown in Appendix 4.

**Figure A11-2
Per Mile Revenues and Costs, and Load Factors**

	CHSR 2035	Acela Exp. '09	NEC Reg '09	Amtk CA '06	Amtk CA '09	Amtk CA '11
Seat Revenue	\$0.18	\$0.40	\$0.18	\$0.05	\$0.07	\$0.07
Seat Cost	\$0.08	\$0.34	\$0.21	\$0.13	\$0.17	\$0.22
Load Factor	75%	56%	44%	28%	32%	27%
Passenger Revenue	\$0.23	\$0.72	\$0.41	\$0.18	\$0.21	\$0.25
Passenger Cost	\$0.10	\$0.61	\$0.48	\$0.49	\$0.52	\$0.82

Figure A11-3 shows the five operating rail systems’ revenues and O&M costs on a per seat mile, as well as what the CHSRA has projected for 2035 in its Draft Revised 2012 Business Plan.

Figure A11-3

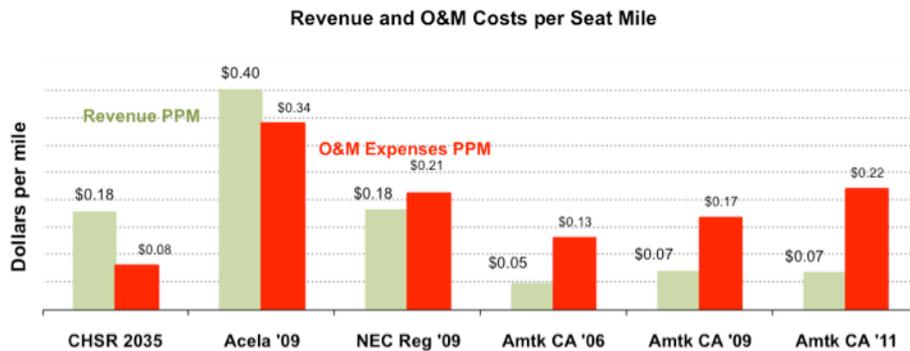
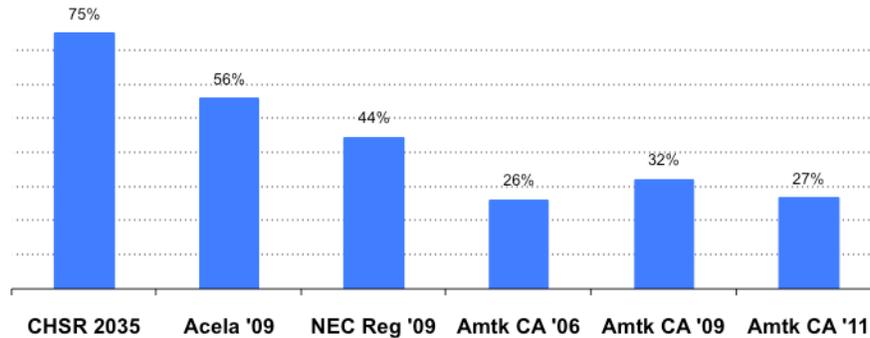


Figure A11-4 is the corresponding, published Load Factors for the operating passenger rail lines, plus the CHSRA’s projected Load Factor of 76%.

Figure A11-4

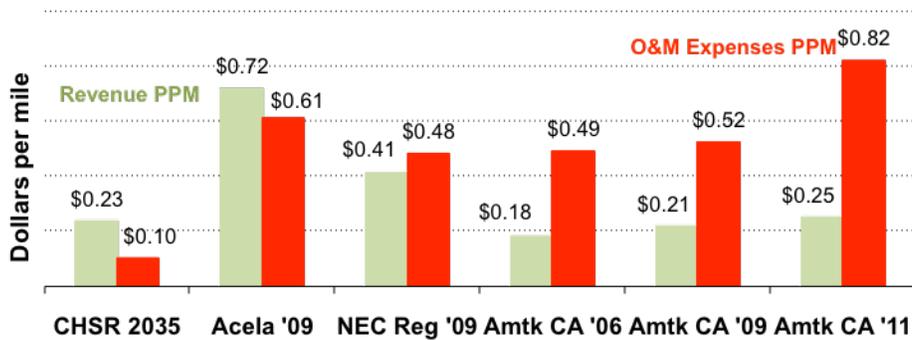
Load Factors of Five Operating Systems + CHSRA's Projected Load Factor



To arrive at the DOT and Congressional Research Service's recommended metric of financial performance, per passenger mile, the Load Factor is used to convert the seat mile data into passenger mile data. Figure A11-5 shows those results.

Figure A11-5

Revenue and O&M Costs per Passenger Mile



The Differences Need Additional Examination – What explains these differences? It is not clear. It may be that, as the Authority has stated, their projected costs are direct operating and maintenance costs, so there must be other costs components in the Acela cost structures that are not in the Authority's cost projections. The Amtrak financial statements do note in their costs the inclusion of Right of Way fees being paid out to the railroads that own the tracks. Without access to detailed operating records, to isolate these cost items, and it is not clear if Amtrak pays for some of the infrastructure maintenance in addition to the Right of Way fees, or if the fees are effectively Acela's 'fair share' of infrastructure maintenance. Appendix 12 provides a detailed analysis of the way the UIC/IUR measures direct costs in

Europe, especially infrastructure costs. Appendix 6 also views the Spanish HSR system's direct operating costs in light of the European Union's mandate on how infrastructure charges may be allocated.

Attempting to reconcile these differences should be a very high priority for the Administration and the Legislature. If the CHSRA's 'total' costs, as opposed to 'direct' costs were to be in the range of the 'faster' Acela's cost of 17¢ per seat mile, they would equal the CHSRA's projected revenues per seat mile, if they were able to reach their very high Load Factor of 76% during the Phase 1 years of operations. This would mean the Authority would be at a breakeven, at best, financial operation, as revenues are projected to be about 18¢ per seat mile. If the problem is looked at from the point of view of cost per passenger mile, the Authority's projected 'total' cost per passenger mile would rise to the range of the projected revenues of 23¢. This would also bring the operation to a financial breakeven. If the actual Load Factor is less than 76%, a subsidy will be required.

To further understand the issue of O&M cost structures, Appendix 13 provides an independent projection of a 'fully loaded' cost structure for the CHSRA's train that may be compared to the current CHSRA projection of direct operations and maintenance (O&M) costs.

Appendix 12

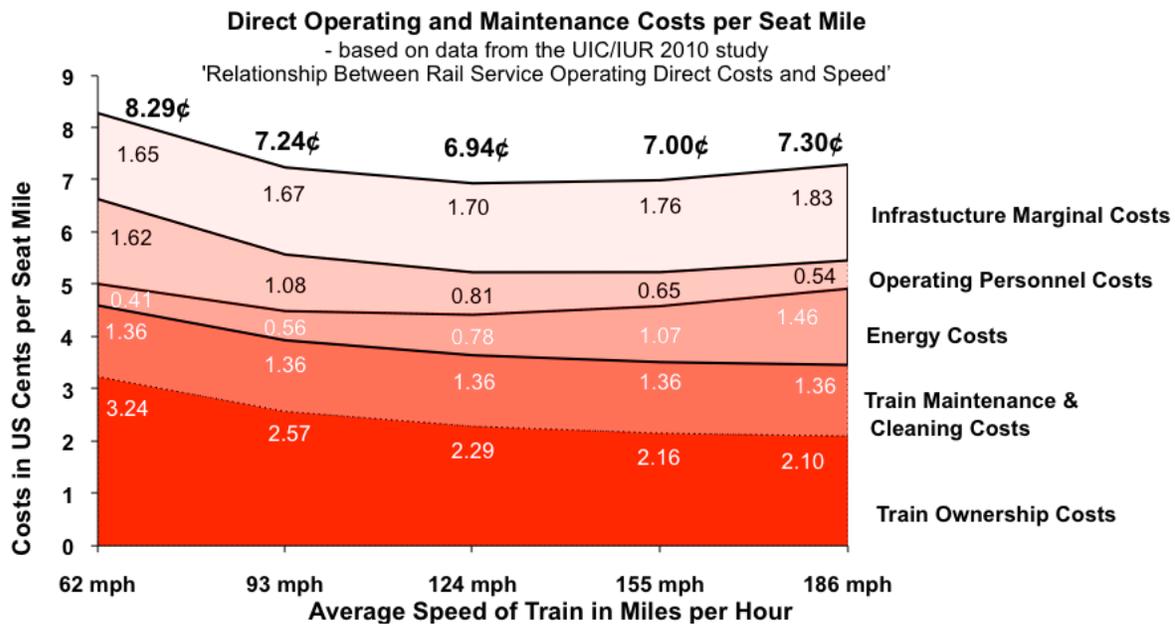
A UIC/IUR Study Of High Speed Rail's Direct Costs and Speed Compared With CHSRA's Projected Operating Costs

In 2010, the Union Internationale des Chemins des Fer (UIC/IUR) released its study of the relationship between HSR systems' speed and the resultant factors that drive operations and maintenance (O&M) costs.

The UIC/IUR study, called 'Relationship Between Rail Service Operating Direct Costs and Speed,' reported that European HSR's direct O&M costs are about US7.3¢ per seat mile, including train ownership costs.¹ Yet the CHSRA declared that the UIC/IUR study's O&M costs were US5.4¢ per seat mile – more than a quarter lower than UIC/IUR reported.²

What components of the UIC/IUR's data on direct O&M costs changed as speed increased – Figure A12-1 shows both the UIC/IUR study's capital train ownership costs and (only) the direct O&M costs of HSR measured in cents (not dollars.) Train ownership, a capital cost that the CHSR hopes to avoid for the next 25 years through Federal grants and State GO bonds, is the largest share of any speed-based equation of direct costs per seat mile – nearly two-fifths at low speed. That percent decreases to 30% at 186mph, since faster trainsets can be deployed over more journeys.

Figure A12-1



¹ The "Relationship Between Rail Service Operating Direct Costs and Speed" study was published by the UIC (International Union of Railways), December 12, 2010. This UIC 2010 publication is found at: http://www.uic.org/IMG/pdf/report_costs_hsr.pdf

² The reference to this is in Table 2 of the CHSRA's letter, of May 4th 2012. A copy of that letter and the Press Release of the same day can be found at <http://www.cahighspeedrail.ca.gov/> under the PDF file called: CHSRA Responds to Flawed Report: Corresponds with Authors 05/04/12.

That's to be expected, capital (the trainset) gets depreciated over many more miles of operations. Operating personnel costs is the other variable that decreases as a percent of total capital and O&M costs; largely for the same reason that ownership costs decrease; crews can be used more efficiently when deployed over more trips per year when trains go faster.

Train maintenance costs as a percent of direct O&M costs are almost stable, the marginal costs of maintaining the tracks, stations, catenaries and rolling stock; ie, the infrastructure, increases only about 10% between UIC/IUR's lowest and highest speeds. Energy costs are the lowest portion (5%) of direct O&M costs at the lowest speed, and the second highest (20%) at 186 mph. Unsurprisingly, at that speed (186mph) the energy cost increase is nearly four-fold more than the 62mph train. Speed costs money.

What does the UIC/IUR findings suggest for direct O&M costs of the CHSRA's speedy train? – Extracting the costs of train ownership from the equation of total costs (analyzed above), direct O&M costs actually decrease until speeds reach about 125 miles per hour. Then they increase. As Figure A12-2 shows in cents (not dollars) cost increases accelerate with every mile per hour of increased speed.

**Figure A12-2
Capital and O&M Cost Per Seat Mile, in US Cents**

From Table 10, 2010 UIC/IUR study, 'Relationship Between Rail Service Operating Direct Costs and Speed'

	62 mph	93 mph	124 mph	155 mph	186 mph
Train Ownership Costs (TOC)	3.24	2.57	2.29	2.16	2.10
Train Maintenance & Cleaning Costs	1.36	1.36	1.36	1.36	1.36
Energy Costs	0.41	0.56	0.78	1.07	1.46
Operating Personnel Costs	1.62	1.08	0.81	0.65	0.54
Infrastructure, Marginal Costs	1.65	1.67	1.70	1.76	1.83
TOTAL inc. TOC capital costs	8.29	7.24	6.94	7.00	7.30
O&M Costs only, not TOC	5.05	4.67	4.65	4.84	5.20
±Δ O&M costs w/±Δ of speed	na	-7%	-1%	4%	7%

Based on UIC/IUR's cost per seat mile inflection point (124mph) to its highest measured speed (186mph), the 'only direct O&M cost' per seat mile increases about 0.008¢ per added mile per hour of speed. But between UIC/IUR's highest two speeds (155 and 186mph) costs grow more rapidly – to about 0.011¢ per added mile per hour of speed. This later 38% jump (0.011¢/0.008¢ PSM) in the cost per seat mile suggests that for every 31 mph increase, the cost per seat mile increment increases yet another 38%. Based on the CHSRA's claimed speed of up to 220mph – 34 mph more than 186mph – suggests that even when measuring only the direct O&M costs, California's HSR costs may exceed the 5.2¢ per seat mile range, if the train's average speed exceeds 186mph.

What can be learned from what was excluded in the UIC/IUR speed/cost study? – While the UIC/IUR studied factors such as average

speeds, the number of train stops, the size of the trains, the features of the infrastructures, etc. and how these factors affected direct O&M costs, what was excluded were costs associated with infrastructure usage over and above the marginal costs of using the infrastructure. The UIC/IUR also did not study the costs of passenger services, ticketing and sales, as these were deemed to be indirect costs, and outside of the scope of the study. UIC/IUR was focused solely on understanding the “operating costs of moving the train.”

There are three major differences between the UIC/IUR study and the CHSRA’s O&M cost program that need to be dealt with to get to an apples-to-apples comparison.

- 1) The UIC/IUR study includes the costs of the paying for the trainsets over time (the TOC), which can be viewed as a depreciation charge of previously purchased trains, or a reserve being set aside for the future purchase of replacement trains. The CHSRA does not include these costs in their calculation of ongoing operating and maintenance costs. CHSRA assumes the initial trainsets are included in the capital spent to construct the track system, paid for by whomever, and by whatever means are found to fund construction. The CHSRA built into their cash flows and their O&M projections the purchase price of replacement trainsets in the period between 2040 and 2050. Therefore no annual reserve is being set aside for the use of the capital assets (the trains) that are being consumed between 2020 and 2040. Consequently, the true operating costs are understated between 2020 and 2040, based on the expectation that there will be sufficient funds between 2040 and 2050 to buy replacement trains.
- 2) The UIC/IUR has no ‘Operating Profit’ built into their cost accounting system. It is purely a ‘Direct Cost’ system. The CHSRA intends to have one or more independent operators manage the system. As a result, these operators will reasonably insist that they must be compensated for their costs and some percentage ‘mark-up’ (or fee) that will represent their gross profit (taxes and net profit after taxes) in what, to them, is to be a profit-making business venture. With no ‘mark-up’ there are unlikely to be outside operators. The CHSRA should include ‘operators’ profit’ as a part of the costs of running the railroad in their revenue and cost projections.
- 3) The UIC/IUR study looks at infrastructure costs from a ‘marginal costs’ point of view. Essentially they ask – what is the incremental cost to the owner of the infrastructure to have one additional train (or seat) move over the infrastructure? For all practical purposes, marginal costs are always less than average costs. The CHSRA must look at average costs as opposed to marginal costs. The CHSRA structure has no other organization to place some of these costs onto; therefore all the infrastructure costs must be recovered. It is reasonable to presume that the UIC/IUR should report marginal infrastructure costs that are lower than the CHSRA average cost projections. But this is not the case. In addition, the UIC/IUR study of

direct costs does not deal with any infrastructure charges in excess of the marginal cost of that charge. Appendix 6 analyzes of the 'excess' charges in the Spanish HSR system

This list summarizes the **direct costs included** in the UIC/IUR study:

- Train Ownership – Repayment of purchase and financing costs and insurance
- Maintenance and Cleaning of the Trains – Fixed and variable maintenance costs and cleaning
- Energy- Traction and auxiliary energy, less energy returned to the power network
- Operating Personnel Costs – Train operation and manning personnel
- Marginal Costs of Infrastructure - Marginal costs of infrastructure and the costs of station use

This summarizes the **other HSR costs not included** in the UIC/IUR study:

- Distribution (sales) and Access Control – Fixed and variable costs of sales and distribution, commissions, and access control
- Passenger Services – Travel services, assistance and insurance
- Advertising – Advertising and promotion
- General and Structural Expenses - General and structural expenses
- Working Capital Costs – Interest and bank charges
- Station and Security Charges – Security charges and station charges per passenger
- Infrastructure Charges Above Marginal Costs – Fixed and variable charges per passenger or per seat, including parking charges

The UIC/IUR study analyzes their data for these various costs parameters; then correlates these costs to different average operating speeds. This exercise produces data tables and charts summarizing the accumulated average costs for those parameters as a function average train speeds. Figures A12-1 and A12-2 are the UIC/IUR values, converted to \$ cents and miles.³

Unfortunately, in the UIC/IUR study, the first row of data in Table 10 (page 44) is flawed and must be corrected to have the table and the chart be consistent. The values in the row called "Train Ownership Cost" are too high; and must be must be divided by ten to make this row in Table 10 consistent with Figure 6 on page 45.

Additionally, on the fifth row, called "Marginal Cost of Infrastructure", in the column for speeds of 250 KM per Hour, the value of 0.5605 obviously should be 0.8605. With these two adjustments Table 10 is consistent with Figure 6 (page 45), and consistent with the study's other analyses.

³ As an example one set of these analyses was referenced in the CHSRA letter of May 4th, specifically Table 10 and Figure 6 on pages 44 and 45.

Converting the costs in Euros (€) per seat kilometer to US Dollars shows that that total direct O&M costs for HSR trains with an average speed of about 185 MPH is around 7.3¢ per seat mile.⁴ Since the CHSRA does not consider “Train Ownership Cost” in their O&M calculations, it appears they ‘backed out’ about US2.1¢ of the UIC/IUR’s O&M costs. This allowed CHSRA to report an adjusted total UIC/IUR O&M cost of about US5.2¢ per seat mile.⁵

Acela Express’ performance can also be measured against the 2010 UIC/IUR’s study on speed and O&M costs – The UIC/IUR also studied these costs parameters on slower moving trains. The study found that trains with speeds like the Northeast Corridor’s Acela Express had total O&M costs that were about 14% higher on a per seat mile basis than the trains with speed in the range of the CHSRA’s proposed system.

The difference is due fundamentally to two factors. First, as these trains are moving slower, their energy costs are less per seat mile. Second, since these trains are moving slower, the costs of labor to operate and staff those trains is more per seat mile. As reported in Appendix 11 of this Report, Acela Express’ 2009 O&M cost was about 34¢ per seat mile. By deduction there must be very high non-direct costs included in the Acela Express 34¢ per seat mile cost, compared with the UIC/IUR study’s direct cost of about 8.3¢ per seat mile. Unfortunately, we have no access to the detailed line item expense reports for Acela Express that might highlight how to reconcile this difference.

In Summary – Figure A12-1 and Figure A12-2 show the costs per seat mile from the UIC/IUR study, as referenced in the May 4th letter from the CHSRA. Acela Express is on the left hand side of Figure A12-1 with costs of about US8.3¢ per seat mile, as opposed to the 34¢ per seat mile cost Acela Express reported in 2009⁶.

CHSRA’s proposed system would be on the far right hand side of Figure A12-1, with direct O&M costs about US7.3¢ per seat mile. While the total cost per seat mile is not vastly different, the mix of labor intensive Operating Personnel Costs and speed related Energy Costs are very different from the slower trains’ cost mix on the left side.

This analysis of the UIC Study of Direct Costs is also used in Appendix 13 to expand the CHSRA’s Operation and Maintenance Model into a broader model that includes other costs that must be considered if evaluating the need for an Operating Subsidy.⁷

⁴ The conversion factors used were 1€=US \$1.27 and 1 mile = 1.61 kilometers

⁵ CHSRA reported US5.4¢ per seat mile for the UIC/IUR study in their May 4th letter. The difference between 5.4¢ and 5.2¢ is due to the drop in the Euros’ versus the US Dollar between early May and late June 2012.

⁶ See Appendix 11, Figure A11-1. Without access to Amtrak’s 2009 detailed cost elements that would clarify why such a large variance exists between Amtrak’s reported costs and the UIC/IUR study’s projected costs, little can be deduced from publically available data about why the difference is so large.

⁷ See Appendix 9 for an explanation of the CHSRA’s O & M Model

Appendix 13

Comparing The UIC/IUR Direct Cost Line Items With CHSRA's, And Constructing More Realistic Revenue/O&M Scenarios

The purpose of this appendix is to understand where the direct costs portion of CHSRA's projected O&M costs (on a per seat mile basis) are similar to (or different from) the per seat direct costs in the UIC/IUR report called 'Relationship Between Rail Service Operating Direct Costs and Speed.'¹ Then this appendix turns to building more realistic CHSRA O&M calculations. It also expands beyond only direct O&M costs, and analyzes a 'full O&M cost' view of the CHSRA's proposed project. It finishes by integrating these projections' results with Load Factors and projected revenue streams to determine whether the proposed California HSR train will need a subsidy.

Figure A13-1					
Comparison of Operations and Maintenance Costs per SEAT Mile					
CHSRA O&M Model. Phase 1 Ridership Volume for 9B Seat Miles (April 2012 Draft Business Plan)			UIC/IUR Direct Costs at HSR Speeds (From the 2010 Study)		
Cost Component	Share	\$ Cents	Share	\$ Cents	Cost Component
Stations	8%	0.006	25%	0.018	Infrastructure, Marginal Costs
Track/Line Miles- Maintenance	13%	0.010			
Operations-Seat (Train) Miles					
Power	24%	0.018	20%	0.015	Energy Costs
Equipment Maintain	27%	0.020	19%	0.014	Train Maintenance & Cleaning Costs
Train Crews	8%	0.006	7%	0.005	Operating Personnel Costs
Administration & Support	8%	0.006			
Trainset Reserve	0%	0.000	29%	0.021	Train Ownership Costs
Insurance	4%	0.003			
Operators' Gross Profit	0%	0.000			
Contingency	9%	0.007			
	100%	0.076	100%	0.073	
			Less	0.021	CHSRA Removal of Train Ownership Costs
				0.052	Net Reported in May 4 th 2012 Letter

Figure A13-1 shows the various costs categories defined in the CHSRA Operation and Maintenance Model matched with similar cost categories in that 2010 UIC/IUR study.² Rows were added for Trainset Reserve and Operator Profit; and while empty in this Figure A13-1, these are discussed in Figure A13-3 and Figure A13-4. An annual seat-miles value of 9Billion seat miles was selected to use in this independent version of the CHSRA O&M model. It produced a cost of 7.6¢ per seat mile. Then the cost per seat/train mile category was distributed per the discussion in the CHSRA O&M document regarding power, train maintenance and train crew costs.

¹ This UIC/IUR report is discussed in detail in Appendix 12. The UIC/IUR report "Relationship Between Rail Service Operating Direct Costs and Speed" study was published by the UIC (International Union of Railways), December 12, 2010. This is found at: http://www.uic.org/IMG/pdf/report_costshs.pdf

² The Model will be found on page 8 of "Estimating High-Speed Train Operating & Maintenance Cost for Draft Revised 2012 Business Plan". It is found at: <http://www.cahighspeedrail.ca.gov/assets/0/152/431/fef25ce4-056f-4262-9a2e-ca3c8fb15724.pdf>. See Appendix 9 for a complete discussion regarding the structure of the CHSRA O&M Model.

Both are very close (<5%) to the Medium case for 2035 in the CHSRA's Revised Business Plan³.

On the right side of Figure A13-1 are the results of the UIC/IUR study. It results in costs of 7.3¢ per seat mile. In Table 2 of CHSRA's May 4th letter to the authors, the CHSRA, apparently removed the Train Ownership Costs cost category, lowering the UIC/IUR projected O&M costs to 5.2¢ – nearly a 30% reduction,

Analyzing each row of Figure A13-1, CHSRA side reveals:

- The Station and Track/Line Maintenance appears to align with the UIC/IUR category of the Marginal Costs of Infrastructure. Combining those two CHSRA cost categories produces 21% of total costs, 4% less than the UIC/IUR's Marginal Costs. This seems counterintuitive since the CHSRA, using an average cost basis, should produce a higher outcome than the use of Marginal Costs by the UIC/IUR.
- Power costs are higher in the CHSRA's model. That seems justified given the high price of electricity in California.
- CHSRA's Equipment Maintenance as a percent of the total is much higher than the UIC/IUR study.
- Train Crew costs are very similar.
- Administration & Support is a cost in the CHSRA model that the UIC/IUR study set aside as it was not related to the speed of the train.
- Trainset Reserve is zero in the CHSRA definition of Operating Costs. It is about 29% in the UIC/IUR's definition of Direct Operating Costs. Insurance is also included as part of the UIC/IUR Train Operating Costs.
- Operating Profit costs are not in either the CHSRA's projections or the UIC/IUR study. These are discussed in Figure A13-3.
- Contingency has no counterpart in the UIC/IUR study. It is assumed that this study is based on actual data collected from the UIC/IUR members who have HSR operations in use.

O&M cost analysis needs to go beyond the boundaries of only direct Operating Costs – Since the intent of this report and this appendix is to determine whether the CHSRA's train will need an annual operating subsidy, it is necessary to analyze the full complement of cost categories of the CHSRA's O&M projections, including those outside of the boundaries the

³ See Appendix 4, Medium Case, for 2035

UIC/IUR's "Direct Cost" study. For example, the CHSRA incorporated a cost category for Administration & Support not found in the UIC/IUR study.

Figure A13-3 and Figure A13-4 incorporate the authors' independent projections of various changes needed to the CHSRA's O&M model to include items that are currently excluded. This results in a broader view of costs that determine the CHSRA train's ability to operate with or without a subsidy.

An overview of the cost factors that have been adjusted in Figure A13-3 and Figure A13-4 is provided on Figure A13-2. Figure A13-3 is the authors' Best Case we believe the CHSRA will be able to achieve, and several factors were increased, as discussed below. Figure A13-4 is the authors' 'More Likely Case' the CHSRA will probably achieve, and several additional factors were increased, as discussed below. If a cell is blank in Figure A13-2, no change was made from the CHSRA's O&M projection.

Figure A13-2				
Changes of Cost Factors In CHSRA's Model of Operations and Maintenance Costs per SEAT Mile				
CHSRA O&M Model. Phase 1 Ridership Volume for 9B Seat Miles (April 2012 Draft Business Plan)			Independent Projections	
			Changes from CHSRA's Cost Factors	
Cost Component	Share	\$ Cents	Best Case	More Likely Case
			Figure A13-3	Figure A13-4
Stations	8%	0.006		
Track/Line Miles - Maintenance	13%	0.010	Two Times	Two Times
Operations-Seat (Train) Miles				
Power	24%	0.018		1.5 Times
Equipment Maintenance	27%	0.020		1.5 Times
Train Crews	8%	0.006		1.5 Times
Administration & Support	8%	0.006	Two Times	Two Times
Trainset Reserve	0%	0.000	\$0.006	\$0.012
Insurance	4%	0.003		
Operators' Gross Profit	0%	0.000	10%	10%
Contingency	9%	0.007		
Total	100%	0.076		

Constructing the 'Best Case' for California's HSR – To more closely account for non-direct costs, the CHSRA should modify the following rows of Figure A13-1, as shown in Figure A13-3:

1. Track/Line Maintenance – should be raised from 1.0¢ to 2.0¢ per seat mile. This raises the combined total in this category to 2.6¢ per seat mile, which is now more than the Marginal Cost value of 1.8¢ per seat. If the UIC/IUR's Marginal Cost of 1.8¢ is reasonably accurate, then the fully absorbed average cost that the CHSRA's train must carry should exceed the UIC/IUR's 1.8¢ per seat mile.
2. Power, Equipment Maintenance plus Train Crew – costs are not changed. Although a 2011 DOT/OIG study suggests HSR equipment maintenance is a very large part of overall O&M costs, there is no way to independently judge if the CHSRA's current projections are

reasonable.⁴ Since these three are the key drivers in the cost model, additional, independent validation of these categories is critical.

Figure A13-3 – A Best Case Scenario					
CHSRA O&M Model. Phase 1 Ridership Volume for 9Billion Seat Miles (April 2012 Draft Business Plan)			UIC/IUR Direct Costs at HSR Speeds (From their 2010 Study on Speed and Costs)		
Cost Component	Share	\$ Cents	Share	\$ Cents	Cost Component
Stations	5%	0.006	25%	0.018	Infrastructure, Marginal Costs
Track/Line Miles Maintenance	18%	0.020			
Seat (Train) Miles					
Power	17%	0.018	20%	0.015	Energy Costs
Equipment Maintenance	18%	0.020	19%	0.014	Train Maintenance & Cleaning Costs
Train Crews	5%	0.006	7%	0.005	Operating Personnel Costs
Administration & Support	13%	0.014			
Trainset Reserve	6%	0.006	29%	0.021	Train Ownership Costs
Insurance	2%	0.003			
Operators' Gross Profit	8%	0.009			
Contingency	8%	0.009			
	100%	0.111	100%	0.073	
			Less	0.021	CHSRA Removal of Train Ownership Costs
				0.052	Net Reported in May 4,th 2012 Letter

3. Administration & Support – should be raised from 10% to 20% of the total of direct operating costs. It is not reasonable that a business operation spanning hundreds of miles of distance, and interacting with the public in thousands of transactions per day can operate all its marketing, sales, communications, administrative and logistics operations for 10% of direct costs. These costs will either be charged directly or be imbedded in the structure that the two independent contractors, who will provide train operations and infrastructure management, will bring to the California program.

4. Trainset Reserve – should be included at about 0.6¢ per seat mile. This will allow for a reserve to be built up over 25-years that would equal the costs (±\$1.5Billion) of the initial trainsets. The annual reserve would grow proportional to the growth of annual seat mile growth. There is no financial ‘interest rate’ attached, just a simple cash ‘set aside’ to accumulate enough cash to repurchase the similar trainsets twenty-five years later.

But the Best Case’s 0.6¢ per seat mile rate is still only 30% of the UIC/IUR’s 2.1¢ per seat mile. Clearly the Authority needs to make a major policy decision on whether and how to set aside enough funds to

⁴ See: ‘HSIPR Best Practices: Operating Costs Estimation’; June 2011; prepared for: Prepared for: Office of Inspector General, US Department of Transportation; by Steer Davies Gleave, Boston MA, under subcontract to Charles River Associates; page 3. Also see Appendix 10 of this report.

purchase new equipment in about 25 years. Or perhaps they hope that trainset replacement money will appear from somewhere when the time comes. No well-run private business would operate without a trainset repurchase program, especially when the backbone of their business' operations are being 'worn out.'

In the CHSRA's O&M cost projections for 2040 to 2050 there is a slight increase above their O&M Model cost projections to account for the projected replacement costs as these occur. However, it is not apparent whether this increase accurately reflects all the funds needed to replace the entire population of train sets. Additionally, to allocate such costs (Billions of dollars) only to the years of replacement, as opposed to the years of use, misstates actual operating results in the early years because the financial results look better. Using their current approach makes later years' financial results look worse.

5. Operating (Gross) Profits – should be at least 10% of total costs (other than Contingency costs). Both the train's operator contractor and its infrastructure management contractor desire to make a profit on their parts in this venture. A gross profit of 10% is selected to allow for a 33% tax rate and a 6.6% net profit for the operators. Given the amount of financial risks these contractors would be asked to undertake, the CHSRA will be fortunate if this cost item is only 10%.

This 'Best Case' analysis considers all the costs of CHSRA's proposed operation. This includes all aspects of 'moving the trains', future plans to purchase replacement trainsets, getting and serving customers, and providing a reasonable profit incentive to the independent operating contractors. The result of this more-realistic-than-present reconfiguration of the total O&M costs in this 'Best Case' scenario for the CHSRA's train raises the total O&M costs to about 11¢ per seat mile. When compared to the Figure A13-1 view of mostly direct costs (and a small portion of Administration and Support) at 7¢-8¢ per seat mile, this approximately 50% increase seems like a reasonable first attempt to estimate more realistic total costs to run California's HSR. It is also the lowest total O&M cost and therefore the "Best Case" that might occur.

A second, independent and 'more-likely-to-be-realistic scenario for CHSRA's O&M costs – The following modifications to the CHSRA's O&M cost projects are presented as an even more realistic alternative.

Looking at each of the rows in Figure A13-4, the following additional modifications of CHSRA's costs should be considered as more realistic than either what the Authority presently estimates as its O&M costs or the 'Best Case' – with the five items noted above added – in Figure A13-3.

Figure A13-4 – A More Likely Case					
Independent Projection of CHSRA Operations and Maintenance Costs per SEAT Mile			UIC/IUR Direct Costs at HSR Speeds		
CHSRA O&M Model. Phase 1 Ridership Volume for 9Billion Seat Miles (April 2012 Draft Business Plan)			(From their 2010 Study on Speed and Costs)		
Cost Component	Share	\$ Cents	Share	\$ Cents	Cost Component
Stations	4%	0.006	25%	0.018	Infrastructure, Marginal Costs
Track/Line Miles-Maintenance	13%	0.020			
Seat (Train) Miles					
Power	18%	0.028	20%	0.015	Energy Costs
Equipment Maintain	20%	0.030	19%	0.014	Train Maintenance & Cleaning Costs
Train Crews	6%	0.009	7%	0.005	Operating Personnel Costs
Administration & Support	12%	0.019			
Trainset Reserve	8%	0.012	29%	0.021	Train Ownership Costs
Insurance	2%	0.003			
Operators' Gross Profit	8%	0.013			
Contingency	8%	0.011			
	100%	0.150	100%	0.073	
			Less	0.021	CHSRA Removal of Train Ownership Costs
				0.052	Net Reported in May 4 th 2012 Letter

6. The costs of Power, Equipment Maintenance, and Train Crews - costs should be increased by 50%. While there is no way to judge if their current projections are reasonable, there is a clear need to 'bracket' these, the largest cost parameters. Since these three cost centers are the key drivers in any HSR system's O&M cost model, additional and independent validation of these categories is critical.

7. Trainset Reserves - should be increased to about 1.2¢ per passenger mile, instead of 0.6¢ per seat mile. Compared the UIC/IUR's 2.1¢ per seat mile, it seems prudent to also increase this item until forensic examinations isolate why there is such a significant difference.

These two additional recommended changes would raise projected costs per seat in the more 'More Likely Case' from 11.1¢ (the 'Best Case') to 15.0¢.

Instead of having just one CHSRA projection, 7.6¢ per seat mile (Figure A13-1) to compare with the UIC/IUR report, there are now three. The original CHSRA projection of 7.6¢ uses a very narrow definition of 'O&M costs'. Using this narrow definition makes it impossible to determine if an annual subsidy will be required. The 'Best Case' in Figure A13-3 expands the definition of costs, with its five new items, that must be considered in the 'Subsidy' question, and leads to a projected O&M cost of 11.1¢ per seat mile.

The 'More Likely Case' (Figure A13-4) increases several additional operating cost factors, for a total of seven areas of change. Compared with the UIC/IUR's very narrow definition of 'direct costs that are related to speed', at 7.3¢; the Best Case – Most Likely Case range of 11.1¢ to 15.0¢ per seat

mile, seems like reasonable projections to base an analysis of the 'Subsidy' question on until an independent validation occurs.

How does the cost per seat mile impact potential profitability and the 'Subsidy' question? – O&M cost projections of the three different cases are compared to the CHSRA's projected revenues on a per passenger mile basis. On each chart revenues are shown at both 100% and at 90% of CHSRA's projections from the Draft Revised 2012 Business Plan.⁵

Each of these cases is based the cost factors discussed in the three previous charts and uses the O&M Model to create cost per seat results over a range of annual seat miles. The two left most ranges bracket the ranges of the IOS South period. The two ranges in the center bracket the ranges of the Bay to Basin. The two right most ranges bracket the cost per seat results ranges of the Phase 1 Blended period.⁶

Various Load Factors are then employed to convert costs per seat miles to costs per passenger mile.⁷ These projected costs per passenger mile can then be compared to the range of projected revenues per passenger mile.

Case One: The Authority's Present O&M Projections – This case, shown in Figure A13-5 looks at CHSRA's current O&M model as outlined in Figure A13-1. The lowest line of Figure A13-5 shows the Authority's presently projected cost per seat mile.

The dashed line (just above the cost per seat mile line) is the first of four different costs per passenger mile results, based on four different Load Factors. This dashed line represents the cost per passenger mile based on the CHSRA's projected average Load Factor of 76%: while above this are three other possible Load Factors: 70%, 60% and 50%.⁸

The highest two dashed lines on Figure A13-5 are revenue per passenger mile projections, at 90% and 100% of CHSRA's projections.

If O&M costs actually occur at only the levels forecasted by the CHSRA, the results are that both of the revenue lines exceed the O&M costs per passenger mile at all of the chosen Load Factors. In Case One, no subsidy would be required.

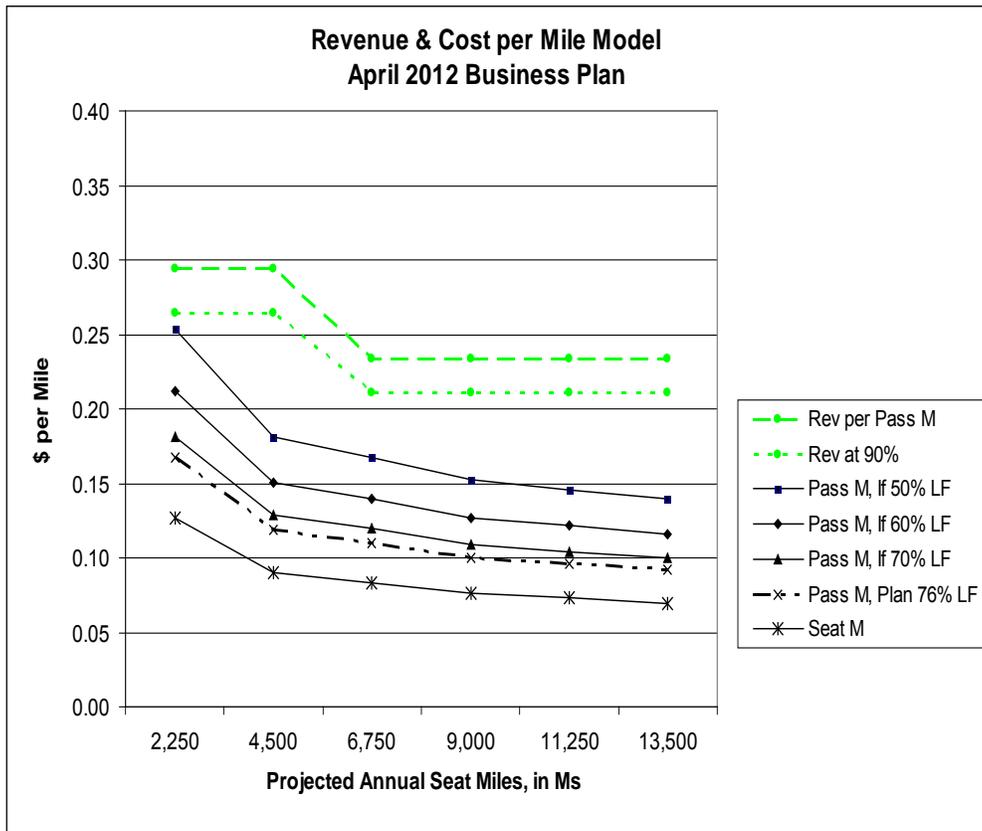
⁵ The reason to show a 90% value is to recognize there is a risk of price variances from the pricing plan discussed in Appendix 5. A negative price variance of 10% is a real possibility given the competitive nature of California's air carries, plus the real possibility that the CHSRA's multi-tier pricing structure will set prices in the Central Valley to Los Angeles or San Francisco too high compared to the alternative of driving.

⁶ See Appendix 4, a detailed examination of operating results for the various periods of projected operations.

⁷ See Appendix 3 for a detailed explanation of the use of Load Factors. See Appendix 9 on how Load Factors can be used in conjunction with the CHSRA O&M Model.

⁸ These Load Factors are discussed in detail in Appendix 9.

Figure A13-5



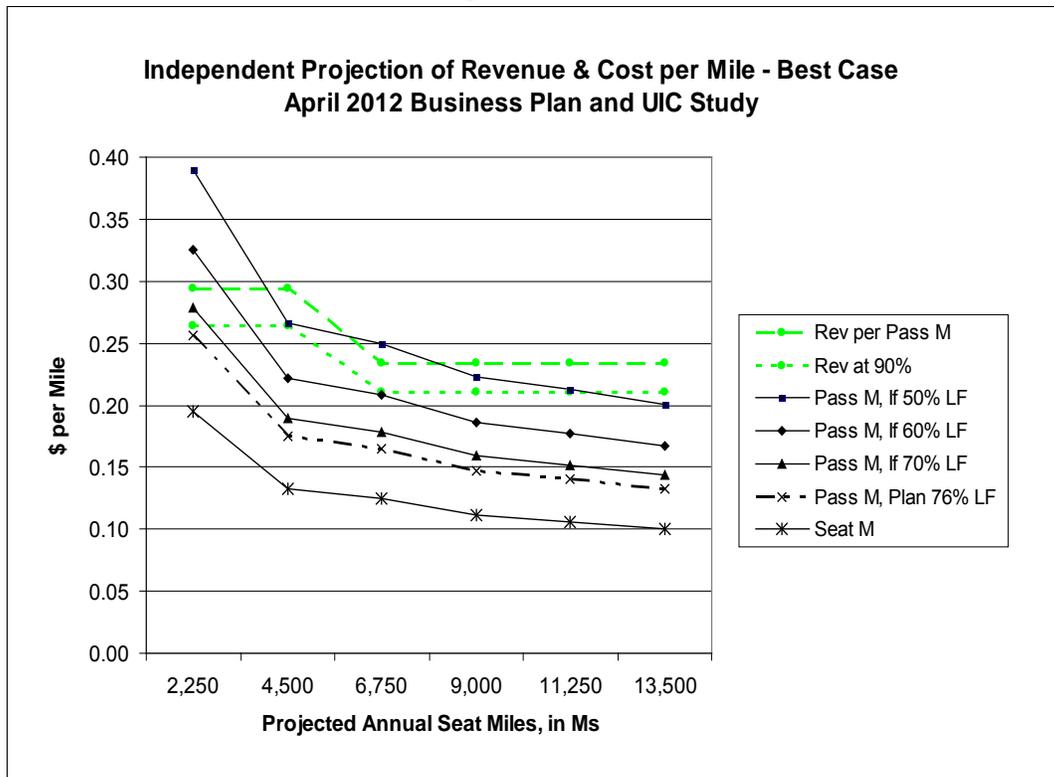
Case Two – The Best Case, shown in Figure A13-6, is based on Figure A13-1 and modified per Figure A13-3, and is based on the broader view of O&M costs; that is, it incorporates more than ‘direct costs’. Incorporating indirect costs raises the CHSRA’s O&M costs to about 11¢ per seat mile when 9Billion seat miles per year are projected, which is near the Medium Case for 2035 in the Draft Revised Business Plan.

Note that the revenue per passenger mile projections did not change at either 100% or 90% of the CHSRA’s present O&M cost model. But the O&M cost per seat mile and the O&M cost per passenger mile, at the different Load Factors, have increased.

If the CHSRA’s train reached CHSRA’s projected 76% Load Factor, it would still be profitable, but with a thinner operating margin.⁹ And at a more reasonable estimated Load Factor of 60%, there is still a positive operating margin at some points on the charts. But that mix of costs and Load Factor brings Case Two very close to requiring a subsidy, especially if the negative price variance of 10% occurs. This is probably the ‘Best Case’ that actually looks at all the various O&M costs that need to be considered.

⁹ As discussed previously in this appendix, no change was made to the cost projection for the three key parameters – Power, Train Crew, and Equipment Maintenance.

Figure A13-6



Clearly if the Load Factor were only 50%, the revenue and cost per passenger mile lines cross one another between the \$4.5Billion and the 9Billion seat mile level and an operating subsidy would be required. If a negative ticket price variance occurred, a larger subsidy would be required.

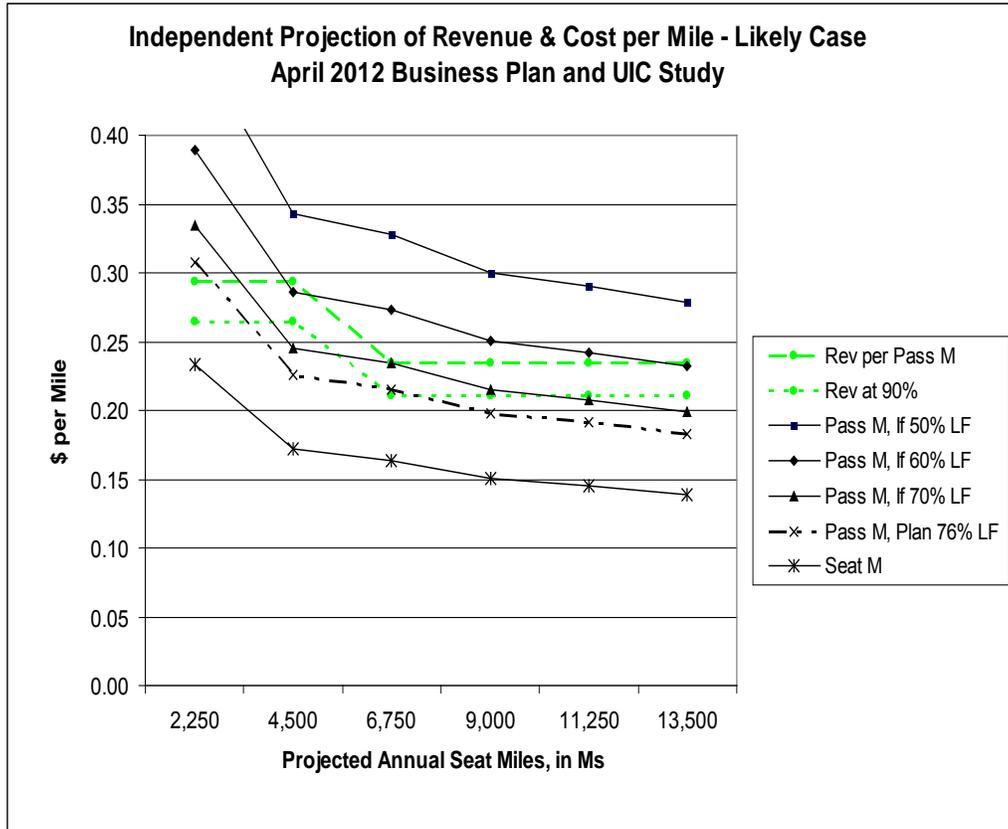
Case Three – A More Likely Case – This analysis, shown in Figure A13-7, is based on the broader view of Operating Costs as defined in Figure A13-1 and Figure A13-4. Incorporating the broader view of ‘costs’, looking at the whole of CHSRA’s O&M costs, and increasing two key cost areas (power, train crew and equipment maintenance costs, and the trainset replacement reserve) as opposed to a narrow view of ‘direct costs’ raises the cost to about 15¢ per seat mile when in 2035 the trains function with 9Billion annual seat miles – roughly the Revised Draft Business Plan’s Medium Case.

In Figure A13-7 the revenue per passenger mile projections have not changed at 100% or 90% levels of CHSRA’s projections; but the cost per seat mile and the cost per passenger mile projections have increased from the “Best Case” in Figure A13-6.

If the CHSRA’s train reached the CHSRA’s projected 76% Load Factor, it would probably have a profitable operating margin, as long as there is no

negative ticket price variance. But if the three O&M cost parameters of Power, Train Crew, and Equipment Maintenance are closer to this estimate of 50% higher than the CHSRA's estimates, Figure A13-7 shows that an operating subsidy would be required, unless the very high CHSRA's projection of a 76% Load Factor is achieved.

Figure A13-7



At an optimistic estimate of the Load Factor of 70%, there is still an operating margin but it is very close to requiring a subsidy, especially if a negative price variance occurs – such as a fare war with the airlines. Figure A13-7 is probably the 'More Likely Case' since it considers all the probable O&M costs. As discussed in Figure A13-4, a 50% increase was applied to the CHSRA's cost projection for the three key parameters of Power, Train Crew, and Equipment Maintenance, and the Trainset Reserve was doubled.

If the Load Factor were only 60%, O&M costs per passenger mile lines exceed Figure A13-7's revenue per passenger mile lines over most of the annual ranges of seat miles, suggesting the need for a subsidy is very high. Clearly, if the Load Factor is only 50%, an Operating Subsidy will be required.

In Conclusion – Figures A13-5, A13-6 and A13-7 deliver at least three important messages:

1. Converting from O&M costs per seat mile to the DOT/FRA's recommended metric, costs per passenger mile (PPM), is critical to understanding the HSR project's overall financial outcomes of higher O&M costs than projected by the CHSRA. Understanding risks is key to understanding whether AB3034's provisions against a subsidy will be violated.
2. The conversion to PPM is based on Load Factors that result from how many seats are filled. Current HSR experience says about 60% is reasonable. The CHSRA projects a 76% Load Factor. No HSR system operates at this overall level of efficiency. It is not apparent that even airlines can continually achieve this level of efficiency. The CHSRA's assumption creates financial risks.
3. The CHSRA focuses their O&M discussion solely on the direct cost of 'running the HSR trains.' While UIC/IUR admits their O&M Direct Cost Study cost equations are limited to only those direct costs that correlate with speed, these government owned and operated HSR systems do not have to conform to AB3034 prohibition against operating deficits. The planned HSR system in California does. If the Administration and the Legislature want to understand the risks of whether a subsidy will be required to cover all the costs of 'running the HSR business' a broader definition of costs, including indirect costs and operator profits, is necessary.

If the project continues to be built, while ignoring the need for a much broader definition of O&M costs, the State will most probably find itself needing to provide subsidies to cover 'unexpected' events.

The probability of an 'unexpected event' happening is very high given both the very high Load Factor (76%) assumed in the Authority's revenue calculations, and the exclusion of much, if not most, of the indirect O&M cost factors in their operating cost calculations. These two planning assumptions, in combination with revenues per passenger mile projections that are half of operators' current and actual revenues per passenger mile create an extraordinarily dangerous situation. When that 'unexpected event' happens, funds to operate the HSR train will need to come from additional taxes or the transfer of funds from other State spending priorities. And when that happens, the HSR train will need a subsidy forever.

Appendix 14

The Financial Impacts of More Realistic O&M Costs On The CHSRA's Profit Equation

This Appendix ultimately shows the potential fiscal consequences of more realistic O&M data being used in CHSRA's profit equations. To do that it, it first builds a model that accurately reproduces the CHSRA's Revised Draft 2012 Business Plan's financial outcomes.

Then it compares the CHSRA's projected operating margins (aka profits) to other possible CHSRA operating margin outcomes, based on other worldwide operation and maintenance (O&M) costs per passenger mile (PPM) that have been included in this report. Using these different O&M cost PPM data sets to compute seven new financial cases, while replicating CHSRA's revenue PPM, it demonstrates what would happen to CHSRA's operating margins if the CHSRA Revised Plan's O&M results were closer to the worldwide actual and projected O&M costs.

Introduction by way of an example – The financial equation modeling starts with Figure A14-1, which uses information from CHSRA's Revised Draft Business Plan as the baseline. This shows that during IOS South's operations, CHSRA projects revenues of 29¢ PPM for their Medium Business Case, and 17¢ PPM of O&M costs. Consequently with a projected 1.9Billion passenger miles traveled in 2025, CHSRA would realize an operating margin of 12¢ PPM, or \$230 Million.

Then, as an extreme contrast, assume that in 2025 both the 1.9Billion passenger miles are still traveled, and CHSRA still has revenues of 29¢ PPM. However, using Acela Express' actual O&M PPM costs as a predictor of future CHSRA O&M costs, 'plug in' that O&M rate of 61¢ PPM (vs. CHSRA's 17¢ PPM), to compute the CHSRA train's financial results for 2025. This produces a negative operating margin (aka operating loss) of 32¢ PPM – a \$608Million loss.¹ This process is applied in each of the seven cases shown in Figure A14-2 and Figure A14-3.

Why so dramatic a change in CHSRA's fortunes in this example? Acela Express, like international HSR operators, all generate revenues between 47¢ and 72¢ PPM compared with CHSRA's projected revenues of 29¢ to 23¢ PPM.² While Acela Express has the highest O&M PPM costs found, O&M cost structures of 40¢ (RENFE, Amtrak CA) or 50¢ (Amtrak NEC) PPM are still significantly higher than the current CHSRA projections.

¹ Revenues for 2025 would be \$550Million (1.9Billion miles x .29¢PPM). But using Acela Express' O&M cost PPM, the CHSRA O&M costs would come to \$1,159Million (1.9Billion miles x 61¢PPM). The loss (\$550M less \$1,159M) would be \$608Million.

² While some would argue that the Acela Express' costs of 61¢ per passenger mile are an extreme example, it is important to realize that until some detailed independent examination is conducted on Acela Express' financial results, it is too early to dismiss it as an unreasonable comparison.

Figure A14-1 (from Figure A4-1) - RIDERSHIP, MILES, REVENUES & O&M COSTS (2010 US\$)

Corridor In Use	IOS	B to B	Phase 1B						Phase 1B
	2025	2030	2035	2040	2045	2050	2055	2060	Average
High									
Ridership, in Ms	10.47	26.76	31.78	32.59	33.41	34.25	35.12	36.00	33.86
Trainset Miles, in M of miles	8.87	21.14	25.34	25.34	25.64	27.14	27.70	27.70	26.48
Passenger Miles, in M of miles	2,484	7,438	8,833	9,056	9,285	9,519	9,760	10,006	9,410
Seat Miles, in M of miles	3,992	9,513	11,403	11,403	11,538	12,213	12,465	12,465	11,915
Load Factor, Pass M/Seat M	62.2%	78.2%	77.5%	79.4%	80.5%	77.9%	78.3%	80.3%	79.0%
Mile per Pass, Pass M/Ridership	237	278	278	278	278	278	278	278	278
Revenue, in \$M	733	1,743	2,070	2,122	2,176	2,231	2,287	2,345	2,205
O & M Cost, in \$M	373	709	850	888	921	956	929	903	908
Revenue per Pass Mile, R/Pass M	0.295	0.234	0.234	0.234	0.234	0.234	0.234	0.234	0.234
O & M Cost per Pass Mile, C/Pass M	0.150	0.095	0.096	0.098	0.099	0.100	0.095	0.090	0.096
Revenue per Seat Mile, R/Seat M	0.184	0.183	0.182	0.186	0.189	0.183	0.183	0.188	0.185
O & M Cost per Seat Mile, C/Seat M	0.093	0.075	0.075	0.078	0.080	0.078	0.075	0.072	0.076
Medium									
Ridership, in Ms	8.14	21.44	25.71	26.36	27.02	27.71	28.41	29.12	27.39
Trainset Miles, in M of miles	6.95	17.58	20.89	21.00	21.66	22.53	22.89	23.11	22.01
Passenger Miles, in M of miles	1,922	5,905	7,079	7,258	7,441	7,629	7,822	8,019	7,541
Seat Miles, in M of miles	3,125	7,909	9,398	9,448	9,747	10,136	10,301	10,400	9,905
Load Factor, Pass M/Seat M	61.5%	74.7%	75.3%	76.8%	76.3%	75.3%	75.9%	77.1%	76.1%
Mile per Pass, Pass M/Ridership	236	275	275	275	275	275	275	275	275
Revenue, in \$M	564	1,380	1,655	1,687	1,740	1,784	1,829	1,875	1,762
O & M Cost, in \$M	334	627	724	776	802	805	766	778	775
Revenue per Pass Mile, R/Pass M	0.294	0.234	0.234	0.232	0.234	0.234	0.234	0.234	0.234
O & M Cost per Pass Mile, C/Pass M	0.174	0.106	0.102	0.107	0.108	0.106	0.098	0.097	0.103
Revenue per Seat Mile, R/Seat M	0.180	0.174	0.176	0.179	0.179	0.176	0.178	0.180	0.178
O & M Cost per Seat Mile, C/Seat M	0.107	0.079	0.077	0.082	0.082	0.079	0.074	0.075	0.078
Low									
Ridership, in Ms	5.80	16.12	19.63	20.13	20.63	21.16	21.69	22.24	20.91
Trainset Miles, in M of miles	5.02	14.01	16.43	16.65	17.68	17.91	18.08	18.52	17.55
Passenger Miles, in M of miles	1,359	4,371	5,324	5,459	5,597	5,738	5,883	6,031	5,672
Seat Miles, in M of miles	2,259	6,305	7,394	7,493	7,956	8,060	8,136	8,334	7,895
Load Factor, Pass M/Seat M	60.2%	69.3%	72.0%	72.9%	70.3%	71.2%	72.3%	72.4%	71.8%
Mile per Pass, Pass M/Ridership	234	271	271	271	271	271	271	271	271
Revenue, in \$M	395	1,019	1,241	1,272	1,304	1,337	1,371	1,405	1,322
O & M Cost, in \$M	251	518	611	655	705	708	672	656	668
Revenue per Pass Mile, R/Pass M	0.291	0.233	0.233	0.233	0.233	0.233	0.233	0.233	0.233
O & M Cost per Pass Mile, C/Pass M	0.185	0.119	0.115	0.120	0.126	0.123	0.114	0.109	0.118
Revenue per Seat Mile, R/Seat M	0.175	0.162	0.168	0.170	0.164	0.166	0.169	0.169	0.167
O & M Cost per Seat Mile, C/Seat M	0.111	0.082	0.083	0.087	0.089	0.088	0.083	0.079	0.085

Notes: 450 seats per trainset per Table 9, page 9 of O & M Report for Revised Draft Business Plan, April 2012. For High & Low Cases - Ridership, Trainset and Passenger Miles from April 19, 2012 PB Memo regarding Green House Gases. For the Medium Case - Ridership, Trainset and Passenger Miles is an average of the High and Low Cases. Revenue and O & M Costs, in \$M, from page 12 of O & M Report for Revised Draft Business Plan, April 2012.

By applying O&M PPM cost data from real operating environments as well as independent projections, while keeping constant CHSRA's revenue of 23¢ to 29¢ PPM, the operating margin results will almost always show negative financial consequences.³ But CHSRA's train must always have both low revenues and lower still O&M cost per passenger mile (or per seat mile).

The CHSRA's fundamental problem is that to remain competitive in California's airline and auto travel marketplaces, their HSR trains can only generate per passenger mile revenues at about half (or less) of what actual HSR operators collect worldwide. At the same time the CHSRA will most probably be trying to cover O&M PPM costs that will be similar to worldwide O&M PPM costs. These O&M PPM costs could be two, three or even more times CHSRA's currently projected O&M per passenger mile (PPM) costs.

As Figure 4 in Section 3 shows, the CHSRA is projecting O&M costs around 10¢ PPM, and revenues of about 23¢ PPM. But across the spectrum of existing HSR systems, revenues run between 40¢ and 55¢ PPM: with Acela Express toping out at 72¢ PPM. Simultaneously, CHSRA's O&M estimate of 10¢ PPM, confronts real world O&M costs of 23¢ to 30¢ to 40¢ to 60¢ per passenger mile. This disconnect defies rational business or financial logic.

From the CHSRA baseline financial forecast to alternative financial results using CHSRA's constant revenues in conjunction with more realistic O&M costs – The CHSRA projects positive operating margins, starting with the IOS South. These 'profits' continue to flow throughout the Phase 1 Blended (Phase 1B) operations period until their forecasts end in 2060. Figure A14-1 (also A4-1) shows the financial results for the Authority's three cases (High, Medium, Low) in the Draft Revised 2012 Business Plan. The Medium case is used for CHSRA's financial projections, and is the baseline used here.

Analyzing the CHSRA's profits when subjected to fixed revenues but reflecting worldwide O&M costs – CHSRA calculated their operating margins for the entire Phase 1 Blended 2030-2060 forecasting period based on increasing ridership producing ever increasing revenues then deducted their projected O&M costs of about 8¢ per seat mile, under the assumption of a 76% Load Factor. This calculation produced the positive operating margins displayed as the Baseline case in the top row of Figure A14-2, with the Phase 1 Blended period on the right.

Figure A14-2 compares CHSRA's projected case's operating margin with examples from actual passenger rail operations plus four independent projections, from the Peer Review Group, the LAO, a CHSRA case with a 60%

³ The CHSRA's O&M projections are the lowest O&M costs for HSR systems per passenger mile found in publically available data. The only example of a lower-than-CHSRA revenue PPM is the CA Amtrak data between 2005 and 2011. But that three-route system requires a subsidy nearly equal to the revenues it collects, which is prohibited by law in the CHSRA project.

Load Factor (vs. 76% LF), and an independently produced Likely Case with a 60% Load Factor.

The April 2012 Revised Draft Business Plan forecasts a positive operating margin of about \$230 Million in 2025, once IOS South operations have begun. This margin grows to about \$750 Million by 2030 – the start of the Bay to Basin’s operations. Once Phase 1 Blended operations start about 2035, the operating margin is about \$1,000 Million (\$1Billion) per year, and remains about this high through 2060.

Figure A14 -2 Estimated Operating Margins and Differences In Operating and Maintenance Margins [Profits or (Losses)] From The CHSRA Baseline Medium Business Plan Case (Uses a 76% Load Factor) – All sums in Millions of 2010 \$\$ Uses CHSRA Baseline Revenue then subtracts O&M Costs for each Group Case from the CHSRA Revenue						
	IOS Operating Period 2025		Bay to Basin Operating Period 2030		Phase 1 Blended Operating Period Average Year (2035 to 2060)	
Group Case (LF = Load Factor)	Operating Margin	Difference from Baseline	Operating Margin	Difference from Baseline	Operating Margin	Difference from Baseline
CHSRA Baseline (76% LF)	\$230	na	\$753	na	\$987	\$0
CHSRA (60% LF)	\$153	(\$77)	\$600	(\$153)	\$778	(\$208)
1 - UIC/IUR (Direct O&M Only-60% LF)	\$330	\$100	\$660	(\$93)	\$842	(\$145)
2 - Independent Likely Case (60% LF)	(31)	(\$261)	(\$131)	(\$884)	(\$123)	(\$1,110)
3 - Peer Review Group Analysis	\$0	(\$230)	\$0	(\$753)	\$0	(\$987)
4 - LAO Analysis + Spanish Report	(\$12)	(\$242)	(\$391)	(\$1,144)	(\$501)	(\$1,487)
5 - International HSR + Amtrak CA + NEC	(\$301)	(\$531)	(\$1,277)	(\$2,030)	(\$1,632)	(\$2,618)
6 - Acela Express	(\$608)	(\$838)	(\$2,222)	(\$2,975)	(\$2,838)	(\$3,825)

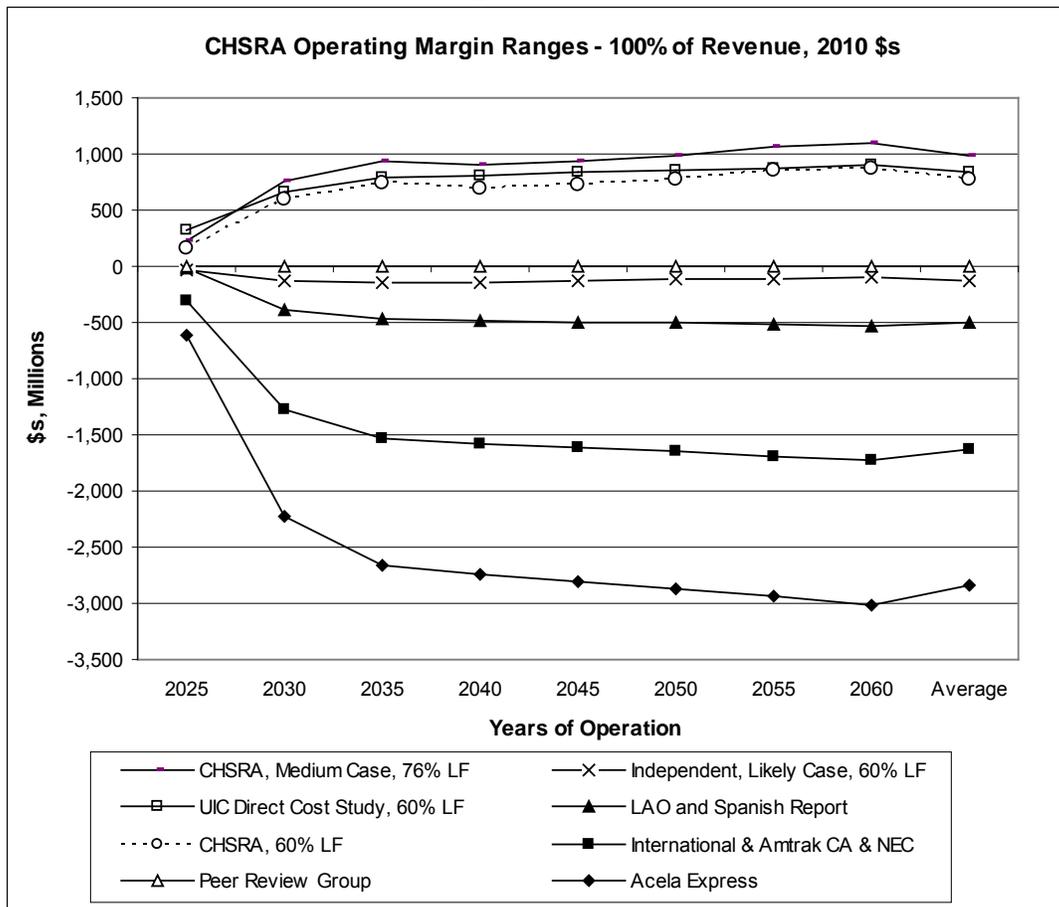
For each pair of columns, the right hand column shows the difference between the baseline CHSRA projection of operating results and this case’s projection of operating results. The parentheses of the left most column in Figure A14-2 show the projected annual operating losses in 2025 (during the IOS period) for four of the seven operating margin calculations that use the different O&M costs per passenger mile projections while these profit/loss calculations keep CHSRA’s revenue stream the same as its Revised Plan does. The same is true for the other two column pairs representing operating margins in both 2030 (Bay to Basin period) and the average over the period 2035 to 2060 (Phase 1 Blended period).

In Group Case 1 the UIC/IUR O&M calculation uses only a subset of direct O&M cost data, as discussed below in Group Case 1. In Group Case 3 the Peer Review Group said costs would be no less than revenues (therefore no positive operating margin, as discussed in Group Case 3. All other Group Cases result in projections of operating losses, and therefore illegal subsidies.

The dynamics over time from modeling by using CHSRA's forecasted revenues but changing the O&M costs – Figure A14-3 illustrates over the forecasting period, 2025 to 2060, how the CHSRA train's operating margins would change if the California's HSR system's revenues PPM are held constant but reflected the six different cases of HSR O&M costs PPM worldwide and independent O&M and profit calculations.

Figure A14-2 is the base for information presented in Figure A14-3. In Figure A14-3, the CHSRA baseline case's operating margin is the solid line at the top of the chart. Directly above the Year 2025 represents the IOS South period of operations. Directly above the Year 2030 represents the Bay to Basin period of operations, while directly above the Year 2035 to 2060 represents the Phase 1 Blended period. The rightmost numbers are the average 'profit' projections for the 2035 to 2060 Phase 1 Blended period.

Figure A14-3



What's behind the seven models of operating profit equations?

– The Revised Draft Business Plan does not project Load Factors *per se*, a critical omission. Rather, CHSRA uses its Cambridge Systematics passenger forecasts, then it calculates the number of trainsets (and consequently seats) that will be needed to serve this market demand. The relationship of the total number of miles the passengers will travel to the total number of miles the trains (therefore seats) will travel results in what the passenger transportation industry defines as the Load Factor.⁴

CHSRA's average projected Load Factor for the Revised Business Plan (76%), highlighted in Figure A14-1, would reflect an extremely high degree of efficiency in placing passengers into most of the seats almost all of the time. There is a great risk such efficiency will not be sustained over peak hours and days, and off peak hours, and days over the more than three decades (2025-2060) of operations forecasted by CHSRA. The consequences of a lower Load Factor are the increased costs needed to provide more train capacity (and therefore more seats, since a lower Load Factor means that the operator will have more empty seats per train) to meet the same amount of market demand and revenues.

To understand the financial consequences of different per passenger mile (PPM) O&M costs on California's proposed HSR, seven cases were built using the same model: keep revenues PPM the same but vary the O&M costs per seat mile and at projected Load Factors to reflect findings in Section Three of worldwide O&M costs per passenger mile.

A special analysis – First however, a special case was modeled to determine the financial model's sensitivity to efficiently loading passengers (the Load Factor), not at the currently projected 76%, but what would appear to be a more reasonable projection of 60% (using 50% in 2025, not 61%).⁵ Figure A14-2 shows, on the second row, that on average during the Phase 1 Blended period, the operating margin drops by about \$200 Million, to \$778 Million per year as a result of this 21% reduction in the Load Factor.

In Figure A14-3 the operating margin for this 60% Load Factor is represented by the dotted line with circles, just below the baseline CHSRA (76% LF) projection. The financial outcomes are sensitive to lower Load Factors, dropping about \$13 Million for every one percent drop in the Load factor, between 76% and 60% Load Factors, assuming no other parameters are changed.

Using six other Group Cases of O&M costs per passenger mile estimates instead of CHSRA's to compute operating margins – Eleven different O&M costs per passenger mile outcomes were discussed in Section Three, (See Figure 4). These were consolidated into six groups. Each

⁴ See Appendix 3, 4, and 16 for a detailed discussion of Load Factors.

⁵ See Appendix 9 for a detailed discussion of the CHSRA O&M Model

group's O&M cost per passenger mile was substituted for the CHSRA's cost per passenger mile. Then the operating margin was recalculated, based on the CHSRA's revenue per passenger mile projection for that period. The range of various outcomes for the CHSRA that would occur, if these different cost projections were to actually occur, is presented in figures A14 -2 and A14-3. The striking conclusion is that only one possible outcome leads to a positive operating margin, and that is for Group #1.

Group #1 – UIC/IUR direct O&M cost study, using a 60% Load Factor (LF) – One conclusion reached by examining cost factors in the CHSRA O&M model is that it is very 'direct cost focused.' A reasonable degree of commonality was found by comparing cost factors of the CHSRA profit model with the results of the UIC/IUR HSR study's direct costs.⁶

As discussed in Appendix 12, the UIC/IUR's 2010 study, as opposed to the UIC/IUR's 2011 letter discussed later, is silent on the details of whether European HSR systems accounting procedures include pensions, health care, liability, casualty and property insurance. It also only allocates the marginal O&M infrastructure maintenance costs such as for tracks and stations. It is also not clear if equipment maintenance costs of their national rail systems are allocated proportionately to various HSR corridors, or if these are direct O&M cost charges.

Because of probably incomplete data being submitted by participating UIC/IUR members, the UIC/IUR's [the International Union of Railways] calculations, must be used cautiously. Unlike the O&M costs for California's proposed train, Europe's existing, government-owned HSR systems aren't exposed to federal or state (or local) taxes, as California HSR's operators will be. Some of the UIC/IUR's ever-constant claims of HSR's profitability, are partly due to Europe's social benefits (health care, pensions, etc.) being off the HSR operator's income statements.⁷ Similarly, the EU's directive to separate track ownership and maintenance from direct operating costs keeps some, yet unknown costs off HSR operators' Profit and Loss Statements.⁸ However, the UIC/IUR's profitability claim may be mostly due to worldwide HSR ticket prices per passenger mile (PPM) that are about twice the CHSRA's projected ticket prices PPM. These differences between the existing financial models and the proposed California system makes the UIC/IUR's profitability statements nearly irrelevant to the California HSR's financial outlook.

⁶ See Appendix 12 for an analysis of the UIC HSR direct cost study. See Appendix 13 for a comparison of the results of the CHSRA O&M model and the findings in the UIC HSR direct cost study.

⁷ The French state grants Société Nationale des Chemins de fer Français (SNCF), \$2-\$3Billion annually for "tariff and public service contributions, concessionary fares and various other services" and pays a retirement supplement to SNCF "which is not shown on SNCF's income statement." Quote is from: International High-Speed Rail Systems: a Hearing before the Subcommittee on Railroads, Pipelines and Hazardous Materials of the Committee on Transportation and Infrastructure, House of Representatives; April 18, 2007. http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110_house_hearings&docid=f:34799.pdf

⁸ EU Directive 91/440, decreed to encourage cross border rail competition, has spawned a series of national government entities such as Réseau Ferré de France (RFF). The French Government appoints twelve of the eighteen Directors of both SNCF and RFF, a super majority with wide financial discretion.

What may be of value from the UIC/IUR when calculating the CHSRA's O&M costs are the direct costs data sets provided in the 2010 UIC/IUR study. But this would be only a starting point to better understand CHSRA's overall future O&M costs; and not the whole picture of what must be included in California's privately-run HSR operation.

Figure A14-3 best illustrates the communality between the UIC/IUR and the CHSRA's accounting for O&M costs. When the UIC/IUR direct cost per seat mile is converted to costs per passenger mile using a 60% Load Factor, the UIC/IUR line (with small, empty boxes) appears almost on top of the CHSRA profit projection that also uses a 60% Load Factor. If the UIC/IUR direct cost data had been used to project CHSRA O&M cost, both using a 60% Load Factor instead of CHSRA's Revised 2012 Draft Business Plan's 76%, the operating margins would have been very similar. This is the only one of the six Groups that produced positive CHSRA operating margins.

Group #2 – An independently produced, Likely Case (using a 60% Load Factor) - The UIC/IUR study's clearest message is about what is not included in their study. The study focused on understanding the relationship between selected O&M cost elements and the average operating speed of the trains generating those costs. Consequently, they listed a number of costs elements that were either not included, or only partially included.⁹

This suggested building a financial model to include those costs items that were not previously included in the CHSRA's O&M model, or only partially. Two independent projections of were developed of "fully loaded - see through" O&M costs projections as shown in Figure A13-2 in Appendix 13:

- A "Best Case" that added several items, but did not significantly increase the key parameters of the costs associated with the number of miles of track or the number of train miles (and therefore seat miles)¹⁰.
- A "Likely Case" that built upon the "Best Case" but increased the cost factors associated with the number of miles of track and the number of train miles (and therefore seat miles)¹¹.

The Likely Case (Load Factor of 60%), shown on Figure A14-3 with the "x" on the line, shows that the average cost per passenger mile is about 25¢ when the additional cost factors are considered. As Figure A14-2 demonstrates, the Likely Case results in a CHSRA net operating deficit averaging about \$125 Million per year during the Phase 1 Blended operating period.

⁹ See Appendix 12

¹⁰ See Appendix 13, Figure A 13-2

¹¹ See Appendix 13, Figure A 13-2

Group #3 – Peer Review Group - The Peer Review Group's opinion in May 2012 was that operating costs would not be less than the projected revenues, in effect predicting a breakeven operating margin.¹² Since the CHSRA's projected revenues per mile are about 23¢ per passenger mile, the Peer's expected the CHSRA's O&M costs to be about 23¢ per passenger mile. By definition, the Peers' *de facto* 'sign off' on the CHSRA's O&M model is neutral, although the Peers clearly question the ability of the CHSRA's train to do any better than cover its operating costs. In Figure A14-3, the Peer's projection is the line cut by a "triangle" on the axis of zero Operating Margins. This is more than twice the O&M cost of 10¢ per passenger mile in the CHSRA's Revised Business Plan.

Group #4 – The LAO letter and 'High Speed Railways in Spain,' report - The Legislature Analysts' Office (LAO) sent a letter in May to several members of the Legislature that projects International operators' O&M cost to be around 30¢ per passenger mile.¹³ While the LAO acknowledged that one of their inputs was material contained in the supposedly 'flawed' BBVA reports, the LAO has not altered their report.

The 2010 study 'High Speed Railways in Spain,' referenced in the CHSRA's letter of May 4th contained detailed financial and operational information.¹⁴ This made it possible to estimate the AVE's system's operating costs at about 32¢ per passenger mile¹⁵.

Figure A14-3 shows that by combining these two studies findings into Group #4, and substituting 30¢ per passenger mile of O&M costs (versus 10¢ PPM) into the CHSRA's financial model, while still using their 23¢ of revenues per passenger mile during the Phase 1 Blended period, the result in Figure A14-2 is an annual CHSRA operating deficit of about \$500 Million.

Group #5 – International HSR experiences, plus Amtrak CA and Amtrak Northeast Corridor (NEC) - Section Three shows there are several US passenger rail segments and several International HSR operating systems that have O&M costs around the 45¢ range per passenger mile (PPM). For the USA:

- **Amtrak NEC Regional** – Amtrak's operations known as the NEC Regional, provide local services on the same corridor the Acela Express travels. NEC Regional's 2009 financial data indicate a 48¢ PPM O&M cost to move 7 Million passengers.¹⁶ The combination of a low Load Factor (44%) and high cost per seat mile (21¢) combine to make the

¹² See Appendix 2 for information regarding the Peer Review's projections

¹³ See Appendix 1 for information regarding the LAO Report and their projections

¹⁴ A PDF of that report "High Speed Railways in Spain" can be downloaded from:

<http://trb.metapress.com/content/1783390k6737971j?p=43e43340740c43c4bf34eae35e5c3400&pi=4>

¹⁵ See Appendix 6 for a detailed analysis of this report on the Spanish HSR system.

¹⁶ See Appendix 11 for an analysis of Amtrak operating results.

48¢ PPM. NEC Regional's cost per seat mile is almost three times the CHSRA's projections.

- **Amtrak California** – The Amtrak California set of data comes from the three regional routes operating here. These three had 2009 O&M costs of around 17¢ per seat mile, nearly twice what CHSRA projects (8¢). Because of very low Load Factors (32%) on these routes, O&M costs PPM were 52¢.

Low Load Factors can produce substantial operating losses, even if the cost per seat mile might be reasonable. Neither the NEC Regional nor the three California segments were able to cover their high operating cost per passenger mile, due to two factors. First, they have high cost per seat mile, between 17¢ to 21¢ – two to three times CHSRA's projections. Second, they have poor Load Factors; in the range of 32% to 44% - a half to two fifths of CHSRA's projected 76%.

There are also four indicators of operating costs from international HSR operators that are in the range of 45¢ PPM.

The RENFE Report - The Spanish rail and HSR operator, RENFE, presented their program to the CHSRA Board in 2011. As discussed in the 'Forever' report, the key conclusion was that their operating costs were about 45¢ PPM.¹⁷ This is somewhat higher than the 32¢ from the 2010 study 'High Speed Railways in Spain,' discussed in Group #4 above. Appendix Six concludes that it is not clear how to reconcile this difference. Whether 45¢ or 32¢ PPM, the Spanish HSR system's O&M costs are three to four times the CHSRA's projections.

BBVA? - The reportedly 'flawed BBVA data used in the 'Forever' report pointed to European O&M costs of about 45¢ PPM, based on a BBVA/UIC report sourced from CHSRA's Draft 2012 Business Plan.¹⁸ Despite promises by the CHSRA to the Assembly that the corrected UIC/IUR data would be provided, nothing has been made public. Therefore, it appears that whatever was allegedly 'flawed' was of such small significance to UIC/IUR that it is not worth correcting. Consequentially the 'Forever' report's overall conclusions on O&M costs remain valid.

Official Stance of UIC/IUR In February 2011, the Director General of the UIC/IUR sent the CHSRA's CEO a letter and the official stance of that organization on profitability. The stance said; *"The public authorities/society generally bear the costs of investing in new*

¹⁷ See "Forever" Report, pages 6 and 7, at www.sites.google.com/site/hsrcaliffr and at www.cc-hsr.org, go to Financial Reports.

¹⁸ See "Forever" Report, page 4 to 6, at www.sites.google.com/site/hsrcaliffr and at www.cc-hsr.org, go to Financial Reports.

infrastructure, constructing and maintaining the infrastructure and related equipment such as safety, control-command and signalling [sic] etc."¹⁹ This makes it clear that some, if not much, of an international HSR system's costs are borne by government agencies other than the operator.

The 'farebox revenues', shown in Figure 1 and mentioned in the UIC/IUR letter which says "*Generally speaking Operating Costs can be covered by farebox revenues*" are in the range of 40¢ to 50¢ per passenger mile.²⁰ This means O&M costs can generally be covered by these revenues of 40¢ to 50¢ per passenger mile. Based on the UIC/IUR's own statement, a reasonable range for existing HSR operating costs is therefore 40¢ to 50¢ per passenger mile.

International HSR Minimum O&M Costs – In mid-2011, Brief Notes #14 and #15 addressed findings from analyses of both revenues and costs of HSR operators in Europe and Asia.²¹ These found that international HSR revenues average about 43¢ PPM. Since only two HSR segments (Paris-Lyon and Tokyo-Osaka) are reportedly profitable, it stands to reason that, overall, international O&M costs PPM are about 40¢ or higher.

These two US conventional rail and four international HSR rail O&M data sets point to operating costs of about 45¢ per passenger mile. Grouped under 'International HSR + Amtrak + NEC in Figure A14-2, and represented on Figure A14-3 by the line with 'filled' black squares, these five sets of data would make CHSRA's annual operating losses about \$1,600 Million (\$1.65 Billion) during the Phase 1 Blended period of operations.

Group #6 – Acela Express – Acela Express, Amtrak's high-speed service between Boston, New York and Washington, offers some interesting, and worrisome-for-CHSRA, financial results.²² In 2009, while only carrying three Million of Amtrak's 10 million Northeast Corridor passengers, the average revenue is 72¢ PPM. This is greater than three times CHSRA's projected revenue of 23¢ PPM during the Phase 1 Blended period of operations.

It appears that one of the reasons Acela must charge this highest of all per passenger mile fares (found while preparing this report) is because their O&M

¹⁹ The 2011 UIC/IUR letter, confirming that "farebox revenues" generally cover O&M expenses. is found in Attachment 11 and also at <http://www.calhsr.com/wp-content/uploads/2010/02/IUR-Officials-Letter-to-CHSRA-CEO.pdf>

²⁰ See Appendix 12 and Appendix 8 for a more detailed analysis of this 2011 letter to the CHSRA. See Attachment 11 for a copy of the February 2011 letter.

²¹ Brief Notes 14 and 15 can be found at www.sites.google.com/site/hsrcaiffir and at www.cc-hsr.org, go to Financial Reports.

²² See Appendix 11 for a detailed comparison of Amtrak and CHSRA operating and financial results and projections.

costs are also high, at about 61¢ PPM. The underlying reasons are the same two as discussed above for Amtrak California and the NEC Amtrak. In 2009 Acela Express had both a poor Load Factor (56%) and a very high cost per seat mile of 34¢. While this was a dangerous operating combination, Acela's reality might shed some light on 1) CHSRA's projections of 23¢ of revenues (a third of Acela's) per passenger mile and 2) a cost per seat mile four times that projected by CHSRA.²³ As discussed in Appendix 11, it is not clear if there are infrastructure charges, from the owners of the rail lines, in excess of Acela's 'fair' share of those infrastructure costs. However, it is doubtful this is the only root cause of the difference between Acela Express's 61¢ PPM cost and the CHSRA cost projection of 10¢ PPM

Additionally, the UIC/IUR study of HSR direct cost showed only a 14% higher direct-only O&M costs per seat mile for 'slower' HSR systems (eg. Acela) versus 'faster' systems like the CHSRA is planning²⁴. Since this is not a dramatic reduction in direct-only costs per seat mile between the two types of rail systems, Acela Express' high operating costs may be a reasonably valid predictor of higher operating costs the CHSRA's train can expect.

The 'black diamond line' at the base of Figure A14-3 shows the results over time of using these higher O&M costs as inputs to the CHSRA's financial model, while maintaining the CHSRA's 23¢ PPM revenues. Figure A14-2 also shows CHSRA incurring operating losses of about \$2,800 Million (\$2.8Billion) per year during the Phase 1 Blended Period.

How sensitive are these financial results to price variations? –

In the same way that the CHSRA's O&M Model built a 10% Contingency in its financial projections, there needs to be an understanding of the impact and risk of variations in the price per ticket. This has nothing to do with variations in the number of passengers being carried. This analysis focuses on the revenue that can be collected each time a ticket is purchased.

If, for example, the airlines respond to the CHSRA's \$83 ticket price by cutting San Francisco to Los Angeles fares by 10%; and simultaneously not enough higher priced, short haul train tickets are sold for drivers who might consider using the train between the Central Valley and Los Angeles or San Francisco, it is conceivable that overall revenues could drop by 10%, carrying the same volume of passengers, because both long haul and short haul ticket prices have to be cut by 10% to hold passenger volumes.

In this example O&M costs would remain the same, but CHSRA's train would achieve only 90% of the expected revenue. Figure A14-4 shows the impact

²³ There is no publically available, detailed O&M cost breakdowns to understand how much of Acela's 34¢ per seat mile should be attributed to leasing infrastructure and right of way charges by the private railroads that exceed the true cost of using their railroad's right of way. However, even if half of these are costs 'excess' costs, that would still imply an O&M cost of about 17¢ per seat mile; leading to an O&M cost of 30¢ per passenger mile. That is still three times what CHSRA presently estimates as their O&M charges.

²⁴ See Appendix 12, Figure A12 -1.

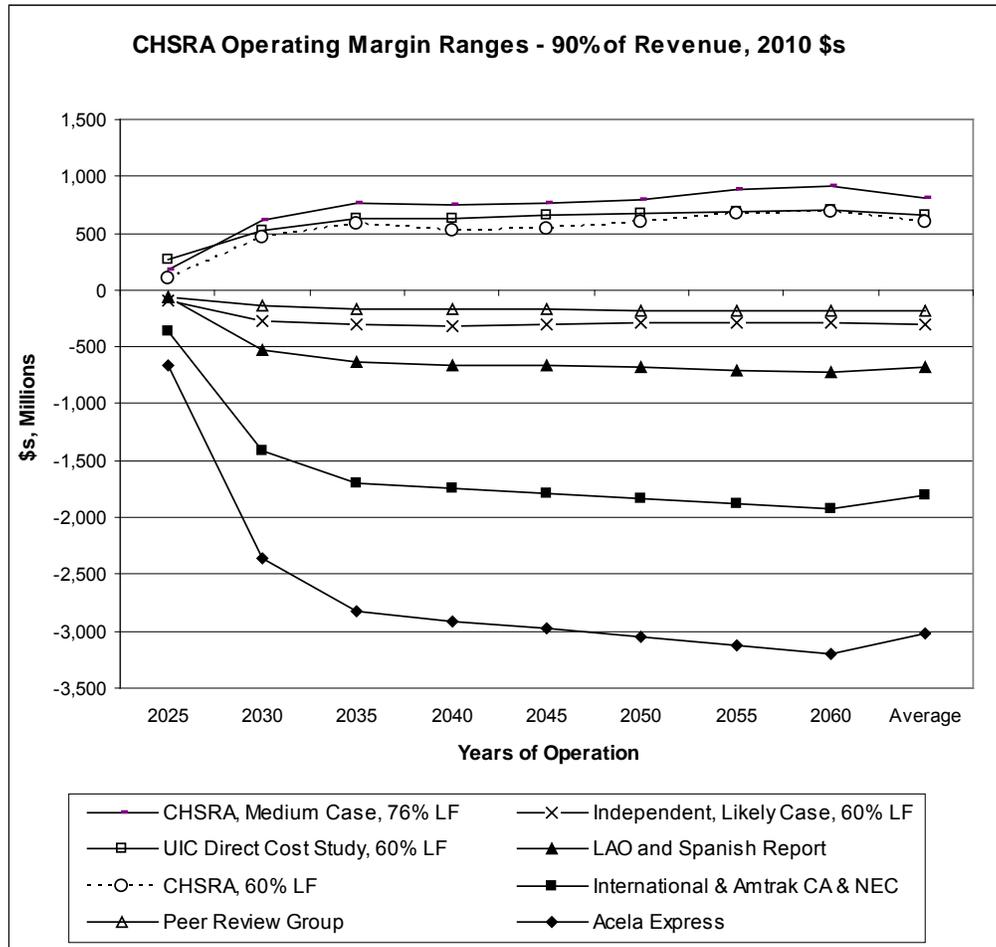
of such changes of dropping revenues by 10% while applying the seven different O&M cost structures to the CHSRA's financial model.

Figure A14 -4 Estimated Operating Margins and Differences In Operating and Maintenance Margins – Profits or (Losses)] – From The CHSRA Baseline Medium Business Plan Case at 90% of Revenues (Uses a 90% of CHSRA Revenues and a 76% Load Factor) – All sums in Millions of 2010 \$s Uses CHSRA Baseline Revenue then subtracts O&M Costs for each Group Case from 90% of the CHSRA Revenue						
	IOS Operating Period		Bay to Basin Operating Period		Phase 1 Blended Operating Period	
	2025		2030		Average Year (2035 to 2060)	
Group Case (LF = Load Factor)	Operating Margin	Difference from Baseline	Operating Margin	Difference from Baseline	Operating Margin	Difference from Baseline
CHSRA Baseline (76% LF)	\$174	\$0	\$615	\$0	\$810	\$0
CHSRA (60% LF)	\$97	(\$77)	\$462	(\$153)	\$602	(\$208)
1 - UIC/IUR (Direct O&M Only-60% LF)	\$273	\$100	\$522	(\$93)	\$666	(\$145)
2 - Independent Likely Case (60% LF)	(\$87)	(\$261)	(\$269)	(\$884)	(\$299)	(\$1,110)
3 - Peer Review Group Analysis	(\$56)	(\$230)	(\$138)	(\$753)	(\$176)	(\$987)
4 - LAO Analysis + Spanish Report	(\$69)	(\$242)	(\$529)	(\$1,144)	(\$677)	(\$1,487)
5 - International HSR + Amtrak CA + NEC	(\$357)	(\$531)	(\$1,415)	(\$2,030)	(\$1,808)	(\$2,618)
6 - Acela Express	(\$665)	(\$838)	(\$2,360)	(\$2,975)	(\$3,014)	(\$3,825)

The dynamics of when these losses would occur are shown in Figure A14-5. For both the International operator's case, and the Acela Express case, those drops are precipitous from the start of operations in 2025; then while still creating negative margins, level off about fifteen years later. The Acela Express calculation shows that during the Phase 1 Blended Period, the operating loss would be about \$200 Million more annually than in the CHSRA forecasted 100% of revenue case shown in Figure A14-2.

That drop in per passenger ticket revenues would, in general, lead to a drop in operating margins of between 15% and 20%. If the CHSRA were able to produce operating margins as they project, such a drop would not have a significant impact on the State. If the operating margins are at breakeven (vis a vis the Peers' Review), or already are negative (as all the other sources, other than the UIC Direct Costs Study, would predict), such a price drop could lead to an additional subsidy of \$150 Million to \$200M per year, forever.

Figure A14-5



How did the CHSRA get into this predicament? – The two organizations that are relied on to provide unbiased, non-partisan financial analyses of the CHSRA’s plans both say that operating and maintenance (O&M) costs are most probably going to be higher than the current CHSRA projections. The LAO says O&M costs could be three times higher, if they ‘tracked’ international results. The Peer Review group says the CHSRA’s estimated O&M costs will be twice as high, if not higher.

It is also important to recognize that Acela Express and the NEC Regional Amtrak lines, like the international HSR operators, are generating revenues between 40¢ and 72¢ per passenger mile. Compare this with CHSRA’s projections of 29¢ to 22¢ per passenger mile. This means that O&M cost structures outside of California, of 40¢, 50¢ or 60¢ per passenger mile are reasonable. The combination of these real world O&M costs with the CHSRA’s low per passenger mile revenue potential is a formula for disaster.

CHSRA's financial problems derive from being in the California transportation marketplace. To be competitive, CHSRA's fare pricing structure must be 22¢ to 29¢ PPM (for long haul and short haul passengers), not Acela Express' 70+¢ PPM market place. Likewise CHSRA cannot charge the +40¢ PPM that international HSR carriers and the Amtrak NEC Regional trains charge PPM.

Given this low price point, in order to remain relevant, California's HSR must conform to the California's market. Simultaneously, CHSRA runs the risk of incurring the considerably higher O&M costs found around the world. This appears to be a structural business problem that is not solvable, and will surely lead to serious financial losses and the need for an operating subsidy.

What impact could such cumulative losses have on the State of California's finances? – What happens if between 2025 and 2060 the CHSRA's operating losses have to be funded annually out of the State's General Fund or get added to existing debt servicing obligations during their forecast period for operations, from the IOS in 2025 through the Phase 1 Blended Plan period? Obviously nothing if the train is as profitable as the Authority says, and very little if its finances are as good as the UIC/IUR's estimates of direct-only O&M expenses are expected. But using the financial formula of this appendix, that computes results based on actual and projected operating margins, the results could be dramatically negative.

Two assumptions – First, as in all prior reports by the authors, CHSRA's ridership projections are used throughout these analyses. The Authority's ridership projections drive the vast majority of their revenue forecast outcomes, but lack credibility with independent forecasters.²⁵ Since critics have not been able to inspect the CHSRA's proprietary model, and the Legislature has not seen fit to fund or force another study, we are forced to use CHSRA's ridership forecasts, albeit with great trepidation.

Second, projections shown in Figure A14-6 (and predecessors Figure A14-2 and Figure A14-3) are in 2010 dollars, not Year of Expenditure (YOE) dollars. This means inflationary impacts are not in those analyses. Assume the State's General Fund expenditures will not grow faster than inflation over the next 40 to 50 years. With the General Fund paying out about \$92 Billion for FY2012-13, the annual percentage impact of the cases discussed below for the Bay to Basin and Phase 1 Blended periods are noted as if they would affect the General Fund in 2010 dollars.

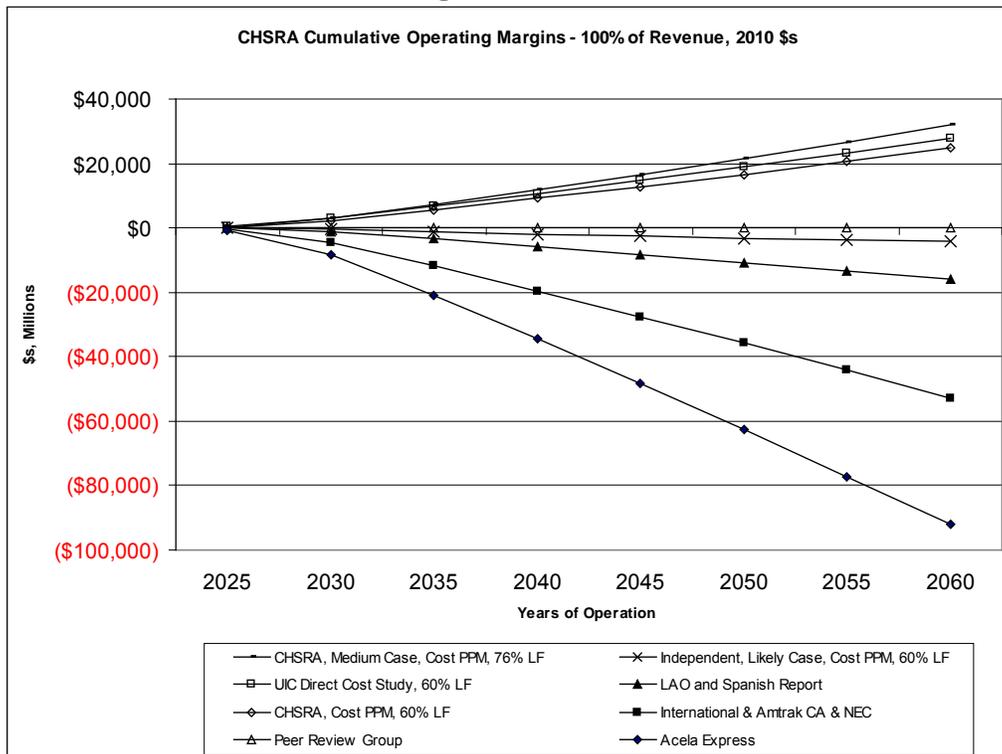
Figure A14-6 summarizes the consequences of the projected annual operating margins (positive and negative) for the eight different cases shown in Figure A14-2 and Figure A14-3. Specifically, it shows the magnitude of the tax increases, the reduction of other services, or need for the State to find other sources of revenue to cover the annual losses likely to occur when

²⁵ The most prominent of these challenges came from the Institute for Transportation Studies, UC Berkley. In a 2010 report to the Legislature, called Review of "Bay Area/California High-Speed Rail Ridership and Revenue Forecasting Study" - Research Report UCB-ITS-RR-2010-1, ITS found Cambridge Systematics' work unreliable for forecasting revenues to be generated by the high-speed train.

CHSRA's low revenues of 23¢ per passenger mile collides with the realities of higher O&M costs and then redounds onto the State's fiscal situation.

Current CHSRA financial projections are in the range of the UIC/IUR study of 'direct-only' O&M costs. But the UIC/IUR admits there are some cost items in their O&M calculations that were intentionally excluded from their 'direct cost only' study's equations. So more, or much more, could be added if those UIC/IUR accounts were expanded to include all the O&M costs California's HSR will incur. When a broader view of existing European HSR operations, Amtrak services and independent projections are considered, the risks of large operating losses become very apparent.

Figure A14-6



The loss potential is very large if the CHSRA, or even the Peer Review Group or the UIC/IUR's O&M estimates do not reflect reality. Starting with the most benevolent scenario, the Independent Likely Case (60% Load Factor) would lose about \$430 Million over the 35-year forecasting period. This would be about 0.1%, annually, of the General Fund for FY2012-13 (Figure A14-2). But that loss would be about \$18 Billion if reality turns out to be closer to the financial performance equation using O&M data from the LAO and the two reports from Spain's HSR system. In that case, the loss would add 0.4% to 0.5% annually to today's General Fund's obligations.

When using the same financial performance equation, losses over 35 years using the O&M data based on the international HSR experience and the two Amtrak zones (CA and NEC) would add up to \$57 Billion – annual losses of \$1.6 Billion, or 1.4% to 1.8% of today's General Fund obligations. This is a very worrisome prospect.

The largest loss, because the Acela Express' revenue and O&M cost data are from the USA and so at odds with the CHSRA's, would be nearly \$100 Billion over the forecast period, or \$2.8 Billion per year – amounting to 2.4% to 3.1% of today's General Fund. Coincidentally, that \$2.8 Billion per year loss almost equals the amount State appropriated to begin the first section of the HSR project during the week ending July 5th 2012.

Any and all losses from HSR's operations must be accounted for 'on top of' the State's existing annual expenditures and its debt service to its long-term obligations. This could be in the form of taxes, special charges, diverting existing funds such as truck weight fees, or even potential funds such as Cap & Trade based charges. While there is no law or regulation that requires or suggests where such monies will come from, those losses don't simply disappear from the State's accounts.

The danger of financing a single year's operating loss – Losses will be unavoidable and annual once they begin to occur. If the State 'steps across the line' even for a single year to subsidize HSR operations, the die will be cast and there will be no incentive for the operator to lower those losses. Since operators said they would only enter into a contract that places the burden of operating losses on the State, the only result can be to raise ticket prices, and/or reduce the frequency of service, thereby reducing ridership – a downward spiral.²⁶ Amtrak's history is replete with unsuccessful efforts to tame its operating deficit, and defeated by Congress' continuing to subsidize its operations; clearly a precedent of interest to high-speed rail's promoters.

But by law and by the 2008 promise to voters that "the users of the system pay for the system" California's HSR train cannot have an operating subsidy. Whether the State's Legislature and Administration see fit to abrogate that provision and create 'moral hazard' for the operator to take excessive risks knowing the State will stand behind them remains to be seen. But there is no escape from subsidizing losses once started.

The impacts on the State's General Fund will be substantial, if not dangerous in any of the cases where losses occur – larger if California's HSR train tries to operate on its present revenue estimate PPM, but incurs Acela Express's O&M costs PPM. The only known way to fund such negative impacts on the General Fund will be additional taxes, a dramatic reduction in other functions provided by the State, such as education and public and social services, or both. Hopefully that choice never arises, but the potential seems very real.

²⁶ In May 2008, five months before the Prop1A vote, CHSRA Board had the Infrastructure Management Group (IMG) survey private sector firms' interest in helping finance the project. In a June 2008 Board presentation, CHSRA learned private firms were reluctant to take risks based on the Authority's then-ridership forecasts; ". . .respondents argued that interest in equity investment would increase if the risk to the concessionaire were decreased, perhaps through some form of revenue guarantee . . ." See: Report of Responses to the Request for Expressions of Interest For Private Participation in the Development of A High-Speed Train System in California by the Infrastructure Management Group (IMG) to the California High-Speed Rail Authority Board Financing Workshop, dated October 2008; page 2 of 17.

Appendix Fifteen Information Needed To Resolve Questions About CHSRA's O&M Costs

At the end of Mr. Rossi's 30 April testimony at the Assembly Transportation Committee, Assembly Member and Chair Lowenthal said in response to his claims of data being available: *"So that data can be made available? And then we can move on from that. We just needed to be transparent."*

Here are ten specific questions that remain concerning the accuracy of international O&M costs, and those costs used, computed and stated by the Authority. These are:

- 1) What are the details of the CHSRA's O&M data set and equations to compute O&M costs per seat mile quoted on Table 2 of the May 4th letter? Apparently several Republican members of the Legislature and their Caucus' transport consultant, Gregson Porteous, are reputed to have asked for detailed O&M data several months ago, but as yet do not seem to have received it.
- 2) What are the CHSRA's load factor assumptions and projections that would allow their O&M costs per seat mile to be converted to O&M costs per passenger mile?
- 3) We are unable to find on the Web the citation in Table 2 of the May 4th letter on Taiwan's O&M costs, which the CHSRA claims is; *"The best parallel to California's proposed system . . ."* While the Taiwan system's bankruptcy was laid at the feet of default on its capital servicing obligations, without a clear ability to understand the components and calculations of the Taiwan HST O&M costs, we are left in the dark about how parallel their O&M charges actually are. Please provide those components, assumptions, and spreadsheet calculations.
- 4) Please provide the assumptions and the spreadsheets that convert the data in Figures 4, 5, and 6, and Table 4, which were footnoted as the AVE (Spain) O&M costs, as referenced in Table 2 of the May 4th letter. The divergence between the US2¢ to 3¢ per seat mile (Table 2, row 3) to the RENFE presentation and the financial analysis included in Attachment 9 is too great to ignore. Specify what assumptions were made about the number of trains, number of seats, number of kilometers, operating expenses, rail charges, and European to US conversion ratios. Are the 'rail charges' set to fully recover all infrastructure costs, or are they set at the marginal cost? If they are set at a marginal cost, how much infrastructure cost is not included in Table 2 row 3?
- 5) What calculation procedures convert the UIC/IUR direct operating costs, in the range of about 3.5 Euro cents per seat mile (in the referenced UIC/IUR 2010 report on direct operating costs), to US5.4¢ per seat mile? Are the rail

charges included in the 3.5 Euro cents per seat mile set to fully recover all infrastructure costs, or are they set at the marginal cost?

6) What are all the other, indirect, CHSRA operating costs per seat, which are not included in the 6.3 to 6.7 cents per seat mile? The Legislature needs to be provided a "complete see-through" fully loaded cost structure, to be compared to Revenues, in order to be able to determine the risk, or the need, for a subsidy. These additional costs could include items such as non-direct:

- trainset and other equipment and infrastructure replacement costs
- infrastructure maintenance and repair costs
- non-operational labor costs, such as marketing, sales, customer services, station and infrastructure security, and G & A
- health, pension and insurance benefits
- capital equipment and operations and maintenance of security systems for passengers and the train's capital investments
- passenger services and ticket sales, which are often considered indirect cost
- Federal, State and local tax exposures since the Authority asserts that the train will be operated by a private entity.
- Allocation for a profit margin, for the private operator, unless we are to assume the operator will make zero profit after collecting revenues and paying all costs.

7) An accompanying document to the November Draft Plan said that Operations and Maintenance costs " . . . grew at 60 percent of the growth of ridership, so if ridership grew one percent, operating expense costs grew six-tenth of one percent." (See: California High-Speed Rail Benefit-Cost Analysis (BCA) October 2011, prepared by Parsons Brinckerhoff, Section 5.2] Put another way, the Plan says that for every US\$1 increase in revenue, the train will incur only US60¢ of operating costs. This method of projection the growth of operating costs virtually assures a profitable operation; but is unrealistic and never likely to be approved by either private investors or the Financial Accounting Standards Board. Can the Authority establish proof that either such a method actually tracks the historical records of the established high-speed rail operators, or that the CHSRA or its consultants did not actually use this process to compute O&M costs?

8) The UIC/IUR report footnoted in Table 2 of the May 4th letter is specific about being a study of **direct** operating costs, with a focus on the variables that are affected by speed and distance. While this is a good starting point to understand O&M costs, it is insufficient to understand the question of whether there will be the need for a subsidy. Can the full formula and data of how direct operating costs can be expanded to incorporate all costs necessary to provide HSR service to California be provided for public scrutiny?

Therefore, the complete list of all indirect operating, infrastructure, and maintenance costs – and all other costs (G&A, etc) – need to be added to the data. Once that task is done, the calculations need a range of load factors that can ‘bracket’ the ridership projections. We would suggest the best load factor be set at 70% (slightly below airline’s 75% point to point loading), and the worst at 50% because at less than a 50 % load the operator would start eliminating trains from the schedule. Load factors of 70%, 60%, and 50% would seem to be a reasonable range. Only then can the O&M analyses ‘move up’ from direct operating costs, to a fully loaded Profit and Loss indication of whether an operating subsidy will be required. Such a projection would need to include the costs of Operator, the Track Manager, and the Authority

9) What is the correct set of data for the 2007 BBVA Report data that is in question? If, as Mr. Rossi testified, the correct data is available from UIC/IUR, please forward it, as soon as possible, along with correspondence from the senior-most UIC/IUR executive in charge of the UIC/IUR attesting to such data as being correct and being the replacement for formerly ‘flawed’ data.

10) If the BBVA report’s UIC/IUR data set is ‘flawed’ then what assurances should anyone have that any other UIC/IUR data set is not as flawed? For example: referring specifically to footnote (4) – the UIC/IUR report in Table 2 of the May 4th letter – it appears that the cited UIC Table 10 is incorrect and is inconsistent with Figure 6. This is because it appears that the first row of data in Table 10 is off by a factor of ten, making the totals at the bottom of Table 10 dramatically different than Figure 6. (See Attachment 11.)

This forces the question of whether any UIC/IUR data set can be trusted? To assure the public of the veracity of any UIC/IUR data, please provide all correspondence between the CHSRA and the UIC/IUR concerning the discovery of ‘flawed’ data, the agreement to correct such data, and the certification that any other data is complete, timely and correct. The same is required of the BBVA since on April 30th Mr. Rossi said; “. . . and the BBVA said they’re going to correct it.”

Concluding comments on the need for independently verified and accurate O&M data

Until the public is able to fathom, research and compare the O&M costs independently of the Authority, these and many other questions about CHSRA’s O&M costs will remain. Since the project cannot have an operating subsidy, this becomes the crucial benchmark. For the Legislature and the Administration to proceed to fund a project with so many of California’s billions of dollars being at risk without knowing the answers to these O&M questions seems fiscally negligent.

Appendix Sixteen

On The Importance Of Using The DOT's Preferred Per Passenger Mile Metric To Measure Financial Performance

On April 30th 2012, CHSRA Board Member Mike Rossi's stated before an Assembly Transportation Committee that using per passenger miles (PPM) as a metric for O&M costs was; *"not only contrary to standard industry practice, but incorrect and misleading . . . and that neither the airline nor passenger rail industry relies on cost per passenger-mile as the measure of operating costs."*¹ This charge was reiterated in a letter to the authors dated May 4th 2012.² However, there is considerable and official evidence that contradicts that point of view.

Two Federal Railroad Administration directives say that per passenger miles is the metric to gauge financial performance –

Contrary to the above statement and May 4th letter's assertion, per passenger miles is **THE** standard metric for measuring financial performance in the passenger transportation industry. It's use and how to convert from seat miles to passenger miles is discussed in detail in Appendices 3, and 4 of this report.

The State-supported Amtrak California data shows costs per passenger mile is used to evaluate the passenger rail industry's performance in California.³ That report documents what subsidies the State provides to the San Joaquin route of Amtrak; but similar subsidies are also provided to the other two Amtrak routes in California. In that way, the Legislature and analysts can determine what allocations need to be for annual subsidies.

In addition, the U.S. Department of Transportation (the US DOT) document, 'Federal Subsidies to Passenger Transportation' of December 2004, prepared by the Transportation Bureau of Transportation Statistics has examples (see pages 1, 5, 8, 10, and Tables 3 and 4) of using per passenger mile as the metric of performance across a wide range of rail and air passenger modes.⁴ No less than the agency granting California over \$3Billion chooses per passenger miles as the metric by which financial performance is measured.

Finally, The Congressional Research Service (CRS) in its December 2009 report, 'High Speed Rail (HSR) in the United States' said; *"Comparing costs on a per-mile basis is not as useful as comparing costs on a per passenger-mile basis, which is the cost of moving one passenger one mile."*⁵ These

¹ The statement is found in Attachment Seven to this report.

² A copy of the letter and accompanying tables, with the authors' home addresses redacted, is Attachment Eight to this report.

³ See Attachment Ten to this report

⁴ Available at http://www.bts.gov/publications/federal_subsidies_to_passenger_transportation/

⁵ Available at: www.fas.org/spp/crs/misc/R40973.pdf

Federal Government sources point to per passenger miles, not seat miles, as the correct metric when measuring financial options' performance – which is part of the Legislature's fiduciary responsibility.

The per passenger mile metric measures financial performance and is why analysts and the Legislature must use it –

Can the CHSRA's proposed project live up to AB3034's demand that there cannot be an operating subsidy? To answer this question, both revenues and costs need to be on the same basis, eg. dollars of revenues and costs per passenger mile. To convert the cost per seat mile data, collected by operations personnel, to cost per passenger mile, the cost per seat mile is divided by the Load Factor to arrive at costs per passenger mile. Load factors are the crucial catalyst to understand whether the project is financially viable.

A Load Factor of 100% – where passenger miles equal per seat miles – is not a practical assumption or a measure of the cost effectiveness of financial performance. As a baseline for comparison, Amtrak's Load Factors vary between 55% and 65%. Airlines' Load Factors have to be about 70%-75% to remain even nominally profitable.⁶ Based on the CHSRA'S most recent Business Plan data, their 76% Load Factor seems very optimistic.⁷

The 'Forever' report, like this report, actually started with cost per seat-mile data; but to understand the financial impacts of this data the cost structure required going 'deeper.' We knew the cost per seat mile metric was not a measure of relative financial performance, which was critically important to have, if the Legislature's fiduciary responsibility was to show that the train's financial performance does not require an operating subsidy (as per Section 2704.08 (c) (2) (J) of AB3034).

The 'Forever' report's objective was to point out that, on the basis of various assumptions, including load factors, that operating costs per passenger mile fluctuate – ie. a greater number of passengers on a train set produce a lower per passenger mile cost. The link between the two metrics is the DOT/RITA's Load Factor. While the operating costs per passenger mile will vary as the Load Factor varies, the revenue per passenger mile will also vary as choices by the operator on ticket prices occur – ie. price increases, discounts, or free passes. Assuming a steady state pricing strategy, an excellent predictor of financial viability will be the cost per passenger mile, driven by: 1) the Load Factor projection and, 2) the costs per seat mile projections.

⁶ A study of rail and airline load factors can be found in Section 2 of CHSRA's Ridership and Revenue Forecasting document at http://www.cahighspeedrail.ca.gov/Business_Plan_reports.aspx

⁷ See Appendix 4 for an analysis of the CHSRA financial and operational data on a per seat and a per passenger miles basis, and the resulting Load Factors based on the passenger and train traffic projections.

Attachment One

**Letter to Governor Brown,
October 21, 2011 from Mr. Warren
and Mr. Grindley, providing a
copy of a PowerPoint presentation
*"The Financial Aspects of
California's Proposed High Speed
Rail System"***

October 21, 2011

Governor Edmund G. Brown, Jr.
Governor's Office
c/o State Capitol, Suite 1173
Sacramento, CA 95814

Dear Governor Brown,

Accompanying is a copy of the presentation *The Financial Aspects of California's Proposed High Speed Rail System*, the culmination of our work over the past several months.

For your information, last month, copies of this presentation were delivered to the offices of Ken Alex, Gareth Elliott and Chris Ryan.

In addition, copies of this presentation has been provided to key members of the Senate, the Assembly, the department of Finance, the LAO, and the Treasurer. We believe they have found this work to be credible, timely, and very important.

The attached graphics driven presentation summarizes the issues found in the September, 2011 Edition of *The Financial Risks Of California's Proposed High-Speed Rail Project*. A copy of this report was sent to your office on September 19, 2011.

This fifteen page presentation, *Financial Aspects of California's Proposed High-Speed Rail System*, touches on everything from the likely construction costs and ridership numbers for the proposed high-speed system, to jobs and to the devastating impact on California's General Revenue Fund.

Among the more salient findings are: (See the page numbers of the presentation that addresses this finding)

The Authority's construction and permanent job forecasts are vastly overestimated according to US Bureau of Labor Statistics calculation methods. In fact, at the state wide level, no substantial net new permanent jobs will be created, as jobs are just shifted from the air and auto markets to the rail market. (Page 2, 3, and 5)

All high-speed rail systems in the world are subsidized. The Director General of the International Union of Railways and nine other sources confirm this. Californians decided in 2008 to subsidize up to \$9Billion of the proposed system's construction costs and none of its operating costs. Nothing more. (Page 7 and 8)

The Legislature made it clear in 2008, and the Authority confirmed in its 2009 Business Plan, that the system's operator would service any construction debt. No return to the taxpayers for addition funds is authorized. (Page 12)

For every 'free' Federal dollar, the State must commit to spend at least \$46 in principal and interest to service the debt on the \$66Billion Phase One project. (Page 4 and 9)

If the California voters are to gain the promised Entire System connecting six major cities, it will cost at least \$116Billion to build, and require at least \$240Billion of debt principal

and interest payments over 30 years – three times the cost of \$45Billion declared in 2008. (Page 10, 11, and 12)

Over the past year the reduction in the availability of Federal ‘free’ grant awards and increases in construction costs have created a situation that is financially untenable. The train’s operating margins (revenues minus costs) will be inadequate to service the debt that might have to be authorized to build the system. This will lead to increases in State taxes, or in an increase in the State’s annual debt service as a percent of General Fund Revenues, of from 25% to 50%. (Page 13 and 14)

We acknowledge the movement underway by the California High Speed Rail Authority and their State appointed Peer Review Committee to shift the project’s financial performance metrics from those prescribed in the 2008 law and Prop 1A to one where ‘social benefits’ are the principal measure of its worth. This is not only contrary to the present law, but creates a slippery slope toward justifying other selected ‘worthy’ projects.

Our publications on high-speed rail will be found on the web site of the Community Coalition on High-Speed rail – <http://www.cc-hsr.org/>. They exist in the public domain and require no authorization to copy or distribute.

This presentation’s message is vital to all Californians.

For further information, please contact the authors at:

Alain Enthoven (650 723 0641)
Bill Warren (650 321 8638)
William Grindley (650 324 1069)

Please look over the presentation, and discuss it with your direct reports who have copies. If you would like to discuss it or certain aspects of the proposed project, let us know. We hope it will be a helpful reference point. Additional PDF copies are available at the www.cc-hsr.com Web site.

We hope you find this helpful.

Yours Truly,

William C Grindley


(650) 324-1069
wgrindley@stanfordalumni.org

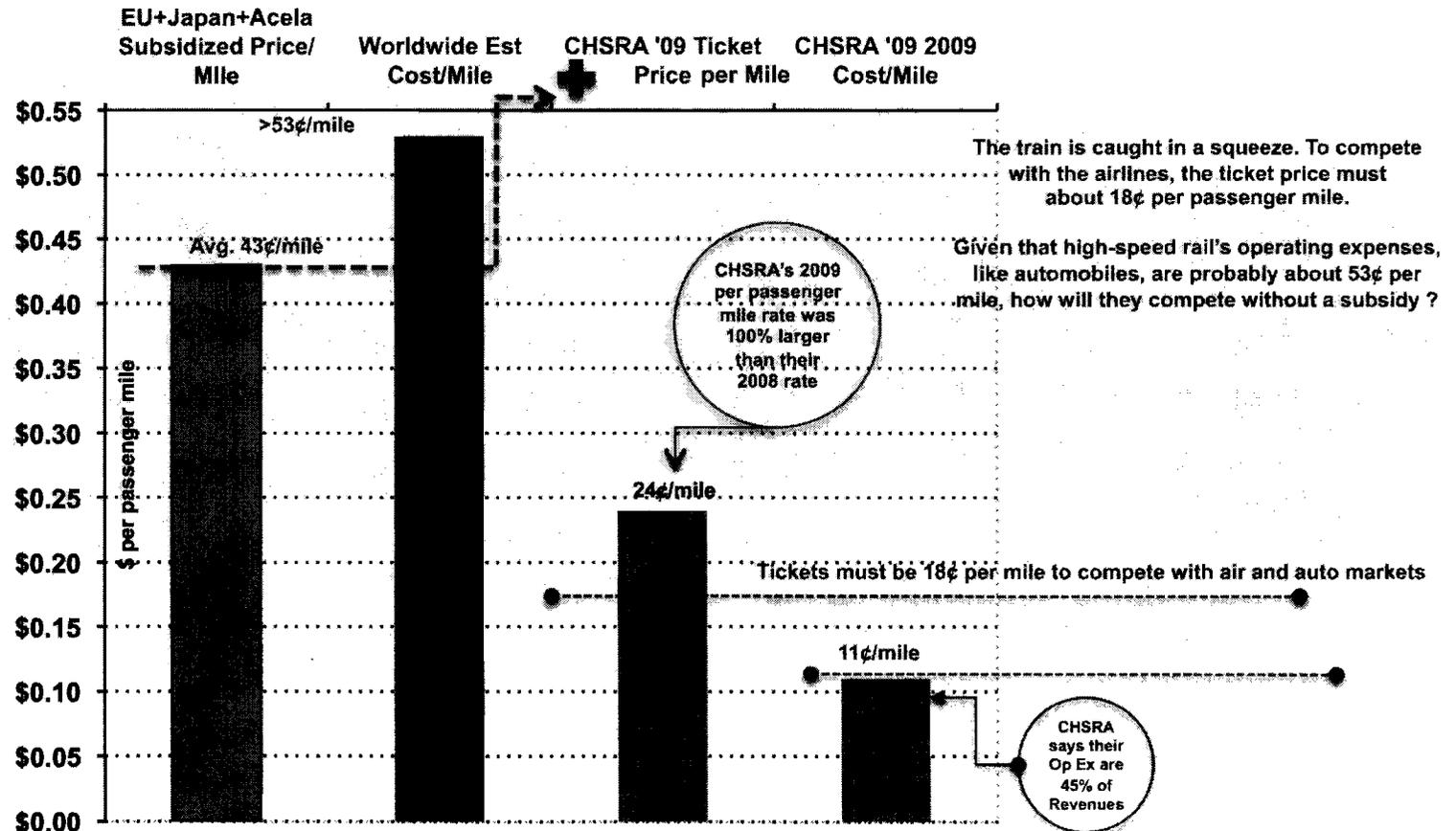
Copies to:
Alain C. Enthoven
William H. Warren



Attachment Two

Page 7 from the PowerPoint presentation "*The Financial Aspects of California's Proposed High Speed Rail System*", discussed with Mr. Richard, Mr. Morales, and Mr. Rossi, on November 17, 2011

Europe, Japan & Acela's Subsidized Ticket Prices Per Passenger Mile Are Twice The Price Of CHSRA's 2009 Plans For Phase One



? How can the California system operate at about 55% of Europe and Japan's subsidized per passenger mile ticket prices and 25% of Europe and Japan's cost per mile ?

Attachment Three

**E-mail and two attachments
(Brief Notes 14 and 15)
sent to Mr. Rossi on
November 18, 2011**

From: William Warren (williamhwarren@sbcglobal.net)
To: rossim@aol.com;
Date: Fri, November 18, 2011 9:01:18 AM
Cc: dan.richard@earthlink.net; moralesje@pbworld.com; wgrindley@sbcglobal.net;
Subject: Info That Might Help

Hi,

Following up on our conversation about revenues and costs per mile, attached are two one page documents we published on this point. They might be of assistance to your staff.

The same point is discussed in a September 2011 Financial Risks Report we released 2 months ago. This revenue and cost discussion is in Section 2.6.1. Your staff can download this rather long report from www.cc-hsr.org

Will be interesting to see what they think.

Hope tomorrow is not too good an evening for you, but that you enjoy the Thanksgiving Holiday.

Bill
650-321-8638

ON EVIDENCE-BASED HIGH-SPEED RAIL FARES

Brief Note #14 – July 5th 2011

From the authors of *The Financial Risks Of California's Proposed High-Speed Rail Project* and six Briefing Papers. Available at <http://www.cc-hsr.org/>

Finding: CHSRA's projected fares not only don't mirror existing systems' but are also below the costs of running Europe and Japan's subsidized systems

Background: In 2008 California's voters were promised they could travel from LA to SF ". . . for about \$50 a person."¹ By 2009 the one-way fare had doubled to \$105.² The driving distance between LA and SF is roughly 430 miles. The 2008 ticket price per mile was therefore \$0.12 per passenger mile; the 2009 ticket price \$0.24 per passenger mile.

What do subsidized European, Japanese systems, and their US high-speed rail's cousin (Acela), charge travelers for the one -way, least expensive class of travel on major segments? And what would the LA to SF least expensive class, high-speed rail ticket price be if those segments' rates were applied?³

EXISTING HIGH-SPEED RAIL SYSTEM SEGMENTS ⁴	From/To	To/From	Miles Center to Center	One Way Lowest Adult Fare (\$US)	Lowest Adult Fare per passenger mile	A Similar CHSRA LA-SF Fare Would Therefore Be
Italy – Trenitalia	Rome	Milan	362	\$122	\$0.34	\$145
France – TGV	Paris	Lyon	289	\$115	\$0.40	\$171
Spain – AVE	Madrid	Barcelona	383	\$153	\$0.40	\$172
USA – Acela	Boston	WDC	449	\$196	\$0.44	\$188
Germany – ICE	Berlin	Frankfurt	339	\$168	\$0.50	\$213
Japan-Shinkansen	Tokyo	Osaka	343	\$170	\$0.50	\$213
EXISTING HIGH-SPEED RAIL AVERAGE PRICE PER PASSENGER MILE AND A COMPARABLE CHSRA LA-SF TICKET PRICE					\$0.43	\$184
AS PLANNED BY THE CALIFORNIA HIGH-SPEED RAIL AUTHORITY (CHSRA)						
CHSRA 2008 Plan	LA	SF	430	\$55 est.	\$0.12	na
CHSRA 2009 Plan	LA	SF	430	\$105 est.	\$0.24	na

Using the average of those existing systems' rates (\$0.43/mile), the least expensive, one-way, LA to SF ticket would cost about \$184. This is more than three times the price promised to voters in 2008, and almost twice (175%) the price in the CHSRA's 2009 Plan. If CHSRA is to it meet the Legislature's statutory requirement and keep its promises to 2008's voters about no operating subsidies, no new taxes and only "users of the system pay for the system", then the CHSRA fares must be higher – probably much higher.⁵

Conclusions: Since the average passenger per mile price of the six established system segments is \$0.43/mile (the five that are truly high-speed rail systems plus Acela), and all these systems are subsidized; their operating costs must be at least \$0.44/mile. How can the CHSRA price their tickets at just slightly more than half (\$0.24/mile) the actual average of \$0.43/mile rate and still claim to produce an operating margin (surplus)?⁶ The CHSRA's estimated fares do not stand up to scrutiny; or even comparisons to Acela and the subsidized high-speed rail fares in Europe and Japan.

¹ See: The Official Voter Information Guide at <http://www.voterguide.sos.ca.gov/past/2008/general/arqu-rebut/arqu-rebutt1a.htm> (pg. 1)

² California High-Speed Rail Authority "Report to the Legislature; December 2009; pg. 65 and Table B, pg. 70.

³ On the issue of high-speed rails' subsidies, see Note #6 and Note #10. Found at <http://www.cc-hsr.org/>

⁴ Distances between European and US city pairs are from Google Maps, taking their city center to city center driving distances as representative of track miles. Ticket prices for European systems are from Rail Europe; <http://www.raileurope.com/index.html>. Distance and price (using \$US = 80.9 Yen) for Shinkansen are from East Japan Railway Company; at <http://www.jreast.co.jp/e/charge/index.asp>

⁵ Section 2704.08(J) says the high-speed train cannot have an operating subsidy. Also see: Op. Cit Official Voter Information Guide says (pg 1) that the system will relieve congestion "without raising taxes" and Op. Cit Official Voter Information Guide (pg.2) that the "users of the system pay for the system"

⁶ Op. Cit Report to the Legislature; December 2009; page 82, Table J.

ON OPERATING COSTS OUT OF SYNC WITH THE FRA AND REALITY

Brief Note #15 – July 14th 2011

From the authors of *The Financial Risks Of California's Proposed High-Speed Rail Project* and six Briefing Papers. Available at <http://www.cc-hsr.org/>

Finding: CHSRA's estimated operating costs don't reflect real world experience

Background: The CHSRA 2009 Business Plan's one-way single fare of \$105 equates to \$0.24 per mile for the roughly 430 land miles between Los Angeles and San Francisco.¹ That Plan also estimates operating costs at about 45% of the CHSRA's projected revenues from 2020 to 2035; making their average passenger mile operating cost about \$0.11.² Some observations on the CHSRA's 2009 expense and revenue claims:

When calculating costs, the CHSRA used 3% as the "same average rate of inflation" for their operating costs, such as labor, electrical power, health care, fuel and security costs.³ Many of these variable costs grow faster than 3%, understating realistic future costs.

CHSRA assumed some entity other than the train's operator pays the property, casualty and liability insurance, putting those burdens on the State and its taxpayers.⁴

To accept the CHSRA's operating cost projections would be in spite of a prior Federal Railroad Administration's observation: "The operating cost per seat mile from the FRA study for the California corridor (2006\$) is approximately 40 % higher than the CHSRA's projections."⁵

Europe and Japan's high-speed rail systems price their tickets at about \$0.43 per passenger mile.⁶ They do so only by virtue of receiving capital subsidies, operating subsidies or both from their governments.⁷ Therefore, those systems' operating costs must be at least \$0.44 per passenger mile.

At the CHSRA's 2009 Plan's ticket price (one-way LA-SF at \$105), a high-speed rail ticket costing \$0.24 per passenger mile is less than half the allowable \$0.51 per mile the Internal Revenue Service's allows for deducting business auto mileage.⁸ That makes the CHSRA's cost per passenger mile at \$0.11 about one-fifth of the authorized per mile costs of operating an automobile, an unreasonably low comparative rate of operating costs that raises more questions about the CHSRA's estimates.

How can California's train, where "the users of the system will pay for the system" produce a positive cash flow when its projected passenger per mile costs are about a fifth of those of operating an automobile; or a quarter of the estimated costs to operate Europe and Japan's subsidized high-speed rail systems?⁹ Wouldn't private investors or operators already have entered the US market if the CHSRA's \$0.11 per passenger mile operating costs were valid?

Conclusions: More realistic cost projections in CHSRA's next Plan will likely raise the operating cost per passenger mile. To keep a positive operating margin and to avoid an operating subsidy, these cost increases will lead to upward pressures on the estimated price per mile.¹⁰ However, previous work by these authors has shown that CHSRA's 2009 pricing plans also were not competitive with the airline and automobile segments, which will create downward price pressures, by as much as 25%.¹¹ It's unclear how these conflicting price requirements and financial sustainability versus fare competitiveness, can be resolved.

¹ California High-Speed Rail Authority "Report to the Legislature; December 2009; pg. 65 and Table B, pg.70. For computations on this as well as six high-speed rail systems, see Brief Note #14 at www.cc-hsr.org

² Ibid. Page 82, Table J for Revenues and Operating Costs, plus page 83, Table K for Capital Replacement Costs. Forty five percent of \$0.24 per passenger mile is \$0.11 per passenger mile.

³ See Brief Note #3, found at <http://www.cc-hsr.org/>

⁴ These and other observations on the poor quality of CHSRA's operating cost calculations are found both in Appendix C to 'The Financial Risks Of California's Proposed HSR Project' and Notes #3 and # 12 by the same authors. See: <http://www.cc-hsr.org/>

⁵ Cox, Wendell; Vranich, Joseph and; Moore, Adrian: The California High-Speed Rail Proposal: A Due Diligence Report: Reason Foundation; Policy Study 370; September 2008; pg. 49.

⁶ Brief Note #14, On Evidence Based High-Speed Rail Fares, and Brief Note #10, On Financial Shell Games, at www.cc-hsr.org

⁷ See 'The Financial Risks Of California's Proposed High-Speed Rail Project', pg. 59, at: <http://www.cc-hsr.org/>

⁸ See: 2009 IRS guidelines. See: <http://www.savingtoinvest.com/2009/12/2010-vs-2009-standard-mileage-rate-tax.html>

⁹ Op. Cit The Official Voter Information Guide pg. 2. Section 2704.08(J) of AB3034 prohibits an operating subsidy.

¹⁰ For details, see Brief Notes #3 and #12 and App. C of The Financial Risks of California's HSR Project; found at www.cc-hsr.org

¹¹ For details, see Brief Notes #8, #9, & #13, and App. A of The Financial Risks of California's HSR Project; at <http://www.cc-hsr.org/>

Attachment Four

**E-mail sent to Mr. Richard
and Mr. Rossi
on February 3, 2012**

From: William Warren (williamhwarren@sbcglobal.net)
To: dan.richard@earthlink.net; rossim@aol.com;
Date: Fri, February 3, 2012 5:20:36 PM
Cc: wgrindley@sbcglobal.net;
Subject: Fw: Info That Might Help

Hi Dan and Mike,

I am following up on the conversation we had back in November regarding the projected operating costs per mile compared to those in Europe and Japan. I believe that you two were going to have someone investigate the issue and get back to me. That never occurred.

I continue to believe this is a critical issue and it needs to be resolved.

We continue to discuss the point in our most recent documents, both of which we have delivered to you at the CHSRA offices in Sacramento. In the document "Twelve Misleading Statements..." we discuss this point as item #6. In the document "CHSRA 2012 Draft Business Plan Assessment..." we discuss this point in section 2.1. Electronic PDF copies of both of these documents are available at www.cc-hsr.org

While I know there continues to be much controversy about "ridership", I believe the issues surrounding operating costs are equally important. If our conclusions are valid, the risks of operating subsidies being required are very high.

If you could have the person assigned to the task that came out of our November 17th meeting get in touch with me, I would appreciate it.

Thanks,

Bill Warren
650-321-8638

PS - Mike, sorry about Big Game...

Attachment Five

**Letter to Mr. Richard, March 21, 2012
from Mr. Warren providing copies of
three recent publications, including
*"The CHSRA Knows Their Proposed
High-Speed Train Will Forever Need
An Operating Subsidy"***

March 21, 2012

Mr. Dan Richard
Chairman of the Board of Directors
California High Speed Rail Authority
770 L Street, Suite 800
Sacramento, CA 95814

Dear Mr. Richard,

Enclosed are three documents which relate to your High Speed Rail Program.

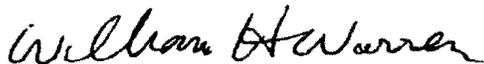
“An Analysis Of Local Transit Agencies’ Proposals To Claim High-Speed Monies For Their Capital Enhancements” - I would draw your attention to pages 7 and 8. Additional copies are available at www.cc-hsr.org

“The CHSRA Knows Their Proposed High-Speed Train Will Forever Need An Operating Subsidy” – This is a follow up to the conversations we had back in November on this subject. Since you were not on the Board at the time I draw your attention to pages 4 through 6. Additional copies are available at www.cc-hsr.org

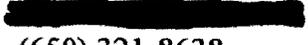
“A Partial Catalog of Inappropriate, If Not Illegal, Actions In The Conduct and Execution Of California’s Proposed High-Speed Rail Project” – By the nature of the audience, this document will most probably not be posted on the web site.

If you would like to discuss any of these, please let us know.

Yours Truly,



William H. Warren



(650) 321-8638

williamhwarren@stanfordalumni.org

Copies to:

Alain C. Enthoven

William C. Grindley

Attachment Six

**Letter to Mr. Rossi,
April 25, 2012
from Mr. Warren and Mr. Grindley**

April 25, 2012

Mr. Mike Rossi
Member of the Board of Directors
California High Speed Rail Authority
770 L Street, Suite 800
Sacramento, CA 95814

Mr. Rossi,

We take strong exception to the statement attributed to you in the April 24th Los Angeles Times article by Mr. Ralph Vartabedian, on California High Speed Rail (HSR).

Your statement was "*We have met with the authors of the report in an attempt to correct their flawed assumptions and conclusions*". This statement is incorrect.

Let us refresh your memory.

1. We met with Mr. Richard and Mr. Morales on November 17, 2011 in Sacramento. Simultaneously you were on the speaker phone. We discussed a series of charts we had developed in the summer of 2011 regarding the HSR program and its finances. One key chart, see Attachment 1, was on the apparent inconsistency between high-speed rail revenues and operating costs (on a passenger mile basis) of systems in operation, and the California program's projections. You said you would investigate this inconsistency and get back to us.
2. The following day, November 18, Mr. Warren sent you an e-mail with two of our Brief Notes, Numbers 14 and 15, which were the source documents for the chart we had discussed the prior day. See Attachment 2.
3. Having heard nothing from anyone from the CHSRA regarding this issue, Mr. Warren sent a follow-up message to you and Mr. Richard on February 3, 2012. See Attachment 3.
4. Again, having heard nothing from anyone in the CHSRA regarding this issue, Mr. Warren sent copies of three of our most recent reports to Mr. Richard on March 21, 2012. See Attachment 4. The second of the reports was our most recent publication regarding findings of actual revenues and operating costs on operating high-speed rail systems. This Report, titled *The CHSRA Knows Their Proposed High-Speed Train Will Forever Need An Operating Subsidy*, is most probably the one Mr. Vartabedian asked you to comment on.

If you believe someone from the Authority met with us on this subject, since our meeting on November 17, 2011, we would like to know the details of the meeting, as neither of us have any record of such an event.

We would also point out that the 'Forever' Report Mr. Warren sent to Mr. Richard in March was substantially based on new information which we uncovered from the CHSRA's own web site, after our meeting with you in November. Since you were not on the Board in mid-2011, we draw your attention to pages 4 to 6 of this Report. See Attachment 5.

We believe that our work is not "flawed." You believe the work being done on this subject at and for the CHSRA is not "flawed". At least we have this to agree upon.

However to publicly state that the Authority has met with us to "attempt to correct" our work is both incorrect and condescending. As citizens of California we expect better of our public servants.

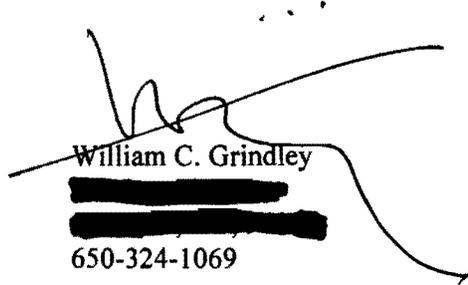
Yours truly,



William H. Warren

[REDACTED]
[REDACTED]

650-321-8638



William C. Grindley

[REDACTED]
[REDACTED]

650-324-1069

Copies to:

Dan Richard, CHSRA
Ralph Vartabedian, Los Angeles Times
Alain Enthoven
Alan Bushell

Attachment Seven

**Text of Mr. Rossi's testimony
on April 30, 2012
before the Assembly Transportation
Committee**

Transcription of Mr. Rossi's testimony on operating expenses on 30 April 2012 in front of the Assembly Transportation Committee, Bonnie Lowenthal Chair.

Chair Lowenthal – That would be great and following the comments I want to move on to the finance panel

Mr. Rossi - The article in the paper refers to a report done by some gentlemen on the Peninsula. And there are actually three issues with their report.

Mr. Rossi - The first is that they used data from a report from the Spanish Foundation, BBVA. In there, there is a chart that shows a series costs, one of them being operating costs. This data came from a data base UIC in Europe. The problem is that they picked up the wrong numbers. The numbers they are showing for operational expenses are actually capital acquisition costs. So the data, the way they get to their 40¢, just isn't right. And The UIC has in fact said that was a mistake and . . . , and the BBVA said they're going to correct it. (found at 1 minute:10 seconds)

Mr. Rossi - The second issue then has to do with the fact that they used a proxy for expense per seat mile; they used passenger mile proxy which they use by creating a capacity number - 75% for every item on the list. No one does that: what you do is per seat, just like aviation. And they didn't have the data to do that, so they attempted to convert. It would make any difference; because, it's not their fault because the data they used is not their fault because it is flawed data. (1 minute:59 seconds)

Mr. Rossi - The third problem is a much more interesting one - because once you get the right operating numbers; when you look at the comparisons to how we intend to run high-speed rail and the way its run in Europe there's no comparison. The Europeans have built an operating structure that has a series of charges that we don't have; they have a series of management companies that we don't have; they have the classic that results in a series of profit centers taking money from one profit generator.

Mr. Rossi - The more appropriate comparison would be to Taiwan, even though it's smaller, it is run the same way we would run ours. And when you look at our operating margin, or the cents per mile, we're 60% more than theirs, they're at 5¢ - we're are at 10¢. There . . . it's 4 something.

The other thing you could look at is the most recent publications for the Spanish operator, even after you take all the charges we don't have, they have a 35% net profit margin. So it's just not the right comparison.

Chair Lowenthal – So that data can be made available? And then we can move on from that. We just needed to be transparent

Mr. Rossi - Right - And the linkage are there. They can go directly to the UIC and pull it up. As I say, it wasn't their fault. The compilation by the Spanish authors and the BBVA report, and they picked up the wrong column. I think it was column 42.

END

Attachment Eight

**Letter from Mr. Rossi of the CHSRA
to Mr. Warren and Mr. Grindley
on May 4th, 2012, with two Tables**



May 4, 2012

William H. Warren
[REDACTED]
[REDACTED]

Board Members:

Dan Richard
Chairperson

Lynn Schenk
Vice-Chairperson

Thomas Richards
Vice-Chairperson

Robert Belgenorth

Russell Burns

Jim Hartnett

Michael Rossi

Thomas J. Umberg

William C. Grindley
[REDACTED]
[REDACTED]

Dear Messrs. Warren and Grindley:

Over the past few days there has been much public discussion of your March 17th report on the California High-Speed Rail Authority's projected operations and maintenance costs. Since your work reopened debate over these projections, I want to set the record straight by providing you with some information to clarify the errors in the underlying data relied upon in your report.

Had the Authority been given the opportunity to discuss or review your report prior to your press conference, we likely could have avoided this misunderstanding. Still, it is important to clearly state the flaws in your analysis so that we can have a fact-based, professional discussion about the project going forward.

Specifically, there are four issues regarding your report and subsequent public statements that warrant clarification:

1. Mistaken use of capital costs.

The Authority takes criticism seriously, and insists that our staff review external reports and reviews carefully. In fact, many of the revisions to our draft Plan were a direct result of external input.

So, when we learned of your report, we directed staff to review the BBVA study you cited and the underlying UIC data on which it was based (but which you did not reference). The Authority wanted to make sure that if you had indeed found an error that we were not aware of, we would be able to modify our plan to address the problem in an expeditious manner. The magnitude of the discrepancies you identified suggested that there was a serious problem with the data you used, leading us to consult the source data as opposed to relying on second-hand information.

JERRY BROWN
GOVERNOR



Staff quickly discovered that the BBVA report included a critical mistake – the authors had cited the UIC data incorrectly, using rolling stock acquisition costs as operating costs. The UIC has confirmed this error and has sent an extract of their HSR database to show that the data used was indeed acquisition cost of rolling stock (see table 1 attached).

As stated by Gianfranco Cau, senior advisor on rolling stock at UIC, in an April 26 email to our staff, “the ‘Operating Costs per train’ into your table [the table from BBVA report used in your report] are the data of acquisition for the High Speed Trains, not the operating costs. Our table says literally *Coûts/ Coût total - monnaie nationale, date d'achat* and I verified, as a reference, the costs of the Italian High Speed Trains that I know.”

2. Reference to BBVA report in the supporting technical documents of the Business Plan.

In the days since your report became publicized, Mr. Warren was quoted as saying that you, “took the BBVA data because it was footnoted in (the bullet train’s) business plan.”

The Business Plan did not utilize data from the BBVA report. Rather, the reference to the BBVA report in the Plan was only made to highlight other efforts to benchmark costs. There was no citation or use of BBVA data, so your suggestion that our Plan relied on the same flawed data as your report is inaccurate.

The data and methodology used to compile the estimated operating costs for the proposed high-speed rail system are explained in Chapter 6 of the Plan and in the supporting technical document available on the Authority’s website.

3. Use of passenger-miles for measurement of operating costs.

As we discussed at our November 17, 2011 meeting, the appropriate determination of operating costs is the cost per seat-mile, not passenger-mile. Using passenger-miles for operating costs is not only contrary to standard industry practice, but incorrect and misleading.

From a cost perspective, a railroad (or airline) is moving its equipment, not the people riding the train. The cost of moving the train (power, labor, etc.) is the same whether there are 10 passengers or 100 passengers. A cost per passenger-mile metric artificially skews the measurement of operating costs, making them appear lower for high passenger loads and higher for low passenger loads. This is why neither the airline nor passenger rail

industry relies on cost per passenger-mile as the measure of operating costs.

Surely, ridership is critical because passengers provide the primary source of revenues that offset the costs. Yet, while it is possible to make a calculation of costs per passenger-mile, such a calculation effectively mixes costs and revenues and does not provide an accurate picture of the cost of providing service.

4. Comparisons with other systems.

As we have noted in the past, comparisons with European systems are misleading because of the very different business structures they utilize. To get an accurate assessment on such matters, data cannot be used without ensuring that a true apples-to-apples comparison is being made. Below, we provide several comparisons of operation and maintenance costs between the proposed California HSR and international systems (see table 2 attached). The best parallel to California's proposed system is Taiwan's high-speed rail model where, unlike in Europe, the train operators own the tracks in a lean vertically integrated structure, similar to the one we are developing in California.

A study from UIC and data from Spanish AVE also contribute to demonstrate that the projected O&M costs for California high-speed rail are higher than those observed in other international systems; that is, that we have not understated costs.

I expect that we may well disagree on certain things going forward. However, I hope we can maintain a shared interest in open, accurate analysis and presentation of the information that shapes public discussion about high-speed rail in California. I trust that you will address the mistakes in your report that resulted from your reliance on the BBVA report.

Sincerely,

A handwritten signature in black ink, appearing to read 'Mike Rossi', with a long horizontal line extending to the right.

Mike Rossi
Member, California High-Speed Rail Authority Board

cc: California State Senate Committee on Transportation and Housing
California State Assembly Committee on Transportation
California State Senate Budget Subcommittee No. 2
California State Assembly Budget Subcommittee No. 3
California High-Speed Rail Legislative Peer Review Group
Alain Enthoven
Alan Bushell

TABLE 1

MATÉRIEL ROULANT À GRANDE VITESSE		HIGH SPEED RAIL ROLLING STOCK			
	UNITE		UNIT	ETR 500 (4)	
38	Coût total - monnaie nationale, date d'achat		Total Cost of Acquisition - local currency, year of purchase	46,025 M ITL	
39	Coût total - monnaie nationale, actualisé 1997		Total Cost of Acquisition - local currency, actualized 1997	52,560 M ITL	
40	Coût total - €, actualisé 1997 (ou année achat)	Mio €	Total Cost of Acquisition - in € actualized 1997	27.24	
41	Coût total - €, actualisé 2002 (aprox. 5 % annuel)	Mio €	Total Cost of Acquisition - in € actualized 2002	34.05	
48					
49				ETR 500	

ETR 480	AVE	ALARIS	ICE 1	ICE 2	ICE 3	ICE 3 Polycourant	ICE / T - ET415	TGV Réseau	THALYS
28,750 M ITL	2 693 M ESP		51,556 M DEM	38,550 M DEM	33,292 M DEM	37,970 M DEM	25,000 M DEM	13.57	19.82
32,632 M ITL	3 139 M ESP	860 M ESP (1)	61,145 M DEM	40,786 M DEM			26,450 M DEM	89 M FRF	130 M FRF
16.91	18.92	5.18	31.13	20.76	17.02	19.41	13.46	13.57	19.82
21.1375	23.65	6.475	38.9125	25.95	17.871	20.3805	15.479	16.96	24.78

ETR 480	AVE	ALARIS	ICE1	ICE2	ICE3	ICE 3 Polycourant	ICE/T ET415	TGV Réseau	THALYS
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TGV DUPLEX	TGV Réseau tric.	TALGO (REMORQ.)	TALGO (LOC+REM.)	ETR 500	VELARO	HTE	ICN
130 M FRF		590 M ESP		37,900 M ITL			
	93 M FRF	605 M ESP		49,535 M ITL			20,75 M CHF
19.82	14.06	3.64		25.67			14.09
20.81							
TGV DUPLEX	TGV Réseau tric.	TALGO (REMORQ.)	TALGO (LOC+REM.)	ETR 500	VELARO	HTE	ICN

TABLE 2

O&M Costs of HSR		Notes	Cost per Seat-Mile
O&M Costs [cents per seat-mile]	CAHSR	(1)	¢ 6.3 – 6.7
	Taiwan HST	(2)	¢ 3.1
	AVE Spain	(3)	¢ 2.4 – 3.4
	UIC	(4)	¢ 5.4

(1) - Phase 1 Blended forecast in 2040 in \$2010 (low – high range)

(2) - Taiwan HSR Corporation, “Year End Financial Report 2010 & 2009”, March 31, 2010

(3) - Sanchez-Borras, Robuste, & Criado, “High-Speed Railways in Spain”, pp. 39-48, “Transportation Research Record, No. 2261 -- Railways 2011”. Range calculated from Figures 4, 5, & 6, and Table 4.

(4) - “Relationship between rail service operating direct costs and speed”, UIC, January 2010, pages 44-45, Table 10 and Figure 6, http://www.uic.org/IMG/pdf/report_costs.shs.pdf



Attachment Nine

**The LAO May 4 2012 Comments On
Operating And Maintenance (O&M)
Costs Used In The CHSRA's
Revised Draft Business Plan of
April 2012**



May 4, 2012

Hon. Diane Harkey
Assembly Member, 73rd District
Room 6027, State Capitol
Sacramento, California 95814

Dear Assembly Member Harkey:

This letter responds to your request regarding operating and maintenance (O&M) cost projections for the California High-Speed Rail (HSR) project. Specifically, you asked that we examine the operating cost structures of several existing HSR systems outside of the United States, and use this information in assessing (1) the reliability of the California High-Speed Rail Authority's (HSRA's) own operating cost projections, and thus, (2) the ability of California's system to meet the legal requirement that the planned passenger service not require an operating subsidy. In conducting our analysis, you asked that we consider the various reports and briefs on the HSR project previously prepared by William C. Grindley, Alain C. Enthoven, William H. Warren, and Alan H. Bushnell (hereafter referred to as GEWB).

Principal Findings. Our analysis finds that the O&M costs estimated by the HSRA are about 10 cents per passenger-mile (the number of seats per train per mile traveled), consistent with the findings of GEWB. Our review also found no serious concerns with HSRA's overall methodology for estimating these costs, which suggests that based on HSRA's ridership and revenue estimates it is possible for HSR to operate without a subsidy. We then analyzed the O&M costs for foreign HSR systems, which was difficult because of factors such as foreign institutional arrangements between governments and rail operators, subsidy practices, access fees, language differences, and cost accounting procedures. Based on our analysis, we estimate that O&M costs for existing systems were in the range of 30 cents per passenger-mile, somewhat below the value estimated by GEWB, but still well above the O&M costs estimated by the HSRA. However, we were unable to completely reconcile the significant gap between the O&M costs observed by GEWB and the O&M costs estimated by HSRA. At least two studies are forthcoming which may help to more satisfactorily explain the differences in these estimates. It is unlikely, however, that these studies will be available in time to inform the Governor's 2012-13 budget request to begin HSR construction in the Central Valley.

BACKGROUND

Operating Subsidy Not Allowed. In November 2008, voters approved Proposition 1A, which authorizes the state to sell up to \$9.95 billion in general obligation bonds to partially fund the development and construction of an HSR system. Proposition 1A also imposed numerous statutory requirements on the development of this HSR system. Among these is a requirement that the planned

Legislative Analyst's Office
California Legislature
Mac Taylor · Legislative Analyst
925 L Street, Suite 1000 · Sacramento CA 95814
(916) 445-4645 · FAX 324-4281

passenger service not require a local, state, or federal operating subsidy. The term “operating subsidy” is not defined in statute.

The HSRA has defined O&M costs to include the (1) salaries and benefits of all personnel; (2) electric power; (3) maintenance and cleaning of trains and stations; (4) maintenance of track way and track structures such as viaducts, tunnels, and bridges; (5) insurance; (6) the provision of feeder bus service; and (7) administrative costs, which include sales, marketing and reservation costs, control center operations, security, general administration, and support. According to the HSRA, O&M costs do *not* include (1) initial capital outlay for the track, maintenance facilities, and stations; (2) acquisition of trains; (3) interest on debt; or (4) capital asset renewal and replacement.

Business Plan Indicates Operating Surplus Achievable. The HSRA released its most recent business plan in April with somewhat revised cost and ridership estimates. The business plan indicates that passenger train operations will begin in 2022 for service between Merced and the San Fernando Valley. Ridership on this Initial Operating Segment (IOS) is expected to be about 8 million passengers per year in 2025. The plan assumes that passenger train service between San Francisco and Los Angeles will begin in 2028 with ridership of about 26 million passengers in 2035. Annual revenues for the IOS portion are estimated at \$0.8 billion in 2025 and annual revenues for the completed system are estimated at \$3.3 billion in 2035. At these levels of ridership and revenue, the HSRA indicates that no operating subsidy would be necessary. The HSRA estimates that O&M costs in 2035 would be \$1.4 billion and so the project would generate a significant operating surplus.

Critics Assert an Operating Subsidy Would Be Necessary. Although GEWB has made a number of points in its publications, three appear to be particularly important in the context of considering HSR costs and the possible need for operating subsidies.

- First, the GEWB analysis assumes average O&M costs of roughly 10 cents per passenger-mile for California.
- Second, GEWB presents evidence on actual HSR experience outside of the US that suggests average O&M costs are more in the range of 45 cents per passenger-mile.
- Thus, GEWB finds that if the actual costs incurred in California were more in the range of what has been experienced elsewhere outside of the U.S., a large operating deficit would result unless revenues somehow were more than doubled. Because this would require much higher ticket prices that would, in turn, significantly reduce ridership, operating subsidies would be unavoidable.

California's HSR Cost Projections

The HSRA's primary consultant, Parsons Brinkerhoff, developed a model to estimate costs for ten components of operating and maintaining a high-speed passenger rail system. These ten components have been subsequently collapsed into a simplified model with six aggregated components. Figure 1 (see next page) summarizes the various O&M cost components along with the activity unit and the cost per unit. While this is a simplified model, suitable for quickly estimating the O&M costs of any reasonable scenario in the proposed California HSR system, the underlying cost calculations include a variety of different assumptions and can be quite complicated. They incorporate a wide range of factors such as fixed versus variable components and assumptions about the lifecycle of various equipment, annual demand, ridership peaking factors, service schedules, and maintenance schedules, among many other assumptions. As mentioned earlier, costs excluded from

the O&M calculations include capital costs (including initial outlays, acquisition of trains, and debt-service) and capital replacement costs.

Figure 1
Operating and Maintenance Cost Components of California's High-Speed Rail

Train operations and maintenance ^a	Train miles	\$20
Infrastructure maintenance	Route miles	200,000
Stations and train cleaning	Number of stations	4,100,000
Insurance	Lump sum	25,000,000
Administration and support ^b	Percent of above costs	10 percent
Contingency	Percent of above costs	10 percent

^a This component includes train crew, electric power, and trainset maintenance.
^b This component includes sales, marketing, reservations, administration, and control center staffing.

No Serious Concerns Regarding O&M Cost Estimation Methodology. We reviewed the written methodology for estimating O&M costs provided to us by HSRA and asked their consultants clarifying questions in writing and in meetings. The methodology and the assumptions appear to be reasonable. The largest driver of cost, by far, is the operation and maintenance of equipment. This is a cost that varies with the number of train miles traveled and therefore, if demand is low, there would be fewer trains making fewer trips. After considering specific assumptions and sources of cost data, we found no major errors and could identify no major omissions that would lead to a significant increase in the cost per passenger-mile. Despite finding HSRA's cost estimation methodology reasonable, we note that there are a number of risks that could affect actual O&M costs once the system is operational. Specifically, insufficient ridership would increase the risk of an operating subsidy given the high fixed O&M costs. In addition, major cost components, such as electricity and wages, could increase at a faster rate than general price inflation for various reasons.

Including Capital Renewal and Replacement Costs Would Increase O&M Costs. While HSRA's O&M costs do not appear to have any serious omissions or include unfounded assumptions, the costs—as noted earlier—do not include capital renewal and replacement costs. That is, the O&M costs do not reflect that HSR assets are being used up over time beginning when the asset is placed in service (commonly referred to as depreciation). Adding an expense item for depreciation would increase O&M costs. It is unclear whether there is a standard practice internationally for the treatment of these capital-related costs.

Magnitude of Costs. In order to compare the estimated O&M costs of California's system with costs of other HSR systems, we asked HSRA to express their costs in terms of dollars per passenger-mile. The results varied by the number of years of operation and the stage of construction involved. For the Phase 1 system, however, the costs for the different scenarios were in the range of 10 cents per passenger-mile, or similar to what GEWB had assumed.

COSTS OF OTHER HSR SYSTEMS COMPARED TO CALIFORNIA

There are several other HSR systems in operation throughout the world, with the precise number depending on exactly how the term “high speed” is defined. These existing systems include (1) our domestic Amtrak *Acela* system on the East Coast of the U.S., and (2) foreign systems, including those operating in Belgium, Spain, France, Germany, Italy, Japan, and Korea. It is our understanding that most of these systems require subsidies of various sorts, including operating subsidies.

Comparing Operating Costs Is Challenging

Comparing the O&M costs of HSR in California to foreign systems can be especially challenging because of:

- Difficulties in obtaining correct O&M cost data for other systems. In many cases this requires access to the proprietary private information of operators and, since private operators compete for their contracts, they can be reluctant to share internal information with others.
- Differences in how costs are defined and measured, including how capital costs are treated, and international differences in cost accounting rules and procedures.
- Governmental subsidies, which can distort cost and revenue data and obscure true underlying operating margins.
- The need to apply exchange rates in order to compare costs when different currencies are used can significantly change the value of the O&M costs when converted into U.S. dollars.
- The common practice of paying “access charges.” High-speed rail service operators do not own and maintain the track, but instead lease capacity from the owner of the infrastructure, paying what are known as access charges. These charges vary and it is difficult to determine how they impact the O&M costs for different operators.
- International differences in labor costs and benefits and how they are accounted for in the O&M cost calculations.
- The different physical and operational characteristics of track—such as the age of the infrastructure (which increases costs) and the extent to which HSR systems share the route with other passenger rail services or freight trains.
- Various types of accounting policies used in certain countries, which in some cases can understate costs so as to obscure operating deficits due to government subsidy-related policies and requirements.

Comparisons With the Amtrak *Acela* Service Are Difficult

We were unable to validate the HSRA’s O&M costs by looking at those of the Amtrak *Acela* service because there are many significant differences between that system and the one planned for California. Foremost, the California HSR will travel primarily on dedicated tracks maintained by the HSRA or a private operator. In contrast, Amtrak must lease capacity at a premium price from private freight railroad companies which are responsible for maintaining their track. The access charges are

costly and reflect the demand for both passenger and freight travel along the busy northeastern rail corridor. In addition, administrative expenses are spread across Amtrak's entire nationwide system.

This attempted comparison helps to highlight some of the factors that make an apples-to-apples comparison of the operating costs of different railroads difficult. First, track maintenance may be performed by a different company than the operator and this company may not wish to make its cost structure transparent for competitive reasons. Or it may simply be difficult to isolate the cost of maintaining one corridor of track by a company that maintains thousands of miles of track. Second, it is our understanding that high-speed track is more costly to maintain than standard track for trains traveling at speeds between 79 miles per hour (MPH) and 110 MPH. Third, a significant component of the O&M costs for many passenger rail operators are access fees, which the California HSR system will not pay unless the current business model is changed. Lastly, passenger rail operators that operate multiple rail services may be required to cross-subsidize a low-revenue service with the excess operating margin from a high-revenue service.

International Comparisons Raise Concern

According to the HSRA, it relied on extensive international case studies to develop their O&M cost estimation model. To help conduct our analysis, we requested from HSRA contact information for international HSR operators on three separate occasions and never received that information. Therefore, our comparison of the California HSR costs with other systems relies heavily on publically available documents, many provided by the HSRA and cited in their own documentation, as well as sources familiar with international rail systems that we cultivated ourselves.

The primary data source for O&M costs for various HSR systems is a 2007 report *Economic Analysis Of High Speed Rail In Europe*. (The report was funded by a foundation created by a Spanish bank, BBVA, and is hereafter referred to as the BBVA Foundation report.) According to the authors, the database used for the report includes data for 166 projects in 20 countries, 40 of which are projects already in operation, 41 of which are currently under construction, and 85 of which are somewhere in the planning or approval stage. Using this data we arrived at somewhat lower average costs than GEWB—about 30 cents per passenger-mile compared to 45 cents. However, the costs per passenger-mile for various international systems are still well-above that estimated by HSRA.

The magnitude of the cost discrepancy between BBVA and HSRA suggests that a variety of factors are involved which likely result from definitional, measurement, and accounting issues. However, we have been unable to satisfactorily reconcile the two numbers completely, despite communications with both domestic and foreign parties familiar with the data.

HSRA's Viewpoint

We have asked HSRA about the significant difference between its own O&M cost estimates and those associated with the BBVA Foundation report. The HSRA has been adamant that the two numbers are "apples and oranges" due to a variety of factors, including those identified above. It is HSRA's contention that, in many cases, foreign costs are actually lower than estimated California costs would be, after making adjustments for accounting and other differences. We have asked HSRA to reconcile the differences for us, since we believe it should be its responsibility to show why its own O&M cost numbers differ from those of others, especially those purporting to reflect the actual operating experience of other systems. The HSRA has informed us that it is in the process of contacting the authors of the BBVA Foundation report to try to explain why the numbers differ. In

addition, the HSRA has contacted another group that is reviewing O&M costs for the Federal Railroad Administration. The HSRA told us that this group may have developed a better understanding of the BBVA Foundation report and can explain why those numbers are so high and may be incorrect. However, we were provided with no further information to independently verify this although we understand that a report on those findings by this group is forthcoming.

In addition, the HSRA is joining the Union Internationale des Chemins de fer (UIC), an organization of rail operators headquartered in Europe. The HSRA has told us that they intend to request the staff of the UIC review and comment on its O&M cost estimates. The HSRA expects preliminary results to be available as early as the end of June; however, a more detailed report will not be available until October 2012. This review might offer some additional useful information regarding the reliability of HSRA's cost estimates.

CLOSING COMMENTS

The reliability of HSRA's O&M cost estimates is of critical importance in ensuring that California's system can function without an operating subsidy, as required by state law. While we found no serious concerns with the authority's O&M cost estimates, we were not able to reconcile their numbers with O&M cost estimates of other systems. We have requested that HSRA explain the significant difference between their estimated O&M costs and those identified for operating HSR systems in the BBVA Foundation report. The HSRA has indicated that at least two studies addressing these issues are forthcoming. It is unlikely, however, that these studies will be available in time to inform the Governor's 2012-13 budget request for \$2.7 billion to fund construction in the Central Valley.

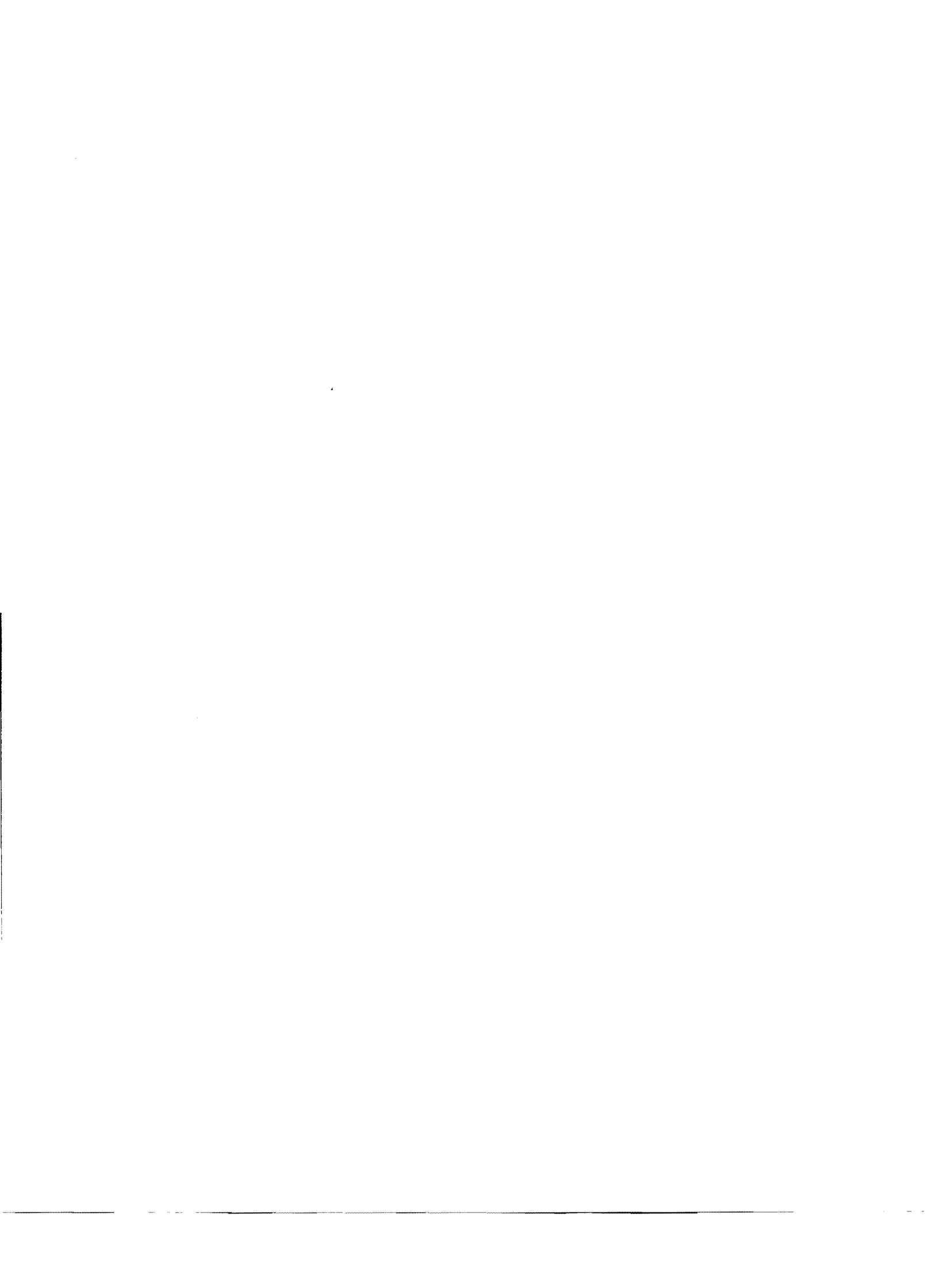
Should you have questions regarding this information, please contact Brian Weatherford of my staff at (916) 319-8337 or Brian.Weatherford@lao.ca.gov.

Sincerely,



Mac Taylor
Legislative Analyst

cc: Hon. Ted Gaines
Hon. Doug LaMalfa
Hon. Kevin Jeffries



Attachment Ten

**Amtrak Operating Performance
for San Joaquin Route
for FFY 2008-2009**

SAN JOAQUIN ROUTE

OPERATING PERFORMANCE FROM AMTRAK BILLINGS
OPERATING PERFORMANCE

FFY 2008-09 SUMMARY

	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	FFY 2008-09
TRAIN SERVICE													
AMTRAK MONTHLY BILLING SUPPORT ITEMIZATION													
REVENUE													
Train Transportation	\$ 1,602,444	\$ 1,196,836	\$ 1,812,285	\$ 1,378,806	\$ 1,280,804	\$ 1,427,617	\$ 1,542,744	\$ 1,627,129	\$ 1,650,578	\$ 1,677,024	\$ 1,790,291	\$ 1,427,665	\$ 18,611,823
Food & Beverage	\$ 289,716	\$ 116,345	\$ 149,193	\$ 170,474	\$ 130,026	\$ 122,988	\$ 158,538	\$ 79,048	\$ 143,015	\$ 260,062	\$ 188,714	\$ 147,129	\$ 1,935,248
Mail-Express-Other	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Train Revenue	\$ 1,892,160	\$ 1,312,981	\$ 1,961,478	\$ 1,547,280	\$ 1,410,630	\$ 1,550,605	\$ 1,701,282	\$ 1,706,177	\$ 1,793,593	\$ 2,137,086	\$ 1,979,005	\$ 1,574,794	\$ 20,547,071
EXPENSES													
Train and Engine Crews	\$ 696,403	\$ 754,684	\$ 881,796	\$ 769,472	\$ 657,899	\$ 738,423	\$ 698,013	\$ 733,344	\$ 704,064	\$ 756,092	\$ 709,107	\$ 713,602	\$ 8,812,899
Train Fuel & Power	\$ 511,792	\$ 318,257	\$ 249,621	\$ 306,700	\$ 216,524	\$ 218,003	\$ 260,110	\$ 213,955	\$ 331,412	\$ 244,884	\$ 413,998	\$ 314,226	\$ 3,598,482
On-Board Svc - Labor	\$ 114,365	\$ 119,472	\$ 123,133	\$ 124,219	\$ 96,963	\$ 123,608	\$ 113,168	\$ 126,170	\$ 109,835	\$ 115,071	\$ 111,737	\$ 111,895	\$ 1,388,610
On-Board Svc - Supplies	\$ 69,891	\$ 78,968	\$ 100,195	\$ 71,023	\$ 35,649	\$ 79,954	\$ 89,174	\$ 72,513	\$ 94,302	\$ 89,948	\$ 101,681	\$ 97,521	\$ 980,820
Rolling Stock Rental	\$ 6,742	\$ (2)	\$ 2,755	\$ 1,208	\$ 911	\$ 1,749	\$ -	\$ 5,095	\$ 1,558	\$ -	\$ 524	\$ 4,064	\$ 24,604
Station Services	\$ 419,515	\$ 438,243	\$ 446,196	\$ 449,121	\$ 401,175	\$ 410,609	\$ 389,418	\$ 426,473	\$ 386,976	\$ 436,535	\$ 410,603	\$ 377,673	\$ 4,992,537
Transportation	\$ 229,038	\$ 244,566	\$ 244,613	\$ 283,084	\$ 293,765	\$ 261,072	\$ 258,060	\$ 228,549	\$ 299,958	\$ 264,764	\$ 334,657	\$ 331,097	\$ 3,267,613
Maint. of Equipment	\$ 780,347	\$ 722,197	\$ 732,482	\$ 1,222,350	\$ 370,964	\$ 743,642	\$ 591,082	\$ 591,082	\$ 750,041	\$ 653,367	\$ 693,063	\$ 662,578	\$ 8,251,714
Maintenance of Way	\$ 179,401	\$ 174,328	\$ 192,864	\$ 177,045	\$ 189,610	\$ 188,858	\$ 174,348	\$ 200,901	\$ 192,511	\$ 208,223	\$ 197,069	\$ 179,867	\$ 2,247,925
Other Railroad	\$ 16,380	\$ 24,705	\$ 24,460	\$ 26,030	\$ 21,370	\$ 25,307	\$ 21,555	\$ 21,453	\$ 21,426	\$ 21,591	\$ 21,836	\$ 17,074	\$ 266,187
RR Performance Pmts	\$ 157,730	\$ 349,223	\$ 326,233	\$ 412,970	\$ 314,990	\$ 345,126	\$ 392,920	\$ 396,920	\$ 399,833	\$ 403,252	\$ 442,022	\$ 466,542	\$ 4,407,761
Commissary	\$ 38,271	\$ 81,253	\$ 76,013	\$ 81,329	\$ 68,760	\$ 116,202	\$ 79,742	\$ 79,633	\$ 167,329	\$ 69,576	\$ 82,903	\$ 102,666	\$ 1,043,677
Crew Base	\$ 8,401	\$ 9,401	\$ 9,859	\$ 9,562	\$ 8,425	\$ 9,063	\$ 8,645	\$ 7,835	\$ 7,440	\$ 7,816	\$ 7,277	\$ 12,817	\$ 106,611
Marketing & Other Advertising	\$ 54,055	\$ 40,842	\$ 43,605	\$ 40,964	\$ 43,184	\$ 45,605	\$ 54,548	\$ 59,448	\$ 47,779	\$ 44,381	\$ 55,519	\$ 62,714	\$ 692,554
Route Advertising	\$ 114,231	\$ 30,371	\$ 57,905	\$ 108,327	\$ 31,248	\$ 95,556	\$ 89,748	\$ 21,364	\$ 13,038	\$ 14,933	\$ 24,967	\$ 32,904	\$ 634,582
Commissions	\$ 52,244	\$ 65,207	\$ 51,225	\$ 49,112	\$ 45,988	\$ 50,104	\$ 51,689	\$ 38,909	\$ 54,111	\$ 50,017	\$ 54,246	\$ 50,354	\$ 612,206
Sales	\$ 19,527	\$ 15,123	\$ 17,639	\$ 17,815	\$ 15,961	\$ 17,270	\$ 17,851	\$ 22,233	\$ 17,297	\$ 19,598	\$ 16,321	\$ 19,756	\$ 216,091
Information & Reservations	\$ 168,438	\$ 172,118	\$ 225,987	\$ 242,328	\$ 212,164	\$ 177,426	\$ 184,072	\$ 191,567	\$ 213,714	\$ 215,789	\$ 185,280	\$ 221,115	\$ 2,409,998
General Support	\$ 124,260	\$ 122,484	\$ 128,761	\$ 138,344	\$ 123,725	\$ 115,816	\$ 123,714	\$ 121,389	\$ 129,187	\$ 126,088	\$ 106,433	\$ 132,560	\$ 1,492,851
Insurance	\$ 146,445	\$ 154,957	\$ 223,009	\$ 189,777	\$ 174,861	\$ 146,456	\$ 162,219	\$ 148,621	\$ 150,535	\$ 143,170	\$ 27,435	\$ (586,627)	\$ 1,068,657
Total Train Expenses	\$ 3,810,496	\$ 3,906,398	\$ 4,158,191	\$ 4,719,870	\$ 3,810,845	\$ 3,810,879	\$ 3,740,805	\$ 3,885,413	\$ 3,895,872	\$ 3,833,791	\$ 3,866,198	\$ 3,192,335	\$ 46,516,489
Train Income (Loss)	\$(2,018,336)	\$(2,593,417)	\$(2,196,713)	\$(3,172,590)	\$(2,400,215)	\$(2,360,274)	\$(2,039,523)	\$(2,159,236)	\$(2,202,079)	\$(1,796,705)	\$(1,907,188)	\$(1,617,541)	\$(25,965,418)
Supplemental Expenses - State Only													
Inventory Purchases	\$ 67,999	\$ (53,518)	\$ 49,090	\$ 28,461	\$ (28,720)	\$ (67,322)	\$ 35,959	\$ 35,959	\$ 28,097	\$ (89,629)	\$ 32,758	\$ (88,286)	\$ (49,152)
Road Foreman	\$ 10,100	\$ 10,100	\$ 10,100	\$ 10,100	\$ 10,100	\$ 10,100	\$ 10,100	\$ 10,100	\$ 10,100	\$ 10,100	\$ 10,100	\$ 10,100	\$ 121,200
Sales Mar & Maint Sched Mar	\$ 13,200	\$ 13,200	\$ 13,200	\$ 13,200	\$ 13,200	\$ 13,200	\$ 13,200	\$ 13,200	\$ 13,200	\$ 13,200	\$ 13,200	\$ 13,200	\$ 158,400
Oakland Security Services	\$ 23,028	\$ 23,028	\$ 16,675	\$ 27,792	\$ -	\$ 11,116	\$ 16,675	\$ 16,675	\$ 5,558	\$ 16,675	\$ -	\$ -	\$ 154,222
Equipment Operation Liaison	\$ 9,500	\$ 9,500	\$ 9,500	\$ 9,500	\$ 9,500	\$ 9,500	\$ 9,500	\$ 9,500	\$ 9,500	\$ 9,500	\$ 9,500	\$ 9,500	\$ 117,000
San Joaquin Special Trains	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
On-Board Operations Supervisor	\$ 10,100	\$ 10,100	\$ 10,100	\$ 10,100	\$ 10,100	\$ 10,100	\$ 10,100	\$ 10,100	\$ 10,100	\$ 10,100	\$ 10,100	\$ 10,100	\$ 60,600
Electricians	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 46,500
Oakland Maint Facility Insurance	\$ 14,454	\$ 14,454	\$ 14,454	\$ 14,454	\$ 12,729	\$ 12,729	\$ 12,729	\$ 12,729	\$ 12,729	\$ 12,729	\$ 12,729	\$ 12,729	\$ 159,648
Equipment Insurance	\$ 32,113	\$ 32,113	\$ 32,113	\$ 32,113	\$ 61,182	\$ 61,182	\$ 61,182	\$ 61,182	\$ 61,182	\$ 61,182	\$ 61,182	\$ 61,182	\$ 1,492,851
Total Supplemental Exp	\$ 186,494	\$ 58,777	\$ 185,232	\$ 146,719	\$ 80,997	\$ 60,805	\$ 159,345	\$ 159,345	\$ 140,266	\$ 182,718	\$ 182,718	\$ 182,718	\$ 1,386,322
Gr. Total Train Income(Loss)	\$(2,198,830)	\$(2,652,394)	\$(2,351,945)	\$(3,318,309)	\$(2,481,020)	\$(2,421,469)	\$(2,180,178)	\$(2,342,445)	\$(2,342,445)	\$(1,830,461)	\$(2,069,906)	\$(1,659,215)	\$(27,355,740)
CONNECTING BUS SERVICE - State Only													
REVENUE													
1 - Los Angeles Buses	\$ 236,964	\$ 296,334	\$ 434,050	\$ 352,801	\$ 290,187	\$ 284,046	\$ 310,647	\$ 261,426	\$ 350,307	\$ 410,424	\$ 355,388	\$ 293,399	\$ 3,865,973
3 - Stockton-Sacto-Redding	\$ 116,248	\$ 103,408	\$ 132,801	\$ 112,752	\$ 90,847	\$ 102,398	\$ 107,830	\$ 97,177	\$ 89,496	\$ 132,053	\$ 105,988	\$ 95,852	\$ 1,285,844
6 - Stockton-San Jose	\$ 21,494	\$ 23,989	\$ 30,099	\$ 28,425	\$ 28,248	\$ 21,733	\$ 24,629	\$ 22,558	\$ 22,665	\$ 30,211	\$ 20,183	\$ 22,361	\$ 296,755
7 - Martinez-Eureka	\$ 71,139	\$ 69,468	\$ 109,479	\$ 86,506	\$ 47,190	\$ 72,514	\$ 64,305	\$ 74,037	\$ 74,136	\$ 81,134	\$ 79,023	\$ 73,419	\$ 925,348
9 - Bakersfld-Baratow-Las Vegas	\$ 34,482	\$ 37,779	\$ 54,125	\$ 37,752	\$ 34,073	\$ 31,119	\$ 36,141	\$ 34,354	\$ 50,015	\$ 63,066	\$ 60,669	\$ 46,306	\$ 525,880
10 - Bakersfld-Santa Barbara	\$ 41,241	\$ 44,675	\$ 59,294	\$ 42,138	\$ 38,222	\$ 44,635	\$ 42,763	\$ 37,529	\$ 48,708	\$ 52,778	\$ 46,537	\$ 39,455	\$ 535,925
12 - Bakersfld-Lncstr-Palmdale	\$ 20,738	\$ 16,212	\$ 26,130	\$ 24,925	\$ 14,333	\$ 19,385	\$ 18,450	\$ 11,727	\$ 15,144	\$ 17,702	\$ 13,214	\$ 10,200	\$ 208,360
15 - Modesto-Yosemite	\$ 285	\$ -	\$ -	\$ -	\$ 322	\$ -	\$ -	\$ -	\$ 14,566	\$ 23	\$ 22	\$ 11	\$ 15,219
18 - Visalia-Hanford-Santa Mana	\$ 28,397	\$ 25,359	\$ 35,278	\$ 28,718	\$ 27,953	\$ 27,569	\$ 27,469	\$ 23,875	\$ 28,766	\$ 34,784	\$ 30,425	\$ 24,775	\$ 343,366
19 - Bakersfld-SBdo-Indio	\$ 55,633	\$ 60,127	\$ 98,566	\$ 73,684	\$ 61,514	\$ 61,829	\$ 65,893	\$ 47,949	\$ 71,279	\$ 82,147	\$ 72,088	\$ 56,235	\$ 806,944
34 - Stockton-San Francisco	\$ 16,717	\$ 17,758	\$ 18,339	\$ 14,870	\$ 20,390	\$ 13,411	\$ 16,747	\$ 7,116	\$ 25,837	\$ 15,032	\$ 15,491	\$ 19,688	\$ 201,396
35 - San Jose-Santa Cruz	\$ -	\$ -	\$ -	\$ -	\$ 3,325	\$ 647	\$ 672	\$ 740	\$ 608	\$ 741	\$ 610	\$ 533	\$ 7,876
56 - ACE	\$ 6,856	\$ 74	\$ 978	\$ 141	\$ 6,125	\$ 7,792	\$ 84	\$ 1,973	\$ 84	\$ 162	\$ 49	\$ 56	\$ 16,414
Total Bus Revenue	\$ 686,194	\$ 685,181	\$ 999,137	\$ 811,712	\$ 683,029	\$ 691,078	\$ 715,630	\$ 620,455	\$ 795,641	\$ 928,317	\$ 799,667	\$ 682,289	\$ 9,050,350
EXPENSE													
1 - Los Angeles Buses	\$ 379,999	\$ 382,049	\$ 462,101	\$ 397,857	\$ 354,256	\$ 390,326	\$ 392,256	\$ 308,961	\$ 378,119	\$ 401,468	\$ 393,417	\$ 370,043	\$ 4,689,889
3 - Stockton-Sacto-Redding	\$ 274,035	\$ 262,800	\$ 285,345	\$ 250,126	\$ 232,998	\$ 252,654	\$ 226,834	\$ 224,834	\$ 201,110	\$ 208,155	\$ 206,074	\$ 200,583	\$ 2,617,233
6 - Stockton-San Jose	\$ 73,792	\$ 71,411	\$ 78,888	\$ 73,792	\$ 66,651	\$ 72,192	\$ 71,411	\$ 73,792	\$ 71,411	\$ 73,792	\$ 71,411	\$ 71,411	\$ 1,537,334
7 - Martinez-Eureka	\$ 140,164	\$ 139,515	\$ 144,914	\$ 139,464	\$ 125,967	\$ 139,464	\$ 134,965	\$ 131,677	\$ 121,841	\$ 125,903	\$ 125,903	\$ 121,841	\$ 1,591,618
9 - Bakersfld-Baratow-Las Vegas	\$ 87,828	\$ 85,269	\$ 87,828	\$ 87,828	\$ 79,328	\$ 87,828	\$ 84,995	\$ 58,267	\$ 42,765	\$ 44,191	\$ 44,191	\$ 42,765	\$ 833,083
10 - Bakersfld-Santa Barbara	\$ 104,989	\$ 95,910	\$ 99,107	\$ 99,107	\$ 97,157	\$ 99,107	\$ 95,910	\$ 99,107	\$ 99,107	\$ 99,107	\$ 99,107	\$ 99,107	\$ 1,180,424
12 - Bakersfld-Lncstr-Palmdale	\$ 44,589	\$ 43,261	\$ 44,580	\$ 40,248	\$ 44,580	\$ 43,122	\$ 44,580	\$ 43,122	\$ 44,580	\$ 44,580	\$ 43,122	\$ 52,794	\$ 528,794
15 - Modesto-Yosemite	\$ 24,800	\$ 24,000	\$ 25,300	\$ 29,600	\$ -	\$ 47,200	\$ 24,000	\$ 27,200	\$ 24,000	\$ 25,026	\$ 25,325	\$ 24,000	\$ 300,091
18 - Visalia-Hanford-Santa Mana	\$ 47,401	\$ 47,915	\$ 51,033	\$ 47,400	\$ 43,503	\$ 51,999	\$ 50,325	\$ 51,999	\$ 50,325	\$ 51,999	\$ 51,999	\$ 50,3	

Attachment Eleven

**Official Statement from the
Union Internationale des Chemins de
Fer (UIC) [International Union of
Railways] (IUR) on
Operating Costs and Profitability
February 8th 2011**



INTERNATIONAL UNION
OF RAILWAYS

unity, solidarity, universality

Directeur Général
Tel. + 33 1 44 49 20 10
loubinoux@uic.org
(KVC)

Mr. Roelof van Ark
Chief Executive Officer
California High-Speed Rail Authority
925 L Street – Suite 1425
Sacramento, California, CA 9514
U.S.A.

Paris, 8 February 2011

Dear Mr. van Ark,

First of all we apologise for our late answer to your letter relating to the development prospects for high speed rail in the USA, in particular California, and to the experience of other countries – mainly Europe and Japan – in operating high speed trains.

Incidentally, you informed us that certain individuals opposed to the introduction of high speed rail in the United States recently circulated a report in California whose intention was to discredit the feasibility and in particular the economic viability of this type of transport.

You also mention that this report refers to statements apparently made by UIC representatives – in particular the UIC High Speed Director – that “only two segments of two high speed rail systems in Europe and Japan break even”.

This quote, clearly taken out of context, gives the overriding impression that high speed rail systems cannot be profitable as a matter of course and therefore require “Operating Subsidies” to break even.

These remarks are incorrect and biased; they neither reflect how business models for high speed are applied in Europe and Japan, nor UIC’s overall stance on the matter. The remarks are clearly part of a campaign to discredit railway transport to benefit other interests.

This is why I am enclosing the following clarification on behalf of UIC, which you may of course use and circulate among your contacts in the United States with reference to UIC.

With best regards,

Jean-Pierre LOUBINOUX



Copy to:

Dr. Michael Clausecker,
General Director UNIFE



INTERNATIONAL UNION
OF RAILWAYS

unity, solidarity, universality

February 2011

Official stance of UIC, the worldwide railway association, on the profitability of the high speed rail system

UIC Position paper concerning High speed

UIC has become aware of a document that has been circulated in the United States, particularly in California, lobbying against the introduction of a high speed rail system in the United States. According to the information we have received, one of the arguments advanced by opponents of the introduction of high speed is the non-profitability of this transport system and the necessary consequence thereof: the payment of "Operating Subsidies" by public authorities, which amounts to a burden for taxpayers and society.

This document seemingly also quotes statements allegedly made by UIC's High Speed Director, according to whom "only two segments of two high speed rail systems in Europe and Japan break even".

As the worldwide railway association whose members include, specifically, all the companies operating high speed services around the world, the International Union of Railways (UIC), cannot allow such untruths to be circulated, nor can it permit the continued use of incorrect arguments against the introduction of a mode of transport recognised as one of the most efficient, cost effective and generally beneficial to society.

Further, UIC cannot allow remarks made by its directors to be repeated out of context and reproduced incorrectly with regard to presentations delivered at seminars and conferences.

High Speed Rail is profitable as a transport system in both Europe and Japan

The most common economic models currently used in Europe and Japan when introducing and operating high speed rail services **consider two types of cost:**

-Operating costs that will mainly be borne by operating companies (costs to be paid from farebox revenues); these costs will include operating and maintenance costs, amortisation of rolling stock, maintenance depots, payment of track access fees by operators, energy costs, etc.

-Costs borne by the public authorities as the owner of rail infrastructure (as for other public infrastructure, highways or public airports). Moreover, according to the European legislation passed under the EU's policy of rail liberalisation, rail infrastructure must be managed separately from train operations (physical/legal separation or at least organisational/financial separation). European rail infrastructure, including high speed rail infrastructure, has to be open to all certified operating companies, incumbent railway companies as well as new entrants.

Generally speaking Operating Costs can be covered by farebox revenues making the operations of HS systems an attractive proposition for private investors.

The public authorities/society generally bear the costs of investing in new infrastructure, constructing and maintaining the infrastructure and related equipment such as safety, control-command and signalling, etc. The payment of track access fees, depending on their level can cover operating and maintenance costs of such infrastructure.

Economic calculations for infrastructure projects in Europe include all the socioeconomic benefits of future rail infrastructure and its contribution to society (particularly in terms of environmental protection and sustainability), which can shoulder the cost of the infrastructure.

When evaluating such projects, economic calculations by European banks (e.g. the European Investment Bank) also systematically include the contribution of future rail infrastructure to improving citizens' lives. The projects also quantify advantages such as reducing road congestion and road accidents, reducing air pollution and CO2 emissions, optimising land use (compared to more space-consuming road infrastructure), land planning, improving inter-regional links, etc.

To summarise, all high speed rail projects developed in Europe have to be considered profitable as a system (combining profitability for the operating company and profitability for the society to which the state-owned rail infrastructure belongs).

The situation is slightly different in Japan as the state first builds the rail infrastructure (as a contribution to society, in view of the overall advantages of rail transportation) and then transfers ownership to the rail operating company, which subsequently has to bear all the various costs already mentioned with regard to Europe (train operating costs as well as infrastructure operating and maintenance costs).

Two high speed lines cover all operating and infrastructure costs

The document circulated in the United States also states the following argument, quoting UIC: *"The Director of High speed rail at the International Union of Railways (UIC) stated that only two segments of two high speed rail systems in Europe and Japan break even"*.

This wording has been reproduced in a resolutely (and intentionally?) incorrect manner. It could only have been said that two high speed line sections, the Paris-Lyon TGV route in France and the Tokyo-Osaka route in Japan, have fully covered both their infrastructure and operating costs after 15 years of service. The idea concerns covering all of the various types of cost and not the profitability of the "high speed rail system" as cited in the misquotation.

As stated above, the profitability of high speed is not assessed by adding infrastructure costs to operational costs, line section by line section, but from the perspective of a high speed rail system serving both the passenger transportation market and society – the citizens – as a whole. The highly positive net result of all these factors taken together is the reason why high speed systems continue to be successfully rolled out in Europe and Asia (Japan, China, Taiwan), and why they soon will be in North Africa, the Middle-East and, one sincerely hopes, on the American continent.

Attachment Twelve

**US House of Representatives
Testimony by
CHSRA CEO Roelof Van Ark**

December 15th 2011

**US House of Representatives Hearing
Subcommittee on Railroads, Pipelines and Hazardous Materials
Testimony by CHSRA CEO Roelof Van Ark
December 15th 2011**

Mr. Chairman, Members - These costs that we have put in our Business Plan have been cross checked and are based on international costs, all the infrastructure costs, including the operations and maintenance costs, including the different economic levels of the different countries, but cross referencing and cross checking to all the systems in the world has been done, including the Acela system in the Northeast Corridor that the Administrator has already referred to.

Chairman - Thank You

- - - - -

This testimony is available at the end of a 5 minute video clip on YouTube at:

http://www.youtube.com/watch?v=IXDeu_4-AXs&feature=youtu.be

This specific testimony is also available as the last 45 seconds of the 5 minute clip on YouTube at:

<http://www.youtube.com/watch?v=bPXs8kYyu8g>

Attachment Thirteen

**William Grindley's Sixth E-Mail
Request To Iñaki Barron de Angoiti,
UIC/IUR Director Of High-Speed Rail,
For Correct HSR Cost Data**

Of July 25th 2012

From: William Grindley (wgrindley@sbcglobal.net)
To: barron@uic.org;
Date: Wed, July 25, 2012 9:42:23 AM
Cc:
Subject: A sixth request for help - Please

Msr. Barrón - This email follows up on five emails to you of July 2nd, June 19th, June 1st, May 22nd and May 2nd. I have also called your office three times, spoken with Ms. Cabel (please excuse me if I have misspelled her name) and requested that you please respond

It is now nearly three months since Mr. Rossi, a Board Member of the California High-Speed Rail Authority, accused the Union Internationale des Chemins des Fer of supplying "flawed" data to the publications on Europe's high-speed rail systems sponsored by the BBVA Foundation. Mr. Rossi also said that the BBVA Foundation and the UIC had agreed to change the "flawed" data.

We have not been able to confirm the statement Mr. Rossi made before a California Assembly Committee. Given the gravity of such accusations, we are still seeking both official UIC confirmation of his statement, as well as copies of the correct Operations and Maintenance (O&M) data for high-speed rail systems; both direct and indirect O&M costs.

Please help us find what the correct Operations and Maintenance costs are for high-speed rail. Much of the future prosperity of California's government hangs in the balance.

Thank You.

William Grindley

--

'Fleecing' Local High-Speed Train Riders While Big City Executives Ride Cheaper

A Briefing Paper - January 29th 2014

Prepared by: William Grindley and William Warren

Forty papers by the same authors on the proposed California high-speed rail project can be found at www.sites.google.com/site/hsrcaliff

Overview: This Paper refutes CHSRA's claims of lower per mile charges for local high-speed rail (HSR) passengers. Riding a HSR train in the Central Valley, Southern California or the SF Peninsula will cost 3-4 times the present-day rail fares between the same destinations. The Central Valley's subsidized Amtrak riders likely will find cheaper, non-rail alternatives; while Caltrain and Metrolink riders will opt to stay with their subsidized fares. The net outcome will be fewer than forecasted riders, lower than forecasted revenues, more congestion and pollution in the Central Valley, and little or no decrease in congestion or pollution within the metropolitan areas: the opposite of CHSRA's claims. CHSRA's assertions again fail the credibility test.

THE AUTHORS

William C. Grindley – World Bank; Associate Division Director, SRI International; Founder and CEO, Pacific Strategies, ret. (BA Architecture, Clemson; Master of City Planning, MIT)

William H. Warren – Officer, US Navy. Forty years of Silicon Valley finance, sales and consulting experience and management, including CEO of several start-ups, Director/Officer at IBM, ROLM, Centigram, and Memorex (BA Political Science, Stanford; MBA, Stanford)

PUBLICATIONS

All available at www.sites.google.com/site/hsrcliffr and at www.cc-hsr.org, then go to Financial Reports

Major Reports on High Speed Rail by the Authors:

- The Financial Risks of California's Proposed High Speed Rail Project (Oct 2010)
- A Financial Analysis Of The Proposed California High-Speed Rail Project (Jun 2011)
- Revisiting Issues In the October 2010 Financial Risks Report (Sep 2011)
- Twelve Misleading Statements on Finance and Economic Issues in the CHSRA's 2012 Draft Business Plan (January 2012)
- California High-Speed Rail Authority's 2012 Draft Business Plan – Assessment: Still Not Investment Grade (January 2012)
- A Partial Catalog of Inappropriate, If Not Illegal Actions in the Conduct and Execution of California's Proposed High-Speed Rail Project – Volume I, March 2012.
- The CHSRA Knows Their Proposed High-Speed Train Will Forever Need An Operating Subsidy (March 2012)
- A Partial Catalog of Inappropriate, If Not Illegal Actions in the Conduct and Execution of California's Proposed High-Speed Rail Project – Volume II, November 2012.
- To Repeat: The CHSRA Knows Their Proposed High-Speed Train Will Forever Need An Operating Subsidy (December 2012)
- Diminishing Prospects For The CHSRA's Initial Construction Section (July 2013)

Briefing Papers:

- Dubious Ridership Forecasts (Oct 2010)
- Six Myths Surrounding California's High-Speed Rail Project (Jan 2011)
- Seven Deadly Facts For California's High-Speed Rail Authority (Jan 2011)
- A Train To Nowhere But Bankruptcy (Feb 2011)
- Big Trouble For California's \$66 Billion Train (Mar 2011)
- Will The Train Benefit California's Middle Class? (Apr 2011)
- DOT/FRA Has Several Reasons To Withhold Further Funding From California's High-Speed Rail Project – November 2012

Brief Notes: Twenty-three one page, single subject papers on various aspects of financial issues related to the proposed high-speed rail system, Oct 2010 - Aug 2011

Any fault found in this report is solely the responsibility of the Authors.

Comparing Real Versus Fantasy Fares – It is well documented that Europe and Japan’s high-speed rail systems (HSR) not only don’t make profits, but that passengers are mainly business travelers. ¹

Figure 1
Fares On Existing High Speed Rail Compared With CHSRA’s Planned One Way Fare

EXISTING HIGH-SPEED RAIL SYSTEM SEGMENTS	From – To	To – From	Center to Center Driving Miles (per Google Maps)	One Way Lowest Adult Fare (\$US)	Lowest Class of Adult Fare (PPM)	A One Way LA-SF Fare Would Be (at 382 miles) ²
Italy – Trenitalia	Rome	Milan	363	\$107	29¢	\$113
Italy – Trenitalia	Milan	Turin	89	\$42	47¢	\$180
France – TGV	Paris	Marseille	481	\$151	31¢	\$120
France – TGV	Paris	Le Mans	131	\$53	40¢	\$153
France – TGV	Paris	Lyon	289	\$97	34¢	\$128
Spain – AVE	Madrid	Seville	331	\$83	25¢	\$96
Spain – AVANT	Madrid	Toledo	55	\$17	31¢	\$117
USA Acela Express	Boston	NYC	217	\$123	57¢	\$218
USA Acela Express	NYC	WDC	227	\$200	88¢	\$337
USA Acela Express	WDC	Philadelphia	139	\$106	76¢	\$291
Germany – ICE	Berlin	Frankfurt	341	\$176	52¢	\$197
Germany – ICE	Fulda	Frankfurt	64	\$42	66¢	\$251
Japan-Shinkansen	Tokyo	Osaka	318	\$177	56¢	\$213
Japan-Shinkansen	Tokyo	Takasaki	69	\$61	88¢	\$338
Average of 14 HSR fares per passenger mile (PPM) and what an equivalent one way SF-LA fare would be using the average of those fares					52¢	\$197
Avg. of 8 HSR long haul (>150 miles) fares PPM and what an equivalent one way SF-LA fare would be using the average of those fares					47¢	\$178
LA-SF FARES AS PLANNED BY THE CALIFORNIA HIGH-SPEED RAIL AUTHORITY (CHSRA))						
2008 Plan	LA	SF		\$55 est.	14¢	
2009 Plan	LA	SF		\$105 est.	28¢	
2012 Revised Plan	LA	SF	382 used ³	\$83 est. ⁴	22¢	

If CHSRA’s proposed fares actually reflected the per mile charges of worldwide HSR fares, as shown in Figure 1, few airline passengers would defect to HSR. Likewise, with considerably lower than European auto operating costs as an option, there is reason to believe the same passenger profile of reimbursed business travelers will also be true for California. That is likely to be a much smaller market than the 33 million rider forecast for the Full Phase 1 Build Out –

¹ In their worldwide study, *The Economics and Politics of High-Speed Rail; Lessons From Experiences Abroad*, page xiii, authors Daniel Albalade, and Germa Bel in; (Lexington Books, 2012) showed that most HSR passengers are those who “travel for business reasons and whose ticket (the amount of which is far from covering the total cost of the service) is paid for by their employers.” In May of 2009 Iñaki Barrón de Angoití, Director of High-Speed Rail at the International Union of Railways (IUR), said, “Only two routes in the world – between Tokyo and Osaka, and between Paris and Lyon – have broken even.” See: Spain’s High-Speed Rail Offers Guideposts For U.S.” NY Times, May 29, 2009. Those PPM fares are 56¢ and 34¢ vs. 22¢ in CA.

² Google Maps says the shortest driving distance from the present-day SF Caltrain station to LA’s Union State is 382 miles. However, the Draft 2012 Revised Plan is based on 540 track miles between SF and Anaheim for the Full Phase 1; or 505 track miles for Blended Phase 1. Subtracting the miles of the ‘Y’ spur to Merced and the LA to Anaheim distance brings the distance from SF Transbay Terminal to LA Union Station to 485 miles.

³ Although the actual HSR track mileage metro-center-to-metro-center is 485 miles, Figure 1 uses Google’s driving distance (382 miles) for calculations because it is the common denominator in all European, Japanese and US fares per passenger mile calculations.

⁴ The Authority’s Pricing Plan, as defined on pages 5-5 and 5-6 of the ‘CHSRA’s Revised 2012 Business Plan, Ridership and Revenue Forecasting Memorandum’ (April 2012). The \$83 result is shown on Table 5.3 on page 5-6, in terms of the planned prices between different city pairs. However, the Revised 2012 Business Plan (April 2012) Executive Summary (pg. ES-14) says; “The average ticket fare between San Francisco and Los Angeles will be \$81 (83 percent of anticipated airline ticket prices).” This inconsistency is also unexplained.

and would (ironically) serve the wealthy and the reimbursed: particularly on the intraregional (local) routes.⁵

In 2009, the Authority admitted fares on some existing high-speed rail lines were greater than or nearly equal to airline fares.⁶ If passengers can fly between SF and LA for 29-32¢ per mile, or drive one or four or five people for 31¢ per mile, middle income or non-reimbursed travelers are not likely to pay the HSR's fares that CHSRA needs to have their HSR train prove profitable.⁷

Figure 1 shows average fares on existing, long haul, high-speed rail routes, are 47¢ per passenger mile; considerably higher per passenger mile (PPM) than CHSRA's proposed 22¢ PPM for downtown-Los Angeles-to-downtown-San Francisco passengers. According to the International Union of Railways' Director General, farebox revenues "generally" cover operating expenses: that makes 47¢ PPM a fare realistic benchmark, not 22¢ per passenger mile.⁸ That's a reason why HSR riders would have to pay at least \$180 to travel one way between the metropolitan centers to have the California train provide legally required sustainable profits- not the CHSRA's \$83 (\$81) one-way ticket.⁹

That's a serious problem for CHSRA, because 2012's \$83 (or \$81) fare for the 382 driving miles between the metropolitan centers computes to be 22¢ per mile. That means CHSRA proposes to charge only about half what HSR travelers elsewhere pay for their ride.¹⁰ CHSRA has never explained how it can charge so little and be profitable, even if its Operating Expenses are half (not a sixth) of Acela's 61¢ per passenger mile, the highest of the existing HSR services surveyed.¹¹

⁵ Exhibit 5-17, page 5-22 [PDF 130] of California High-Speed Rail Program: Revised 2012 Business Plan, April 2012, says that in 2040, 22.1-32.6 million rides will be taken on the full Phase 1 train.

⁶ See: California High-Speed Rail Authority; Report to the Legislature: December 2009, PDF pg. 72. "The 83 percent level is in the middle of a wide range of experience in similar-length markets outside of California, based on prices examined in 2007. At the top end, weekend Acela fares in the New York to Washington market were higher than air fares, and the Japanese Shinkansen fares were 108 percent of air fares for Tokyo- Osaka (322 miles) and 114 percent Tokyo-Hakata (722 miles). London - Paris Eurostar HST fares were 80 percent of air fares, both peak and off peak. Madrid - Sevilla (333 miles), AVE fares were 71 percent of air, and Paris Lyon (244 miles) 71 percent of air." In the Paris-Brussels market (191 miles) HSR fares are 95 % of airfares.

⁷ See: California High-Speed Rail Authority; Report to the Legislature: December 2009, pg. 65 [PDF 67] to compute airfare and driving costs per mile; "The fare is calculated in the same manner as the 50 percent, but is anchored by an LA-SF HST fare at 83 percent of the air fare, or in 2009 dollars a high-speed train fare of \$105 vs. a \$125 air fare, and a \$118 cost to drive." There are 382 miles via the I5-to-I10 route between SF and LA, and 380 miles between LAX and SFO.

⁸ See the letter from Jean-Pierre Loubinoux, Director General of the UIC (International Union of Railways), to then-CHSRA CEO Roelof van Ark of 8 February 2011, page 4. Found at <http://www.calhsr.com/wp-content/uploads/2010/02/IUR-Officials-Letter-to-CHSRA-CEO.pdf> Also see Attachment Eleven of the 'To Repeat' report, July 2012, PDF page 187. The Attachment is that letter. The quotation ""Generally speaking Operating Costs can be covered by farebox revenue. . ." is on PDF page 191. Found at: <https://www.sites.google.com/site/hsrcaliffr/home/2-1-major-reports---2012-plan/08-12-new-report>

⁹ AB3034 §2704.08 (j) says the proposed high-speed train must make an operating profit.

¹⁰ CHSRA proposes to charge 24% of Acela's fare and 37% of Europe's average fare.

¹¹ The Operating Expenses of Acela and European high-speed rail services are explored in the 'To Repeat' report by the same authors. See: To Repeat, The CHSRA's Train Will Need A Subsidy Forever, July 2012, page 7 [PDF 7], which says; "The CHSRA's latest O&M costs, 10¢ PPM, are less than a third of the average O&M costs of existing HSR systems. And they're a sixth of Acela's, the nearest equivalent because that Northeast Corridor train has similar labor, power and maintenance costs as will the California HSR system." Found at: <https://www.sites.google.com/site/hsrcaliffr/home/2-1-major-reports---2012-plan/08-12-new-report>

Changing Policy to Charge Local Riders More – But there’s other fare structure problems that become apparent in Cambridge Systematics’ (CS) April 2012 technical memorandum; CHSRA’s most recent publication on ridership and revenues.¹² The two most salient features of that fare structure are: SF-LA fares for HSR are artificially held down, while simultaneously there are drastic rail fare increases over what passengers now pay for rail tickets inside the Central Valley, LA Basin and San Francisco Bay (the Bookends).

Top-Line Anomalies In CHSRA’s Most Recent Fare Structure – In the upper right corner of Figure 2, any fare that might have exceeded \$83 has been reduced to no more than \$83.¹³ That’s because to be competitive with the average LA-SF 29¢ per passenger mile airline fare, the Authority dictated that the maximum fare between the downtowns of SF and LA could be no more 83% of that average \$100 airline fare. Therefore \$81 is in the April 2012 Business Plan – or \$83 as in the Cambridge Systematics’ memorandum.¹⁴

Despite CS’ introduction to their Table, thirty of the 91 fares in Figure 2 are held at \$83.¹⁵ How realistic is it to force-fit a third of all fares into being the same? Does CHSRA really plan to charge a San Francisco to Bakersfield passenger the same as a San Francisco to Anaheim passenger? That means the San Francisco to Anaheim rider gets to go another 123 miles for free. CHSRA’s \$83 SF-Anaheim ticket is their super bargain.

CHSRA’s latest fares are not based on decades of US and international HSR marketplace data: if they had been, they would reflect Figure 1. The Authority admits the fares are nothing more than assumptions: *“Fare levels are assumed to be comparable to those of other HSR services world-wide—somewhat below current airfares in the longer distance travel markets and well above the out-of-pocket cost of driving in the shorter distance travel markets.”*¹⁶ Even the most basic analysis of Figure 2 shows the fares are only opinions presented to support CHSRA’s contrived tautology to keep the promise that HSR fares would always be lower than the average SF-to-LA airfare. That is no way to run a railroad, especially one that legally must be profitable.

¹² See: Cambridge Systematics’ (CS) final technical memorandum April 12th 2012: Found at http://www.hsr.ca.gov/docs/about/business_plans/BPlan_2012Ch5_RidershipRevForecasting.pdf

¹³ Ibid. See Table 5.2, page 5-6 (PDF pg. 38)

¹⁴ Cambridge Systematics’ (CS) final technical memorandum of Ridership and Revenue Forecasting of April 12th 2012, page 5-5 [PDF pg. 37] says; *“For station pairs between the San Francisco Bay Area and the Los Angeles Basin, HST fares were 83 percent of the passenger-weighted average of expected 2030 airfares between the San Francisco Bay Area and the Los Angeles Basin, which amounted to \$83 in 2011 dollars.”* CHSRA didn’t coordinate what its consultants said in April 2012 with what its own Revised Business plan says about LA-SF fares that same month; not a hallmark of an investment grade effort.

¹⁵ Ibid [PDF 38] Cambridge Systematics says; *“Fares for three movements were capped at \$83 so that they would not be higher than the Bay Area to Los Angeles Basin movements.”* They misspoke. A simple count shows 30 of the 91 fares are held at \$83.

¹⁶ The assumption about HSR fares being *“somewhat below current airfares”* may be true in Europe for intra-country travel. But, with the introduction more than a decade ago of budget airlines operating between European countries, that assumption is far from true. See: California High-Speed Rail Program Revised 2012 Business Plan, April 2012, page 5-11 [PDF 119]

**Figure 2 – CHSRA’s Proposed
Intraregional (Local) And Interregional (Between Regions) HSR Fares
Cambridge Systematics’ April 2012 Technical Memorandum - Figure 5.2 [PDF 38]**

*California High-Speed Rail 2012 Business Plan
Final Technical Memorandum – Ridership and Revenue Forecasting*

Fares for three movements were capped at \$83 so that they would not be higher than the Bay Area to Los Angeles Basin movements. Further details on the derivation of these fares are provided in Appendix E.

Service assumptions varied by scenario. The details of the service frequencies are described in Table 5.4. The stopping patterns are provided in Appendix F.

**Table 5.2 Assumed HST Fares
2011 Dollars**

HST Stations	San Francisco (Transbay)	Millbrae	Redwood City	San Jose	Gilroy	Merced	Fresno	Visalia	Bakersfield	Palmdale	San Fernando	Los Angeles Union Station	Norwalk	Anaheim
San Francisco (Transbay)		\$16	\$17	\$21	\$23	\$55	\$66	\$72	\$83	\$83	\$83	\$83	\$83	\$83
Millbrae			\$16	\$18	\$22	\$55	\$66	\$71	\$83	\$83	\$83	\$83	\$83	\$83
Redwood City				\$17	\$21	\$54	\$63	\$69	\$82	\$83	\$83	\$83	\$83	\$83
San Jose					\$17	\$52	\$59	\$64	\$77	\$83	\$83	\$83	\$83	\$83
Gilroy						\$48	\$55	\$61	\$72	\$83	\$83	\$83	\$83	\$83
Merced							\$41	\$48	\$63	\$79	\$80	\$83	\$83	\$83
Fresno								\$38	\$52	\$68	\$69	\$72	\$75	\$78
Visalia									\$47	\$63	\$64	\$68	\$70	\$72
Bakersfield										\$47	\$48	\$52	\$54	\$56
Palmdale											\$30	\$31	\$32	\$34
San Fernando												\$25	\$28	\$30
Los Angeles Union Station													\$25	\$28
Norwalk														\$25
Anaheim														

Source: Parsons Brinckerhoff.

Notes:  Fare constrained to \$83.
 Fare for San Francisco Bay Area to Los Angeles Basin.

In addition to HST fare policies, the forecasts used common assumptions for air and conventional rail service and fares among the four scenarios:

- **Air Fares and Service** – Actual 2009 airfares and service, as described in Section 2.1.
- **Conventional Rail Fares and Service** – Actual 2011 fares and expected 2030 service, as described in Section 2.2. All scenarios assumed that the Amtrak San Joaquin service would terminate at Merced once the HST service opened.

High and Low Assumptions

CS evaluated each of the four HST service scenarios using assumptions that would generate a range of ridership and revenue outcomes in 2030, from high to low. The fundamental differences between the high and low model runs involve (see Table 5.3):

Fleecing Intraregional (Local) HSR Riders To Let LA-to-SF Business Travelers Ride Cheap – The second consequence of CHSRA’s fares-by-fiat derives from the first. CHSRA must make-up for lost revenues from big-city-to-big-city fares somewhere else. Ergo, a HSR ride almost anywhere other than between the two metropolitan downtowns will cost more per mile than the LA-SF \$83, which works out to 22¢ per mile.¹⁷

The Authority’s 2009 Business Plan says; *“Local trips within the LA Basin and within the Bay Area are much shorter than between-region trips, and have a lower per-mile fare.”* In November 2011, when referring to auto travel, the Authority said; *“High-speed rail is much more efficient and economical for these shorter intercity trips, yielding substantial savings in cost . . .”*¹⁸ Five months later, after Cambridge Systematics had prepared their technical memorandum, CHSRA’s April 2012 Plan was silent on the relative per mile fares for short haul passengers.

Analysis of the April 2012 CS memorandum (Figure 2) shows the opposite of CHSRAs’ claim is true. It shows local trips, such as those inside the Central Valley or inside the Bookends, have a considerably higher per mile charges than *“between-region trips”*.¹⁹ That change – to charge short haul riders more per mile than metro center-to-metro center fares – is not only a reversal of policy and promises; it also creates serious consequences for Amtrak California users, as well as Metrolink and Caltrain riders.

Fleecing Central Valley Riders – Figure 3 analyzes Figure 2’s Central Valley fare anomalies created by a force-fit that dictates metro-to-metro fares at no more than 83% of airline fares.²⁰ The net effect of the shift to charge local (intraregional) passengers more per mile is that riders who might consider a HSR ride within the Central Valley will pay from 30% to 64% more than they would on Amtrak.

Analysis of Cambridge Systematics’ (CS) Figure 5.2 in Figure 3 shows that Central Valley riders wishing to use the HSR train inside the Initial Construction Sector’s (ICS) boundaries will pay between 38¢ and 71¢ per mile – an average of 48¢ per mile.²¹ That’s an average of more than a third again as much (41%) as Amtrak San Joaquin Line’s riders pay now (34¢) inside the ICS.²²

¹⁷ The Authority says their Phase 1 Full Build will be 520 miles. But that includes miles to Anaheim and the ‘Y’ north of Merced. Deducting those miles yields about 485 miles between the downtowns of San Francisco and Los Angeles Union Station. If \$83 is divided by 485 miles, the fare per mile is 17¢.

¹⁸ See: California High-Speed Rail Program, Draft 2012 Business Plan, November 1, 2011, page 1-5 [PDF 23]

¹⁹ See: California High-Speed Rail Authority: Report to the Legislature, December 2009, PDF pg. 72. In the 2008 Business Plan, page 18, Figure 20, [PDF pg. 21] that assertion comes out as *“Short trips entirely inside the Los Angeles/Anaheim area or the San Francisco Bay Area make up 30% of the trips, but only 8% of the revenue because of the shorter length and lower fare structure.”*

²⁰ Figure 3 is based on CS’s Figure 5.2 [PDF 38]

²¹ In recent months, internal CHSRA documents have begun to call the Initial Construction Section (ICS) the First Construction Segment (FCS). See: Memorandum from the CHSRA’s Frank Vacca to Peter Osborn of the Federal Railroad Administration, dated August 28th 2013, PDF pg. 2 *“The CHSR Program has started construction on its First Construction Segment (FCS- Madera to Bakersfield). If the program were to cease to exist subsequent to the completion of the FCS or if construction were suspended for an extended period of time following the completion of the First Construction Segment, the requirement for revenue service to be implemented in compliance with the Grant Agreement on the FCS for “independent utility” would be triggered.”*

²² These Average Fares are computed by taking the sum of the sample fares and dividing this sum by the sum of the sample miles, again derived from Google Maps’ driving distances.

**– Figure 3 –
ICS and IOS Point-to-Point Fare Comparisons**

	Point to Point miles	Avg. HSR fare	HSR Charge Per mile	Amtrak Flex Fare	Flex Fare per mile	% that HSR Fare is > Amtrak's
Intra-ICS destinations						
Merced-Fresno	58	\$41	71¢	\$25	43¢	64%
Merced-Visalia	98	\$48	49¢	\$37	38¢	30%
Merced-Bakersfield	164	\$63	38¢	\$48	29¢	31%
Average			48¢		34¢	38%
IOS Destinations						
Merced-Palmdale	259	\$79	31¢	\$72	28¢	10%
Merced-San Fernando	300	\$80	27¢	\$70	23¢	14%
Average			28¢		25¢	12%

Today a prospective Amtrak passenger can walk into Merced’s station and pay \$25 to go the 58 miles to Fresno. [They could also buy that ride in advance for Amtrak’s Value Fare of \$14.] The Amtrak Flex fare works out to 43¢ per mile, while the HSR train proposes to charge 71¢ per mile – 64% more.²³ A Visalia to Bakersfield Amtrak passenger will pay \$35.50 (45¢ per mile) while a HSR prospect would pay \$47, a third more.

Likewise, CHSRA lists a HSR ticket from Merced to Bakersfield at \$63. An Amtrak Flexible Fare is \$48. [The Value Fare is \$26.] The Merced-Bakersfield distance is 164 miles. The HSR ride cost 38¢/mile – 31% more than Amtrak’s Flexible Fare 29¢ per mile ride [and 140% more per mile than the Value Fare].

When the HSR ride inside the ICS or IOS gets longer, differences between today’s Amtrak Central Valley fares and the HSR fares diminish but don’t disappear. As CS’ Figure 5.2 shows, to go the 189 miles from Visalia to downtown LA, the HSR passenger would pay \$68, or 36¢ per mile. The Amtrak Flex fare is \$58.50 or 31¢ per mile. (The Value Fare is \$34.50 or 18¢ per mile). That HSR ride is still 16% more than on Amtrak, and twice as much as the Value Fare. Within the IOS’s geography, longer HSR-ride and Amtrak fares merge to within 10-14% per mile of one another, and those differences remain even when going to Los Angeles.

Passengers ‘inside’ the ICS and IOS geography will always pay more for any HSR ride than any Amtrak ride; generally considerably more. CHSRA’s working assumption is that after the IOS opens, the Amtrak service will be discontinued south of Merced.²⁴ Along with discontinued service comes discontinued subsidies to Amtrak, and riders’ search for new, inexpensive alternatives.

Riders will calculate whether the few minutes saved by HSR rides are worth traveling by rail. While the longer intra-Valley HSR rides may save passengers’

²³ See: <http://tickets.amtrak.com/itd/amtrak>

²⁴ See: Cambridge Systematics’ (CS) final technical memorandum of Ridership and Revenue Forecasting of April 12th 2012, Section 5.2, page 5-5 [PDF pg. 37] “Note that the existing San Joaquin service south of Merced to Bakersfield is assumed to be discontinued upon the initiation of HST service.”

transit time: ironically, the less time saved (because of a shorter ride) the more the passenger will pay for that HSR ride. This skewing of criteria looms large enough for shorter-ride passengers to seek other-than-rail options. It follows that Central Valley residents will find that HSR fares that are much higher than their Amtrak fares are not value-for-money and will find their way to cheaper alternatives such as regional buses, shared auto or van pools, etc.²⁵

Fleecing The Bookends' Riders – At present no there are no known plans to terminate Caltrain or Metrolink services. But the 'Bookends' intraregional fares are even more costly per mile than the intra-Central Valley fares. Figure 4 highlights that longer HSR rides offer no savings relief to those who live between San Fernando and Los Angeles/Anaheim or Gilroy northward to San Francisco.²⁶

Fleecing SoCal's Metrolink Riders – Despite CHSRA's 2009 claims that shorter HSR rides will "*have a lower per-mile fare*" in fact, the opposite is true.²⁷ An HSR rider will pay two to three times more than Metrolink charges for an equivalent distance Southern California (SoCal) ride.²⁸ Figure 4 shows that from San Fernando to LA Union station that fare will be \$25; three times the \$8 Metrolink fare. The shortest SoCal ride would be the 16 miles from LA's Union Station to Norwalk. On Metrolink the fare would be \$7.25: by HSR that ride would cost \$25: more than three times Metrolink's fare.

Similarly, from LA Union station to Anaheim the HSR ticket would be \$28.00: Metrolink's fare is \$9.00.²⁹ The distance from LA Union Station to downtown Anaheim is 25.2 miles, which means the HSR ride is \$1.12 per mile.³⁰ Rail riders from the busiest station on the planned HSR network will discover they are being asked to pay nearly three times the Metrolink fare.

Fleecing NorCal's Caltrain Riders – For one of the shortest Northern California HSR rides – from the SF Transbay Terminal to Millbrae (15 miles) – the HSR rider would pay \$16, versus \$5 today on Caltrain.³¹ That's \$1.07 per mile for a HSR ride versus 33¢ per mile for a Caltrain ride. If this short HSR per mile fare were used to calculate a fare for the 382 driving miles between LA and SF's downtowns, the fare should be \$410.³² That's eight times what proponents said on 2008's Prop1a ballot.³³

²⁵ The average operating costs of the CA Amtrak lines is \$45¢ per passenger mile, while the average fare is 21¢ per passenger mile. Fares on Amtrak's San Joaquin Line are subsidized by nearly 100%. See: To Repeat, CHSRA's Train Will Need A Subsidy Forever, July 2012, page 20. "*The average ticket revenues (before subsidies) of three Amtrak California (CA) lines: the Pacific Surfliner, San Joaquin and Altamont Corridor (ACE) routes between 2006 and 2011 was estimated at 21¢ per passenger mile. [An unsubsidized price would be over 40¢ per passenger mile.]*"

²⁶ Figure 4 is based on CS's Figure 5.2 [PDF 38],

²⁷ See: California High Speed Rail Authority: Report to the LEGISLATURE, DECEMBER 2009, PDF pg. 72.

²⁸ These Average Fares are computed by taking the sum of the sample fares and dividing this sum by the sum of the sample miles, again derived from Google Maps' driving distances.

²⁹ Source is for SoCal fares is <http://www.metrolinktrains.com/ticketspricing/>

³⁰ For the HSR train's 485 miles between the downtowns of LA and SF, that \$1.11 per mile fare would become an HSR fare of about \$500.

³¹ Northern California Caltrain ride fares comes from their electronic files, found at <http://www.caltrain.com/Fares/farechart.html>

³² If the CHSRA's actual 485 track -mile distance between the centers is used, that would be a \$520 fare.

³³ See page 14 [PDF 14] of the Official Voter Information Guide: Prop 1A, "Travel from Los Angeles to San Francisco in about 2 1/2 hours for about \$50 a person."

– Figure 4 – 'Bookends' Point-to-Point Fare Comparisons						
	Point to Point miles	HSR fare	HSR Charge Per mile	Metrolink or Caltrain Fare	Fare per mile	% that HSR Fare is > Amtrak's
SoCal Destinations						
San Fernando-Anaheim	49	\$30	61¢	\$12	24¢	150%
San Fernando-LA Union Station	31	\$25	81¢	\$8.00	26¢	213%
LA Union Station-Norwalk	16	\$25	\$1.56	\$7.25	45¢	245%
Norwalk-Anaheim	12	\$25	\$2.08	\$7.00	58¢	257%
LA Union Station-Anaheim	25	\$28	\$1.12	\$9.00	36¢	211%
Avg. SoCal			\$1.00		33¢	208%
NorCal Destinations						
SF TBT-Millbrae	15	\$16	\$1.07	\$5	33¢	220%
Millbrae-Redwood City	13	\$16	\$1.23	\$3	23¢	433%
Redwood City-San Jose	24	\$17	71¢	\$5	21¢	240%
San Jose-Gilroy	33	\$17	52¢	\$7	21¢	143%
SF TBT-San Jose	49	\$21	43¢	\$11	22¢	91%
SF TBT-Gilroy	80	\$23	29¢	\$13	16¢	77%
Avg. NorCal			51¢		21¢	150%

The SF-San Jose HSR fare will be \$21, nearly double Caltrain's \$11. An 80-mile HSR ride from SF to Gilroy would be \$23, versus \$13 on Caltrain. That's a 77% increase. The 'local' HSR SF to Gilroy at 29¢ per mile rate (coincidentally that of airfares per mile) would make the HSR fare \$110 between downtowns of LA and SF; more than double 2008's claims of "about \$50." ³⁴

Conclusions On Contrived Fares And The Impacts Of HSR Fares Biased For Metro-to-Metro Riders – First, in their 2008 Plan, CHSRA said: "In 2000, the Authority produced investment-grade forecasts of ridership, revenue, cost and benefits of the system." ³⁵ If those forecasts had been "investment-grade" they would have stood the test of time. They didn't and in the subsequent years, the fare variable that helps decide profitability fluctuated wildly.

There is no consistency in how fares are derived; neither for those between the downtowns of SF and LA, nor for shorter rides within a region (intraregional). The LA-SF fare doubled to \$105 by late 2009; a year after 2008's \$50 promise won 52.7% of the Prop1A votes. ³⁶ Public support plummeted. ³⁷ Then in

³⁴ Using the actual 485 track-miles of CHSRA's route plans, the fare would be \$141, nearly three times the 2008 promise.

³⁵ See: California High-Speed Train; Business Plan, November 2008: page, 2 [PDF 6]

³⁶ California High-Speed Rail Authority; Report to the Legislature, December 2009; Page 65 [PDF 67] says: "The fare is calculated in the same manner as the 50 percent, but is anchored by an LA-SF HST fare at 83 percent of the air fare, or in 2009 dollars a high-speed train fare of \$105 vs. a \$125 air fare, and a \$118 cost to drive." There are also other miscalculations. Eighty-three percent of 2009's \$125 airfare would \$103.75, not \$105 as CHSRA says. According to Google maps the shortest driving distance from the present day SF Caltrain station to LA's Union State is 382 miles, making CHSRA's 2030 estimated cost to drive at 28¢/mile \$107 not

November 2011, airline fares were returned to their supposed 2005-dollar levels (\$99) not the \$125 in the 2009 Plan.³⁸ Consequently ". . . *the average ticket [HSR] fare between San Francisco and Los Angeles will be \$81 (83% of anticipated airline ticket prices) in 2010 dollars* . . ."³⁹ Five months later, in April 2012, HSR fares between the metropolitan centers were the same \$81 in the Business Plan.⁴⁰ While that seems stable, the consultants calculating revenues came up with \$83.⁴¹ Not having the consultants' analyses, right or wrong, reflected in the subsequent business plan, coupled to a fare increase of hundred percent fare increase in one year, followed by 21% decrease, and all within three years, is not a hallmark of an "investment-grade" offering.

Second, there are huge disparities between local and interregional per mile fares, as shown by comparing Figures 1, 3 and 4. California's HSR fares seem purposely biased to have downtown-LA-to-downtown-SF riders' fares subsidized by intraregional (local) riders.⁴² CHSRA never explains why that is, nor how it derives the vast differences between intraregional (local) and interregional fares per mile.⁴³

Consider for example, the 2009 claim about local (intraregional) per mile fares being cheaper than interregional (long distance) fares; "*Interregional trips account for more than 70 percent of the trips and 90 percent of the revenue, as seen in Table C. Local trips within the LA Basin and within the Bay Area are much shorter than between-region trips, and have a lower per-mile fare*"⁴⁴ If the latter part of that phrase were true, then one would expect to see lower per mile charges for local trips. But the opposite is true. The shorter the trip, the higher

CHSRA's \$118. And based on the 2009 Plan's calculations, the 7.9 million riders going straight through between the downtowns of LA and SF would generate \$900 million of revenue in 2035. This computes to an average fare of \$113.92 in 2035. That's 8.5% higher-than-CHSRA's stated \$105 fare. See: CALIFORNIA HIGH-SPEED RAIL AUTHORITY: Report to the LEGISLATURE, DECEMBER 2009; Table C, page 72 [PDF 74] "Riders & Revenues By Market, Initial Phase, 2035, Fares 83% of Air.

³⁷ By late 2011, two out of three Californians no longer supported the project. The September 2011 Probolsky survey with over 60% of Californians against the train is found at www.probolskyresearch.com/.../2011/.../Probolsky-Research-State-Spending-and-High-Speed-Rail-Results-Memorandum2.pdf . The December 6, 2011 Field Poll saying 64% would vote against the train is Release #2400, and can be found at <http://media.sacbee.com/smedia/2011/12/05/17/53/SJKN2.So.4.pdf> . In December 2011 a USC Dornsife/Los Angeles Times Poll found that with the cost of the high-speed rail project rising dramatically "a clear majority of California's registered voters would reject the proposal if given a second chance to vote on it today." See: Dan Weikel and Ralph Vartabedian, "Californians would reject bullet train in revote, polls finds," *Los Angeles Times*, December 6, 2011, <http://articles.latimes.com/2011/dec/06/local/la-me-train-poll-2011120711>

³⁸ See: California High-Speed Rail Program Draft 2012 Business Plan, November 1, 2011, pg. 106.

³⁹ Ibid. pg. ES 8 [PDF 14]

⁴⁰ See: California High-Speed Rail Program Revised 2012 Business Plan; April 2012 page ES-14 [PDF pg.22] "*The average ticket fare between San Francisco and Los Angeles will be \$81 (83 percent of anticipated airline ticket prices) in 2010 dollars*"

⁴¹ See: Cambridge Systematics' (CS) final technical memorandum of Ridership and Revenue Forecasting of April 12th 2012, page 5-5 [PDF pg. 37] says; "*For station pairs between the San Francisco Bay Area and the Los Angeles Basin, HST fares were 83 percent of the passenger-weighted average of expected 2030 airfares between the San Francisco Bay Area and the Los Angeles Basin, which amounted to \$83 in 2011 dollars.*"

⁴² See: Daniel Albalade, and Germa Bel; *The Economics and Politics of High-Speed Rail; Lessons From Experiences Abroad*; (Lexington Books, 2012) page xiii. Given that those riders, or those taking the HSR train on shorter hops, are likely to be reimbursed business employees, that seems somewhat ironical since this class of people's incomes are likely far above California's average per person income. See: <http://bber.unm.edu/econ/us-pci.htm>

⁴³ Perhaps by coincidence, the intra-ICS fare for Merced to Fresno is 71¢, strikingly similar to the New York to Washington Acela fare of 72¢ per mile, and the Merced to Visalia fare of 49¢ coincidentally resembles the long-term history of Europe's shadow subsidy of 45¢ per mile HSR fares.

⁴⁴ See: California High Speed Rail Authority: Report to the LEGISLATURE, DECEMBER 2009, PDF pg. 72.

the per mile fare – in both the Central Valley and the ‘Bookends.’ CHSRA’s credibility is lessened by its own internal contradictions.⁴⁵

Local riders will react to a doubling or tripling of their present (subsidized) fares. Despite the termination of Amtrak San Joaquin Line’s service in the Valley, riders still have cheaper local transport alternatives: subsidized buses, shared rides in autos or private vans. It should also be clear that ‘Bookends’ riders aren’t going to see the two-minute saving in a SF-Millbrae ride, or the 8-minute savings in a SF-San Jose ride being worth spending 3-4 times the Caltrain ride. Ditto for Metrolink’s riders: they will choose with their pocketbooks.

Unintended Consequences: CHSRA Will Not Gain Local HSR Riders And Will Shift Riders From Supposedly Environmentally-Friendly HSR To Polluting Vehicles – ‘Capping’ the SF-to-LA riders’ fare at \$83 will quickly show local riders they are being fleeced: For example:

1. HSR riders between Visalia and Bakersfield would pay more than half (\$47) of the SF-LA ‘capped’ fare (\$83) to go 79 miles, only 20% of the 382 mile driving distance between San Francisco and Los Angeles’ centers.
2. HSR riders between LA Union Station and Anaheim would pay a third (\$28) of the SF-LA ‘capped’ fare (\$83) to go 26 miles, only 7% of the 382 mile driving distance (5% of the 485-mile track distance) between the metropolitan centers.
3. Fellow Southlanders at LA Union only going the 12 miles to Norwalk by HSR would pay 30% of the SF-LA fare to ride only 3% of the driving distance (2% of the 485 track mile distance) between the downtowns of LA- and-SF.
4. Travelers taking the HSR train from San Francisco’s Transbay Terminal (SFTBT) to catch a plane at SFO would pay 20% (\$16) of the SF-LA \$83 HSR fare just to get the first 16 miles. The same is true for those going to their homes or businesses nearby.
5. To get from SFTBT to San Jose, CHSRA is asking potential riders to pay a quarter of (\$21) the total cost of going SF-LA to only go 13% of the driving distance miles (or 10% of the 485 track miles).

Riders will react quickly to these inconsistencies in the value-for-fare. They will make pragmatic choices based on their pocketbooks: and those choices are unlikely to favor a drastically more expensive HSR ride – whether or not other rail alternatives are available. CHSRA’s ridership modelers continue to forecast Central Valley, SoCal and SF Peninsula HSR ridership growth even when fares are set to be two or three times higher than the Amtrak, Metrolink and Caltrain fares. That’s not credible.

⁴⁵ This conclusion is also validated in the ‘To Repeat’ report’s analysis showing that CHSRA’s Medium Ridership Case produced revenues per passenger mile of 23¢ during the years of Blended Phase 1 operations, whereas the revenues per passenger mile will be 29¢ PPM during the early years of operations. These would be years like 2025 when the IOS is first projected to be generating revenues; and the IOS has the higher pricing strategy seen in Figure 3.

HSR Will Aggravate, Not Help Solve California's Air Quality

Problems – There is little doubt that California has serious traffic congestion within its metropolitan areas' highways, and along the Highway 99 arterial. By eliminating the subsidies to Amtrak riders in the Central Valley, and not offering the Bookends' rail riders as cheap a public transport alternative as Metrolink and Caltrain offer, CHSRA will exacerbate those highway congestion problems in the Valley and not contribute to their solution in the Bookends.

Valley riders will opt for internal combustion vehicle alternatives, and Bookends' riders will opt to bear the extra few minutes of transit time and ride the still diesel-driven Metrolink, and the probably still diesel-driven Caltrain. When this happens, the unintended consequence of such drastically raised local HSR fares will result in increased Highway 99 congestion and no green house gas savings in the Central Valley, the LA Basin or the SF Bay Area.

This contradicts what the law underlying the HSR program required, namely that; *"The high-speed train system shall be planned and constructed in a manner that minimizes urban sprawl and impacts on the natural environment."*⁴⁶ Proponents in 2008 said; *"A 220-mile-an-hour statewide rail system will give Californians a faster, environmentally friendly alternative for travel."*⁴⁷ And in 2012, CHSRA said: *"High-speed rail is much more efficient and economical for these shorter intercity trips, yielding substantial savings in cost, fuel, safety, and time, as well as environmental benefits"*⁴⁸

But the opposite seems true for local HSR rides – Central Valley Amtrak riders will defect to something affordable when CHSRA eliminates subsidies to their fares. If anything, the train will not bring improved air quality – it will contribute to air pollution in the Central Valley and, at best, not help solve air pollution at the Bookends. In short, CHSRA fails again to convince that their local fares will meet a legal requirement or promises of their proponent.

Unfortunately, fares are the only part of the profit equation visible to the public. The lack of credible evidence on how fares were computed, and the 'tilting' of the fare structure to attract big city riders shown at the expense of local riders in this paper lead to doubts about CHSRA's ridership forecasts and Operating Expenses and therefore their claims of profitability. But the world outside CHSRA will never know the answers about profitability until complete and free access is gained to the models used by CHSRA for ridership forecasts and market survey data that 'drives' revenue forecasts: work that has been paid for with public dollars.

⁴⁶ See: AB3034 Section 2704.09 (i) says; *"The high-speed train system shall be planned and constructed in a manner that minimizes urban sprawl and impacts on the natural environment."*

⁴⁷ See: Official Voter Information Guide, 2008, page 7 [PDF 7]

⁴⁸ See: California High-Speed Rail Program; Revised 2012 Business Plan; April 2012, page 1-5 [PDF 33]

IF YOU BUILD IT THEY WILL NOT COME

A Forensic Analysis of Why High-Speed Rail In California Will Fail In Its Initial Operating Years

A Briefing Paper – March 5th 2014

Prepared by: William Grindley and William Warren

Forty-one reports by the same authors on the proposed California high-speed rail project can be found at www.sites.google.com/site/hsrcaliffr

Preface: California's High-Speed Rail Authority proposes to bring a new service to the market in 2022. It's +\$31 billion cost may make it the most expensive 'launch' in history, and a lot depends on whether it will be able to attract enough riders to make it profitable. If the travel times or charges to passengers for using rail and buses can't beat going by highway or flying, Californians will have to subsidize its operations forever. This Paper puts the origins of that risk under the microscope.

Overview: For five years (2022-2026) the Initial Operating Segment (IOS) **IS** high-speed rail in California. The California High-Speed Rail Authority (CHSRA) offers nothing more. During this IOS-Only Phase, there is no travel time advantage for potential riders to abandon the airlines or their automobiles to take combinations of rail and bus transport modes between the LA Basin and the SF Bay Area.

Likewise, would-be HSR travelers during the two-year Bay to Basin Phase (2027-2028) will only benefit from a shorter-than-driving travel time between the downtowns of Los Angeles and San Jose. While more expensive, every itinerary using flights to 'defeat the friction of distance' have significantly lower travel times.

CHSRA's offerings don't seem attractive enough to entice travelers to abandon their autos or the airlines. With nothing more to offer travelers, the chances of the CHSRA meeting their ridership or revenue figures and being profitable seem extremely thin, and the interest of private, at-risk capital seems even thinner.

California's high-speed rail project has truly become a 'Field Of Dreams' and it is doubtful whether 'They Will Come' during the seven years of the Authority's IOS and B2B offerings.

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All available at www.sites.google.com/site/hsrcliff and at www.cc-hsr.org, then go to Financial Reports

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- A Partial Catalog of Inappropriate, If Not Illegal Actions in the Conduct and Execution of California's Proposed High-Speed Rail Project – Volume I, March 2012.
- The CHSRA Knows Their Proposed High-Speed Train Will Forever Need An Operating Subsidy (March 2012)
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- Dubious Ridership Forecasts (Oct 2010)
- Six Myths Surrounding California's High-Speed Rail Project (Jan 2011)
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- A Train To Nowhere But Bankruptcy (Feb 2011)
- Big Trouble For California's \$66 Billion Train (Mar 2011)
- Will The Train Benefit California's Middle Class? (Apr 2011)
- DOT/FRA Has Several Reasons To Withhold Further Funding From California's High-Speed Rail Project – November 2012
- 'Fleeing' Local High-Speed Train Riders While Big City Executives Ride Cheaper – January 2014

Brief Notes: Twenty-three one page, single subject papers on various aspects of financial issues related to the proposed high-speed rail system, Oct 2010 - Aug 2011

Any fault found in this report is solely the responsibility of the Authors.

Introduction – California’s High-Speed Rail In Its First Operating Years –

If the Authority finds at least another \$25 Billion to finance its Initial Operating Segment (IOS), the privately operated IOS is supposed to prove that California’s high-speed rail (HSR) program will eventually deliver passengers between the downtowns of LA and SF in 2 hours 40 minutes, not need an operating subsidy and will attract private capital to complete the system promised in 2008.¹

The first five years of the Initial Operating Segment’s operations, **IS** high-speed rail for Californians. The California High-Speed Rail Authority (CHSRA) offers nothing else. To be financially successful, the whole concept promised to 2008’s voters must be proven early on in what is herein called the IOS-Only Phase. To do that, CHSRA’s only offering during those five years must be an attractive enough option for travelers to abandon airplanes and automobiles.

The risks inherent of an HSR start up – During the IOS-Only Phase, CHSRA will launch a new technology and service. Under the sustainable profit demands of AB3034, the HSR train system must be judged first and foremost as any business is; it either succeeds financially or goes bankrupt.² Eighty percent of all businesses fail within eighteen months of their launch.³ Examples abound of failed launches: for example, Coca Cola’s New Coke, Ford’s Edsel, Apple’s Newton, Microsoft’s Webtv, or Sony’s Betamax. Then there is Webvan, Pets.com, and Solyndra. While investors lost millions of dollars in each failure, the difference is the first group’s launches were from creditworthy, ‘going concerns’ with name recognition and brand value that survived, while the latter were start-ups that no longer exist.⁴

HSR in California is neither a ‘going concern’ nor a ‘disruptive’ technology. It’s an unknown start-up with its brand value indubitably tied to Amtrak’s poor passenger service and annual operating subsidies.

Background – During the five years of the IOS-Only Phase, the Authority only offers high-speed rail between San Fernando and Merced to the present market of Amtrak riders, airline passengers or auto drivers. Travel on the remainder of the route is by conventional rail or bus. That combination must be competitive with existing travel times and prices. But is it? Ridership forecasts tell the Authority’s side of the story.

The 2014 Draft Plan says; “*The Medium outcome for the ridership forecast shows an overall ridership greater than 10 million trips in 2025 . . .*”⁵ In 2022, when the IOS-Only Phase begins and is supposedly profitable, ridership is forecasted to be about 4.6 Million.⁶ The Authority’s 2014 Plan is silent on IOS ridership before 2025, but assumes ridership explodes when IOS-Only operations start.⁷

Figure 1 Forecasted Ridership During IOS-Only Phase And Years 1 and 2 Of B-to-B Operations			
IOS- B2B Ops Year	Year	Central Valley Ridership 2013-2030	Sections Available for Passengers
	2013 actual ⁸	1.2 million	Central Valley
	2017 est.	1.6 million	growth at 6.6% pa 2013-2021
	2021 est.	2.0 million	year before IOS begins
1	2022 est.	4.6 million	IOS-Only – CHSRA estimate
2	2023 est.	6.3 million	IOS-Only – CHSRA estimate
3	2024 est.	8.1 million	IOS-Only – CHSRA estimate
4	2025 est.	10.4 million ⁹	IOS-Only – CHSRA estimate
5	2026 est.	12.3 million	IOS-Only – CHSRA estimate
6	2027 est.	14.6 million	B-to-B becomes operational
7	2028 est.	17.4 million	B-to-B
8	2029 est.	20.6 million ¹⁰	Phase 1 becomes operational
9	2030 est.	24.4 million ¹¹	Phase 1

Figure 1 shows the growth rate in Central Valley Amtrak riders of 6.6% between 2012 and 2013. ¹² Using that record growth rate indicates that in 2021, before the IOS-Only Phase begins, Central Valley ridership would be 2.03 million. According to the Authority, the following year (2022), when the IOS-Only Phase begins, ridership is to more than double to 4.6 million. Figure 1 also shows the Authority expects ridership to increase nearly three-fold during the five years of the IOS-Only Phase. That 28% per year growth would be most enviable.

A Comparative Analyses of Would-Be Travelers’ Options In the IOS-Only Phase –To verify whether HSR-travel would be an attractive travel option requires analyzing the IOS-Only Phase’s advantages for passengers between its 2022 opening and when the Bay to Basin is operational in 2027. ¹³

Material for that analysis is embedded in a two types of practical examples showing would-be travelers’ choices. The first type is of passengers from suburbs within 15 miles of the proposed south and northern terminus for Phase 1. ¹⁴ The potential traveler would be going from Norwalk in the LA Basin to Berkeley in the SF Bay Area. ¹⁵ The second type is central city to central city. The examples are Los Angeles to San Jose, and Los Angeles to San Francisco. As a recent study shows, both Californian metropolises are business centers, which like Europe, will be the arrival or destination of most HSR passengers. ¹⁶

Since HSR service’ during the IOS-Only Phase starts at San Fernando, the examples start in the LA Basin, but the sequence could be reversed. The travel time and costs of reaching these destinations are analyzed using three different ways of transit during the IOS-Only Phase – by driving, by way of the CHSRA’s offering(s), or by using the airlines as the principal ‘distance killer’

While Figure 1’s ridership figures look great on paper, doubling the first year and growing three fold in five years – the devil is in the details of what choices would-be passengers are likely to make.

Travel times are the first devil. Although challenged by their Peer Review Group, the Authority's 2014 Draft Plan still clings to promise to voters of a 2hour 40minute ride between the SF and LA downtowns.¹⁷ That Plan now 'fudges' travel speed downward from the top 220mph operating speeds promised voters, to operate, " . . . *at speeds capable of exceeding 200 miles per hour.*"¹⁸ Even an average of 200mph is still unrealistic given that data from decades of operations in Europe and Japan confirm that above about 186mph, power costs surge, maintenance costs increase, deceleration times increase and time advantages of going faster diminish. The IUR/UIC Director of HSR presented Figure 2 to the US Congress in 2007, and Figure 3 analyzes the realities of station-to-station times and average speeds on high-speed rail routes from that presentation.

What jumps out from Figure 3, an analysis of the UIC/IUR presentation's figures in Figure 2, is that the non-stop Paris-Brussels 'Thalys' is the shortest route with the fastest average speed.¹⁹ Stops take time and also require deceleration and acceleration time.²⁰ On average, existing high-speed routes average a little over 100mph between destinations.

Given the evidence, it seems the Authority is making a very generous assumption that their train will travel the 300 miles between San Fernando and Madera (Merced) in 123-132 minutes; an average speed of 136-146mph.²¹ However for purposes of this example, the Authority's average trip time during the IOS-Only Phase (128 minutes) is used to calculate total travel time.²²

Counting the travel times in minutes – Study Figure 4's options for a potential passenger during the five years of IOS-Only. Compare the elapsed travel-time results of principally using HSR, an auto or airplanes to overcome 'the friction of distance' between the state's largest metropolises.

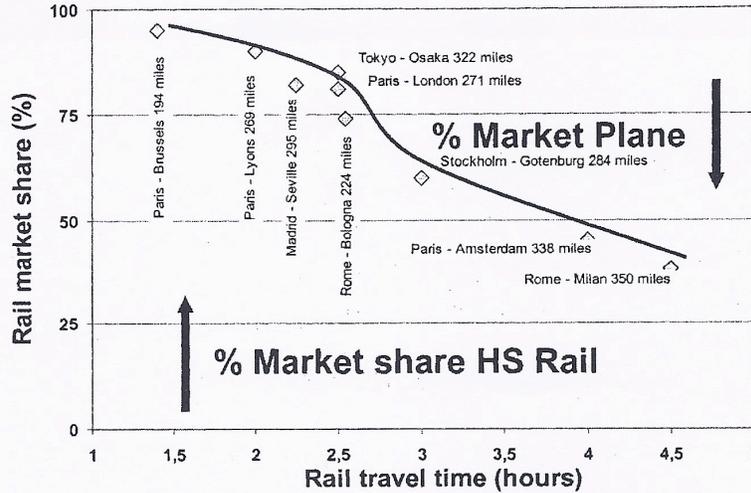
Travel times using the high-speed train during the IOS-Only Period – Figure 4 shows the HSR-based journey between the two metropolitan centers requires at least three separate tickets and four connections.²³ It also assumes the best of all possible conditions, i.e. connection times are not underestimated, all transport modes arrive and depart on time, no HSR security searches are required, estimated travel times are accurate, and each connection is made on time: that is to say, the journey proceeds with no waiting or "idle time" before the next scheduled departure (This is a very optimistic assumption as some of these Metrolink and Caltrain departures are once per half hour, or once per hour, especially on off hours and weekends) .

Adding together the increments, if the Norwalk-originated traveler only wished to go downtown San Francisco, he or she must go via the SF Peninsula on Caltrain from San Jose. That journey would be at least eight hours.²⁴ Using HSR, travel time from Norwalk to Berkeley requires at least seven hours if taking the bus between Merced and Oakland. The Norwalk-Berkeley journey, using Caltrain on the SF Peninsula, and then BART, would take at least eight and a half hours.

Figure 2 ²⁵

Distances And Station-To-Station Travel Times On Nine HSR Routes
 (Source: Director, HSR – International Union Of Railways/Union Internationale des Chemins des Fer)

How train travel time influences market share



For travel times of 4 hrs or less, HS rail captures 50+% of combined air/rail traffic on a route



Figure 3 – Analysis of Figure 2

Figure 3 Analysis of IUR/UIC Station-To-Station Times And Average Speeds – Station-to-Station –			
Origin and Destination of Nine HSR Routes	Distance (miles)	Travel Time	Average Speed
Paris-Brussels	194	1hr 22min	145mph
Paris-Lyon	269	1hr 56min	136mph
Madrid-Seville	295	2hrs 20min	74mph
Rome-Bologna	224	2.5hrs	54mph
Tokyo-Osaka	322	2.5hrs	129mph
Paris-London	271	2.5hrs	108mph
Stockholm-Gotenburg	284	3hrs	95mph
Paris-Amsterdam	338	4hrs	85mph
Rome-Milan	350	4hrs 10 min	85mph
Average station to station speed			101mph

Figure 4
Estimated One-Way Elapsed Travel Times of Travel Options During the IOS-Only Phase (2022 - 2026)
 (Calculations in minutes: totals converted to hours and minutes)

Point-to-Point Increments	Transit Mode	Travel Times of CHSRA's Offerings ²⁶			Travel Time By Auto		Travel Time Using An Airplane		
		Norwalk to Berkeley – Two Options –		Central LA to San Jose	Norwalk to Berkeley	Central LA to San Jose	Norwalk to Berkeley	Central LA to San Jose	Central LA to Market St. SF
		Via San Francisco	Via Oakland ²⁷	Via Union Station	Owner - operated auto	Driver lives in Central or South LA ²⁸	Via LGB to OAK to Berkeley ²⁹	LAX to SJC then to San Jose center	LAX-SFO to Market Street SF ³⁰
Board + time to departure point ³¹		15	15	15			25	35	35
LGB/LAX Security & Boarding							45	45	45
Norwalk-LA Union Station	Metrolink ³²	30	30						
Connection		5	5	5					
LA Union - San Fernando	CHSRA Bus ³³	37	37	37					
Ticketing & Connection		15	15	15					
San Fernando-Merced	HSR ³⁴	128	128	128					
Connection Only		5	5	5					
Merced-Oakland	CHSRA Bus		160 ³⁵						
Merced-San Jose	CHSRA Bus	150 ³⁶		150					
Flying Time LGB-OAK, LAX-SJC, LAX-SFO³⁷							59	50	56
Ticketing & Connection		15	15				25	15	15
San Jose To Millbrae	Caltrain	40							
Ticketing & Connection		15							
Millbrae-Berkeley	BART	62							
SFO to SF	BART								33
Oakland-Berkeley	BART ³⁸		16				23		
SJC-San Jose	#10+VTA							35 ³⁹	
Minimum Total Travel Time		8hrs. 37min	7hrs. 6min	5hrs 55 min	6hrs. 13min⁴⁰	5hrs. 20min⁴¹	2hrs. 57min	3hrs. 0min	3hrs. 4min

Highway times during the IOS-Only Phase – Of the roughly 100 million annual passenger trips between Southern and Northern California, about nine in ten are made by autos, trucks or busses. Figure 4 shows the driving time between the downtowns of Los Angeles and San Francisco is around six hours, while taking the Megabus is 7 hours and 40 minutes.⁴² Driving from Norwalk to Berkeley takes six hours and thirteen minutes: Norwalk to San Jose is five hours and twenty minutes.

Travel times using airplanes during the IOS-Only Phase – In every case on Figure 4, travelers looking to 'cut the time' use the airlines as their 'distance killer' between the LA Basin and the SF Bay Area arrive at either their central city or inner suburb destinations in about three hours.

Conclusions on relative travel times during the IOS-Only Phase – Figure 4 shows that, during the five years of the IOS-Only Phase, potential HSR passengers gain no travel time advantage over either driving times or air travel's times. Elapsed times of combined flights and ground connections show that airline passengers arrive at their destinations in about half the time as HSR users, and as little as a third the time as CHSRA's offerings.

Similarly, driving during the IOS-Only Phase has a clear time advantage over HSR-based travel. Between Norwalk and Berkeley, travelers arrive fifty-three minutes quicker than those using the CHSRA Bus from Merced to Oakland, and two hours and twenty minutes quicker than if the traveler is routed through San Jose and San Francisco. Between the centers of Los Angeles and San Francisco, the driver arrives a half hour earlier and doesn't spend more time renting a car. Even the Megabus gets between Los Angeles and San Francisco faster.

Why would any Californian choose to ride use the HSR offering to get between the two regions when they can get there faster by auto and a lot faster using the airplanes during the IOS-Only Phase?

Relative travel costs are the second devil during the IOS-Only Phase

– Would the five years of CHSRA's IOS-Only offerings attract the budget-minded auto or airline traveler because of lower point-to-point costs? Figure 5 has a lot to say about that question.

The travel costs of using the high-speed train during the IOS-Only Period – As Figure 5 shows, choosing the CHSRA's offerings during the IOS-Only Phase to get from Norwalk to Berkeley (or vice versa) fall a few dollars on either side of \$100. Getting from Central City Los Angeles to San Jose would be \$93.25. The onward trip to from San Jose to downtown San Francisco on Caltrain would add another \$9.00.⁴³

The costs of going by highway during the IOS-Only Phase – Relative to worldwide costs, driving in California is cheap.⁴⁴ During the IOS-Only Phase an auto driver, can drive the 403 miles between Berkeley and Norwalk for under \$61 in gas, and for a total operating cost of \$98.25 can add family and friends for a few dollars more.⁴⁵ For a few dollars less than gas, drivers take their own cars (and families) from the center of Los Angeles and downtown San Francisco, or \$10 dollars less between LA and San Jose – a very useful benefit to travelers in low-density California.⁴⁶ Travelers could also take the Megabus between the city centers for \$23-\$34.⁴⁷

The costs of using airplanes during the IOS-Only Phase – As pointed out in a 2012 study on worldwide HSR systems, the profiles of HSR passengers show they are either affluent or reimbursed for their travel expenses.⁴⁸ As Figure 5 shows, using the airlines, a Berkeley to Norwalk journey costs about \$144. Getting from downtown Los Angeles to San Jose is about \$126, to downtown San Francisco about \$133.

Caveat Fidelis (Believer Beware) of CHSRA's airfares – The costs of traveling by air between the two metropolitan areas will always be more expensive than using the HSR option because CHSRA set average airfares between the two cities as their benchmark and their fares 17% cheaper. That approach is by definition tautological – 'heads I win, tails you lose.' This simplistic approach to HSR fares is an excellent marketing tool, but unrealistic. It also creates all sorts of distortions in the Authority's own pricing schemes whereby a third of all fares quoted by CHSRA must be held to no more than 83% of the average airline fares (\$86).⁴⁹

Figure 5
Estimated One-Way Costs For Travel Options During the IOS-Only Phase (2022 - 2026)

Point-to-Point Increments	Transit Mode	Elapsed Times of CHSRA's Offerings			Travel By Auto		Travel Time Using An Airplane		
		Norwalk to Berkeley – Two Options –		Central LA to San Jose	Norwalk to Berkeley	Central LA to San Jose	Norwalk to Berkeley	Central LA to San Jose	Central LA to Market St. SF
		Via San Francisco	Via Oakland ⁵⁰	Via Union Station	Owner-operated auto ⁵¹	Driver lives in Central or South LA ⁵²	Via LGB to OAK to Berkeley ⁵⁵	LAX to SJC then to San Jose center ⁵⁶	LAX-SFO to Market St. SF ⁵³
Norwalk - LA Union	Metrolink ⁵⁴	\$7.25	\$7.25	\$0			\$37.00 ⁵⁵	\$20.00 ⁵⁶	\$20.00
LA Union Station - San Fernando	CHSRA Bus ⁵⁷								
San Fernando - Merced	HSR	\$86	\$86	\$86					
Merced - Oakland	CHSRA Bus								
Merced - San Jose	CHSRA Bus								
Airline Fares LGB-OAK, LAX-SJC, and LAX-SFO ⁵⁸							\$104	\$104	\$104
San Jose - Millbrae	Caltrain ⁵⁹	\$7.00							
Millbrae - Berkeley	BART ⁶⁰	\$5.10							
SFO - SF	BART								\$8.65
Oakland - Berkeley	BART		1.85				\$2.50		
SJC - San Jose	#10+VTA							\$3.00	
Minimum Total Costs		\$106.15	\$97.15	\$93.25	\$60.66 to \$98.25	\$52.64 to \$85.25	\$143.50	\$125.85	\$132.65

Conclusions on relative costs of travel – CHSRA has accepted that its fares can't compete in California on a cost basis with auto operating costs, so plans to compete with airline fares: *"Fare levels are . . . somewhat below current airfares in the longer distance travel markets and well above the out-of-pocket cost of driving in the shorter distance travel markets."*⁶¹ When the costs of driving will only be 70% of the costs of getting between the two central cities, or three-fifths the costs of getting between Norwalk and Berkeley, it will be very hard to pry auto drivers from their seats based on the driver's operating costs relative to the high-speed rail option. And when a Megabus passenger can get between San Francisco and Los Angeles for a third to half the CHSRA's offering, it will be a difficult 'sell' to budget travelers. During the IOS-Only Phase, CHSRA's ability to deflect travelers from highway travel (nine-tenths of the market) to their offerings is nil, especially if there are passengers on-board.

The Berkeley to Norwalk air travel option is about a third to half more expensive than the two IOS-Only offerings if using HSR. The five airlines serving the intra-state market will deeply discount or cross-subsidize fares that will force down high-speed rail's fares.⁶² To get from downtown Los Angeles to downtown San Jose using airplanes will be nearly half (46%) as much more. Using the airplane as a 'distance killer' will cost the San Francisco to Los Angeles traveler to pay about a quarter more than if he or she had used the CHSRA's offering during the IOS-Only Phase. CHSRA's offering may attract some air travelers, who like most

riders in Europe's shorter distance markets, are either affluent or reimbursed for their travel expenses: but how many?⁶³

In 2007, at the peak of the SF Bay Area – Southern California air travel, there were 10.5 million journeys between the six Southern California airports and the three SF Bay Airports.⁶⁴ After that air travel declined 17%.⁶⁵ While there is no way to tell how many airline passengers there will be when the IOS-Only Phase begins, 10.4 million seems possible. However, CHSRA's 2026 ridership forecast for their train of 12.3 million – 28% growth per year and a three-fold increase during the IOS-Only Phase – seems unrealistic, particularly if the Authority assumes many of them will be former airline passengers – as CHSRA must in order to meet their forecasts in Figure 1.

The third devilish detail is the self-inflicted bias of per mile charges in the Central Valley and 'Bookends' – In 2013, the twelve trains of the Central Valley's San Joaquin Amtrak made that line Amtrak's fifth busiest.⁶⁶ North and southbound boardings were 1.57 Million in 2013.⁶⁷

The Authority will eliminate subsidies to riders on the Central Valley's San Joaquin Amtrak line on HSR (or HST) when IOS-Only Phase's rail service is in place in 2022 – effectively a forced fare increase.⁶⁸ As a recent report on post-subsidized rail fares points out, if a passenger wants to make a short trip on HSR during the IOS-Only Phase, they will face ticket prices per mile up to three to four times per mile of what riders between the metropolitan centers will pay.⁶⁹

This is significant, because in the 2014 Draft Plan, the Authority claims no bias towards short or long haul charges per mile in the fare structure: *"In developing these forecasts, the Authority's consultants have not assumed any revenue optimization that would result from adjusting fares to optimize yields on specific markets such as short distance and commuter trips either in the San Francisco Bay Area and/or in the Los Angeles Basin."*⁷⁰ Yet the opposite is true: local (intraregional) passengers who might consider a HSR ride within the Central Valley, the San Francisco Bay Area and the Los Angeles Basin will pay considerably more per mile than they would on Amtrak, Metrolink or Caltrain.⁷¹

The February 2014 Draft Business Plan has exactly the same fare bias as the 2012 Plan, keeping downtown SF-to-downtown-LA fares low per mile (23¢) while a HSR ride in the Valley or the 'Bookends' will cost 27¢ to \$2.08 per mile.⁷² This is particularly injurious to intra-Central Valley riders who seemingly have no option but to pay 38¢-71¢ per mile, an average rise of 38% above what they pay now on the San Joaquin line. But they do have other options to travel inside the Valley and to Los Angeles by driving or carpools.

Inside the Valley, HSR will always be the travel time winner. A driver can cover the 164 miles between Valley's northern and southern terminuses (Merced and Bakersfield) in 2 hours and 36 minutes: the Amtrak ride takes three quarters of an hour more.⁷³ HSR's predicted travel times vary between an hour and an hour and fifteen minutes.⁷⁴ CHSRA's quicker, non-stop trains will fly through Fresno, Hanford, Visalia, and other Valley towns at 164mph: the slower, two stop trains will average 131mph. No contest.

Between Merced and Los Angeles the HSR train also wins the travel time race. Today's Amtrak train and bus journey takes five and a half hours.⁷⁵ The driving time from is an hour less – 4 hours and 26 minutes. That's still an hour and a half longer than taking the high-speed train and Metrolink.⁷⁶

But does the HSR train win the price competition? Between Merced and Bakersfield the Amtrak ticket is \$48 (Flexible fare is \$26).⁷⁷ The HSR ride would be 35% more (\$65).⁷⁸ In the Valley, Amtrak passengers' today pay about 54% of the San Joaquin Line's operating costs: i.e. their tickets are subsidized 46%.⁷⁹ Many if not most of today's 1.57 million (Figure 1) Amtrak riders will find alternatives to paying the increased HSR rail prices since Amtrak travelers aren't riding Amtrak for speed. They like the subsidized fares.

Driving the 280 miles between Merced and Los Angeles is cheaper than the HSR + Metrolink ride offered in the IOS and B2B phases. The gasoline cost of driving between the two is \$42.49: the full costs of driving would be \$70.⁸⁰ The CHSRA fare between the two is \$86.⁸¹ When families, friends or employers consider that the driver could take three to four passengers between Merced and Los Angeles for \$70, driving becomes the 'slam dunk' option.

How will the Authority expect attract Central Valley travelers to join them, or 'Bookends' commuters to abandon their subsidized fares when driving is cheaper and HSR fares will be so much higher than today's subsidized fares?

The fourth, but still unquantifiable, devil emerges from the 'HSR-unfriendly' urban structure of California's two metropolises. A recent scholarly paper pointed out the fragility of assuming the urban core of San Francisco and Los Angeles would be able to supply HSR passengers like Barcelona and Madrid.⁸² The authors point out that; "*HSR has proved to work best in populous, dense, and mono-centric urban centers, such as Paris and Tokyo*"⁸³ Neither the Bay Area nor Los Angeles can be classified as having densely populated urban centers. Being spread out makes it difficult for public transit development, when the ". . . *radius of a catchment area of transit stations, [should] be less than 400 meters.*" and HSR for inter-urban trips should have ". . . *a catchment area of 1.5 – 5 kilometers . . .*" [i.e. 0.9-3 miles].⁸⁴ That poses a very large challenge for travelers to get to stations served by HSR.

Nor are LA and SF mono-centric: their employment centers are scattered around their metropolitan areas, stymieing the development of transit to feed passengers to high-speed train stations. In fact "*Los Angeles is the prime example of a polycentric city*" where urban analysts, "*identified 36 employment center in 1990 and 48 in 2000.*" and "*The Bay Area is only slightly less polycentric . . . with 22 employment centers.*"⁸⁵

Reinforcing the difficulty of attracting passengers from polycentric cities, the authors say, ". . . *population centers do not coincide with employment centers or the areas with relatively high incomes in the California cities.*"⁸⁶ They also say "*Business trips usually take up a significant proportion of HSR trips. Many*

business trips originate or terminate at office district destinations where employment concentrates."⁸⁷ Much has been made of 200-350 mile high-speed rail journeys in Europe taking market share from air travel, such as the Madrid-Barcelona AVE train.⁸⁸ But as pointed out in a 2012 book, those two-to-four hour trips are on high-speed rail systems (HSR) that not only don't make profits, but most passengers are reimbursed for their ride.⁸⁹ Without either the wealthy downtowns, or easy access to HSR by reimbursed travelers, attracting the numbers of riders shown in Figure 1 becomes even more questionable.

California's high-income areas' populations, needed to pay non-subsidized fares, are not in the central cities. And while the paper on urban structure and density's conclusions are as yet unquantifiable, the findings should give pause to optimistic forecasting of ridership and revenue for HSR in California.

Conclusions on the promise of high-speed rail at the conclusion of the IOS-Only Phase – The Draft 2014 Business Plan says that the IOS will demonstrate "*Ridership and revenues sufficient to attract private capital for expansion.*"⁹⁰ This will come will come because the project moves ". . . to complex long-term concession agreements with underlying private capital investment."⁹¹ In short, private investors are to raise at-risk funds to buy a concession that will produce enough revenue to both operate the IOS trains profitably and simultaneously invest as much as \$20 billion to build the Bay to Basin (B2B) infrastructure.⁹² Since all of this is to be done without the State providing an operating subsidy as prohibited by AB3034, this is the definition of capital-at risk.

Potential private investors will ask why should they invest if there are no time or cost advantages for the roughly ninety million auto travelers during the IOS-Only Phase to defect to the CHSRA's offerings. They will also ask whether air travelers – many, if not most, of who are on business trips between the metropolises – would choose a round-trip of 10-17 hours versus six hours door-to-door, especially since their costs are likely reimbursed.

They will see that, unlike the Golden Gate Bridge's use of revenue bonds, there has never been at-risk money put into the project – not since its inception and not in the 15 years (2012-2026) since the Legislature agreed to match federal funds. They will know that the Authority's own consultants told them in 2008 and 2009 that there would be no private money in the project unless there was an illegal subsidy – euphemistically called a 'revenue guarantee.'⁹³ But most importantly they will see the evidence presented here that challenges the Authority's ridership claims in Figure 1 and ask themselves whether those forecasts are realistic enough to risk their personal savings and their client's savings to pay billions of dollars for a concession.

The Bay-to Basin Phase won't improve demand for the Authority's offerings much either – When and IF the CHSRA finds yet another \$20 Billion – a total of \$51 Billion – to build onward north and west of Fresno to San Jose, the Bay to Basin Phase of the program will be completed.⁹⁴ CHSRA forecasts it will have the San Fernando to San Jose portion of their system ready by 2027.

Will would-be travelers use the B2B? The evidence is in Figure 6, where costs were found to remain the same as during the IOS-Only Phase, and only HSR-based travel times change.

B2B's only significance to the traveler is the HSR service between Fresno and San Jose. The Authority says that the total travel time of the CHSRA's offering between San Fernando and San Jose ranges from 151-157 minutes, an average of 154 minutes.⁹⁵ Given the exegesis of climbing and descending Pacheco Pass with HSR's constrained grades, and maintaining an average speed of about 150mph, that would be remarkable.

That increased speed of getting from the Central Valley to San Jose seems to be the sole benefit of spending another \$20 Billion.⁹⁶ If true, that speed would bring the advantage that during the Bay to Basin Phase (B2B), HSR travelers between Central Los Angeles to San Jose arrive in 3hours and 51minutes, cutting a quarter of the time off a auto journey and a third off the travel time by HSR during the IOS-Only Phase. That may be attractive to some auto drivers without passengers, but likely only so if they do not need to rent a car at their destination. Otherwise, all airline-based itineraries and their connections to the Bay Area are still quicker.

Conclusions at the end of the IOS-Only and Bay to Basin phases – Given the paucity of either travel time or cost advantages, where are more than 17 million forecasted riders by the end of the B2B Phase – a more than four fold increase in seven years – supposed come from? ⁹⁷

Time-sensitive business passengers for those IOS and B2B years certainly won't abandon the airlines to spend more time getting between California's metropolitan areas. Even at the close of the B2B phase, air-based travel is still faster to any of the destinations than HSR-based travel – about three hours or less compared to almost four to six hours for the best HSR-based options. The business riders, i.e. the less-price sensitive market segment, won't find comfort in a lower-than-airfare-based ride from CHSRA's offering in either phase since most of them are reimbursed for their travel expenses. Time matters to them, particularly if it is 'face time' with customers or time at home.

Some travelers will want the experience of a combination of transit rail, a HSR, buses, and commuter rail to get between city centers, or nearer their home base. But the inconvenience alone of so many connections (up to six) to get to or from Disneyland or Berkeley will put off many, if not most families traveling with children to even the B2B's offerings; particularly when they learn that California's urban sprawl demands a rental car. Similarly, families will ask what's the HSR advantage through the B2B phase when they can drive all three or four of them round-trip for under \$200, versus about \$700 for transit and HSR train tickets?⁹⁸ The difference is money in their pockets.

Figure 6
Estimated One-Way Elapsed Travel Times of Travel Options During the Bay to Basin Phase (2022 - 2026)
 (Calculations in minutes: totals converted to hours and minutes)

Point-to-Point Increments	Transit Mode	Travel Times of CHSRA's Offerings ⁹⁹			Travel Time By Auto		Travel Time Using An Airplane		
		Norwalk to Berkeley – Two Options –		Central LA to San Jose	Norwalk to Berkeley	Central LA to San Jose	Norwalk to Berkeley	Central LA to San Jose	Central LA to Market St. SF
		Via San Francisco	Via Oakland ¹⁰⁰	Via Union Station	Owner - operated auto	Driver lives in Central or South LA ¹⁰¹	Via LGB to OAK to Berkeley ¹⁰²	LAX to SJC then to San Jose center	LAX-SFO to Market Street SF ¹⁰³
Board + time to departure point ¹⁰⁴		15	15	15			25	35	35
LGB/LAX Security & Boarding							45	45	45
Norwalk-LA Union Station	Metrolink ¹⁰⁵	30	30						
Connection		5	5	5					
LA Union - San Fernando	CHSRA Bus ¹⁰⁶	37	37	37					
Ticketing & Connection		15	15	15					
San Fernando – San Jose	HSR	154		154					
San Fernando-Merced	HSR ¹⁰⁷		128						
Connection Only			5						
Merced-Oakland	CHSRA Bus		160 ¹⁰⁸						
Flying Time LGB-OAK, LAX-SJC, LAX-SFO ¹⁰⁹							59	50	56
Ticketing & Connection		15	15				25	15	15
San Jose To Millbrae	Caltrain	40							
Ticketing & Connection		15							
Millbrae-Berkeley	BART	62							
SFO to SF	BART								33
Oakland-Berkeley	BART ¹¹⁰		16				23		
SJC-San Jose	#10+VTA							35 ¹¹¹	
Minimum Total Travel Time		6hrs. 28min	7hrs. 6min	3hrs 46 min	6hrs. 13min ¹¹²	5hrs. 20min ¹¹³	2hrs. 57min	3hrs. 0min	3hrs. 4min

If reimbursed business travelers are unlikely to use the HSR system in its first seven years, and families with children are also unlikely HSR travelers, the Authority's ridership (and therefore revenue) figures are suspect. One could conclude that the main purpose of the HSR system may be to serve reimbursed government employees. Even if that were the purpose, the system would likely serve only less than four million riders per year; far below the 17 million forecasted for end of the B2B Phase in 2028.¹¹⁴

On the face of it, the Authority's offerings through the seven years of IOS and B2B are unattractive to both those not being reimbursed for their trip and those dependent on the time-efficiencies of California's airline-based travel. That makes the Authority's ridership projections – 4.6 million in 2022 and 17.4 million in 2028 – highly suspect.

Un-kept promises are the Authority's hallmark – Set aside for a moment the hosts of unfulfilled promises the Authority has made about the costs, start times and other aspects of California's high-speed rail system.¹¹⁵ Now the Authority's 2014 Business Plan promises to have the at least 151 miles of high-speed capability between Fresno and San Jose operational in 2027 – seven years after opening the IOS.¹¹⁶ It also promised that two years later (2029) the truncated promise to voters, fictionally portrayed by the Authority as

2008's Phase 1, would be operational.¹¹⁷ In 2008 the Authority told would-be travelers they could get between the downtowns of San Francisco and Los Angeles for about \$50 and be there in two hours and forty minutes. It also said the entire Phase 1 would cost about \$33 Billion, and by 2011 the Authority said the entire Phase 1 would be operational by 2033 (now postponed).¹¹⁸ During the IOS and B2B phases, the train was also supposed to help improve the environment, but won't.¹¹⁹ In 2008 the Authority and the Legislature promised there was no need for an operating subsidy, yet that too has been rescinded.¹²⁰ Promises were made: few were kept.

The Authority's ridership and revenue forecasts for the IOS or B2B phases have not, and will not, convince private, at-risk capital to invest

– The promise of someday having high-speed service operating between the metropolitan centers is enticing. But in practical terms, for their combined seven-year history the IOS-Only and the B2B phases have little to offer the middle income or the budget minded, the wealthy or the reimbursed traveler. People don't choose inconvenience and higher costs today for a promise of a better tomorrow. They have and will have better travel time or price options for travel inside California by 2022 and more in 2029. That is the definition of progress.

Anyone seeking private capital knows that the risks of a new service are very high: the principal one being the presence of competitors, i.e. the 'survivors' serving the same market. Investors know that too. If customers already have other choices, such as the airlines or inexpensive auto travel for as long as seven years, a 'second chance' would be very rare. Even if a HSR launch happens, competitors will cut prices or offer enhanced services – or both. Then there are 'disruptive technologies' – think of seven years ago (2007) when there was no Tesla, Facebook or Twitter, no self-driving car, no ride sharing or other 'disruptive' transportation or communication technologies. In less than a decade these and other offerings have changed way we communicate. By 2022 or 2029 more 'disruptive' changes are likely; but the Authority's offerings would be still be dependent on a single, fixed rail system.

No private capital has been forthcoming in the nearly two decades the project has been publically discussed. There's a good reason for that; and this analysis has shown why. Neither the IOS, nor the B2B phase offers many travelers the clear time or cost advantages that might produce enough revenue to attract private, at-risk capital to pay back its shareholders and invest in further extensions of HSR service. Nor is private, at-risk capital likely to be forthcoming.

The entire HSR project's rationale: profitable, environment-friendly, more rapid and cheaper travel between San Francisco and Los Angeles' downtowns, becomes unhinged by starting high-speed rail's role in transporting Californians with the IOS-Only Phase as the only offering, and only adding a quicker ride to San Jose in the next, B2B, phase. Launching the HSR project into the headwinds of market-tested airline operations and relatively very cheap auto travel, competitive forces the Authority cannot influence, without unassailable costs and/or travel time advantages is a receipt for rapid financial failure.

END NOTES TO 'IF YOU BUILD IT THEY WILL NOT COME'

¹ On the subject of a private operator, Exhibit 1.1, page 16 of the California High-Speed Rail Draft 2014 Business Plan says the IOS will have a private sector operator and will produce revenues sufficient to attract private capital. On the subject of not needing an operating subsidy, the Draft 2014 Business Plan, Exhibit 6.3 PSF 52, broaches the subject of a \$50M operating subsidy during the ramp-up period. However, the requirements of AB3034, Section 2704.08 (c) (2) (J) and Section 2704.08 (d) (2) (D) are the train cannot have an operating subsidy. No mention is made of allowing an operating subsidy during the ramp-up period, and this requirement assumes no return on the capital grants from Federal or State of California sources. On the subject of travel times between the downtowns of San Francisco and Los Angeles, the California High-Speed Rail Draft 2014 Business Plan Ridership and Revenue Forecasting—Draft Technical Memorandum, Appendix A, PDF 70 shows that the fastest trains between the downtowns of SF and LA when the Phase 1 is eventually finished will require 180 minutes, which is three hours – not the 2 hours 40 minutes promised voters in 2008.

² AB3034 Section 9, Article 2 (5) says; " *Revenues of the authority, generated by operations of the high-speed train system above and beyond operating and maintenance costs and financing obligations, including, but not limited to, support of revenue bonds, as determined by the authority, shall be used for construction, expansion, improvement, replacement, and rehabilitation of the high-speed train system.*

³ Eric T. Wagner, "Five Reasons 8 out of 10 Businesses Fail" *Forbes*, September 12, 2013.

⁴ By July 2001, after just two years in business, Webvan had spent just about all of the \$1.2 billion put up by investors. See: <http://www.venturenavigator.co.uk/content/153>. Founded in 1998, and backed by Amazon.com, Pets.com raised \$82.5 million in a February 2000 initial public offering. Within 18 months, nearly all was lost. See: <http://news.cnet.com/2100-1017-248230.html>. Solyndra received a \$536 million U.S. Energy Department loan guarantee before going bankrupt. See: <http://en.wikipedia.org/wiki/Solyndra>

⁵ See: California High-Speed Rail Draft 2014 Business Plan, PDF 42

⁶ See: California High-Speed Rail Draft 2014 Business Plan Ridership and Revenue Forecasting—Draft Technical Memorandum, Figure 3.1 [PDF 25]. Estimates for 2022 and onwards are from Exhibit 4.2 [PDF 43] of the 2014 Draft Business Plan.

⁷ Exhibit 4.1 [PDF 42] of the 2014 Draft Plan shows that by 2030, a year after the Bay-to-Basin is operational (as shown in Figure 3.2 PDF 26 of Cambridge Systematics' Technical Memorandum, Ridership and Revenue Forecasting), the Medium Ridership estimate on the IOS will be 24.4 million.

⁸ For 2013 ridership on the San Joaquin line, see; Tim Sheehan, Fresno Bee, October 14, 2013 "Amtrak's San Joaquin trains set ridership record. Found at <http://www.fresnobee.com/2013/10/14/3553276/amtraks-san-joaquin-trains-set.html>

⁹ Estimates for 2022-2024 are from Exhibit 4.2 [PDF 43] of the Draft 2014 Business Plan

¹⁰ See: California High-Speed Rail Draft 2014 Business Plan Ridership and Revenue Forecasting—Draft Technical Memorandum, PDF 24 and PDF 25

¹¹ See Exhibit 4.1 [PDF 42] of the Draft Plan

¹² Amtrak San Joaquin ridership 2012-2013 growth was 6.6%. The compound growth rate of 6.6% was used to forecast growth 2013-2021.

¹³ See: California High-Speed Rail Draft 2014 Business Plan Ridership Exhibit 4.1 [PDF 42] and the Revenue Forecasting—Draft Technical Memorandum, PDF 24 and PDF 25.

¹⁴ The California High-Speed Rail Draft 2014 Business Plan Ridership and the Revenue Forecasting; Draft Technical Memorandum, Figure 3.3 [PDF 27] shows that Phase 1 HSR Service terminates at LA Union Station, where riders connect to Metrolink, and in the north in San Francisco in Phase 1. Terminating at LA Union Station violates 2008's promise that had HSR serving Anaheim and subsequent Business Plans through 2011.

¹⁵ Norwalk and Berkeley, both considered inner radius suburbs of their central city, are roughly equal distances (15 miles) from Los Angeles Union Station and the SF TransBay Center respectively. A 2004 study suggests the market catchment area of Amtrak to be a 25 miles radius. See: T.R. Leinbach, *City Interactions: The Dynamics of Passenger and Freight Flows*, in Hansen & Giuliano; *The Geography of Urban Transportation* (pp. 30-58). NY: Guilford Press.

¹⁶ C. Zhong, G. Bel, M. Warner; High-Speed Rail Accessibility: What Can California Learn from Spain; 2013

¹⁷ On PDF 98 of the 2014 Draft Business Plan, the August 14, 2013 Peer Review Report says; ". . . it is unlikely that trains would actually be scheduled to run during normal hours of operation within the 30 minute or 2 hours 40 minute limits at the completion of the Phase I Blended system."

¹⁸ See: California High-Speed Rail Draft 2014 Business Plan, page 3 [PDF 3]

¹⁹ The non-stop Thalys, departing Paris at 8:25am, arrives in Brussels at 9:47am, a journey of 1 hour 22 minutes. The economy ticket price is US60¢ per mile. Found at:

<http://www.raileurope.com/index.html>

²⁰ This calculation allows 5 minutes for deceleration and connection at two stations. See: <http://www.japan-guide.com/e/e2018.html> Tokyo-Osaka, a longer route, with an average of 129mph would increase its average speed only to 138mph if deceleration and acceleration for the Nagoya and Kyoto stops were not counted.

²¹ See: California High-Speed Rail Draft 2014 Business Plan Ridership and Revenue Forecasting—Draft Technical Memorandum, Appendix A [PDF 68]. The center of the page table shows 'HSR Patterns' Merced to San Fernando (Sylmar) Run Times to range from 123 to 132 minutes, which over the 300 miles of the IOS equates to speeds of 133mph to 150mph.

²² In the CHSRA 2014 Draft Plan's Ridership and Revenue Technical Memorandum [PDF 68], it also says that a transfer time takes 15 minutes. Assuming that connection time includes ticketing, this is used in travel time calculations only when changing transport modes; i.e. from Metrolink to HSR, bus to Caltrain and Caltrain to BART (or vice versa). Same mode connections are five minutes. While this seems minimal, Amtrak assumes it and 5 minutes is used. See:

<http://tickets.amtrak.com/itd/amtrak>.

²³ The Pacific Surfliner web site gives a five-minute interval to disembark in LA Union and board the next train. While this seems minimal, it is used. See: <http://tickets.amtrak.com/itd/amtrak>. Metrolink fares and times are at: <http://www.metrolinktrains.com>. The Caltrain Baby Bullet schedule shows a station to station time between San Jose Diridon and San Francisco's Fourth and King Street station to be 1 hour and 7 minutes. BART timetables are at:

<http://www.bart.gov/schedules/bylinerresults?route=7&date=02/18/2014>.

²⁴ The traveler at San Jose who wishes to go to downtown San Francisco could take Caltrain's 1 hour and 7 minute Baby Bullet train to 4th and King Street, San Francisco.

²⁵ Iñaki Barron de Angoití, Director of High Speed Rail at the International Union of Railways/UIC, presented this chart to the US Congress On April 19th 2007. See: International High-Speed Rail Systems: a Hearing before the Subcommittee on Railroads, Pipelines and Hazardous Materials of the Committee on Transportation and Infrastructure, House of Representatives; April 19, 2007, at http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110_house_hearings&docid=f:34799.pdf.

²⁶ Norwalk and Berkeley, both considered inner radius suburbs of their central city, are roughly equal distances (15 miles) from Los Angeles Union Station and the SF TransBay Center respectively. A 2004 study suggests the market catchment area of Amtrak to be a 25 miles radius. See: T.R. Leinbach, City Interactions: The Dynamics of Passenger and Freight Flows, in Hansen & Giuliano; *The Geography of Urban Transportation* (pp. 30-58). NY: Guilford Press.

²⁷ This option assumes the passenger goes from Merced to Oakland by CHSRA bus service, then to Berkeley by BART

²⁸ Assumes the driver lives in Downtown LA, Huntington Park or South Los Angeles, a 15-minute drive to pass near LA Union Station on or entering Hwy 5.

²⁹ The airport nearest Norwalk is Long Beach (LGB) – 12 miles. See: <http://www.travelmath.com/nearest-airport/Norwalk,+CA>. Driving time is 20 minutes. Prime Time Shuttle is scheduled pick-up. See <https://primetimeshuttle.hudsonltd.net/res>

³⁰ The San Francisco TransBay Center (SFTBC) is supposed to substitute for the Caltrain Terminal at from 4th and King Street. While SFTBC is scheduled to be completed in the fall of 2017, five years before the IOS is completed, the IOS funding does not include a connection to the SFTBC. See: <http://transbaycenter.org/construction-updates/project-schedule>

³¹ Driving time to the Norwalk/Santa Fe Springs Metrolink station is assumed to be 5 minutes, connection time another 5 minutes

³² Travel times for the 10 daily Metrolink trains (5am-5:33pm) between the Norwalk/Santa Fe Springs Station to LA Union Station vary between 27 and 37 minutes; the average being 30.2 minutes. See:

http://www.metrolinktrains.com/schedules/line/name/Orange%20County/service_id/1152.html

Amtrak does not stop at the Norwalk/Santa Fe Springs Station.

³³ PDF page 25, Figure 3.1 of the 2014 Draft Plan, Cambridge Systematics' Technical Memorandum, Ridership and Revenue Forecasting, shows that during the IOS-Only Phase, there will be a Dedicated Bus Connection between LA Union Station and San Fernando. Travel time is 37 minutes per page A-1 [PDF 68] of the 2014 Draft Plan, Cambridge Systematics' Technical Memorandum, Ridership and Revenue Forecasting .

³⁴ Assumes the average 2014 Plan's Merced-San Fernando run times (123-132 minutes); See the HSR Patterns table on page A-1 [PDF 68] of the 2014 Draft Plan, Cambridge Systematics' Technical Memorandum, Ridership and Revenue Forecasting.

³⁵ This is by CHSRA dedicated bus. Travel time is 160 minutes per page A-1 [PDF 68] of the 2014 Draft Plan, Cambridge Systematics' Technical Memorandum, Ridership and Revenue Forecasting.

³⁶ This is by CHSRA dedicated bus. Travel time is 150 minutes per page A-1 [PDF 68] of the 2014 Draft Plan, Cambridge Systematics' Technical Memorandum, Ridership and Revenue Forecasting.

³⁷ Flying times: LGB-OAK, See: <http://www.travelmath.com/flying-time/from/Long+Beach,+CA/to/Oakland,+CA> For LAX-SJC, see: <http://www.travelmath.com/flying-time/from/LAX/to/SJC> For LAX-SFO, see: <http://www.travelmath.com/flying-time/from/LAX/to/SFO>

³⁸ BART from Oakland Lake Merritt to Downtown Berkeley takes 16 minutes and Oakland Coliseum to Downtown Berkeley takes 23 minutes. See:

<http://www.bart.gov/schedules/bylineresults?route=3&date=03/02/2014>

³⁹ Assume from the aircraft's landing to the free Airport Shuttle bus takes 15 minutes. The No. 10 VTA Bus takes 10 minutes from SJC to the Santa Clara Transit Center. See:

<http://www.vta.org/routes/rt10>. From there it connects with Caltrain to San Jose Diridon station, which takes 9-10 minutes. Counting connections, SJC to downtown takes approx. 35 minutes.

⁴⁰ For Norwalk to Berkeley driving times see: <http://www.travelmath.com/driving-time/from/Norwalk,+CA/to/Berkeley,+CA> .

⁴¹ For Central Los Angeles to San Jose city center is 5hrs. 20 minutes see:

<http://www.travelmath.com/driving-time/from/Norwalk,+CA/to/San+Jose,+CA>

⁴² The Stagecoach Group owns Megabus. Megabus.com lists four daily services between San Francisco and Los Angeles. See: <http://us.megabus.com>. Travelmath.com says the driving distance is 381 miles, and driving time is 5 hours 59 minutes. See:

<http://www.travelmath.com/driving-time/from/San+Francisco,+CA/to/Los+Angeles,+CA>

⁴³ Total costs between the SF and LA's central cities would be \$102.25. For Caltrain fares, see: <http://www.caltrain.com/Fares/farechart.html>

⁴⁴ Comparing an auto's operating costs to a rail trip during the IOS-Only Phase is relevant because HSR also has capital and maintenance costs. The main operating cost of an auto is gasoline. Compared with five nations with sizeable HSR systems, California's gasoline is cheap. Gas in the UK is 92% more expensive than the US, Japan's 74% higher, France's 62% higher, Germany's 49% and Spain's 20% higher. This comparison is important because it demonstrates the relative attractiveness of HSR to California's auto drivers versus HSR relative to drivers in the five other (HSR) markets. See: http://www.nationmaster.com/graph/ene_gas_pri-energy-gasoline-prices

⁴⁵ Based on gasoline costs, the website, travelmath.com, computes the costs of the 393 miles using gas mileage at 25mpg, gas prices at \$3.859, for a total price of \$60.66. See: <http://www.travelmath.com/cost-of-driving/from/Norwalk,+CA/to/Berkeley,+CA>. Table 4.4 in Cambridge Systematics Technical Memorandum on Ridership and Revenue Forecasting to the 2014 Plan [PDF 33] says the costs of driving is \$98.25-an average of 25¢/mile. What the Plan does not say is that the auto, SUV, van or truck could hold more than one passenger plus the driver, and that their costs are 'fully loaded' (incorporating insurance, maintenance, etc. costs).

⁴⁶ The 'gasoline only' cost to drive the 381 miles between central SF and central LA is \$58.87. See: <http://www.travelmath.com/cost-of-driving/from/San+Francisco,+CA/to/Los+Angeles,+CA>.

The 'gasoline only' cost to drive the 341 miles between central LA and San Jose is \$52.69. See: <http://www.travelmath.com/cost-of-driving/from/San+Jose,+CA/to/Los+Angeles,+CA>. The Authority's 'fully loaded' cost is \$85.25. See: FN45 for an explanation of the differences.

⁴⁷ The Stagecoach Group owns Megabus. Megabus.com lists two fares between the downtowns of San Francisco and Los Angeles. See: <http://us.megabus.com>.

⁴⁸ Daniel Albalade, and Germà Bel in, *The Economics and Politics of High-Speed Rail; Lessons From Experiences Abroad*, page xiii (Lexington Books, 2012) showed that most HSR passengers are those who "travel for business reasons and whose ticket (the amount of which is far from covering the total cost of the service) is paid for by their employers."

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- ⁴⁹ See: California High-Speed Rail Draft 2014 Business Plan Ridership and Revenue Forecasting—Draft Technical Memorandum, Table 3.1, page 3-5 [PDF 28].
- ⁵⁰ This option assumes the passenger goes from Merced to Berkeley by CHSRA bus service
- ⁵¹ The website <http://www.travelmath.com/cost-of-driving/from/Norwalk,+CA/to/Berkeley,+CA> says that assuming 25mpg, and the cost of gasoline at \$3.859, the “gas only” one-way cost of driving is \$60.66, at 15.4 cents per mile. The Authority’s “fully loaded” one-way cost of driving is \$98.25. See PDF page 33, Table 4-4 on page 4-4, of the 2014 Draft Plan, Cambridge Systematics’ Technical Memorandum, Ridership and Revenue Forecasting, at an average of 25 cents per mile. Note: This “Auto” could hold from 1 to 4 passengers.
- ⁵² Assumes the driver lives in Downtown LA, Huntington Park or South Los Angeles, a 15-minute drive to pass near LA Union Station on or entering Hwy 5.
- ⁵³ The San Francisco TransBay Center (SFTBC) is supposed to substitute for the Caltrain Terminal at from 4th and King Street. While SFTBC is scheduled to be completed in the fall of 2017, five years before the IOS is completed, the IOS funding does not include a connection to the SFTBC. See: <http://transbaycenter.org/construction-updates/project-schedule>
- ⁵⁴ Metrolink fares are from <http://www.metrolinktrains.com/ticketspricing/>. All Metrolink fares are ‘Regular Fare’ prices. Other ground transport modes are noted.
- ⁵⁵ Prime Time Shuttle is a privately offered pick up at a residence or business service. See <https://primetimeshuttle.hudsonltd.net/res>
- ⁵⁶ See: <https://shuttletolax.com/reservations/SELDEP>
- ⁵⁷ PDF page 28, Table 3.1 of the 2014 Draft Plan, Cambridge Systematics’ Technical Memorandum, Ridership and Revenue Forecasting, shows that during the IOS-Only Phase, the maximum fare will be \$86.
- ⁵⁸ The maximum price of a one-way HSR ticket was set at 83% of the average airline fare (\$86). However, the website Expedia says, airline fares for a one-way fare on the day of travel were: LGB-OAK, \$138. For LAX-SJC, \$199. For LAX-SFO, \$204. See: <http://www.expedia.com/Flight-Search->
- ⁵⁹ See: <http://www.caltrain.com/Fares/farechart.html>
- ⁶⁰ See: <http://www.bart.gov/tickets/calculator>
- ⁶¹ See: California High-Speed Rail Program Revised 2012 Business Plan, April 2012, page 5-11 [PDF 119]
- ⁶² In the CHSRA’s Draft 2014 Business Plan, the SF-LA fare is set at \$86 – 83% of the average annual fares between airports in Los Angeles Basin and the SF Bay Area. Using an average distance between SFO and LAX, (338 miles), BUR (327 miles), SNA (372 miles), the airline charge works out to about 25\$ per mile. On February 10th 2014, Virgin America, American Airlines, United Airlines and US Airways offered a two week advance purchase one-way, February 24th LAX-SFO ticket for \$58. Southwest Airline’s was \$59.
- ⁶³ Op Cit. Albalade, and Bel, The Economics and Politics of High-Speed Rail; Lessons From Experiences Abroad
- ⁶⁴ The six southern ones were Burbank (BUR) Los Angeles International (LAX), Long Beach (LGB), Ontario (ONT), Palm Springs (PSP), Orange County-Santa Ana (SNA) and San Diego (SAN). The Bay Area airports were Oakland (OAK), San Francisco International (SFO) and San Jose (SJC).
- ⁶⁵ See: California High-Speed Rail 2012 Business Plan, final technical Memorandum, *prepared for Parsons Brinckerhoff for the California High-Speed Rail Authority, prepared by Cambridge Systematics, Inc. Ridership and Revenue Forecasting*, Appendix B, Table 1, page 10, [PDF 116] of *Potential Airline Response to High-Speed Rail Service in California*, prepared by Aviation System Consulting, LLC August 2011, Prepared for Cambridge Systematic, [Sic] Inc.
- ⁶⁶ The Fresno Bee, December 2, 2013; Tim Sheehan, Amtrak’s San Joaquin Valley trains see record ridership: Found at <http://www.fresnobee.com/2013/12/02/3644370/amtraks-san-joaquin-trains-see.html#storylink=cpy>
- ⁶⁷ Source: National Railroad Passenger Corporation (Amtrak)
- ⁶⁸ See PDF 43, CHSRA, Draft 2014 Business Plan, February 7 2014. Also, Cambridge Systematics’ (CS) final technical memorandum of Ridership and Revenue Forecasting of April 12, 2012, Section 5.2, page 5-5 [PDF pg. 37] says “Note that the existing San Joaquin service south of Merced to Bakersfield is assumed to be discontinued upon the initiation of HST service.” The Draft 2014 Plan is silent on discontinuing or continuing the subsidized Amtrak service.

⁶⁹ See 'Fleecing' Local High-Speed Train Riders While Big City Executives Ride Cheaper: A Briefing Paper, January 29, 2014; found at www.sites.google.com/site/hsrcaliffr/home/briefing-papers/01-2014-fleecing-local-high-speed-train-riders.

⁷⁰ See PDF 43, CHSRA, Draft 2014 Business Plan, February 7 2014

⁷¹ William Grindley and William Warren, 'Fleecing' Local High-Speed Train Riders While Big City Executives Ride Cheaper: A Briefing Paper, January 29, 2014; found at www.sites.google.com/site/hsrcaliffr/home/briefing-papers/01-2014-fleecing-local-high-speed-train-riders

⁷² In a back-handed recognition of this highly cynical approach, the Authority says: "*The consultants have assumed the same high-speed rail fare structure as assumed in the 2012 Business Plan forecasts and presented in the Draft 2014 Business Plan Ridership and Revenue Technical Memorandum.*" The Technical Memorandum is available at:

http://www.hsr.ca.gov/About/Business_Plans/Draft_2014_Business_Plan.html

⁷³ Driving time is at <http://www.travelmath.com/driving-time/from/Bakersfield,+CA/to/Merced,+CA>. The Amtrak ride is 3 hours and 10 minutes See: <http://tickets.amtrak.com/itd/amtrak>

⁷⁴ See: 2014 Draft Plan, Cambridge Systematics' Technical Memorandum, Ridership and Revenue Forecasting, page A-1 HSR Patterns [PDF 68].

⁷⁵ See: <http://tickets.amtrak.com/itd/amtrak>

⁷⁶ To go the 280 miles takes 4hrs. 26 minutes. See: <http://www.travelmath.com/driving-time/from/Merced,+CA/to/Los+Angeles,+CA>

⁷⁷ See: <http://tickets.amtrak.com/itd/amtrak>

⁷⁸ See CHSRA's Draft 2014 Business Plan, Cambridge Systematics' (CS) final technical memorandum of Ridership and Revenue Forecasting, Table 3.1, [PDF 28]

⁷⁹ In Federal Fiscal Year 2010-11, the San Joaquin route required a 46% subsidy to make up the difference between its operating costs and passenger-based revenues. Source: "Amtrak Operating Results, Amtrak Invoice (Actual and Contract Results) at 100%.

⁸⁰ For gasoline-only costs, see <http://www.travelmath.com/cost-of-driving/from/Merced,+CA/to/Los+Angeles,+CA>. The Authority's "fully loaded" one-way cost of driving the 280 miles is \$78. See PDF page 33, Table 4-4 on page 4-4, of the 2014 Draft Plan, Cambridge Systematics' Technical Memorandum, Ridership and Revenue Forecasting, at an average of 25 cents per mile. Note: This "Auto" could hold from 1 to 4 passengers.

⁸¹ See CHSRA's Draft 2014 Business Plan, Cambridge Systematics' (CS) final technical memorandum of Ridership and Revenue Forecasting, Table 3.1, [PDF 28]

⁸² See: Chuyuan Zhong, Germà Bel, and Mildred Warner: High-Speed Rail Accessibility: What Can California Learn From Spain? 2013, found at: http://mildredwarner.org.s3.amazonaws.com/2012/09/20/Zhong_Bel_Warner_HighSpeedRail_2012-b19b0817.pdf

⁸³ Ibid, pg. 8

⁸⁴ Ibid, pg 12

⁸⁵ Ibid, pg. 9

⁸⁶ Ibid, pg. 22

⁸⁷ Ibid, pg. 18

⁸⁸ In addition to the claims made by the UIC/IUR's Director of High-Speed Rail in the US Congress (Figure 2) since the introduction of the AVE between Madrid and Barcelona, HSR has captured over 50% of the train-air passengers. See: "EU could ground short-haul flights in favor of high-speed rail." *The Guardian*, April 18th 2011: at

<http://www.theguardian.com/world/2011/apr/18/eu-transport-plan-short-haul-flights>

⁸⁹ In their worldwide study, *The Economics and Politics of High-Speed Rail; Lessons From Experiences Abroad*, page xiii, authors Daniel Albalade, and Germa Bel in; (Lexington Books, 2012) showed that most HSR passengers are those who "*travel for business reasons and whose ticket (the amount of which is far from covering the total cost of the service) is paid for by their employers.*" In May 2009 Iñaki Barrón de Angoití, Director of High-Speed Rail at the IUR, said, "*Only two routes in the world — between Tokyo and Osaka, and between Paris and Lyon — have broken even.*" See: Spain's High-Speed Rail Offers Guideposts For U.S." *NY Times*, May 29, 2009. Those PPM fares are 56¢ and 34¢ vs. 23¢ in CA respectively.

⁹⁰ See: Draft 2014 Business Plan, Exhibit 1.1, page 16 [PDF 16]

⁹¹ Ibid. pg. 29 [[PDF 29]

⁹² Ibid. Exhibit 1.1, [PDF 16] says the IOS costs \$31 Billion to build and by time the B2B is completed, \$51 Billion will be spent; implying the B2B will cost \$20 Billion, much if not all to be privately funded.

⁹³ Five months before Prop 1A passed (June 2008) the Authority's consultants, IMG, reported that private, ". . . respondents argued that interest in equity investment would increase if the risk to the concessionaire were decreased, perhaps through some form of revenue guarantee . . ." [See: Report of Responses to the Request for Expressions of Interest For Private Participation in the Development of A High-Speed Train System in California by the Infrastructure Management Group (IMG) to the California High-Speed Rail Authority Board Financing Workshop, dated October 2008; page 2 of 17 The presentation was given in June but the printed report issued in October. "A presentation summarizing the results of the RFEI was made before the Authority Board of Directors on June 11, 2008 "] Eighteen months after the IMG's 2008 survey, in a September 2009 IMG-Goldman Sachs workshop, CHSRA learned: "Private appetite for ridership risk is limited without revenue guarantee or until ridership proven." [See: California High-Speed Rail Authority Board Financing Workshop; A presentation by Infrastructure Management Group Inc. and Goldman Sachs; September 3, 2009; pages 9-1]

⁹⁴ See Exhibit 1.1 [PDF 16] of the 2014 Draft Plan. The IOS is to cost \$31 Billion (YOE) and the cumulative expenditure through building the Bay to Basin is listed as \$51 Billion.

⁹⁵ See page A-2, [PDF 69] 2014 Draft Plan, Cambridge Systematics' Technical Memorandum, Ridership and Revenue Forecasting

⁹⁶ See Exhibit 1.1 [PDF 16] of the 2014 Draft Plan. The IOS is to cost \$31 Billion (YOE) and the cumulative expenditure through building the Bay to Basin is listed as \$51 Billion.

⁹⁷ That would be an annual growth rate of about 25%

⁹⁸ Travelmath.com computes the costs of the 403 miles using gas mileage at 25mpg, gas prices at \$3.37, and consumption of 16.12 gallons for a total price of \$54.42. See:

<http://www.travelmath.com/cost-of-driving/from/San+Francisco,+CA/to/Anaheim,+CA>. Even considering lower miles per gallon or higher gasoline prices, three passengers would not increase the price of driving one way four-fold. The \$300 estimate is errs to the high side, while four fares to go the distance on CHSRA's offering would cost \$452 (\$113 x 4). A round trip would cost \$904 and take 16hours and thirty-two minutes.

⁹⁹ Norwalk and Berkeley, both considered inner radius suburbs of their central city, are roughly equal distances (15 miles) from Los Angeles Union Station and the SF TransBay Center respectively. A 2004 study suggests the market catchment area of Amtrak to be a 25 miles radius. See: T.R. Leinbach, City Interactions: The Dynamics of Passenger and Freight Flows, in Hansen & Giuliano; *The Geography of Urban Transportation* (pp. 30-58). NY: Guilford Press.

¹⁰⁰ This option assumes the passenger goes from Merced to Oakland by CHSRA bus service, then to Berkeley by BART

¹⁰¹ Assumes the driver lives in Downtown LA, Huntington Park or South Los Angeles, a 15-minute drive to pass near LA Union Station on or entering Hwy 5.

¹⁰² The airport nearest Norwalk is Long Beach (LGB) – 12 miles. See: <http://www.travelmath.com/nearest-airport/Norwalk,+CA>. Driving time is 20 minutes. Prime Time Shuttle is scheduled pick-up. See <https://primetimeshuttle.hudsonltd.net/res>

¹⁰³ The San Francisco TransBay Center (SFTBC) is supposed to substitute for the Caltrain Terminal at from 4th and King Street. While SFTBC is scheduled to be completed in the fall of 2017, five years before the IOS is completed, the IOS funding does not include a connection to the SFTBC. See: <http://transbaycenter.org/construction-updates/project-schedule>

¹⁰⁴ Driving time to the Norwalk/Santa Fe Springs Metrolink station is assumed to be 5 minutes, connection time another 5 minutes

¹⁰⁵ Travel times for the 10 daily Metrolink trains (5am-5:33pm) between the Norwalk/Santa Fe Springs Station to LA Union Station vary between 27 and 37 minutes; the average being 30.2 minutes. See:

http://www.metrolinktrains.com/schedules/line/name/Orange%20County/service_id/1152.html
Amtrak does not stop at the Norwalk/Santa Fe Springs Station.

¹⁰⁶ PDF page 25, Figure 3.1 of the 2014 Draft Plan, Cambridge Systematics' Technical Memorandum, Ridership and Revenue Forecasting, shows that during the IOS-Only Phase, there will be a Dedicated Bus Connection between LA Union Station and San Fernando. Travel time is 37 minutes per page A-1 [PDF 68] of the 2014 Draft Plan, Cambridge Systematics' Technical Memorandum, Ridership and Revenue Forecasting .

¹⁰⁷ Assumes the average 2014 Plan's Merced-San Fernando run times (123-132 minutes); See the HSR Patterns table on page A-1 [PDF 68] of the 2014 Draft Plan, Cambridge Systematics' Technical Memorandum, Ridership and Revenue Forecasting.

¹⁰⁸ This is by CHSRA dedicated bus. Travel time is 160 minutes per page A-1 [PDF 68] of the 2014 Draft Plan, Cambridge Systematics' Technical Memorandum, Ridership and Revenue Forecasting.

¹⁰⁹ Flying times: LGB-OAK, See: <http://www.travelmath.com/flying-time/from/Long+Beach,+CA/to/Oakland,+CA> For LAX-SJC, see: <http://www.travelmath.com/flying-time/from/LAX/to/SJC> For LAX-SFO, see: <http://www.travelmath.com/flying-time/from/LAX/to/SFO>

¹¹⁰ BART from Oakland Lake Merritt to Downtown Berkeley takes 16 minutes and Oakland Coliseum to Downtown Berkeley takes 23 minutes. See: <http://www.bart.gov/schedules/bylinerresults?route=3&date=03/02/2014>

¹¹¹ Assume from the aircraft's landing to the free Airport Shuttle bus takes 15 minutes. The No. 10 VTA Bus takes 10 minutes from SJC to the Santa Clara Transit Center. See: <http://www.vta.org/routes/rt10>. From there it connects with Caltrain to San Jose Diridon station, which takes 9-10 minutes. Counting connection time, from SJC to downtown takes approximately 35 minutes.

¹¹² For Norwalk to Berkeley driving times see: <http://www.travelmath.com/driving-time/from/Norwalk,+CA/to/Berkeley,+CA> .

¹¹³ For Central Los Angeles to San Jose city center is 5hrs. 20 minutes see: <http://www.travelmath.com/driving-time/from/Norwalk,+CA/to/San+Jose,+CA>

¹¹⁴ In 2011, the State employed about 400,000 Full Time Equivalents. See: <http://www2.census.gov/govs/apes/11stca.txt>. Local and special purpose governments in California employed about 1.35 Million. See: <http://www2.census.gov/govs/apes/11locca.txt>. However, local and special purpose employees rarely travel outside their jurisdiction, and State government employees only occasionally. Even assuming all 1.75 million of them did use HSR annually and each took two trips, ridership by all California government employees would be 3.5 million, a fraction of Figure 1's estimates.

¹¹⁵ In 2008, the downtown LA-to-downtown SF Phase 1, all on high-speed trains, was touted as costing \$33 Billion. By November 2011, that had risen as high as \$117 Billion. Only when the Authority unilaterally eliminated the expensive 'Bookends' did the costs seem to retreat to \$68-\$79 Billion. The Authority also claimed they could build the Initial Construction Section in the Central Valley with their \$6 Billion in-hand until November 2013 when their engineers admitted the ICS' costs are closer to \$7-\$8 Billion. Within the space of two years, that ICS now costs 18-33% more than the Authority has commitments for. ICS construction was to have started in September 2012. As of close of February 2014, the Authority is still a long way from acquiring enough land to seriously begin construction.

¹¹⁶ PDF page 25 and Figure 3.2 [PDF 26] of the 2014 Draft Plan, Cambridge Systematics' Technical Memorandum, Ridership and Revenue Forecasting, shows that by 2027, six years after the IOS is operational, the Bay to Basin section will open between Fresno and San Jose. The driving distance between Fresno and San Jose is 151 miles. See: <http://www.travelmath.com/drive-distance/from/Fresno,+CA/to/San+Jose,+CA>

¹¹⁷ PDF 26 and Figure 3.3 [PDF 26] of the 2014 Draft Plan, Cambridge Systematics' Technical Memorandum, Ridership and Revenue Forecasting, shows that by 2029, eight years after the IOS is operational, what the Authority refers to as Phase 1 will open between Los Angeles Union Station and San Francisco's TransBay Center. This ignores the fact that 2008's voters were promised a southern terminus of Phase 1 at Anaheim. Figure 3.3 shows Anaheim-bound riders must change to Metrolink at LA's Union Station.

¹¹⁸ See California High-Speed Rail Program; Draft 2012 Business Plan, November 1, 2011, pg. ES-8 [PDF14]

¹¹⁹ The 2014 Draft Plan, page 17, still claims the train will alleviate both congestion and pollution. See: *"The high-speed rail system will help reduce congestion on the state's highways and at its airports, will help the state improve air quality and meet its greenhouse gas reduction goals, and put thousands of people back to work"* Once HSR is in the Central Valley, and fares per mile jump, present-day Amtrak riders will vote with their pocketbooks to find auto or bus alternatives – exacerbating congestion and pollution. Unless there is some yet-to-be announced policy to end transit subsidies at the 'Bookends' the Caltrain and Metrolink riders will stay with their subsidized rail rides.

¹²⁰ This Paper does not analyze the subject of CHSRA's claims of a profitable service or environmental advantages while operating. However, The Authority's 2014 Draft Plan admits that the first three years (2022-2024) of the IOS-Only Phase will require an operating subsidy of \$50 Million. See: California High-Speed Rail Draft 2014 Business Plan, Exhibit 6.1, page 52 [PDF 52]. There is no provision in the underlying legislation (AB3034) to permit the first three years of the system to have an operating subsidy. Not only would explicit ballot claims in 2008 of "NO NEW TAXES" be violated; but to finance that deficit, new legislation to override AB3034's Section 2704.08 (c) (2) (J) and Section 2704.08 (d) (2) (D) would have to be passed to allow this to happen. See: 2008, Supplemental Quick Reference Guide on Proposition 1A, page 3. Admission of this subsidy would also have a 'chilling effect' on would-be passengers. The actual or potential disruption to sales and ticketing during the 1980s and 1990s during the US budget airline 'shake-out' is proof positive the traveling public will only buy tickets into the near future from a stable transport alternative. The lack of a clear future for HSR, plus the legislative wrangling and inevitable court cases will inflict on the perception that HSR will not be available cannot be discounted. While Coca-Cola and Apple survived 'bumps-in-the-road' and continued as on-going businesses, HSR in California is a start-up company with considerable competition in the in-state transport system. Customers don't buy promises of better HSR tomorrow: they buy today's predictable and inexpensive modes transportation services to where they need to go soon.