

IF YOU BUILD IT, THEY WILL NOT COME – THE SEQUEL –

THE FINDINGS AND CONSEQUENCES OF COMPETITIVE ANALYSES OF HSR VERSUS AUTO AND AIR TRAVEL – 2029-2040

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Overview: In March 2014, we released **IF YOU BUILD IT, THEY WILL NOT COME** and presented it to the California Senate's Transportation and Housing Committee. The Legislature took no action. This paper expands those findings.

We urge readers to visit and study this paper's foundations at <https://sites.google.com/site/hsrcliffr/home/2-1-major-reports---2018-plan/09-2018-if-you-build-it-they-will-not-come---the-sequel>. Review the MS Excel files that compute the Total Travel Time and Total Travel Cost competitiveness of high-speed rail (HSR), Auto and Air travel on 140 routes during 2029-2032 and 180 routes between 2033 and 2040 – the places where the California High-Speed Rail Authority (CHSRA) claims 14.4 Million riders will come from in 2029 and 36.2 Million in 2033. There, you will also find 'Screen Shots' documenting both round-trip airfares used in each analysis plus the Greyhound Bus fares used in this paper to conclude that **less than one-in-five of CHSRA's 2018 forecasted riders are likely to choose HSR over Auto or Air travel between 2029 and 2040.**

Executive Summary

Our competitive analyses of high-speed rail (HSR), Auto and Air travel on over three-fourths of all possible routes showed that ***less than one-in-five of the California High-Speed Rail Authority's (CHSRA) 2018 forecasted riders will choose HSR over traveling by Auto or Air*** since its Total Travel Times are longer. HSR Total Travel Costs are *always more than driving* – and on distances of +400miles *always more costly than travelling by Air*.

Why so few riders? Nearly three-fourths (74%) of Californian's population live (and will live) in the state's three major markets. With one exception (Gilroy-to-Palmdale), the Authority should not claim any riders between California's largest two markets (Los Angeles-18 Million and the SF Bay Area-8 Million) nor between the second and third largest (San Diego County-3Million) markets. Air travel is always faster. With no form of CHSRA service, no riders should have been forecasted between Los Angeles and San Diego's markets.

if riders use HSR to travel to or from Sacramento during False Phase 1 (2033-2040), they will be on an Authority bus one-way at least 2hours 40minutes: before 2033 the one-way bus ride is 4hours. For example, to reach their District Offices, San Joaquin Valley legislators will spend about 50% *more* Total Travel Time than traveling by Auto; SF Bay Area legislators will spend *more than twice* an Auto's Total Travel Time. For districts inside the LA Metro Area, not only is Air travel cheaper, but an HSR trip is *more than twice* Air travel's Total Travel Time. San Diego legislators will spend more for fares and *more than three times* the Total Travel Time using high-speed rail to reach their District than if they traveled by Air.

Ten years after Prop. 1A, CHSRA has spent over \$5Billion with no track laid. In the two years between 2016 and 2018, the opening of the San Jose-San Joaquin Valley link was postponed four more years with costs rising 43% (\$20.7Billion to \$29.5Billion). Seven years behind schedule, and facing a \$65Billion funding gap, the price tag for LA-to-SF's False Phase 1 is now to +\$77Billion, far *more than twice* the \$33Billion 2008's voters approved.

CHSRA's high costs of commuting by HSR between the San Joaquin Valley and Silicon Valley will not solve the two Valleys' imbalances of housing and jobs. Nor will connecting HSR with the Altamont Corridor Express (ACE) at Merced; as residents there are unlikely to accept a 9hour daily commute by ACE train to/from San Jose – nor would Fresno residents accept a daily, round-trip commute of 10hours 20minutes by HSR (connecting in Merced) and an ACE train.

HSR proponents claim many benefits for the project. But the State Auditor recently documented CHSRA's shoddy management, a repeat of former years, likely to be repeated. If False Phase 1 is built, Californians will be burdened with servicing +\$100Billion of capital expense and HSR trains that will require an *unknowable-to-the-public operating subsidy forever* to serve very few riders. HSR will solve not metropolitan areas' auto congestion, while a nearly-empty train can never be a clean-energy efficient train. Nor will a Train-To-Nowhere, as a Democratic Congressman called it nearly a decade ago, burnish California's national and international image of technology leadership or fiscal rectitude.

Why does California's Legislature and Governor still support any high-speed rail project ?

FOREWORD

Assembly Bill 3034, the "Safe, Reliable High-Speed Passenger Train Bond Act for the 21st Century" is a bond measure authorizing the sale \$9.95 billion in general obligation bonds that the California Legislature may authorize for the construction of a high-speed train system. The Bill-then-Law is ambitious, but unambiguous:

AB3034 Section 2704.08 (J) *"The planned passenger service by the authority in the corridor or usable segment thereof will not require a local, state, or federal operating subsidy."*

Grindley and Warren painstakingly investigate the long sequence of claims by the California High Speed Rail Authority (CHSRA) that construction and operation of an unsubsidized system is feasible. It is not, but for more than ten years following the 2008 vote on Proposition 1A, the CHSRA has persistently made work for its consultants, contractors and itself, already spending at least \$5Billion on a \$77Billion project for which the California State Auditor reports that almost \$65Billion in costs are associated with no source of finance.

Grindley and Warren engage in a far-reaching empirical analysis that lays bare the CHSRA's efforts to obscure the truth, comparing the Authority's contrived modeling outputs to historical evidence. The Authority is lying to try and protect a hopelessly unproductive project, manipulating ridership, revenue, and operating and maintenance cost forecasts to try and counter publicly-available evidence to the contrary.

The CHSRA and its consultants' have hidden from public and media scrutiny the details of tens of millions of dollars in computer-based forecasts and analyses. The Authority has concocted the forecasts it needs to make their project appear financially viable. By virtue of either ignorance or complicity, the US Department of Transportation, ex-Governor Jerry Brown, and California's Legislature all have been partners in these counterfeit claims.

In truth, there is no fare that will render profitable a system that would allow Californians to travel between Los Angeles and San Francisco in two and one-half hours, nor, for that matter, is there any way even to build such a system without billions of dollars more of government funds. No private investment will be forthcoming without a revenue guarantee from California, but such a guarantee would be illegal.

The authors detail a politically driven project, ring-fenced with pseudoscience intended to hide the self-serving assumptions that the CHSRA uses as the foundation for its specious claims of a profitable system. It is astounding that the conspiracy has persisted for so long.

The people of California owe Grindley and Warren a debt of gratitude for their work.

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THE AUTHORS

WILLIAM C. GRINDLEY – World Bank; Associate Division Director, SRI International; Founder and CEO, Pacific Strategies, ret. (Bachelor of 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 (October 2010)
- A Financial Analysis Of The Proposed California High-Speed Rail Project (June 2011)
- Revisiting Issues In the October 2010 Financial Risks Report (September 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)
- 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)
- A Partial Catalog of Inappropriate, If Not Illegal, Actions in the Conduct and Execution of California's Proposed High-Speed Rail Project – prepared for DOT's OIG (November 2013)
- Sixteen Violations of the Federal Rail Authority's Contract With California's High-Speed Rail Authority – prepared for DOT's OIG (March 2015)

BRIEFING PAPERS:

- Dubious Ridership Forecasts (October 2010)
- Six Myths Surrounding California's High-Speed Rail Project (January 2011)
- Seven Deadly Facts For California's High-Speed Rail Authority (January 2011)
- A Train To Nowhere But Bankruptcy (January 2011)
- Big Trouble For California's \$66 Billion Train (March 2011)
- Will The Train Benefit California's Middle Class? (April 2011)
- Fleecing Local High-Speed Train Riders While Big City Executives Ride Cheaper (January 2014)
- If You Build It They Will Not Come (March 2014)

BRIEF NOTES: 23 one-page, single subject papers on various aspects of financial issues related to the proposed high-speed rail system, October 2010 - August 2011

ANY FAULT FOUND IN THIS REPORT IS SOLELY THE RESPONSIBILITY OF THE AUTHORS.

AUTHORS' PREFACE

This paper is one result of a decade of careful analyses of every California High-Speed Rail Authority (CHSRA) business plan and appendices. That effort revealed misleading statements, distortions, capricious assumptions and conclusions unsupported by empirical evidence. It was a journey into a world of professionals all too ready to make their forecasts fit politicians' need to present the image of a financially sustainable high-speed (HSR) system. Our 41 papers in the public domain, seventy trips to Sacramento and eight to Washington D.C., highlighted the protective barriers erected against citizen oversight by a state government that prides itself on its transparency.

This paper's thesis is that the Authority has long known how to measure its trains' competitiveness – a 2007 UIC/IUR diagram suggested HSR's competitiveness boundaries and the joint US DOT-CHSRA EIR/EIS of May 2008 defined the metrics. It also shows that using empirical information from CHSRA's publications and its experts' statements produces more believable and feasible ridership results than those based on 'optimism bias' that, ". . . *overestimate benefits and underestimate costs*. . ."¹ or 'strategic misrepresentation' inherent in modelers' contracts where, ". . . *lying pays off*. . ."²

For over a decade, empirical analyses such as this paper is based on, have not 'seen the light of day.' CHSRA's project has been exemplar of strategic misrepresentation, protected by state law that hides its ridership modelers' methods behind a protective curtain of supposed proprietary information.

We not only owe a debt of gratitude to Oxford Professor Bent Flyvbjerg for early-on showing how 'strategic misrepresentation' is endemic in mega-projects, but also to scholars in Barcelona, Berkeley, Cornell, Stanford, the University of Southern California and other US universities and foundations. A special Thank You goes to several members of the Fourth Estate, who bravely continued to point out just how flawed California's HSR project was until their editors and publishers became convinced.

The following agreed to read this Paper and found its findings and conclusions supported by its 320 route competitive analyses' database:

Wendell Cox – Principal of Demographia, consultants on land use and transport policies and co-author of several reports on California's high-speed rail project

Tench Coxe – Managing Director, Sutter Hill Ventures, Palo Alto, California

Alain C. Enthoven – The Marriner S. Eccles Professor of Public and Private Management, Emeritus, Stanford University

Kathy Hamilton – Investigative journalist and author of *The Hamilton Report* on California's high-speed rail project (<http://www.thehamiltonreport.com/author/kathy-hamilton/>)

Thomas Holt – author and President, VORT Corporation

¹ Quoting the work of Nobel Prize winner Daniel Kahneman (Lovallo, D., and Kahneman, D. (2003), 'Delusions of Success: Professor Bent Flyvbjerg says ". . . *managers make decisions based on delusional optimism rather than on a rational weighting of gains, losses, and probabilities. They overestimate benefits and underestimate costs. They involuntarily spin scenarios of success and overlook the potential for mistakes and miscalculations. As a result, managers pursue initiatives that are unlikely to come in on budget or on time, or to deliver the expected returns. Over-optimism can be traced to cognitive biases, that is, errors in the way the mind processes information.*" See: How Optimism Undermines Executives' Decisions', *Harvard Business Review*, July, pp.56–63.), p. 349 [PDF 6]

² "If we now define a lie in the conventional fashion as making a statement intended to deceive others . . . we see that deliberate misrepresentation of costs and benefits is lying, and we arrive at one of the most basic explanations of lying that exists: *lying pays off* or, at least, political and economic agents believe it does. Where there is political pressure there is misrepresentation and lying, according to this explanation." See: Bent Flyvbjerg, *Survival of the Unfit: why the worst infrastructure gets built—and what we can do about it*. See: p. 351 [PDF 8] at: <https://academic.oup.com/oxrep/article-abstract/25/3/344/424009/Survival-of-the-unfit-why-the-worst>

C. William Ibbs – Professor, Engineering and Project Management, University of California, Berkeley

Paul S. Jones, Ph.D. – Railroad Engineer specializing in high-speed rail (Spain and Korea)

Adrian Moore, Ph.D. – Co-author of several reports on California’s high-speed rail project and V.P. of Policy, Reason Foundation

James E. Moore, II – University of Southern California, Professor of Engineering and Policy

James C. VanHorne – The A.P. Giannini Professor of Banking and Finance, Emeritus, Stanford University

Richard White – Professor of History, Stanford University and author of RAILROADED

We also ‘tapped’ the knowledge and wisdom of other colleagues who know about railroads and particularly about running businesses, which by law [AB3034, Section 2704 (8) (j)] California’s HSR train must be. Among the many are: Mike Brady, Stuart Flashman, Morris Brown, David Schonbrunn, Ken Orski, Mark Powell, Cindy Bloom, CC-HSR, especially Jim Janz, plus Elizabeth Alexis, Nadia Naik and Rita Wespi of Californians Advocating Responsible Rail Design (CARRD).

TABLE OF CONTENTS

PART ONE – WHY IT IS IMPORTANT TO UNDERSTAND WHAT THIS PAPER SAYS, WHAT WE DID TO PREPARE IT AND HOW TO READ IT

- 1.1 What We Sought To Do and What We Did
- 1.2 Readers Should Start With A Visit To Our Web Site
- 1.3 How We Measured Whether HSR, Auto or Air Travel As Being The Most Competitive
- 1.4 Why HSR Can't Compete With Auto Total Travel Costs
- 1.5 For Ten Years The Authority Had The Means, Motive and Opportunity To Prove Its System's Total Travel Time and Total Travel Cost Competitiveness
- 1.5 What Would Be A Reasonable *A Priori* Expectation For California's HSR Train's Ridership?

PART TWO – ONE UNIVERSAL AND SEVERAL CHSRA-IMPOSED ENCUMBRANCES SERIOUSLY IMPEDE HIGH-SPEED RAIL'S CHANCES OF 'WINNING' ROUTES

- 2.1 HSR and Air's Shared and Pervasive Impediment To Winning Routes
- 2.2 The Authority 'Shot Itself In The Foot With Two Long-Term, Self-Imposed Burdens To 'Winning' Riders
- 2.3 An Inexplicable Claim of 'Other Regions' Riders Whose HSR-Inclusive Trips Are Encumbered By A Commercial Bus or Auto Rides, Resulting In Little Time On HSR
- 2.4 Albeit A Temporary Encumbrance, Repercussions Of The Cross-Tehachapi Buses' Inconvenience Will Plague HSR's Future
 - 2.4.1 – The SV-CV Period: A Lesson In Brand Destruction
- 2.5 How Do CHSRA-Imposed Encumbrances Affect HSR's Competitiveness In 2029 and 2032?

PART THREE – WHAT ARE CHSRA'S TRAINS CHANCES OF COMPETITIVELY WINNING RIDERS ON UNENCUMBERED ROUTES?

- 3.1 The International Union of Railways Recognizes That High-Speed Rail's Competitiveness is 'Bracketed'
- 3.2 What Are CHSRA's Chances Of Capturing Riders Traveling Between California's Three Major Markets?
- 3.3 Why HSR Can't Compete Against Auto Travel's Total Travel Time On Short, Unencumbered Routes Of <125miles
- 3.4 The UIC/IUR-Derived Diagram Predicted That Auto Travel Would 'Win' All But One Intra-Regional Route
- 3.5 How Does Ignoring The UIC/IUR-Derived Diagram and California's Regional Geography Change HSR's Competitiveness?

PART FOUR – ROUTES WHERE THE AUTHORITY CAN CLAIM RIDERS BY HSR TRAVEL BEING FASTER THAN AUTO OR AIR TRAVEL

- 4.1 Unencumbered HSR 'Wins' Inside The UIC/IUR's Sweet Spot During Its First Four Operating Years
 - 4.1.2 Unencumbered HSR 'Wins' MTC-SJV Routes Between 2033 and 2040
- 4.2 While Not During Its Launch Years, But Between 2033 and 2040, Unencumbered HSR 'Wins' Some SCAG-SJV Routes
- 4.3 CAUTION: An HSR Link Between Silicon Valley and The San Joaquin Valley Would Not Be A Solution To Silicon Valley's Housing Problem
 - 4.3.1 The Costs Of Commuting By The HSR Link Between Silicon Valley and The San Joaquin Valley (MTC-SJV)**
 - 4.3.2 What The Competitive Analyses of Routes Between the SF Bay Area (MTC) and The San Joaquin Valley Told Us**
 - 4.3.3 What Practical Considerations Might Potential SF Bay Area-San Joaquin Valley Commuters Make?**
 - 4.3.3.1 How Long Will The Valley's Cheaper Land and Housing Last?**
 - 4.3.3.2 Why Leave The San Joaquin Valley?**
 - 4.3.4 Considerations Silicon Valley Employers Should Give To The SV-CV Link**
- 4.4 The Consequences of Less Than 100% of The Forecasted SF Bay Area-San Joaquin Valley (MTC-SJV) and Los Angeles Metro Area-San Joaquin Valley (SCAG-SJV) Ridership

- 4.4.1 HSR 'Wins' on MTC-SJV Routes During The SV-CV Period
 - 4.4.1.1 Bereft of Any Other Route 'Wins' The SV-CV Period Is A Designed Bankruptcy**
 - 4.4.2 HSR 'Wins' on MTC-SJV and SCAG-SJV Routes During False Phase 1**
- 4.5 Four Reasons Why The Links Between Silicon Valley and The San Joaquin Valley and The LA Metro Area and The San Joaquin Valley Are A March To Bankruptcy
- 4.6 Afterword – On Connecting HSR With ACE

PART FIVE – THE CONSEQUENCES OF HSR BEING UNCOMPETITIVE ON SO MANY ROUTES BETWEEN 2029 AND 2040

- 5.1 What Does The Authority Offer Potential Patrons In 2029-2032 and 2033-2040?
- 5.2 A Look At Our Route Analyses' Outcomes
- 5.3 HSR's Biggest Route Losses Are Between The State's Biggest Markets
- 5.4 Routes ≠ Riders: From Routes To Ridership: The Reckoning
- 5.4 What Would The Impacts Be On Our Competitive Ridership Forecasts If Some Of Our Analyses Were Wrong?

PART SIX – EXAMPLES OF THE TIME AND MONEY LEGISLATORS WILL WASTE TRAVELING TO/FROM THEIR DISTRICTS BY HIGH-SPEED RAIL AND A PLEA FOR LEADERSHIP

- 6.1 Examples For Legislators To Personally Understand HSR's Lack Of Competitiveness On Routes Familiar To Them
 - 6.1.1 Los Angeles Metro Area State Legislators
 - 6.1.2 SF Bay Area State Legislators
 - 6.1.3 San Diego County State Legislators
 - 6.1.4 San Joaquin Valley State Legislators
- 6.2 Lawmakers' Use Of High-Speed Rail Would Represent A Significant Waste of Time and The Legislature's Travel Budget
- 6.3 A Decade Of Optimism Bias and Strategic Misrepresentations On Ridership Have Discredited The Authority and Its Supporters
- 6.4 HSR For California May Have Been A Bold Vision In the 1970s, But Not Forty Years Later
- 6.5 A Plea For Sanity Before Californian's Discover The Project Is Too Built To Stop, Then Too Big To Fail

A GLOSSARY OF TERMS USED IN THIS PAPER

MS EXCEL WORKBOOKS (ONLY AVAILABLE AT THE WEBSITE) FOR THE SV – CV PERIOD (2029 – 2032) FOR FALSE PHASE 1 (2033 – 2045)

APPENDICES (ONLY AVAILABLE AT THE WEBSITE)

APPENDIX A – ACELA'S ACTUAL MARKETS AND RIDERSHIP PROJECTIONS AS 'BENCHMARKS' ON THE REASONABLENESS OF CHSRA'S RIDERSHIP FORECASTS

APPENDIX B– EVALUATION OF THE APPROACH TAKEN IN OUR PAPER, IF YOU BUILD IT THEY WILL NOT COME – THE SEQUEL, USING ACELA'S RIDERSHIP AS A BASELINE

APPENDIX C – ROUND-TRIP AIR FARES

APPENDIX D – ONE-WAY BUS FARES

APPENDIX E – UIC/IUR GRAPHIC SHOWN TO THE US CONGRESS (ENLARGED VIEW)

APPENDIX F – (AVAILABLE AFTER MARCH 15TH, 2019) – TOTAL TRAVEL TIMES ON ONE-WAY TRIPS USING HSR, AUTO AND AIR BY KEY MEMBERS OF THE LEGISLATURE AND THE CALIFORNIA HIGH-SPEED RAIL AUTHORITY

PART ONE

WHY IT IS IMPORTANT TO UNDERSTAND WHAT THIS PAPER SAYS, WHAT WE DID TO PREPARE IT AND HOW TO READ IT

* * * * *

Former California Assembly Speaker Willie Brown might as well have been speaking about the Authority's (CHSRA) strategy for the state's high-speed rail (HSR) project when he said, "*Start digging a hole and make it so big, there is no alternative to coming up with the money to fill it in.*"³ Despite a decade of critiques, court challenges and a gap of many tens of billions of dollars between available and needed funds, spending continues.

It isn't too late for California's government to understand that there aren't sufficient funds or public support⁴ to waste on "A Train To Nowhere"⁵ over a 'pruned' LA-SF route that, in the unlikely event gets built, will not only require an operating subsidy forever, but will be 'one more tombstone' that attests to incompetence, if not fraud and corruption. CHSRA's one-time Chairman, now describes the project as a betrayal of the voters' intent⁶ while this paper 'peeks' into a gigantic waste of money by the state's political elites and what is an affront to most Californians, particularly the San Joaquin Valley's residents, farmers and businesses.

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1.1 WHAT WE SOUGHT TO DO AND WHAT WE DID – Our objective was to ascertain which of three travel modes, HSR, Auto or Air, is more time and/or cost efficient on routes where the HSR train would board and discharge passengers.⁷ To do this we computed the round-trip Total Travel Times

³ "If people knew the real cost from the start nothing would ever get approved. The idea is to get going. Start digging a hole and make it so big, there is no alternative to coming up with the money to fill it in." Former Assembly Speaker Willie Brown SF Chronicle, July 28, 2013.

⁴ In December 2018, the Public Policy Institute of California (PPIC) released a report from a survey that showed 64% of Californians gave only low-to-medium priority for building the high-speed rail system – 46% of them saying the HSR train was very low to low priority. See: p. 25 [PDF 25] of Californians & Their Government, PPIC, December 2018. Found at: <https://www.ppic.org/publication/ppic-statewide-survey-californians-and-their-government-december-2018/> Actually, that finding is both a surprise (few survey results change so quickly from 53% support to low-to-medium support) and ironical since over the last few years, PPIC's, PPIC Statewide Survey: Californians & Their Government has said something like what it said in March 2018, "A slight majority favor building the high-speed rail system (53% favor, 43% oppose)." That headline belies how survey respondents were 'pushed' to give answers favorable to the HSR project. Page 27, Question 24 is enlightening because it said, "If oppose, ask: 'What if the high-speed rail system cost less, would you favor or oppose building it?'" If the PPIC surveyors had been 'neutral' they would never have asked that secondary question or asked those that favored the HSR project something like "What if the high-speed rail system cost more, would you continue to support it?" Also, PPIC had to know that by early 2018, the promise of \$33Billion had risen to \$77Billion. Found at: <http://www.ppic.org/publication/ppic-statewide-survey-californians-and-their-government-march-2018/>

⁵ Whether the monies to be spent on the 'Train to Nowhere' meet the legal strictures of AB3034 or what exactly the CHSRA plans to do with whatever is built are still open questions. A PDF file of the letter from Congressman Dennis Cardoza (D-CA) to then-Secretary LaHood and FRA Administrator Joseph Szabo of November 30 2010 named the project "A Train To Nowhere" that can be found at <http://cardoza.house.gov/index.cfm?sectionid=87&itemid=701>

⁶ "To me, the Authority Chairman during all the planning and pre-November 4, 2008 efforts regarding the bond measure, this constitutes the greatest betrayal of all in the context of the original intent and promises to voters." Quentin Kopp, Former Chairman of the California High-Speed Rail Authority. See: page 9 of the Declaration of Quentin L. Kopp, in the case of John Tos, et. al., Plaintiffs v. California High Speed Rail Authority, et. al., Defendants: Case No. 34-2011-0013919, Filed with the Superior Court of the State of California, County of Sacramento, Trial Date, May 31, 2013.

⁷ Table 2.2, page 2-5 [PDF 25] of 2018's Ridership and Revenue Forecasting, Technical Supporting Document, lists fares for 91 Origins-Destinations. However, Table 5.3 [PDF 41-42] of that same document claims passengers and revenues from fares from regions that are not listed in Table 2.2, such as Sacramento (SACOG), San Diego County (SANDAG), and 'Other Regions' broadly, defined as: to/from the Monterey/Central Coast, To/From Far North, To/From W. Sierra Nevada. [See: p. 3.2-25 [PDF 252] of the Final: Bay Area to Central Valley High-Speed Train (HST) Program Environmental Impact Report/ Environmental Impact Statement (EIR/EIS) Volume 1: Report, May 2008, at: http://www.hsr.ca.gov/docs/programs/bay_area_eir/BayCVValley08_EIR_finalHST_vol1.pdf This paper adds to Table 2.2's list of fare-generating Origins-Destinations, not only Sacramento and San Diego, but also Turlock, Modesto, Stockton, Lodi and Elk Grove, clearly shown as being served by Authority-dedicated buses in both Figure 2.1 and Figure 2.2 of the Ridership and Revenue Forecasting report. It also recognizes O-D revenues for the cities of Monterey, Redding and Lake Tahoe and between those (Other-Other) to account for the 'Other' categories in Table 5.3.

and Total Travel Costs ⁸ of each of those modes for Origin-Destinations (O-D) from which the Authority claims riders and revenue. All of the O-D analyses used verifiable data, cited below each relevant column in the MS Excel tables, plus Air and Bus fares collected for these O-D comparisons and found appendices C and D, are found at: <https://sites.google.com/site/hsrcliffr/home/2-1-major-reports---2018-plan/09-2018-if-you-build-it-they-will-not-come---the-sequel>. For Auto and Air travel we relied largely on Google, Expedia and Kayak. For HSR's Total Travel Times and Total Travel Costs, we only used the Authority and its consultants' inputs to calculate Total Travel Times and Total Travel Costs.

The penultimate step was to summarize the 'winners' of the route analyses, shown in Figure 21. Finally, to attain ridership estimates under competitive conditions, our Paper uses the Authority's 2018 'mature' (i.e. final ramp-up year's) forecasted ridership, in the CHSRA's 2018 Ridership and Revenue document⁹. These are the Authority's maximum, estimated market penetrations for HSR ridership during two periods, the SV-SJV Period (2029-2032) and False Phase 1 (2033-2040).¹⁰ CHSRA's 2018 Business Plan then used five years to 'ramp up' estimates for operational and financial purposes.¹¹ Figure 22 in Part 5 translates HSR's route competitiveness versus Auto or Air into HSR ridership routes where it is competitive with Auto or Air travel.

This step-by-step approach measured each travel mode's time and cost competitiveness, with winners 'flagged' by color code in the MS Excel spread sheets – accessible at the site noted above. Each route took one row in a spreadsheet, defined by the O-D (Origin-Destination) of the city pairs

⁸ The decade-old DOT/FRA-Authority report defined the metrics for competitiveness, "*Total travel time includes the time spent getting to a station or an airport, waiting for the next scheduled train or flight, getting to the boarding area, checking and retrieving luggage, getting a rental car or taxi, and getting to the final destination.*" [See: p. 1-8 [PDF 79] of Volume 1 Bay Area to Central Valley HST Final Program EIR/EIS of 2008, at: http://www.hsr.ca.gov/Programs/Environmental_Planning/bay_area_2008.html] The same volume, [p. 3.2-28 [PDF 255], says "*Passenger cost for this analysis means the total cost of the trip, including the cost of traveling to the airport or station, the airplane or train fare, and other associated expenses. . . All-day parking in downtown San Francisco or Los Angeles was set at \$25. As shown in the table, the door-to-door average perceived one-way cost per person for traveling between representative city pairs by highway range from \$40 to \$137 for total costs.*" Later, the same study, p. 3-2.30 [PDF 261] it says, "*As with air travel, both an access fee and an egress fee ranging from \$15 to \$31 round trip are part of the HST average total costs.*" We could have quoted the Authority on one-way Total Travel Costs using \$137 or \$40 or \$31 as access+egress costs. We chose \$23, the average of \$15-\$31.

⁹ See: Table 5.3 [PDF 41-41] of CHSRA's 2018 Ridership and Revenue Forecasting Technical Supporting Document

¹⁰ We call the Authority's Phase 1 a 'False Phase 1' because it does not conform to AB3034's Section 2704 (b) (2) provision on Phase 1, "*As adopted by the authority in May 2007, Phase 1 of the high-speed train project is the corridor of the high-speed train system between San Francisco Transbay Terminal and Los Angeles Union Station and Anaheim.*" But the Authority has no intention of building AB3034's Phase 1 and in 2012 said it will do so only, "*If required, a Full Build option for Phase 1 could be completed by 2033 . . . for a cumulative cost of \$91.4 billion.*" See p. ES-14 [PDF 22] of the California High-Speed Rail Authority Revised 2012 Business Plan. Denying that AB3034 was its governing law, in 2012, the Authority's Plan also said, "*If a decision is made in the future to construct the Phase 1 Full Build system, this would involve constructing fully dedicated high-speed rail infrastructure between San Jose and San Francisco and between Los Angeles and Anaheim.*" See p. 3-12 [PDF 92] of the California High-Speed Rail Authority Revised 2012 Business Plan. No Legislature Act and no Ballot proposition allowed the Authority the right to equivocate.

¹¹ CHSRA recognized that during the first years of each forecast period – the SV-CV Period (2029-2032) and False Phase 1 (2033- 2040) – HSR will not be a 'mature' HSR service system. For purposes of projecting financial results such as annual cash flows and operating margins, HSR 'ramped up' ridership, revenues and costs from the period's early years. [See the 2018 Business Plan (June 2018), p. 94 [PDF 94] that says, "*Ramp-up refers to the period of time during early operations in which ridership and revenue builds up as the system matures, travelers become acquainted with the new rail service and trip behavior adjusts to reflect the introduction of a new travel mode.*" and p. 93 [PDF 93] that says, "*Ridership and farebox revenue forecasts incorporate the same ramp-up methodology used in the 2016 Business Plan, which assumes 40 percent ramp-up in year one, 55 percent ramp-up in year two, 70 percent ramp-up in year three, 85 percent ramp-up in year four and 100 percent ramp-up in year five.*" The 'ramp-up' method is an accepted business practice to account for market penetration adjustments during the initial years of a new, alternative supplier. What Table 5.3 [PDF 41-41] of CHSRA's 2018 Ridership and Revenue Forecasting Technical Supporting Document specifies is the Authority's 'mature' ridership and revenue projections; i.e. 100% of the market potential the Authority expects to achieve in two periods: the SV-CV Period, then False Phase 1. However, such 'ramping up' does not change HSR trains' competitive position against Auto or Air travel. This is because HSR's competitive position is based on what the HSR trains' offer as services, fares and schedules as defined in that same Business Plan's Ridership and Revenue Forecasting Technical Supporting Document, to compete for market share against Auto and Air in the two periods.

being examined and required data or calculations for thirty-seven (37) MS Excel columns, totaling over 11,000 inputs. Each route's findings are graphically displayed to the far right of the columns.

The 140 O-D route analyses for the SV-CV Period (2029-2032/33) were 75% of the 187 possible combinations of Origins and Destinations;¹² while the 180 O-D route analyses for False Phase 1 (2033-2040) represented 77% of the possible 234 combinations of Origins and Destinations.¹³ Those 'samples' indicate that our work has a strong chance of being $\pm 5\%$ within 99% accuracy.¹⁴ We are confident that our competitive analyses, cross-checked many times, fairly accurately represent California high-speed rail's potential to attract traveling Californians away from Autos or Airplanes.

1.2 READERS SHOULD START WITH A VISIT TO OUR WEB SITE – The underlying strengths of this Paper¹⁵ is its forensic, step-by-step competitive analyses of 320 routes calculated using MS Excel. Since there is no practical way to explain more than a fraction of those route analyses' outcomes in writing,¹⁶ nor incorporate more than a few route analyses' graphical highlights into this Paper, we urge readers to inspect our data sets at: <https://sites.google.com/site/hsrcaliffr/home/2-1-major-reports---2018-plan/09-2018-if-you-build-it-they-will-not-come---the-sequel>. See what we actually did; verify that we used unbiased, publicly-available sources for Auto and Air travel,¹⁷ and that the California High-Speed Rail Authority or its consultants' publicly-available information are the sources of data inputs for the HSR trains' Total Travel Time and Total Travel Costs.

¹² Figure 2.1 of 2018's Ridership and Revenue Forecasting, Technical Supporting Document shows 7 HSR stations, 3 inside the SF Bay Area (MTC) and 4 inside the San Joaquin Valley. It also shows 5 Authority-dedicated bus destinations inside the LA Metro Region and 10 destinations, including Authority bus stops, inside the San Joaquin Valley. That same figure shows Amtrak to San Diego; but doesn't address Table 5.3's claims to riders and revenues from and between 'Other' regions. In total, there are 187 possible Origins-Destination fares for the SV-CV period.

¹³ While they are not HSR stops in the SV-CV Period, Millbrae and Palmdale are HSR stops during False Phase 1, yielding 91 fares in Table 2.2 of the 2018 Plan's Ridership and Revenue Forecasting, Technical Supporting Document. Counting the cities and regions from which the Authority claims revenue, as discussed previously, makes a total of 234 possible fare-generating Origins-Destinations.

¹⁴ The SV-CV Period calculations, based on a sample of 140 analyses of a universe of 187 possible Origins-Destinations, has a 99% chance of being $\pm 4\%$ of equal to our findings; while the False Phase 1 calculations, based on a sample of 180 analyses of a possible universe of 234 Origins-Destinations, has a 99% chance of being $\pm 5\%$ of our findings. To compute those confidence intervals, we used the confidence interval formula at: <https://www.surveysystem.com/sscalc.htm>

¹⁵ For 'hardcopy' readers, access to an electronic version of this report is: a) open you browser to the following web address: <http://www.sites.google.com/site/hsrcaliffr/> This will take you to our Home Page, b) look on the left side of the Home Page for various sections of the site; c) select "2.1 Major Reports - 2018 Plan" and d) once on page 2.1, for the complete report select subpages (1): [10/2018 If You Build It, They Will Not Come - The Sequel](#)

¹⁶ Our 320 calculations of Total Travel Times and Total Travel Costs are on 140 intra-regional, adjacent regions, non-adjacent regions' and 'Other Regions' routes for the SV-CV Line period (2029-2033) and 180 trips along the same routes plus intra-MTC and SGAC routes of <50miles for 2033-2040's False Phase 1.

¹⁷ Google driving distances and directions provided the Auto data, all include a 15% 'uplift' coming from an ABC report. See: <http://abcnews.go.com/US/time-americans-waste-traffic/story?id=33313765> One-way flight times between commercial airports and two-week, advance purchase ticket costs are from web sites such as Expedia, Travelocity, Kayak, etc. While we exempted HSR, we unilaterally added another 45minutes to Air travel's Total Travel Time equation to account for the extra time to 'clear' airport security on each beginning of the round trip.

Study the graphics and ask: "would I pay more than driving to get to my destination quicker by high-speed rail?" Check the math. Verify that we credited the correct 'winner' for each route.¹⁸ Make sure you understand the fifty-six column charts that show Origin-Destination results for each route.

For example, Figure 1, shows five False Phase 1 (2033-2040) city-pair routes between California's three largest metropolitan populations (LA

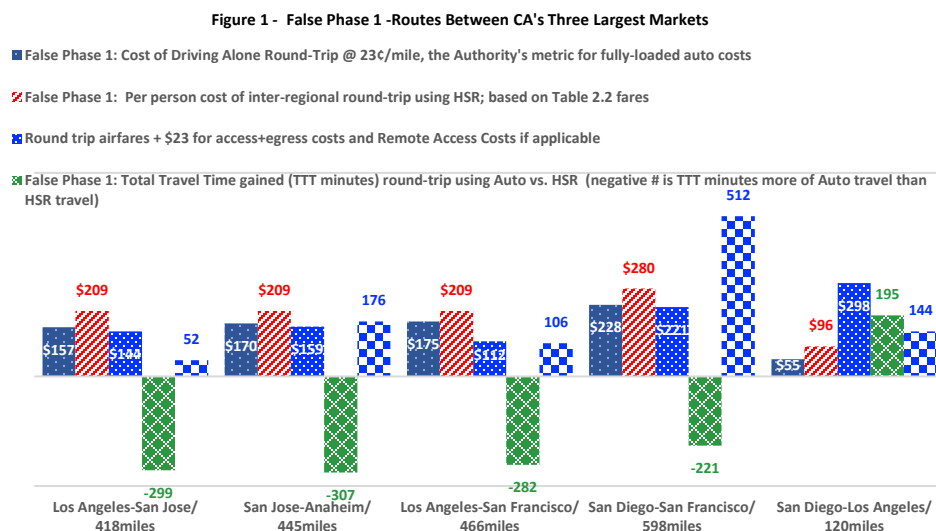
Metro Area, SF Bay Area and San Diego County). The first three columns (left-to-right) in each city-pair column set show the Total Travel Costs for a round-trip: i.e. driving round-trip Los Angeles- San Jose will cost \$157 (in dark blue), HSR will be \$209 (candy cane-red stripes) and Air will cost \$144 (light blue with white dots).¹⁹

The last two columns in each city-pair set compare differences: i.e. the fourth column from the left (white-hatched, green background) in each set shows how many minutes quicker Auto Total Travel Time is than traveling by HSR, while the last column in each set in (checkered flag blue and white) shows how much quicker Air travel is over HSR.²⁰

View the graphics like this: if the green, white-hatched column is 'above' the line, Auto's Total Travel Time 'wins' that route over HSR's by the number of minutes noted above the column: if, in the last column in each set the blue-white checkered column is above the line, it shows the minutes gained by traveling round-trip by Air versus HSR. When either of those columns point downward, as four of the five green-hatched columns in Figure 1 do, i.e. HSR is quicker than Auto.

Finally, use our template to test how long and how much an HSR, Auto and Air round-trip would take from your chosen Origin to a chosen Destination. If your test makes our calculations seem reasonable, read this paper. We cannot claim you won't find errors; but unlike the Authority's, ours are the public domain.

1.3 HOW WE MEASURED WHETHER HSR, AUTO OR AIR TRAVEL AS BEING THE MOST COMPETITIVE – How did we measure HSR's vitality when competing against Auto or Air's Total Travel Times and Total



¹⁸ Readers will find that each row of analysis is marked in the left-most column (A) with whether HSR, Auto or Air travel 'wins' that route: a yellow-highlighted cell means HSR is winner on the basis of shorter Total Travel Time than Auto or Air travel, but Auto (green highlighted) or Air (blue highlighted) travel can only 'win' if it is both Total Travel Time quicker and Total Travel Cost cheaper than HSR.

¹⁹ Auto driving cost calculations use the Authority's total costs of owning, operating and maintaining an Auto, \$0.23/mile. See Table 3.3, p.3-4 [PDF 32] of CA High-Speed Rail 2018 Business Plan, Ridership and Revenue Forecasting: Technical Supporting Document. HSR costs, also found in the route analyses, include fares as well as the costs of access and egress to and from an HSR station, as do Air travel's Total Travel Costs.

²⁰ Note: in Figure 1 the green-hatched column pointing downward in the Los Angeles-San Jose city-pair round-trip means HSR travel is five hours (299 minutes) quicker than Auto. But with the last column set, the blue-checkered column pointing upward means Air travel is quicker by more than 2hours (144minutes) compared with HSR travel.

Travel Costs? Simply stated, we 'set a low bar' when declaring HSR the 'winner' of all of a route's riders; and a 'high bar' if declaring Auto or Air a 'winner'. The process was:

- On a specific route, if HSR is either Total Travel Time OR Total Travel Cost more competitive than Auto and Air's Total Travel Times or Total Travel Cost, i.e. faster or cheaper than Auto or Air travel, that route is a 'win' for HSR. [n.b. we found no un-subsidized route where HSR was cheaper than driver-only Auto travel.]
- Conversely, only if Auto's Total Travel Time and its Total Travel Cost is both quicker and cheaper than HSR's, is that route considered a 'win' for Auto
- Likewise, only if Air's Total Travel Time and its Total Travel Cost is both quicker and cheaper than HSR's, is that route considered a 'win' for Air

In our MS Excel-based calculations of HSR's competitiveness, at:

<https://sites.google.com/site/hsrcaiff/home/2-1-major-reports---2018-plan/09-2018-if-you-build-it-they-will-not-come---the-sequel> the cue to whether HSR is the 'winner' of the route is simple: if the left-most column or the last column of the MS Excel calculations are highlighted yellow.²¹ If the highlighting is green, Auto has 'won' or if blue, Air 'won' the by being both Total Travel Time and Total Travel Costs faster and cheaper than high-speed rail.

Our 'winner-take-all' method emphasizes the Authority-defined key measure of its trains' competitive performance, Total Travel Time.²² This single dimension for winning a route inherently gives HSR an advantage by having to only 'win' based on its chosen metric.

Not only does HSR 'win' routes based on only one of two measures, Total Travel Time (TTT) or Total Travel Costs (TTC), we further 'tilted the scales' in favor of HSR versus Auto or Air travel's TTT. We only counted Authority-stated Run Times: no time was added to pick up or discharge passengers. We added 15% more driving time to every Auto route to recognize the possibility of highway congestion. We also 'tilted' for HSR against Air Travel's TTT and TTC by adding, 1) 45minutes more for airport security to Air's TTT, and 2) another \$15-\$31 to Air's TTC to recognize that some travelers' nearest airports are 50 or more miles from their journeys' origins. On those routes where both Auto and Air 'win' we declared for Auto, because of multiple Auto travelers' potential per passenger savings.

1.4 WHY HSR CAN'T COMPETE WITH AUTO TOTAL TRAVEL COSTS – Even if driving alone, Auto travelers spend less per mile than either HSR or Air passengers. With the exception of subsidized routes between Madera-Sacramento and Merced-Sacramento, Auto's Total Travel Cost advantage is generic and universal.²³ Why? Getting to and from an HSR station isn't free. There are either taxi/Uber, ridesharing and public transit fares, or for non-central city residents, perhaps driving and parking costs.

Early-on the Authority conceded that its HSR trains could not compete against the low costs of operating an Auto.²⁴ Gasoline, considered by travelers as their out-of-pocket costs, is still relatively

²¹ Yellow denotes that Auto travel is both quicker and faster than HSR. Blue connotes that Air travel is both quicker and faster than HSR. If a green hatched column points down, it means HSR is faster than Auto. If a blue and white checked column points down, it means HSR travel is quicker than Air travel.

²² The Authority's ridership consultants' 2013-2014 RP/SP surveys said, ". . . the more competitive HSR travel times are, the higher share HSR attracts . . ." See p. 2-40 [PDF 72] of Final Report, California High-Speed Rail Ridership and Revenue Model, Business Plan Model-Version 3 Model Documentation, prepared for California High-Speed Rail Authority, prepared by Cambridge Systematics, Inc.; February 17, 2016

²³ This is truer still in Auto ridesharing, where the total ownership, maintenance and operating costs – set by the Authority at 23¢/mile – is shared between the driver and passengers. See Table 3.3, p. 32 [PDF 3-4] of the 2018 Plan's Ridership and Revenue, Technical Supporting Document.

²⁴ Nine years ago, the Authority admitted its fares will not be able to compete with cheaper driving costs but will compete with airline fares. "Train fares were assumed to be somewhere between the cost of driving and of taking an airplane or train" See p. 64 [PDF 66] of the California High Speed Rail Authority: Report to the Legislature, December 2009. Also, as it had in 2009, in 2012 the Authority admitted its HSR fares can't compete with Auto's. "Fare levels are assumed to be . . . well above the out-of-pocket cost of driving in the shorter distance travel markets." See: California High-Speed Rail Program Revised 2012 Business Plan, April 2012, p. 5-11 [PDF 119]

cheap in California, about half that of other nations' with in-place HSR systems.²⁵ The 2008 US DOT and CHSRA EIR/EIS gave a range for these access+egress costs.²⁶ We chose the average, \$23 for a round-trip journey²⁷ and integrated that into computations for both HSR and Air's Total Travel Costs. Consequently, with the exception of the highly-subsidized Authority bus routes north of Madera (2029-2032) or Merced (2033 onwards)²⁸ no HSR or Air route is Total Travel Cost competitive with an Auto drivers' full costs (23¢/mile).²⁹

1.5 FOR TEN YEARS THE AUTHORITY HAD THE MEANS, MOTIVE AND OPPORTUNITY TO PROVE ITS SYSTEM'S TOTAL TRAVEL TIME AND TOTAL TRAVEL COST COMPETITIVENESS – A decade ago the Authority and DOT/FRA agreed that high-speed rail (HSR) will have to compete with Auto and Airline travel for passengers.³⁰ Authority-dedicated buses³¹ and HSR must offer travelers a quicker and/or cheaper option based on competitive Total Travel Times and Total Travel Costs.³²

In its jointly published 2008 EIR/EIS, the Authority bragged that not only was its HSR system, ". . . designed to compete with air and auto travel"³³ but that "For longer-distance intercity trips, HST

²⁵ Perhaps one factor effecting the use of high-speed rail in Europe and Asia is the cost of gasoline. On August 20, 2018, US gasoline prices were US\$3.11/litre, China US\$1.11¢/litre, Japan US\$1.34¢/litre, Spain US\$1.54, Germany US\$1.70/litre, France US\$1.80¢/litre and Italy was US\$1.89¢/litre. That makes the US gasoline cost about half the average of the six nations above (US\$1.56), all leaders in high-speed rail development. For gasoline prices see:

http://www.globalpetrolprices.com/gasoline_prices/

²⁶ "As with air travel, both an access fee and an egress fee ranging from \$15 to \$31 round trip are part of the HST average total costs." found on p. 3-2-30 [PDF 261] Bay Area to Central Valley HST Final Program EIR/EIS, Volume 1: Report, May 2008; prepared by the US Dept. of Transportation/Federal Railroad Administration and the California High-Speed Rail Authority. Found at: http://www.hsr.ca.gov/Programs/Environmental_Planning/bay_area_2008.html

²⁷ The source of the selected average of \$23 for a round-trip of access and egress costs is: the cited Bay Area to Central Valley HST Final Program EIR/EIS, Volume 1: Report, May 2008. In effect, Auto travelers can look on at least 100 miles as 'free' because Auto travel does not have to account for \$23 of round-trip access+egress costs like HSR's and Air's that must include that cost into their round-trip Total Travel Costs.

²⁸ The 2029-2040 \$1.00 Authority Bus fares from, "Stockton/Modesto/Denair/Merced/Fresno Amtrak to Madera" are heavily subsidized. Example: Greyhound's Madera-Stockton fare is \$28, not the Authority's \$1.00. That citation also says "\$10 from Sacramento, Elk Grove and Lodi to Madera" meaning the \$10.00 one-way Sacramento-Merced Authority Bus fares are subsidized. For Authority fares, see p. 2-6 [PDF 26] of 2018 Business Plan, Ridership and Revenue Forecasting, Technical Supporting Document. Greyhound's Sacramento-Merced fare cost \$29, not the Authority's \$10 cited above. The Authority's \$1.00 Merced-Madera fare would cost \$15 if on Greyhound. See:

<https://www.greyhound.com/en/ecommerce/schedule>

²⁹ For 23¢ per mile as the total operating costs see Table 3.3, p. 3-4 [PDF 32] of the 2018 Business Plan's Ridership and Revenue Forecasting, Technical Memorandum. To compute the costs of driving with one passenger, the Authors added 10% to the full cost of driving alone (23¢/mile). Driving is cheaper than one HSR fare on the same route and ridesharing with one person is cheaper than paying twice the HSR or Air fares plus fixed access and egress costs. This is shown in our MS Excel calculations, but not in the graphic representations of competitive positions.

³⁰ The Authority said, "The proposed system . . . would be designed to compete with air and auto travel." See p.5-5 [PDF 42] of Volume 1 Bay Area to Central Valley HST Final Program EIR/EIS of 2008 [PDF 224] at:

http://www.hsr.ca.gov/Programs/Environmental_Planning/bay_area_2008.html.

³¹ The Authority left unclear whether its Sacramento-Madera/Merced and the cross-Tehachapi bus fleets are for general public use or only for ticket-holding high-speed rail passengers. We have assumed the latter case because the Madera/Merced-Sacramento buses are highly subsidized if compared with Greyhound's fares and CHSRA claims it doesn't require a subsidy.

³² The decade-old DOT/FRA-Authority report defined the metrics for competitiveness, "Total travel time includes the time spent getting to a station or an airport, waiting for the next scheduled train or flight, getting to the boarding area, checking and retrieving luggage, getting a rental car or taxi, and getting to the final destination." See: p. 1-8 [PDF 79] of Volume 1 Bay Area to Central Valley HST Final Program EIR/EIS of 2008, at: http://www.hsr.ca.gov/Programs/Environmental_Planning/bay_area_2008.html The same volume, [p. 3.2-28 [PDF 255], says "Passenger cost for this analysis means the total cost of the trip, including the cost of traveling to the airport or station, the airplane or train fare, and other associated expenses. . . All-day parking in downtown San Francisco or Los Angeles was set at \$25. As shown in the table, the door-to-door average perceived one-way cost per person for traveling between representative city pairs by highway range from \$40 to \$137 for total costs." Later, the same study, p. 3-2.30 [PDF 261] says, "As with air travel, both an access fee and an egress fee ranging from \$15 to \$31 round trip are part of the HST average total costs." We could have quoted the Authority on one-way [Total Travel Costs using \\$137 or \\$40 or \\$31 as access+egress costs: instead we](#) chose \$23, the average of \$15-\$31.

³³ See: p. S-5 [PDF 42] of Volume 1 Bay Area to Central Valley HST Final Program EIR/EIS of 2008, at: http://www.hsr.ca.gov/Programs/Environmental_Planning/bay_area_2008.html

would provide a competitive alternative to driving and flying. For shorter intercity trips, HST would also be an attractive alternative to driving.”³⁴ The Authority also said that, “. . . the more competitive HSR travel times are, the higher share HSR attracts. . .”³⁵ and “Under all forecasted scenarios, each operating section of the California high-speed rail system is projected to operate without a subsidy..”³⁶

While the decade-old, EIR/EIS,³⁷ introduced Total Travel Time as high-speed rail’s key competitive requirement,³⁸ there is no publicly-available ‘paper trail’ on whether the Authority ever analyzed HSR’s relative competitiveness against Auto and Air travel based on Total Travel Time³⁹ and Total Travel

³⁴ See: Volume 1 Bay Area to Central Valley HST Final Program EIR/EIS of 2008, p. 3.2-24 [PDF 251] at: http://www.hsr.ca.gov/Programs/Environmental_Planning/bay_area_2008.html The boldest assertion was “. . . between the San Francisco Bay Area (MTC region) and the Los Angeles Metropolitan Area (SCAG region), HST is projected to capture at least 41% of the travel market . . .” See: p. 3.2-24 [PDF 251] of Final: Bay Area to Central Valley High-Speed Train (HST) Program Environmental Impact Report/ Environmental Impact Statement (EIR/EIS) Volume 1: Report, May 2008.

³⁵ See p. 2-40 [PDF 72] of Final Report, California High-Speed Rail Ridership and Revenue Model, Business Plan Model-Version 3 Model Documentation, prepared for California High-Speed Rail Authority, prepared by Cambridge Systematics, Inc.; February 17, 2016

³⁶ See p. ES-17 [PDF 25] of the California High-Speed Rail Authority, Revised 2012 Business Plan. But the 2014 Plan mentioned profitability only twice. See: Connecting California, 2014 Business Plan, April 30, 2014 page 53 [PDF 53] And neither the 2016, nor 2018 plans mention HSR being competitive against Auto and Air, nor profitability. In fact, the Authority’s 2016 Plan admitted the system may need an operating subsidy through 2040. While it said “The breakeven probability . . . is greater than 99% for the Phase 1 out year . . .” That’s an admission California’s HSR system may need a subsidy. Table 38 also shows that even in 2029, False Phase 1’s first operating year, the probability of having revenues exceed O&M costs is only 88% with 2040 projected to almost (>99%) breakeven. See: Table 38, p.63 [PDF 75] of the Operations & Maintenance Cost Model-Draft 2016 Business Plan: Technical Supporting Document, It is important to note that the Authority is not saying the trains will not require a subsidy. It is saying that statistically, the Authority does not expect to need a subsidy. When it state an 88% probability of having a positive operating margin, it is also showing a 12% probability of having a negative operating margin, and therefore requiring a subsidy.

³⁷ See Final: Bay Area to Central Valley High-Speed Train (HST) Program Environmental Impact Report/ Environmental Impact Statement (EIR/EIS) Volume 1: Report, May 2008. Found at: http://www.hsr.ca.gov/docs/programs/bay_area_eir/BayCVValley08_EIR_finalHST_vol1.pdf

³⁸ The Authority’s ridership consultants’ 2013-2014 RP/SP surveys said, “. . . the more competitive HSR travel times are, the higher share HSR attracts. . .” See p. 2-40 [PDF 72] of Final Report, California High-Speed Rail Ridership and Revenue Model, Business Plan Model-Version 3 Model Documentation, prepared for California High-Speed Rail Authority, prepared by Cambridge Systematics, Inc.; February 17, 2016

³⁹ We searched every Authority business plan since 2008 for competitive comparisons of the Total Travel Times of HSR, Auto and Air, but have found none. We only found comparisons of the three travel modes’ respective Run Times, without mentions of access+egress times in the main report and technical documents. Total Travel Time was defined by the Authority-DOT’s 2008 EIR/EIS, as well as this paper as the sum of all the time requirements for a traveler, using HSR and any other transport modes, to get from his/her Origin (e.g. home or office) to an HSR station, wait for an HSR train, the Run Time of the train (in the Authority’s published documents no disembarking or boarding times seem to be included so none are included here), the time to disembark at the HSR station nearest the Destination and finally the time from the HSR station to the address the traveler is seeking. See: Volume 1 Bay Area to Central Valley HST Final Program EIR/EIS of 2008, at: http://www.hsr.ca.gov/Programs/Environmental_Planning/bay_area_2008.html

Costs. ⁴⁰ Stated simply, we have no Authority document comparing what the 2008 EIR/EIS set out as being crucial to understanding HSR's attractiveness to riders. ⁴¹

From CHSRA documents it's unclear whether the proposed HSR system will "Provide a sustainable reduction in travel time between major urban centers." ⁴² If its own plans and reports ⁴³ were the Means to understand the HSR trains' competitiveness and the decade after the 2008 Prop 1A vote gave it ample Opportunity to publicly defend its HSR system's relative competitiveness, what was the Authority's Motive to keep its HSR system's relative competitiveness from public scrutiny?

1.6 WHAT WOULD BE A REASONABLE A PRIORI EXPECTATION FOR CALIFORNIA'S HSR TRAIN'S RIDERSHIP? – Appendix A ⁴⁴ looks at Amtrak's Northeast Corridor Acela, the only operating HSR system in the USA and one which the Authority recognized as being profitable. ⁴⁵ Unlike the California HSR system, Acela, is part of the National Passenger Railroad Corporation, ⁴⁶ and while not legally required to be profitable, is profitable. To be profitable, Acela's fares must meet its operating costs (O&M). But its fares and its Per Passenger Mile (PPM) fares and O&M PPM are multiples of CHSRA's ⁴⁷ and there are reasons to believe CHSRA's O&M PPM will be more than Acela's. ⁴⁸

⁴⁰ Total Travel Costs is defined in this Paper as the sum of all the costs (including by public transit modes) for a traveler, using HSR and any other transport modes, to get from his/her Origin (e.g. home or office) to an HSR station, the HSR train fare and the costs of getting from the HSR station nearest the Destination to the address the traveler is seeking. Nowhere in the 2008 EIR/EIS did the US DOT/FRA-Authority Authors present the Total Travel Times of HSR, (its 2hours 28minutes in that volume is indefensible) Auto or Air travel. Only Table 1.2-3, p. 1-9 [PDF 82] shows the Total Travel Times of Auto and Air in 2000 and 2030 between four Origins-Destinations – but no comparative times for HSR. See: Volume 1 Bay Area to Central Valley HST Final Program EIR/EIS of 2008, at:

http://www.hsr.ca.gov/Programs/Environmental_Planning/bay_area_2008.html. The 2013-2014 Revealed Preference/Stated Preference Survey document referred to had six samples of times and costs for Air, Auto and HSR, but did not indicate whether or which access+egress times were used in the travel demand model. On December 2, 2017, Mr. Grindley again requested of the Public Records Act Staff "Documentation on where one or more specific survey sample or samples' outcome were used in ". . . the current travel demand model . . ." Specifically, which document and even better, which pages in that document or documents" The December 14, 2017 response cited five Authority documents already in the Authors' possession and known to not point to "which also feeds into the current travel demand model." The conclusion has to be that the use of RP/SP samples to develop an access+egress time for use in modeling was never done.

⁴¹ Despite two Public Records Requests, the response to document where it said the RP/SP survey results "also feeds into the current travel demand model . . ." the Authority provided no record that any of the six samples were ever used by the Authority or its ridership and revenue consultants to compute Total Travel Times. See an August 1, 2017 request by William Grindley for such information, and the August 31, 2017 response from Public Records Act Staff that says, "The 2013-2014 Revealed Preference/Stated Preference Survey Documentation, which also feeds into the current travel demand model, can be found here:

http://www.hsr.ca.gov/docs/about/ridership/2013_2014_RPSP_Survey_Documentation.pdf

⁴² See: US DOT/FRA CHSRA, Bay Area to Central Valley HST Final Program EIR/EIS of May 2008 at:

http://www.hsr.ca.gov/Programs/Environmental_Planning/bay_area_2008.html

⁴³ Including its US DOT/FRA CHSRA, Bay Area to Central Valley HST Final Program EIR/EIS of May 2008 at:

http://www.hsr.ca.gov/Programs/Environmental_Planning/bay_area_2008.html

⁴⁴ Appendix A is available at: <https://sites.google.com/site/hsrcliff/home/2-1-major-reports---2018-plan/09-2018-if-you-build-it-they-will-not-come---the-sequel>

⁴⁵ See: HSRA Report to the Legislature, December 2009 p. 2-15 [PDF 59] "High-speed train services, on the other hand, generate positive cash flows around the world, including the Northeast Corridor" Since there is only one HSR system in the US, and that operates on the NE Corridor, the Report referenced Acela.

⁴⁶ The National Passenger Railroad Corporation, founded in 1971 and whose ownership is the US Government, has never been legally required to make even an operating profit, although that was its charter's goal.

⁴⁷ Six years ago, we showed the per passenger mile (PPM) fares and cost of Acela's revenue and Operations and Maintenance Expense (O&M) and the Authority's estimates of its. The fare used in 2008's Prop. 1A was 14¢ PPM, Acela's PPM fare was ±72¢ PPM. A year later the Authority's LA-SF fare doubled to 28¢ PPM. That same year Acela's O&M was 61¢ PPM and CHSRA's O&M was 14¢ PPM. The divergence between certified-profitable Acela and CHSRA's estimates is all too visible – Acela's audited fares and Op. Ex. are twice or more than CHSRA's Plans. See Figure 5, from our report, – To Repeat – The CHSRA's Train Will Need A Subsidy Forever of August 2102. It is also Figure 5 from the March 2014 paper: IF YOU BUILD IT, THEY WILL NOT COME, at: www.sites.google.com/site/hsrcliff/

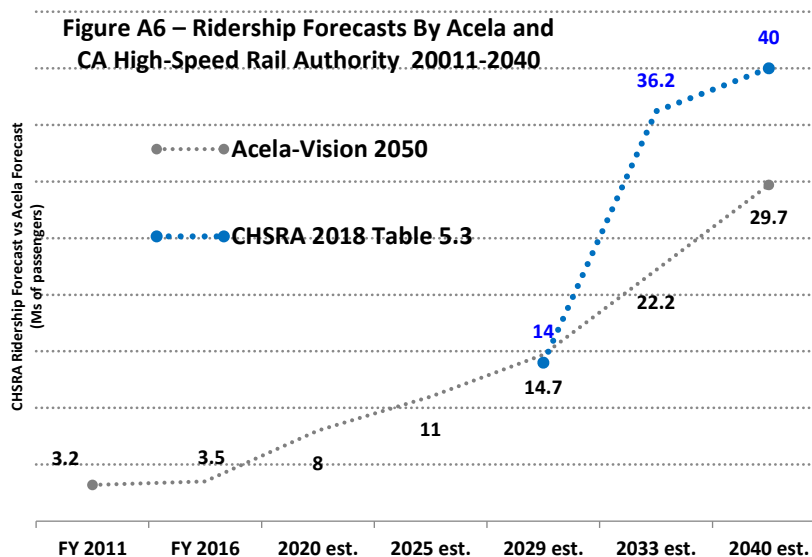
⁴⁸ CHSRA's November 2011 Draft 2012 Business Plan (pg 3- 13) said; "US labor and construction costs are 30 – 75% higher than in other developed countries with existing HSR systems such as France, Germany, Italy, the Netherlands, the UK and Japan." The Authority's possible argument that they might operate with lower labor costs than existing HSR systems seems contradicted by their own document. Add to that, Amtrak's 2010 Office of the Inspector General (OIG)

Appendix A shows that not only does Acela draw from eight states' and the District of Columbia's populations that are 50% larger than California's population; but also, that the densities of Acela-served cities are twice or greater those of the CHSRA's California-only base, and that the dispersion of business locations in California's cities thwarts time-sensitive business travelers from shifting to HSR from faster and often cheaper Air travel.

If CHSRA had done our step-by-step empirical analyses, it would have found it prudent to restrain its ridership forecasts to be closer to or less than Acela's, which early in its history of nearly eighteen years of service, 'topped out' at ± 3.5 Million annually. Figure A6 (from Appendix A) shows that Acela's current 3.5 Million riders are only a quarter (25%) of the Authority's 14 Million 'mature market' forecasted ridership for 2029-2032 – the SV-CV Period!⁴⁹

Like CHSRA, Acela also forecasts its future. But CHSRA's 2033 forecast (36.2 Million) is +60% higher than Acela's for the same year (22.2 Million) and the Authority's 2040 forecast is a quarter greater than Acela's Vision 2050 forecast. That's an enormous difference, particularly when compared with Acela's markets. CHSRA's forecasts are too-large-to-ignore and create a serious 'Credibility Chasm' for the Authority.

Seven years ago, Aviation System LLC, an Authority consultant⁵⁰ forecasted air passenger growth 2009-2030 between the three SF Bay Area airports and the five Southland commercial airports likely to be used by HSR passengers.⁵¹ Using the same rate of growth as Aviation System LLC's 2009-2030 suggests at total of ± 10.2 Million passengers traveling only between (not onward) the eight airports in 2033. Even if the Authority could capture half of Aviation System LLC's estimated O-D Air passengers in 2033 (5 Million), those numbers would be an embarrassment to CHSRA's 36.2 Million forecast for that year. Even



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 than those of Acela's Northeast Corridor. See: *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.

⁴⁹ This Paper's numbers of 2018 forecasted riders come directly from CHSRA's Table 5.3, pp.5-5, 5-6 [PDF41-42] of the 2018 Business Plan's Ridership and Revenue Forecasts, Technical Supporting Document. They represent what CHSRA believes to be the full (100%) market potential for HSR riders at the three points in time in Table 5.3 (2029, 2033 and 2040).

⁵⁰ See: 'Potential Airline Response to High-Speed Rail Service in California,' prepared by Aviation System Consulting, LLC, Berkeley, California, August 2011 Prepared for Cambridge Systematics, Inc., Cambridge, Massachusetts. As found in the October 19, 2011 Ridership and Revenue Forecasting, Draft Technical Memorandum – starting on PDF 57.

⁵¹ The SF Bay Area airports were SFO, SJC, OAK, the five in the Southland were BUR, LAX, LGB, SNA, SAN but not Ontario or Palm Springs. That growth yielded 11.7 Million passengers in 2030, roughly 17% more than 2009's 10 Million over the 21 elapsed years – a compound growth rate of 0.75%. Deducting 'through passengers' going onward by Air (particularly LAX/SFO), 'net' number of Air passengers in both directions in 2030 would be 8.1 Million. See Table B-1. [PDF 108] Baseline Scenario of Potential Airline Response to High-Speed Rail Service in California, prepared by Aviation System Consulting, LLC, Berkeley, California, August 2011 Prepared for Cambridge Systematics, Inc., Cambridge, Massachusetts. Found in the October 19, 2011 Ridership and Revenue Forecasting, Draft Technical Memorandum.

capturing 100% of Aviation System's forecasted 2029 and 2033 passengers would not fulfil the Authority's need for revenue-paying passengers in 2029, 2033 or 2040.

Together, with Acela's ridership stuck at ±3.5Million, Aviation System LLC's empirically-based findings on essentially static intra-California Air travel doesn't bode well for the credibility of the Authority's forecasted 2029 or 2033 forecasts. The consequence is that the vast majority of the HSR travelers will have to come from California's automobile users; a very difficult challenge for an HSR operator.

1.7 HOW CAN OUR COMPETITIVE ANALYSIS PROCESS BE VALIDATED? – A reasonable way to validate the process would be to look at the publicly available data on Amtrak's Acela system and ask, "How would Acela, today, stack up against our predictions of future competitive battles between HSR, Autos, and Air alternatives?" This approach was undertaken and the results, "EVALUATION OF THE APPROACH TAKEN IN OUR PAPER, IF YOU BUILD IT THEY WILL NOT COME – THE SEQUEL, USING ACELA'S RIDERSHIP AS A BASELINE", are available in Appendix B on our Web site at:

<https://sites.google.com/site/hsrcliffr/home/2-1-major-reports---2018-plan/09-2018-if-you-build-it-they-will-not-come---the-sequel>

PART TWO

ONE UNIVERSAL AND SEVERAL CHSRA-IMPOSED ENCUMBRANCES SERIOUSLY IMPEDE HIGH-SPEED RAIL'S CHANCES OF 'WINNING' ROUTES

* * * * *

Here we analyze how, when combined with one or more of the Authority's self-imposed encumbrances, access+egress times, a general 'handicap' to both HSR and Air travel, hurt both modes to 'win' routes, but HSR far more. CHSRA's prime self-imposed encumbrance is the complete isolation of San Diego, the state's third largest metropolitan area ⁵² from any form of CHSRA service: no service = no riders. A second self-imposed obstruction to 'winning' routes are subsidized Authority-dedicated buses to/from Sacramento of up to four hours: a third is the indefensible claim of riders to/from 'Other Regions' whose trips barely touch a high-speed train. While a temporary encumbrance, forcing early-on patrons to ride Authority buses between the San Joaquin Valley and the Los Angeles Metropolitan Area is not only a disincentive, but also has serious repercussions for False Phase 1. Singly and in tandem, these impediments will 'drive' many riders to either Auto (or Air) travel.

.....

2.1 HSR AND AIR'S SHARED AND PERVASIVE IMPEDIMENT TO WINNING ROUTES – Both HSR and Air travel require access+egress times added to their Run Times (Air's Flight Times) to compute Total Travel Times,⁵³ as explained in Part 1. Total Travel Time, which shows how quickly HSR, Auto or Air get travelers from their origin to their final destination, is the Authority's preferred way of measuring its offerings' competitiveness.⁵⁴ A decade ago, the US DOT/CHSRA told of Auto's advantage, "*Unlike common carrier transportation modes (air, bus, or rail), the automobile does not require or depend on intermodal connections to get from the trip origin to the trip destination.*" ⁵⁵

For HSR or Air travelers there is no escape from this grim embrace. Following the analysis done by the Chair of the Authority's Ridership Technical Advisory Panel (RTAP), we deducted a one-way access+egress time to be 71minutes.⁵⁶ At first 71minutes seems high and would be if every high-Speed Rail or Air passenger lived in the city center ⁵⁷ or at the airport. But most California downtowns

⁵² Review of A.3, the graphic description of 'Phase 1 – 2040,' shows no bus or HSR service south of Anaheim towards San Diego County (SANDAG). Nor does Figure 2.2, Phase 1, which also points out that to get to San Diego County travelers should consider either Metrolink, that terminates in Oceanside, or Amtrak's Pacific Surfliner, that terminates at the Santa Fe Depot in downtown San Diego.

⁵³ The decade-old DOT/FRA-Authority report defined the metrics for competitiveness, "*Total travel time includes the time spent getting to a station or an airport, waiting for the next scheduled train or flight, getting to the boarding area, checking and retrieving luggage, getting a rental car or taxi, and getting to the final destination.*" See: p. 1-8 [PDF 79] of Volume 1 Bay Area to Central Valley HST Final Program EIR/EIS of 2008, at: http://www.hsr.ca.gov/Programs/Environmental_Planning/bay_area_2008.html.

⁵⁴ Total Travel Time is the Authority's key competitive metric. The Authority's ridership consultants' 2013-2014 RP/SP surveys said, ". . . the more competitive HSR travel times are, the higher share HSR attracts . ." See p. 2-40 [PDF 72] of Final Report, California High-Speed Rail Ridership and Revenue Model, Business Plan Model-Version 3 Model Documentation, prepared for California High-Speed Rail Authority, prepared by Cambridge Systematics, Inc.; February 17, 2016

⁵⁵ See p. 3.2-25 [PDF 252] of Volume 1, Bay Area to Central Valley Final Program EIR/EIS, May 2008, found at: http://www.hsr.ca.gov/Programs/Environmental_Planning/bay_area_2008.html. Also see: [PDF 224] of that same US Department of Transportation, California High-Speed Rail Authority document that says, "*With the exception of the automobile, intercity transportation options require multiple modes to complete a trip.*"

⁵⁶ In November 2011, ten months after its first meeting, the RTAP Chair's presentation showed that HSR's SF-LA Total Travel Time was 231minutes. Subtracting AB3034's of 2hrs. 40minutes (160minutes) Run Time requirement leaves 71minutes, of access-egress time or round-trip access+egress times of 142minutes. See: PDF 47 of Polzin, Steven; Koppelman, Frank and Proussaloglou, Kimon: Forecasting Revenue and Ridership for High Speed Rail. High Speed Rail-Perspectives and Prospects, Fifth Annual William O. Lipinski Symposium on Transportation, November 14, 2011. Found at: <http://iti.northwestern.edu/publications/Lipinski/2011/Morning2.pdf>

⁵⁷ This assumption that HSR passengers are central city inhabitants is enshrined on p. 3.2-9 [PDF 262] of Final: Bay Area to Central Valley High-Speed Train (HST) Program Environmental Impact Report/ Environmental Impact Statement (EIR/EIS) Volume 1: Report, May 2008 that says, "*Because the HST station are generally located in the city centers, they are assumed to be located close to larger population and work centers than airports.*"

aren't their metropolitan regions' primary residential areas, their suburbs are $\pm 60\%$ -80% of where their populations live and are likely to live in the future.⁵⁸

Consider these Figure 2 example of False Phase 1 Total Travel Times: you live in Santa Monica and need to visit a client in Palo Alto. It takes at least 30minutes to get to LA Union Station, then a 15minute minimum wait for an HSR train,⁵⁹ then disembark in San Jose (17miles south of Palo Alto) and find Uber/Lyft or a rental car (at least another 15minutes), then by Auto to downtown Palo Alto, a 'driving time' of 23minutes. The one-way access+egress time is 83minutes. From Pasadena it's 87minutes and from Torrance it's 100minutes.⁶⁰ Or assume that you live in San Diego County's La Jolla and want to visit Palo Alto. First you must drive or take Amtrak to LA Union Station: that one-way alone access+egress time = 173minutes.

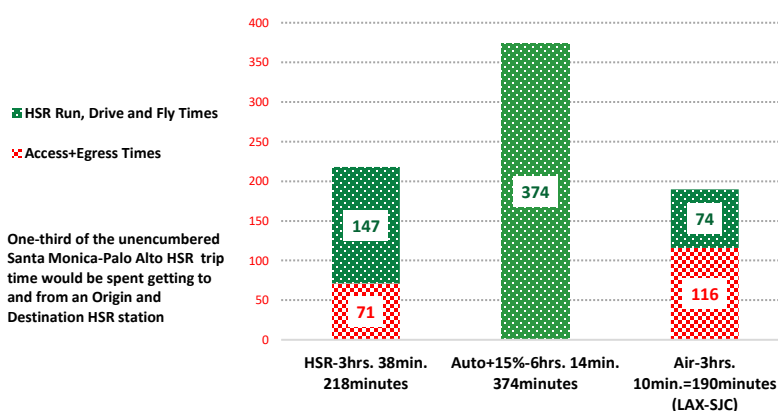
In general, it doesn't matter where you start from or how far you're going, at least 71minutes of access+egress times doesn't go away: it must be part of an Air or HSR passenger's Total Travel Time. Auto users just jump in the cars and go.

2.2 THE AUTHORITY 'SHOT ITSELF IN THE FOOT WITH TWO LONG-TERM, SELF-IMPOSED BURDENS TO

'WINNING' RIDERS – The glaring examples of this are the burdens CHSRA put on riders whose origins or destinations are San Diego and Sacramento. How could this be true?

First, the easy one. San Diego County (SANDAG) never has any form of high-speed rail or Authority-dedicated bus service throughout CHSRA's forecast period (2029-2040).⁶¹ Travelers to/from SANDAG must always use either Metrolink, a +2hour ride from LA Union to Oceanside, or ± 3 hours on Amtrak's Pacific Surfliner to San Diego, plus a 30minute Transfer Time in both cases.⁶² CHSRA patrons

Figure 2 - One Way Total Travel Time - Santa Monica-Palo Alto



http://www.hsr.ca.gov/docs/programs/bay_area_eir/BayCValley08_EIR_finalHST_vol1.pdf The assumption is self-serving in that the time and costs of getting to and through an HSR station would be lower if true than the metropolitan areas where the majority of California cities' populations, like SF Bay Area, LA Basin and San Diego County, do not live in the city centers; they live in suburbs.

⁵⁸ The LA Metro Area, SCAG's population (2014) is 18.95Million. See:

https://en.wikipedia.org/wiki/Southern_California_Association_of_Governments. The City of Los Angeles population is (2016) is 21% (3.98Million) of SCAG's. The SF Bay Area, MTC's population is 8.75Million. See: https://en.wikipedia.org/wiki/San_Francisco_Bay_Area The combined population of San Francisco and San Jose is 22% (0.88M+1.04M=1.92M) of MTC's. See: https://en.wikipedia.org/wiki/San_Francisco and https://en.wikipedia.org/wiki/San_Jose,_California. SANDAG's (San Diego County) 2010 population was 3.10Million. See: https://en.wikipedia.org/wiki/San_Diego_County,_California. The City of San Diego's 2016 population was 1.41Million or 37% of SANDAG's. See: https://en.wikipedia.org/wiki/San_Diego

⁵⁹ A 15minute wait is assumed because HSR trains run every 10minutes and at least 5minutes should be allocated for getting from the street to the passenger's seat on the HSR train. The planned frequency of HSR trains between Los Angeles and San Francisco is much less. During the 2029 to 2033 period the frequency is every 30 minutes, during the early part of the 2033 to 2040 period the frequency is every 15 minutes and by 2040, the frequency is finally at every 10 minutes. See Table A.1.2, Table A.2.2, and Table A.3.2 on pp. A-1 – A-3, [PDF 61-63] of the 2018 Business Plan's Ridership and Revenue Forecasting, Technical Supporting Document.

⁶⁰ The on-the-road time Santa Monica-LAUS and the San Jose-Palo Alto time are from: <https://www.google.com/maps/dir/>

⁶¹ See Figure 2.1, p.2-2 [PDF 22] and Figure 2.2, p.2-3 [PDF 23] of the 2018 Ridership and Revenue Forecasting, Technical Supporting Document that show service to Oceanside (northern San Diego County) and to the City of San Diego only by way of Metrolink and Amtrak's Pacific Surfliner respectively.

⁶² Amtrak's Surfliner only runs hourly. The LA Union-San Diego Run Time and Transfer Time of 200minutes (170minutes + 30minutes) is 12minutes longer than a LA Union-San Francisco HSR-only journey. See Table A.2.2, p. A-2, [PDF 62] of the Authority's 2018 Ridership & Revenue, Technical Supporting Document.

must also put Metrolink or Surfliner's Run fares (\$16.75 one-way or \$36.50 one-way) into their Total Travel Time and Total Travel Cost equations, 'zeroing out' any chance HSR will be time or cost competitive with Auto.

The Authority claims 300,000 riders to/from San Diego County (SANDAG) and all HSR destinations in 2029 and 4Million in 2033.⁶³ The Authority makes no claim to build high-speed rail infrastructure to connect San Diego northward, so these can only be 'phantom riders' to/from California's third largest market. How can there be HSR passengers between San Diego County and anywhere else when there is no HSR service planned south of LA Union Station or Anaheim?

Then there is Sacramento (SACOG): where again CHSRA shows its contempt for law.⁶⁴ Although a smaller population than Fresno,⁶⁵ SACOG 'punches above its weight' as a travel market. ⁶⁶ Sacramento (SACOG) can lay claim to being California's fourth largest travel market, not just because of its location near the

Central Valley's

center or its

proximity to the

Sierra Nevada; but

largely because, as

the state's Capital,

citizens, state

employees,

politicians and

lobbyists travel there

often. Empirical

evidence of that is

how much cheaper

airline travel

between Sacramento

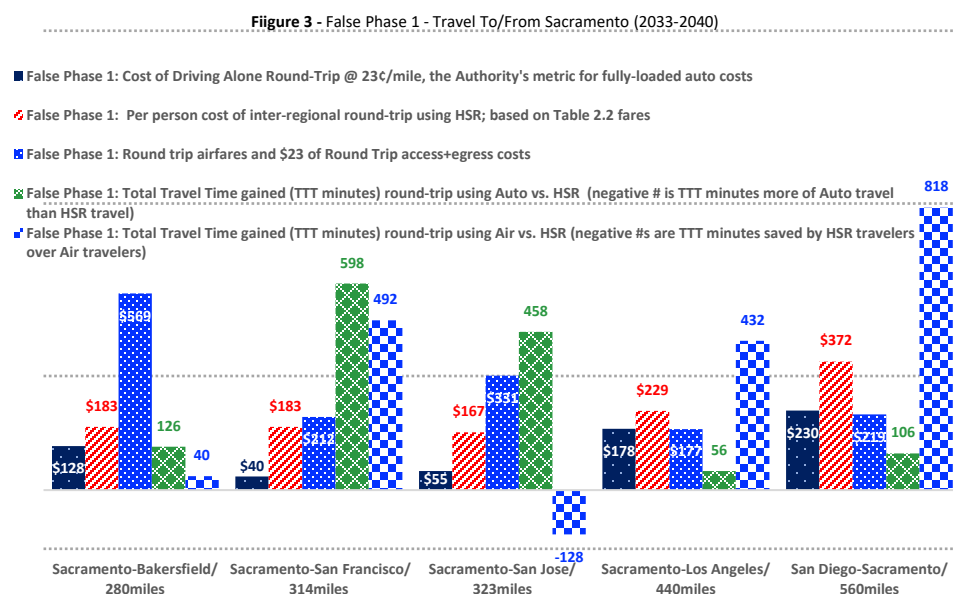
and Los Angeles

International (LAX) is

versus Fresno and

LAX, because there are many more passengers to/from Sacramento.⁶⁷

Figure 3 shows the results for travel between Sacramento (SACOG) and the three major metropolitan areas the LA Metro Area (SCAG), the SF Bay Area (MTC) and San Diego County(SANDAG) ⁶⁸ and the southern-most point (Bakersfield) in the San Joaquin Valley (SJV).



⁶³ See Table 5.3, [PDF 42-43] of the Authority's 2018 Ridership & Revenue, Technical Supporting Document.

⁶⁴ Section 2704.09 (f) says, "For each corridor described in subdivision (b), passengers shall have the capability of traveling from any station on that corridor to any other station on that corridor without being required to change trains." While Section 2704.09 (b) (4) says Sacramento-Los Angeles: two hours, 20 minutes" the Authority makes no provision for anything but an Authority dedicated bus service between Sacramento and Madera or Merced between 2029 and 2040. See: Figure 2.1 or Figure 2.2, pp. A2-2 and A2-3 [PDF 22-23] of the 2018 Ridership and Revenue Forecasting, Technical Supporting Document.

⁶⁵ The 2017 City of Los Angeles' population was 3,999,759, San Jose 1,035,107, San Francisco 884,463, the City of Fresno 527,438, the City of Sacramento 501,901, Oakland 425,195, Bakersfield 380,847 and Anaheim 352,497. See: <https://www.census.gov/quickfacts/fact/table/>

⁶⁶ The six counties that make up SACOG have a combined population of about 950,000. See: Found at: <https://www.sacog.org/publication/sacog-handbookk>

⁶⁷ At 3pm on October 12, 2018, we found a two-week advance purchase, round-trip ticket Fresno (FAT)-Los Angeles International (LAX) departing at 6:00am cost \$418. Found at: https://www.kayak.com/flights/FAT-LAX/2018-10-26/2018-11-06?sort=bestflight_a. In that same search we found a Sacramento (SMF)-Los Angeles International (LAX) two-week advance purchase, round-trip ticket Fresno, also departing at 6:00am cost \$143. Found at: https://www.kayak.com/flights/SMF-LAX/2018-10-26/2018-11-06?sort=bestflight_a

⁶⁸ California's three major markets, in order of importance are: the Los Angeles metropolitan area, represented by the Southern California Association of Governments (SCAG), the San Francisco Bay Area, represented by the Metropolitan

Figure 3 confirms that Auto or Air's Total Travel Time and Total Travel Costs are always less than using the Authority's Bus + HSR.⁶⁹ That's because travelers to/from Sacramento during the SV-CV Period must take a, the nearest HSR station. Because every inbound or outbound HSR passenger is required to take either a one-way 4hour or a 3hour 20minute Authority bus to Madera or Merced, even during False Phase 1 HSR patrons always face a bus ride to/from Merced and HSR 'wins' NO route to or from Sacramento (SACOG) at any time between 2029 and 2040. Does the Authority really believe that 1Million or 2.1Million riders – 7% and 6% of 2029 and 2033's forecasts respectively ⁷⁰ – will abandon Auto or Air travel for a contorted journeys to/ from Sacramento?

2.3 AN INEXPLICABLE CLAIM OF 'OTHER REGIONS' RIDERS WHOSE HSR-INCLUSIVE TRIPS ARE ENCUMBERED BY A COMMERCIAL BUS OR AUTO RIDES, RESULTING IN LITTLE TIME ON HSR – The Authority claims 3.2Million riders in 2029 and 4.7Million in 2033 on its HSR-inclusive offerings to/from 'Other' Regions.⁷¹ An empirically-based inspection of such travel to/from less populated areas would have quickly told the Authority's modelers that HSR is only a fraction of any journey to/from 'Other' Regions.⁷² Our analyses of 26 routes between cities in 'Other Regions' and the major cities in each region where the Authority claimed riders,⁷³ showed that only 8%-42% of travelers' Total Travel Time would be spent on a high-speed train – the average being 26%.

Transportation Commission (MTC) and San Diego County, represented by the San Diego Association of Governments (SANDAG)

⁶⁹ Analyses of the SACOG-(Sacramento) – MTC (SF Bay Area) routes show that because the 2033-2040 Sacramento-Merced bus ride alone takes 3hours 20minutes (200minutes) HSR between those adjacent regions (MTC-SACOG) is never quicker than Auto's Total Travel Time. See Table A.2.1 [PDF 62] of the 2018 Ridership and Revenue Forecasting Technical Supporting Document.

⁷⁰ See the SACOG portions of Table 5.3, [PDF 42] of the Authority's 2018 Ridership & Revenue, Technical Supporting Document

⁷¹ While the Authority claims riders to/from Other Regions and the four regions it also serves (SCAG, MTC, SANDAG and SJV) and between 'Other Regions' in Table 5.3 Table 5.3, [PDF 42] of the Authority's 2018 Ridership & Revenue, Technical Supporting Document, it gives no other details to define why non-urban travelers would go to/from the Monterey/Central Coast, To/From Far North, To/From W. Sierra Nevada to any destination and use high-speed rail as all or part of their conveyance.

⁷² 'Other Regions' was broadly defined as: to/from the Monterey/Central Coast, To/From Far North, To/From W. Sierra Nevada. None of these have nearby high-speed rail stations. See: p. 3.2-25 [PDF 252] of the Final: Bay Area to Central Valley High-Speed Train (HST) Program Environmental Impact Report/ Environmental Impact Statement (EIR/EIS) Volume 1: Report, May 2008, at: http://www.hsr.ca.gov/docs/programs/bay_area_eir/BayCValley08_EIR_finalHST_vol1.pdf. We chose Monterey, Redding and South Lake Tahoe to represent these cities in 'Other Regions.' Since there were no cities cited in the vague description of 'Other Regions' we also analyzed Santa Barbara since the Authority's modelers might be thinking of it as a Central Coast city, and Yosemite Valley as a W. Sierra Nevada city. We performed competitive analyses on five cities – all with destinations south of Sacramento since for 3 of the 5 origins, Los Angeles gave the traveler the greatest time advantage on HSR.

⁷³ We also analyzed HSR-inclusive travel between the cities identified in the 2008 EIR/EIS as representative of 'Other Regions.' See footnote immediately above.

Is the Authority claiming that a round-trip between Redding and Los Angeles, where the traveler spends only a third (34%) of his/her Total Travel Time on a high-speed train really is an HSR journey? Asking travelers to drive +2hours hours Redding-Sacramento or take a Greyhound bus for the first or last 4hours ⁷⁴ on an HSR-inclusive journey is an offer they can refuse.

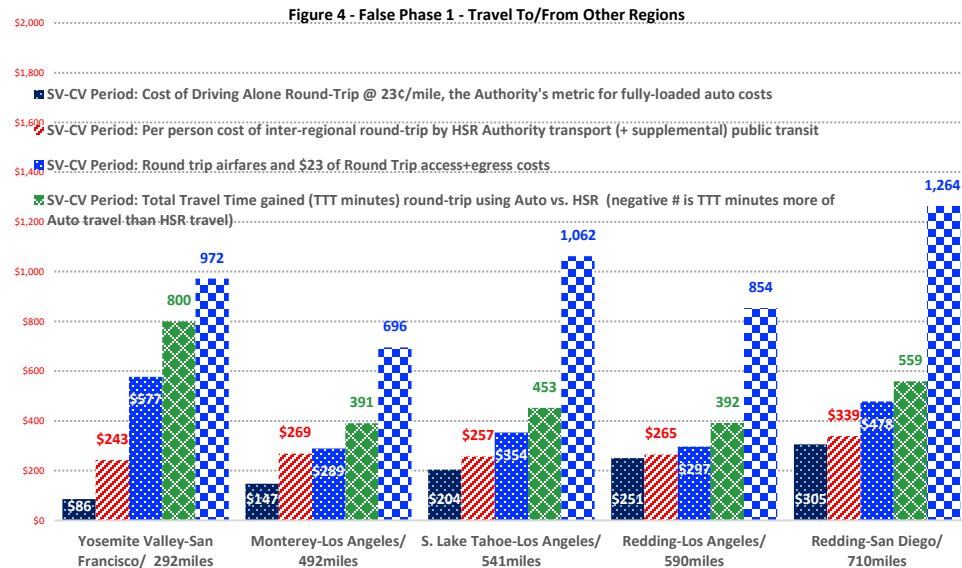


Figure 4 represents the results of analyzing False Phase 1 'Other Regions' travel, that includes the 4hour (240minutes) Sacramento-Madera bus ride. Analyses of both stages of HSR service show that the HSR portion of 'Other' Regions travel is a minor portion the Total Travel Time. HSR's superior speed to Auto's Total Travel Time cannot offset this slow-bus ride encumbrance.⁷⁵

2.4 ALBEIT A TEMPORARY ENCUMBRANCE, REPERCUSSIONS OF THE CROSS-TEHACHAPI BUSES' INCONVENIENCE WILL PLAGUE HSR'S FUTURE – Consider this: before False Phase 1 begins in 2033, the state's largest market, the +18Million people in the LA Metro Area (SCAG), are isolated from the state's other two major markets (the 8.75Million of SF Bay Area and the 3.1Million of San Diego County) by either slow, Authority buses on the traffic-congested LA Grapevine, ⁷⁶ or/and a +2hour or 3hour (140-160minutes) southbound ride from the Los Angeles Metro Area (SCAG) on Metrolink or Amtrak.⁷⁷

⁷⁴ Google driving time Sacramento-Redding is 2hours 20minutes. The one-way Greyhound Express trip Redding-Sacramento takes 3hours 50minutes. See: <https://www.greyhound.com/en/ecommerce/schedule>

⁷⁵ Three examples of round-trip Total Travel Times and the percent of those trips' Total Travel Times that HSR represents during the SV-CV Phase and False Phase 1: 1) During False Phase 1, the HSR portion of Monterey-LA only increases to 21%: that's only 11% of the Total Travel Time during the SV-CV Period. Driving Monterey-LA round-trip during the SV-CV Period would take about 12hours driving, an HSR traveler's door-to-door time using Greyhound and HSR would be over 17hours. Including Transfer Times, the time on-board the HSR train would only be 11% of that trip. 2) During False Phase 1 driving round-trip South Lake Tahoe-LA would take about 17hours, but on an HSR-inclusive trip; the HSR portion of Total Travel Time on a South Lake Tahoe-LA trip is 9%, while during the SV-CV Period trip of 25hours it's only 7%. 3) Driving round-trip Redding-LA would take about 18hours. During the SV-CV Period only 6% of Total Travel Time of over 25hour trip would be on an HSR train and during False Phase 1 the HSR portion of Redding-LA is only 17%

⁷⁶ Crossing the Tehachapi range between Bakersfield and the LA Metro Area takes not only a 15minute Transfer Time on one end and either a 2hours 21minutes (in 2033-2040) to 2hours 40minute (141-160minute) (2029-2032) bus ride. See Table 1.1, p. A-1 [PDF 61] of the 2018 Plan's Ridership and Revenue, Technical Supporting Document. When the 15minute transfer time is counted, the 132-141minute or 160minute cross-Tehachapi bus connecting Los Angeles' four Authority bus ports to Bakersfield, on average takes longer than the Bakersfield-San Jose HSR train (139minutes).

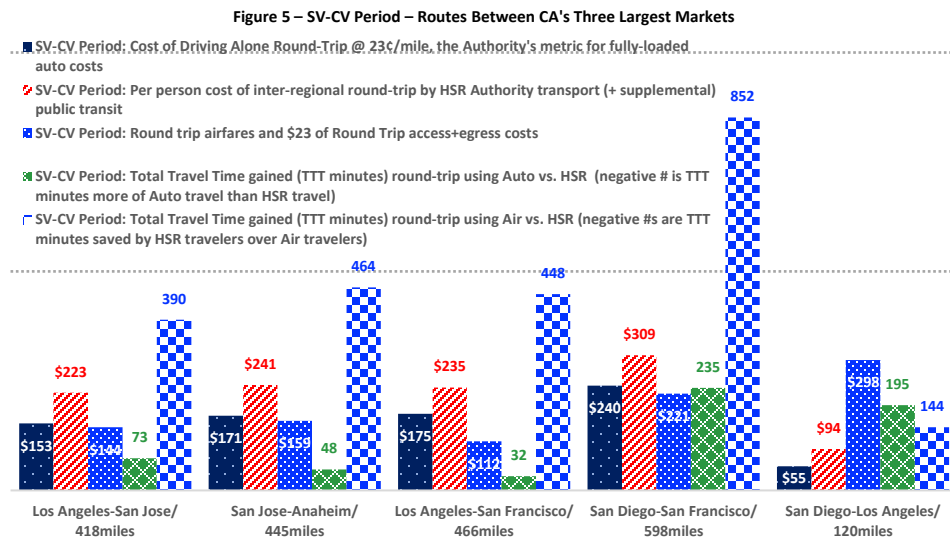
⁷⁷ A minimum of a half-hour wait at LA Union Station must be included because Amtrak's Pacific Surfliner only runs hourly. Metrolink's trains from LA Union run even less frequently. See: <https://tickets.amtrak.com/itd/amtrak>. For Metrolink schedules, see: <https://www.metrolinktrains.com/schedules/?type=station&originId=131&destinationId=111&weekend=0>

Despite this clearly being both illegal⁷⁸ and 'bad for business' CHSRA's forecasters claim that nearly one-in-every five of HSR's riders (18%) during the SV-CV Period's forecasted riders, will take Authority buses and HSR trains to travel between the LA Metro Area (SCAG) and the SF Bay Area (MTC) and between the SF Bay Area (MTC) and San Diego (SANDAG) in those initial operating years (2029-2032).⁷⁹

Launching a 'start up' transport service between California's three largest markets (SCAG, MTC, SANDAG), then 'obstructing' quick passage over the Tehachapis – and no service to San Diego – seems an unlikely strategy to 'win' riders. Figure 5 demonstrates that the Tehachapi buses' crippling effect on HSR's competitiveness and no service to San Diego, keeps HSR out of the 'win' columns for the three major market routes before False Phase 1 begins in 2033.⁸⁰

2.4.1 – THE SV-CV PERIOD: A LESSON IN BRAND DESTRUCTION – If built, HSR's 'launch years' will be a lesson in brand destruction, with devastating consequences far beyond the 2029-2032. Why? Four years ago, the Authority's Peer Review Group warned the Authority it will operate a start-up, aka a Greenfield HSR system.⁸¹ During the SV-CV Period, HSR trains will be high-speed rail's flagship that shape early travelers' attitudes towards using HSR and sets later travelers' expectations.

In brand launches, initial customers are willing to take the 'risk of the new.' But they must be not only satisfied; they must endorse the product or service. More than fifty years ago Dr. Everett



⁷⁸ By having to change from a HSR train to an Authority cross-Tehachapi bus violates AB3034's Section 2704.09 (f) that says, "For each corridor described in subdivision (b), passengers shall have the capability of traveling from any station on that corridor to any other station on that corridor without being required to change trains." while Section 2704.09 (b) (1) says, "San Francisco-Los Angeles Union Station: two hours, 40 minutes". and under Section 2704.09 (b) (2) says "Oakland-Los Angeles Union Station: two hours, 40 minutes" and under 2704.09 (b) (4) it says, "San Jose-Los Angeles: two hours, 10 minutes." and 2704.09 (b) (7) says, "Sacramento-Los Angeles: two hours, 20 minutes." During the SV-CV Period, (2029-2032) CHSRA violates all of these by requiring transfers between an Authority dedicated bus and an HSR train. See: Figure 2.1 or Figure 2.2, pp. A2-2 and A2-3 [PDF 22-23] of the 2018 Ridership and Revenue Forecasting, Technical Supporting Document.

⁷⁹ SCAG-MTC is forecasted to be 2.4Million and SANDAG-MTC is forecasted to be 0.2Million for 2033 in Table 5.3, p. 5-6, [PDF 42] of the SV-CV Period. [The math is 2.6 (2.4+0.2)/14.4=18%] See: 2018 Ridership and Revenue Forecasting, Technical Supporting Document

⁸⁰ Table A.1.3 on p. A-1 [PDF 61] of the Ridership and Revenue Forecasting Technical Supporting Document shows that not only between 2hours 12 minutes (132minutes) and 2hours 40 minutes (160minutes) must be added to the travelers' Total Travel Time between Bakersfield and LA Metro Area destinations but a traveler must add another 15minutes to their Total Travel Time to connect with a bus or HSR train in Bakersfield, making those increments 147minutes, 155minutes and 175minutes. Table A.1.2 of that document says the Run Time Bakersfield-SF is 139minutes, making the LAUS-Bakersfield bus ride 15% longer than the Bakersfield-San Jose HSR portion of the trip.

⁸¹ The full quote is: "HSR in California will be a "Greenfield" system: that is, neither HSR nor adequate intercity rail service on any significant scale exists in California today Connecting California, 2014 Business Plan, April 30, 2014, p.7 [PDF 87] letter from the California High-Speed Rail Peer Review Group, Will Kempton, Chairman; May 18, 2012 Found at: www.cahsrprg.com.

Rogers⁸² work on the diffusion of innovation taught that if the first wave of consumers, aka Early Adopters, are impressed, there is a good chance of reaching a 'tipping point' where the innovation becomes accepted by a much greater market. If not, success is a chimera. Does the Authority think that by providing painfully slow, more expensive travel in its 'launch years' between major markets will gain the approval of Early Adopters?

Start-ups are risky: consider Apple's Newton, Coca-Cola's New Coke, Ford's Edsel, Google's Glasses and Microsoft's Zune; all from established, leading companies in their markets. All failed in the market, where HSR's legal underpinning (AB3034) demands successful financial operations. Surely CHSRA doesn't think its business acumen is greater than any of those companies'.

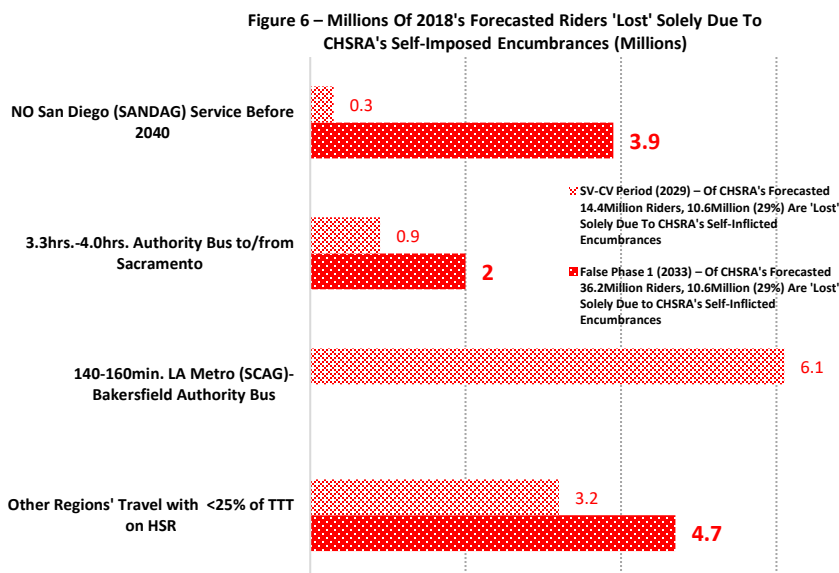
2.5 How Do CHSRA-IMPOSED ENCUMBRANCES AFFECT HSR'S COMPETITIVENESS IN 2029 AND 2032?

– We looked at CHSRA's self-imposed burdens on its route 'wins.' We found that with no service to San Diego, a 3.3-4-hour bus between Sacramento (SACOG) and points south and west and mandatory cross-Tehachapi bus rides during 2029-2032, the Total Travel Times and Total Travel Costs of traveling on the non-existent and encumbered routes by HSR before 2033 was always longer and more expensive than Auto or Air's.

It's hard to claim 14.4Million or 32.6Million riders if you have no HSR service to San Diego and block riders ease of traveling on your high-speed trains with mandatory bus rides over the Tehachapi range as well as to/from Sacramento (SANDAG).

Alone, Figure 6 shows those losses are 'big hits' to CHSRA's ridership, therefore revenue generation ambitions; and subsequently raise serious questions about the validity of the Authority's claim that its HSR system will not need an operating subsidy.

As Figure 6 also shows, of the 14.4Million forecasted riders for 2029 and 36.2Million forecasted riders in 2033, 90% and 83% respectively of the Authority's 2018 forecasted riders, will be 'lost' to Auto or Air travel due solely to the Authority's inherent and self-imposed encumbrances discussed in this Part 2.⁸³



⁸² See: Dr. Everett Rogers's *Diffusion of Innovations* (1962). Found at: <https://teddykw2.files.wordpress.com/2012/07/everett-m-rogers-diffusion-of-innovations.pdf>. In his seminal work, now in its fifth edition, Rogers developed a paradigm around how ideas and innovation spread and what stages different adopters entered the market for the product or service. Rogers' thesis has been upheld and rigorously mapped over the past 50 years. After the Innovators (2.5% of the total market) and Early Adopters (13.5%) come the Early Majority (34%) then the Late Majority (34%) and finally Laggards (16%).

⁸³ Figure 6 is a derivative of Figure 19 of this paper that reconciles our findings on route 'wins' with CHSRA's 2018 forecasts from Table 5.3, p. 5-5 [PDF 41] of the 2018 Plan's Ridership and Revenue, Technical Supporting Document. Figure 6 only counts riders on those routes lost to Auto or Air due to CHSRA's ubiquitous and self-inflicted, route-losing encumbrances as listed.

PART THREE

WHAT ARE CHSRA'S TRAINS CHANCES OF COMPETITIVELY WINNING RIDERS ON UNENCUMBERED ROUTES?

* * * * *

Part Three demonstrates how a 2007 diagram, derived from a Union Internationale des Chemins de fer (UIC)/International Union of Railways (IUR) presentation and California's regional geography combine to further preclude more potential HSR 'wins' on both long and very short routes.

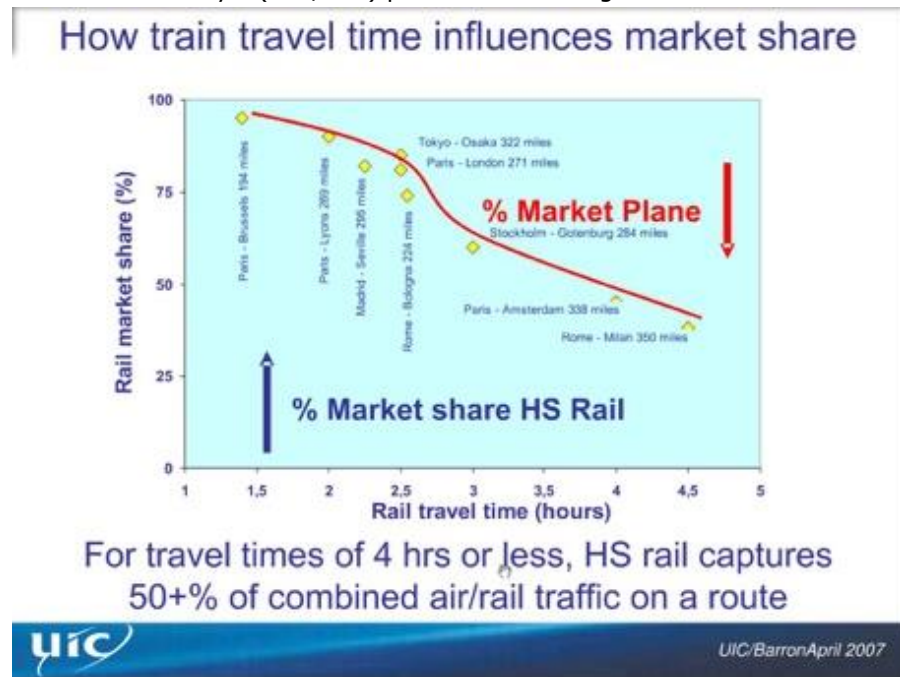
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3.1 THE INTERNATIONAL UNION OF RAILWAYS RECOGNIZES THAT HIGH-SPEED RAIL'S COMPETITIVENESS IS 'BRACKETED'— Eleven years ago, the Director for High-Speed Rail of the Union Internationale des Chemins de fer/International Union of Railways' (UIC/IUR) presented the diagram below to the US Congress.⁸⁴ The UIC/IUR

diagram indicated that HSR ceded its time competitiveness to Auto travel on unencumbered routes of less than ± 1.5 hours of Run Time⁸⁵ or about ± 194 miles (Paris-Brussels). Then at about 3 hours of Run Time or about ± 300 miles (Stockholm-Gotenburg=284 miles) HSR gave up over half its market share to Air travel.⁸⁶ That's HSR's Run Time' competitiveness 'bracket.'

But the UIC/IUR diagram is only about "Rail travel time (hours)"

that only compares Run Times – aka station-to-station times or line haul times. The UIC/IUR did not explore the full implications of traveling on unencumbered routes; aka Total Travel Times. To do that, access+egress times must be added to Run Times – for both HSR and Air travel, while time on Authority buses must be added to HSR Run Times to get HSR's Total Travel Time. After all, what's the point in having a speedy airplane or train ride if getting to and from the station or airport hampers the



⁸⁴ Iñaki Barron de Angoitia, Director of High-Speed Rail at the International Union of Railways/UIC, presented this chart to the US Congress on April 19th 2007. See Mr. de Angoitia's presentation [PDF 50-79] of 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://link.umsi.edu/portal/International-high-speed-rail-systems--hearing/wzsgvIFIGic/>. The Diagram is on PDF 64. While the website has been taken down, the document, Library of Congress number, 9780160795497, is available for purchase through the Supt. of Docs., U.S. G.P.O., 2007.

⁸⁵ The UIC/IUR diagram, as we confirmed by an investigation of timetables, only refers to Run Times: i.e. it did not include access+egress times. It showed a gap between 0 hours and 1.5 hours, which when access+egress times are added gave Auto travel an advantage on routes up to ± 125 miles. Then instead of HSR market share against Air travel falling at "4 hrs. or less" as the title says, the share began a precipitous fall at 2.5 hours or ± 400 miles. This decline in market share at higher mileage would be even more precipitous if access+egress times had been shown.

⁸⁶ An enlarged UIC/IUR diagram is found at the same website as this paper: <https://sites.google.com/site/hsrcaiff/home/2-1-major-reports---2018-plan/09-2018-if-you-build-it-they-will-not-come---the-sequel>

Total Travel Times – and an Authority bus ride adds more? The paper measures and compares Total Travel Times for Auto, HSR and Air, including but not limited to, Run Time comparisons.⁸⁷

Early-on, our empirical data-based work taught us the impacts of adding access+egress times to Run Times. Computing HSR, Auto and Air travel's Total Travel Time indicated that HSR ceded its time competitiveness to Auto travel on unencumbered routes of less than ± 125 miles (± 1.5 hours of Run Time)⁸⁸ while on unencumbered routes greater than ± 400 miles (± 3 hours of Run Time) ceded time competitiveness to Air travel. Similar to the UIC/IUR diagram, we found that HSR's competitiveness on unencumbered routes is 'bracketed' – but at shorter mileage lengths. We dubbed our finding the UIC/IUR-derived diagram

In business' language, our 'bracket' of HSR mileage, where unencumbered HSR competes well is called HSR's 'Sweet Spot.' An HSR route of less than the UIC/IUR-derived diagram's Sweet Spot's threshold (± 125 miles) is the upper limit of Auto travel's Total Travel Time advantage; while above ± 400 miles, HSR's competitive 'ceiling' is Air travel's competitive dominion. As long as a route is within that UIC/IUR-derived diagram's Sweet Spot and not encumbered by a bus or an Amtrak ride (or both) or uses CHSRA's offerings for more than half of the Total Travel Time we found our derivative of UIC/IUR diagram (the UIC/IUR-derived diagram) extremely useful to indicate which transport mode would 'win' which route.

The following discusses – and the graphics illustrate – what keeps HSR from reaching its full potential on routes connecting the three major markets that would today – and will tomorrow – comprise about three-fourths (74%) or more of California's population.⁸⁹

3.2 WHAT ARE CHSRA'S CHANCES OF CAPTURING RIDERS TRAVELING BETWEEN CALIFORNIA'S THREE MAJOR MARKETS? – We analyzed the three routes connecting the three major markets – the LA Metro Area-SF Bay Area (SCAG-MTC), MTC-San Diego County (MTC-SANDAG) and SANDAG-SCAG: i.e. every possible SV-CV Period's twenty-three routes; and all twenty-nine possible False Phase 1 routes between those three markets.⁹⁰ In doing so, we also analyzed routes to/from Long Beach and Oakland because the Authority implicitly counts riders to/from those cities as part of the LA Metro Area (SCAG) and the SF Bay Area (MTC) respectively.⁹¹

⁸⁷ The Authority is aware of travelers' preferences to use the full measure of door-to-door times as the way to choose which mode they will use. In 2011, an Authority ridership forecasting consultant's report also showed similar patterns of existing mode choices where nearly all travel up to 200 miles was by bus, Auto or 'Other' and half of travel up to 450 miles was by Air. After 450 miles nearly all intra-California travel was by Air. See Exhibit 5, p. 34 [PDF 154] of California High-Speed Rail 2012 Business Plan, Ridership and Revenue Forecasting, draft technical memorandum, prepared for Parsons Brinckerhoff for the California High-Speed Rail Authority; prepared by Cambridge Systematics, dated October 19, 2011.

⁸⁸ The UIC/IUR diagram, as we confirmed by an investigation of timetables, only refers to Run Times: i.e. it did not include access+egress times. It showed a gap between 0 hours and 1.5 hours, which when access+egress times are added gave Auto travel an advantage on routes up to ± 125 miles. Then instead of HSR market share against Air travel falling at "4 hrs. or less" as the title says, the share began a precipitous fall at 2.5 hours or ± 400 miles. This decline in market share would be even more precipitous if access+egress times had been shown.

⁸⁹ California's three major population centers are (2016) the Los Angeles Metro Area (SCAG) at 18 Million, the SF Bay Area (MTC) at 8 Million, San Diego Metro Area at 3 Million. The three largest represent 29 Million people or 74% of California's 39.4 Million. Taken from p.1 and Table 4 and Table 5 of CA Department of Finance, New State Population Projections, March 8, 2017. Found at: http://www.dof.ca.gov/Forecasting/Demographics/projections/documents/P_PressRelease.pdf

⁹⁰ The difference in routes served during the SV-CV Period and False Phase 1 is that, unlike False Phase 1, during the SV-CV Period, neither Millbrae nor Palmdale are HSR stops. For HSR stops during the SV-CV Period, see the map on p. 2-2 [PDF 22] of the 2018 Ridership and Revenue Forecasting, Technical Supporting Document. For False Phase 1, see the map on p. 2-3 [PDF 23] of the same document.

⁹¹ Why did we do that? Long Beach is SCAG's second largest city: it has a third more population than HSR-served Anaheim; yet is without HSR service through 2040. Long Beach estimated 2017 population was 469,450, Anaheim was 352,497. See: <https://www.census.gov/quickfacts/fact/table/anaheimcitycalifornia,longbeachcitycalifornia,ca/PST045217> After San Jose and San Francisco, Oakland is MTC's third largest city, but while being seven times Gilroy's population and nineteen times Millbrae's, is also without HSR service through 2040. Oakland's estimated 2017 population was 425,195. Gilroy's was 57,664 and Millbrae's 22,718. See: <https://www.census.gov/quickfacts/fact/table/gilroycitycalifornia,millbraecitycalifornia,oaklandcitycalifornia/PST045217> Not having direct HSR service to Long Beach or Oakland, both served by intra-California and transcontinental flights, while Oakland also serves intercontinental passengers, is a choice the Authority made that has consequences.

When competing for Auto and Air travelers⁹² and their dollars, as the Authority's operator must, the objective should be to capture as much market share as possible from the largest clusters of potential clients. That's Business Strategy 101 and CHSRA's foundation law demands the HSR system operate like an unsubsidized business.⁹³ Wining a very large portion of the routes between the three major markets is essential to the HSR's trains' financial survival.

As the figure on the right shows, passengers on HSR trains' planned route between 2029 and 2040 will travel >400 miles between the state's two largest markets, the LA Metro Area and the SF Bay Area (SCAG-MTC). If only that SCAG-MTC route were operational today, it would be available to about 26Million of California's 39.4Million, i.e. two-thirds (66%) of today's population.⁹⁴

But the ±466mile distance that an HSR train must travel between California's two largest metropolitan centers is clearly longer than the Sweet Spot's ceiling.⁹⁵

Since the SCAG-MTC route accounts for almost one-in-every-five of CHSRA's forecasted passengers (17%-19%) during the train's entire forecasted history, their loss alone carries crippling blows for the Authority's ambitions.⁹⁶



⁹² There are also conventional rail riders; aka Amtrak passengers. But their numbers are so small as to be inconsequential, particularly when Amtrak's, "... existing San Joaquin service south of Merced to Bakersfield is assumed to be discontinued upon the initiation of HST service." leaving on HSR to connect the state's largest and second largest markets. For discontinuing Amtrak San Joaquin Valley service, see Cambridge Systematics' (CS) final technical memorandum of Ridership and Revenue Forecasting of April 12, 2012 said the foregoing. See: Section 5.2, p. 5-5 of Connecting California, 2014 Business Plan, April 30, 2014 Exhibit 4.4 [PDF 43].

⁹³ AB3034's Section 2704.08 (J) requirement to be judged commercially says, "The planned passenger service by the authority in the corridor or usable segment thereof will not require a local, state, or federal operating subsidy."

⁹⁴ California's three major population centers are (2016) the Los Angeles Metro Area (SCAG) at 17.9Million, the SF Bay Area (MTC) at 7.7Million, San Diego Metro Area at 3.2Million. The three largest represent 28.8Million people or 74% of California's 39.4Million. Adding CA's fifth largest market, the multi-county Sacramento Area Council of Governments (SACOG) at 2.5Million: the total would be 31.2Million or 79% of the state's population. Taken from p.1 and Table 4 and Table 5 of [CA Department of Finance, New State Population Projections](http://www.dof.ca.gov/Forecasting/Demographics/projections/documents/P_PressRelease.pdf), March 8, 2017. Found at: http://www.dof.ca.gov/Forecasting/Demographics/projections/documents/P_PressRelease.pdf

⁹⁵ The distance between the downtown termini in Los Angeles and San Francisco, the 466miles used in our calculations, comes from [Independent Determination That the Travel Time Requirements of PROP 1A/AB3034 Cannot Be Met](https://www.google.com/maps/dir/Madera+Station,+Road+26,+Madera,+CA/Sacramento+Valley+Station), Paul S. Jones; March 13, 2015. Madera-Sacramento miles and Merced-Sacramento miles, the two northern-most termini of HSR service are taken into account using Google's route distance and Auto Run Times. For example, Madera-Sacramento's distance by Google is 150miles. Found at: <https://www.google.com/maps/dir/Madera+Station,+Road+26,+Madera,+CA/Sacramento+Valley+Station>

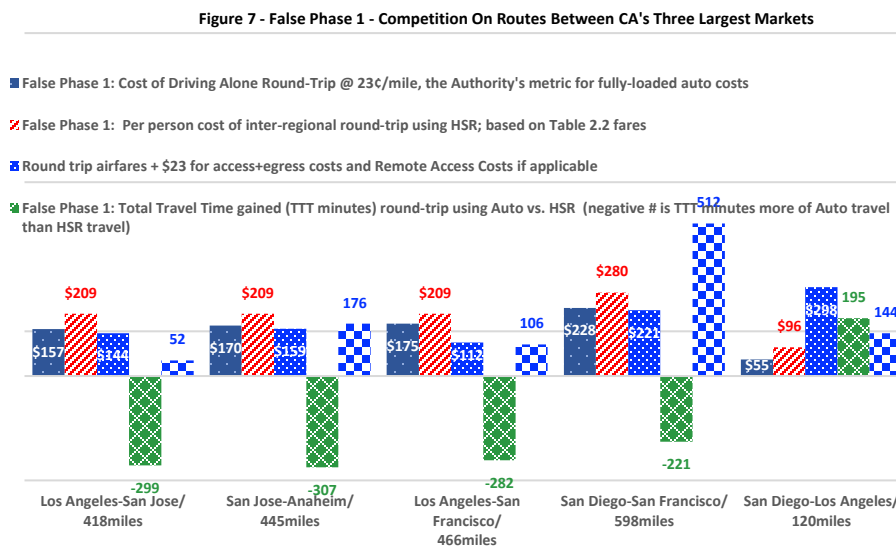
⁹⁶ In 2029, the MTC-SCAG route is forecasted to carry 2.4Million of the 14.3Million travelers (17%); in 2033 that route is supposed to carry 6.7Million of the 36.2Million (19%) and in 2040, MTC-SCAG is forecasted to carry 7.7Million of the

During the SV-CV Period; i.e. HSR's 'launch years of 2029-2032, CHSRA chose to ignore its founding law⁹⁷ as well as encumber the route between the two largest markets by a 2hour 20minute or 2hour 40minute (140-160minutes) cross-Tehachapi bus ride ⁹⁸ that destroys the competitive benefit of HSR's speed. That cross-Tehachapi bus alone eliminates HSR from being competitive during the SV-CV Period.

As Figure 7 shows, even during False Phase 1 the negative consequences of abusing the UIC/IUR-derived diagram's

'ceiling' of ±400miles, may mean HSR travel between the state's two largest markets is quicker than by Auto. But Air's Flight Time (aka Run time) speed cancels out any route 'wins' HSR's full-throttle speed makes against Auto travel. Consequently, the +450miles between the LA Metro Area (SCAG) and the SF Bay Area (MTC) make

Air travel's Total Travel Times both shorter ⁹⁹ and Total Travel Costs less costly than high-speed rail. Figure 7 shows that even without the cross-Tehachapi Authority bus, Air 'wins' the largest-to-second largest city routes: San Francisco- Los Angeles Union Station, while Auto 'win' the largest-to-third largest link, San Diego-Los Angeles, as Section 2704.09 (b) (5) requires.



40Million (19%). See Table 5.3, pp.5-5, 5-6 [PDF 41-42] of the 2018 Business Plan's Ridership and Revenue, Technical Supporting Document.

⁹⁷ Section 2704.09 (f) says, "For each corridor described in subdivision (b), passengers shall have the capability of traveling from any station on that corridor to any other station on that corridor without being required to change trains." while Section 2704.09 (b) (1) says, "San Francisco-Los Angeles Union Station: two hours, 40 minutes". and under Section 2704.09 (b) (2) says "Oakland-Los Angeles Union Station: two hours, 40 minutes" and under 2704.09 (b) (4) it says, "San Jose-Los Angeles: two hours, 10 minutes." During the SV-CV Period, CHSRA violates all of these by requiring transfers between an Authority dedicated bus over the Tehachapi Range and an HSR train that stops in Bakersfield. See: Figure 2.1 or Figure 2.2, pp. A2-2 and A2-3 [PDF 22-23] of the 2018 Ridership and Revenue Forecasting, Technical Supporting Document.

⁹⁸ The Authority's 2018 Plan had its buses loading and discharging passengers in Van Nuys, West LA, Santa Anita, Burbank Airport and Union Station, the first three only being used during 2029-2032, as thereafter they are succeeded by Gateway Cities/Orange County and Anaheim. See Figure 2.1 and Figure 2.2 [PDF 22-23] of the 2018 Plan's Ridership and Revenue, Technical Supporting Document. This was either a contractor's error of a planned waste of money.

⁹⁹ We added an extra 45minutes of airport security time to each 'leg' of an Air journey, but none to HSR travel despite knowing that not only the Paris-London Eurostar requires security time, but that travelers leaving Madrid and Barcelona also submit to such searches.

Figure 8 answers where travelers between the LA Metro Area (SCAG) and the SF Bay Area (MTC) will spend their time on journeys between California's largest (SCAG) and second largest (MTC) major markets during False Phase 1. On the Authority's Premier Route (SCAG-MTC) over a quarter (27%) of Total Travel Time is access+egress time.

During the same 2033-2040, the answer about where a SF Bay Area (MTC)-San Diego (SANDAG) HSR passenger spends time, shown in Figure 9, is shocking: 60% of Total Travel Time is

access+egress time. As Figure 9 shows, because the SF Bay Area -San Diego (MTC-SANDAG) miles are ±600, Air is both Total Travel Time quicker and Total Travel Costs cheaper than using Amtrak and CHSRA's offerings. Violate the UIC/IUR-derived diagram and pay the price in ridership and revenue.

For the LA Metro Area link connecting with San Diego (SCAG-SANDAG), California's largest and third largest markets, the answer to where travelers spend their time is easy: on Amtrak's Pacific Surfliner, Metrolink or driving the ±120miles between the cities' centers. No HSR service between the two markets should equal no HSR passengers.

That LA Metro Area- San Diego (SCAG-SANDAG) route always requires transferring to or from HSR by infrequent and relatively slow Metrolink or Amtrak's Pacific Surfliner trains, an illegal step in an HSR journey.¹⁰⁰ By having no HSR or bus link forecasted in its plans, the Authority forfeits any possible 'win' to/from SANDAG at any time before 2040.¹⁰¹ Somehow, as Part Two discusses, this doesn't stop the Authority from claiming 0.3Million 2029 riders and 3.9Million riders in 2033 to/from San Diego County (SANDAG).¹⁰²

These SV-CV Period and False Phase 1 major market analyses point to not just a dismal future for the Authority's plans, but no future if HSR trains and Authority buses' Total Travel Times cannot best Auto or Air's Total Travel Times and Total Travel Costs. And, as we found, unless the route is subsidized, as

Figure 8 - False Phase 1 – Los Angeles-San Francisco One-Way - HSR's Premier Route
- Connects CA's Largest and 2nd Largest Markets

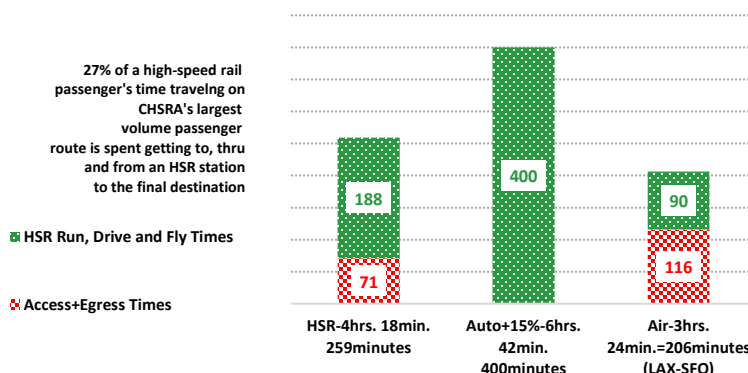
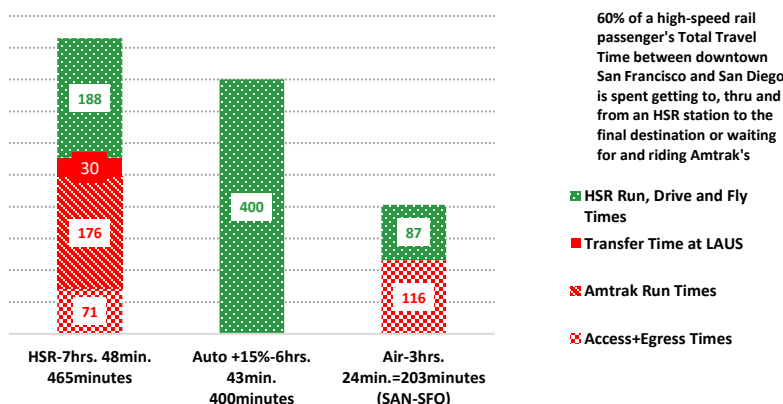


Figure 9 - San Francisco-San Diego One-Way - Connects CA's 2nd and 3rd Largest Markets



¹⁰⁰ Section 2704.09 (f) says, "For each corridor described in subdivision (b), passengers shall have the capability of traveling from any station on that corridor to any other station on that corridor without being required to change trains." While Section 2704.09 (5) says "San Diego-Los Angeles: one hour, 20 minutes." the Authority makes no provision for any type of San Diego-Los Angeles service between 2029 and 2040. See: Figure 2.1 or Figure 2.2, pp. A2-2 and A2-3 [PDF 22-23] of the 2018 Ridership and Revenue Forecasting, Technical Supporting Document.

¹⁰¹ In Figure 2.2, the exhibit of Phase 1 operations, there is no planned HSR or Authority dedicated bus service south of the LA Metro Area. See Figure 2.2, p. 2-3 [PDF 23] of the 2018 Plan's Ridership and Revenue, Technical Supporting Document.

¹⁰² See Table 5.3, p. 5-5 [PDF 41] of the 2018 Plan's Ridership and Revenue, Technical Supporting Document.

the Sacramento buses are, HSR's Total Travel Costs are never cheaper than driving alone, and HSR is much more-costly than Auto's ridesharing situations.

3.3 WHY HSR CAN'T COMPETE AGAINST AUTO TRAVEL'S TOTAL TRAVEL TIME ON SHORT, UNENCUMBERED ROUTES OF <125MILES – Both the UIC/IUR diagram and the UIC/IUR-derived diagram demonstrated where the 'floor' is to HSR competitiveness: unencumbered routes of less than ±125miles (<125miles) Auto 'wins' those routes mainly because travelers get to and from their autos quickly. Even before 2008's Proposition 1A vote, the Authority recognized that Auto travelers start their journeys almost instantly:¹⁰³ i.e. Auto Run Times = Auto Total Travel Times.¹⁰⁴ Later, the Ridership Technical Advisory Panel's Chair gave Auto's Total Travel Time at least a 71minute 'head start' advantage over HSR and Air in one-way travel.¹⁰⁵

3.4 THE UIC/IUR-DERIVED DIAGRAM PREDICTED THAT AUTO TRAVEL WOULD 'WIN' ALL BUT ONE INTRA-REGIONAL ROUTE – The Authority says that 3.1Million riders in 2029 and 9.5Million riders in 2033 will take its HSR trains on route that are totally within a region. Some passengers are even on routes inside the SF Bay Area (MTC) or the LA Metro Area (SCAG) ¹⁰⁶ of less than 50miles (<50miles).

Yet, even before 2016,¹⁰⁷ when CHSRA said HSR cannot compete ". *in shorter-distance markets where autos are the dominant mode.*" ¹⁰⁸ the Authority violated both its own and national rail planning

¹⁰³ The proposition 1A vote was November 2008. Volume 1 Bay Area to Central Valley HST Final Program EIR/EIS was issued in May 2008. PDF 224 of that EIR/EIS (found at:

http://www.hsr.ca.gov/Programs/Environmental_Planning/bay_area_2008.html) of the US DOT/FRA-CA High-Speed Rail Authority EIR/EIS says, "With the exception of the automobile, intercity transportation options require multiple modes to complete a trip." while p. 3.2-25 [PDF 252] of that document says "Unlike common carrier transportation modes (air, bus, or rail), the automobile does not require or depend on intermodal connections to get from the trip origin to the trip destination."

¹⁰⁴ In the 320 route analyses that substantiate this paper, we increased Auto's Run Times (i.e. Total Travel Times) by 15% above what Google maps and directions said. The 15% uplift on an Auto round-trip seems reasonable given that: 1) for a one-way trip, Table 1.2-3 p. 1-9 [PDF 82] of Bay Area to Central Valley Final Program EIR/EIS, May 2008, at: http://www.hsr.ca.gov/Programs/Environmental_Planning/bay_area_2008.html shows that between 2000 and 2030 an Auto trip's Total Travel Time increases from 2% (Sacramento-San Jose) up to 6.9% for BUR-San Jose, with LA-SF at +5.6%, and 2). Also, Americans lose 0%-30% of their daily commute on road traffic delays. See: <http://abcnews.go.com/US/time-americans-waste-traffic/story?id=33323765>

¹⁰⁵ While Air travelers' itineraries have the same access+egress times 'handicap' as HSR against Auto travel, Air travel's Run Times (aka flight times) are half or less of HSR's on the same routes. In short, access+egress times are part of HSR's Achilles' Heel when competing against Autos' Total Travel Times, while aircraft speeds are Air travel's time advantage over HSR. When computing round-trip Total Travel Times for Air travel, we not only added 142 minutes (2* 71minutes) of access+egress time as we did for HSR travel, but for round-trips also added an extra 90minutes (2*45minutes) of extra time above that of HSR wait time only for airport security; i.e. security time is not assumed for HSR travelers. The California High-Speed Rail Authority's five-member Ridership Technical Advisory Panel (RTAP), chaired by Frank Koppelman, Ph.D., first met January 10-11, 2011. See: http://www.hsr.ca.gov/docs/about/ridership/ridership_revenue_peer_finalmay2011.pdf. Ten months later, in November 2011, Dr. Koppelman co-presented a paper that spoke clearly to the need for and size of the non-Run Times (aka Line Haul In-Vehicle times) required in HSR Auto and Air Travel between South San Francisco and Central LA. That diagram showed that HSR's SF-LA Total Travel Time was 231minutes. Subtracting AB3034's required 2hrs. 40minutes (160minutes) Run Time requirement leaves 71minutes or round-trip access+egress times (including 15minutes on each end as the Authority says for Transfer Times) of 142minutes. See: PDF 47 See PDF 7 of Polzin, Steven; Koppelman, Frank and Proussaloglou, Kimon: Forecasting Revenue and Ridership for High Speed Rail. High Speed Rail-Perspectives and Prospects, Fifth Annual William O. Lipinski Symposium on Transportation, November 14, 2011. Found at: <http://iti.northwestern.edu/publications/Lipinski/2011/Morning2.pdf>

¹⁰⁶ This total is the sum of intra-regional HSR travel in 2029 and MTC+SCAG travel 2033. During 2029, 1.9Million HSR riders are supposed to opt for HSR over subsidized Caltrain while no travelers are expected to take HSR inside the SCAG instead of Metrolink's subsidized trains. During 2033, those numbers increase to 2.3Million and 4.7Million respectively. The 2029 total all comes from intra-regional travel while 2033 revenue come from both intra-regional travel and travel of <50miles inside MTC and SCAG. No explanation is given as to how MTC's 2029 revenue \$0.6Million is derived when no <50mile riders are counted for that year.

¹⁰⁷ "We combined long-distance and short-distance interregional trips into one model of long-distance trips (trips 50 miles or more from the trip-maker's home)." See p. 2-1, [PDF 21] of California High-Speed Rail Draft 2014 Business Plan Ridership and Revenue Forecasting—Draft Technical Memorandum

¹⁰⁸ ". . . because high-speed rail is not as competitive in shorter-distance markets where autos are the dominant mode." See p. 6-3 [PDF 39] of the California High-Speed Rail Authority, 2016 Business Plan, Ridership and Revenue Forecasting Final Technical Memorandum

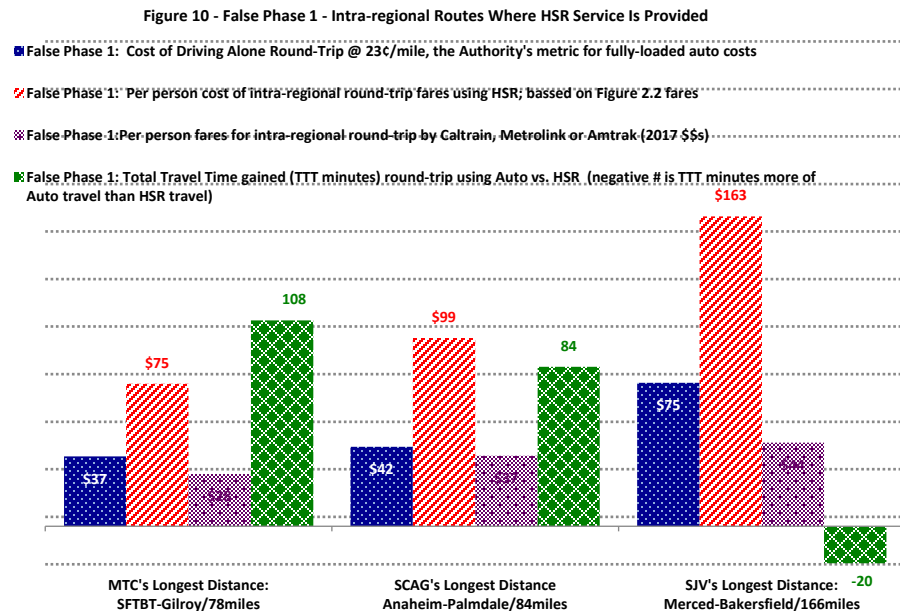
guidelines of only using trips of 100miles or more for planning purposes ¹⁰⁹ when in 2018 it forecasted revenues without riders during the SV-CV Period and riders with revenue in False Phase 1 trips of <50miles or 50-100miles. ¹¹⁰

Figure 10 shows subsidized Caltrain and Metrolink (see purple columns) are cheaper still than Auto travel, reinforcing the Sweet Spot maxim and showing that only one intra-Regional route, Merced-Bakersfield's 166miles, is quicker by HSR: represented by the downward-pointing, hashed green column indicating minutes lost on a round trip using Auto between those cities in 2033.

CHSRA's forecasters also should have realized the futility of competing against region rail and Amtrak, since the Authority's one-way fares are 73-100% higher than those of Caltrain's for SFTBT-Gilroy and Anaheim-Palmdale respectively. ¹¹¹ Because Amtrak's subsidized San Joaquin Valley Line's fares are about one-third of HSR's, the Authority should put aside the notion of capturing its forecasted 1.1Million 2029 riders or the 1.7Million riders for 2033 when it closes Amtrak's subsidized San Joaquin service in 2029 and travelers face higher fares to use HSR on the same routes. ¹¹²

In short, with one exception (Merced-Bakersfield), neither intra-regional riders or MTC and SCAG riders on routes <50miles should be in CHSRA's forecasts. Auto travel 'wins' those routes.

3.5 HOW DOES IGNORING THE UIC/IUR-DERIVED DIAGRAM AND CALIFORNIA'S REGIONAL GEOGRAPHY CHANGE HSR'S COMPETITIVENESS? – To a large degree CHSRA's ridership forecasters'



¹⁰⁹ See p. 1-4 [PDF 14] of the California High-Speed Rail 2012 Business Plan Final Technical Memorandum – Ridership and Revenue Forecasting. The full quote is, "One hundred miles was chosen as the breakpoint for segmenting short distance from long-distance trips. This breakpoint was selected based upon an evaluation of the trip length frequency distributions for interregional trips for each trip purpose from the surveys along with judgment about behavior for short versus long trips. This value was also used in the past as the lower limit for long-distance trips in the 1995 American Traveler Survey (ATS) conducted by the U.S. Departments of Transportation and Commerce."

¹¹⁰ For evidence of the continued policy to count riders in routes of <50miles inside MTC and SCAG, see: Table 5.3, p. 5-6 [PDF 42] of the 2018 Business Plan; Final Technical Memorandum – Ridership and Revenue Forecasting

¹¹¹ In July 2018, the one-way Caltrain 6 Zone fare (SF-Gilroy) was \$15. See: http://www.caltrain.com/Fares/farechart/Fare_Chart_Effective_7_1_2018.html and Metrolink's Anaheim-Palmdale one-way fare was \$18.75. See: <https://www.metrolinktrains.com/tickets/Overview/ticket-info/price-finder/> Contrast that with the Authority's SFTBT (or 4th and King)-Gilroy one-way fare of \$26 and Anaheim-Palmdale one-way of \$38. [See Table 2.2, p. 2-4 [PDF 25] of the 2018 Business Plan, Ridership and Revenue Forecasting, Technical Supporting Document] Those fare differences make the Authority's one-way fares on these longest-distance-routes-inside-the-region 73% more expensive and twice as expensive as Caltrain and Metrolink respectively.

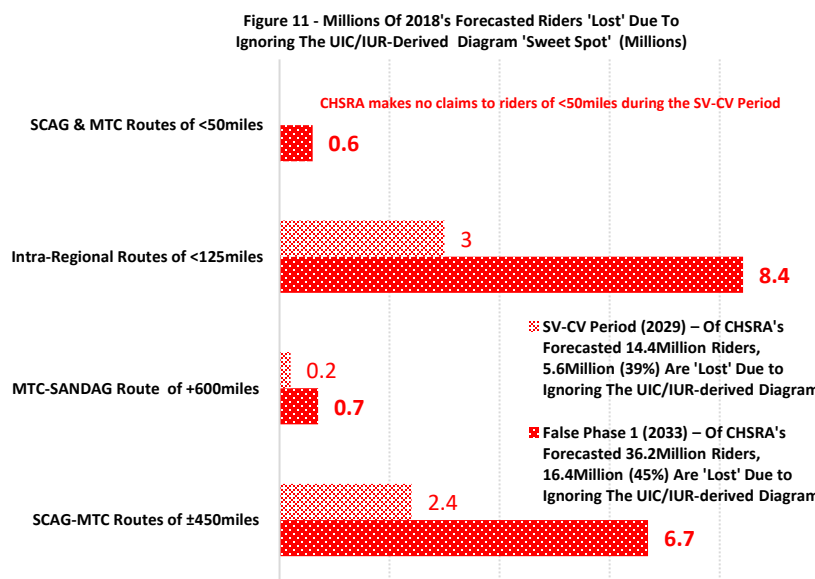
¹¹² Amtrak San Joaquin Valley Line's one-way Madera-Bakersfield fare is \$24 and Merced-Bakersfield fare is \$26. See: <https://tickets.amtrak.com/itd/amtrak>. The Authority's fares are \$64 and \$70, respectfully. For Authority fares see: Table 2.2, p. 2-4 [PDF 25] of the 2018 Business Plan, Ridership and Revenue Forecasting, Technical Supporting Document. The Draft 2014 Business Plan, February 7, 2014. Also, Cambridge Systematics' (CS) final technical memorandum of Ridership and Revenue Forecasting of April 12, 2012 said, "Note that the existing San Joaquin service south of Merced to Bakersfield is assumed to be discontinued upon the initiation of HST service." See: Section 5.2, p. 5-5 of Connecting California, 2014 Business Plan, April 30, 2014 Exhibit 4.4 [PDF 43].

modelers 'worked in a vacuum' when they ignored high-speed rail's competitiveness on very short and very long distances: As Figure 11 shows, this particularly damages HSR 'wins' for the +450miles between the LA Metro Area (SCAG) and the SF Bay Area (MTC) and the +600miles between MTC and San Diego (SANDAG).

Failing to account for Air travel's insurmountable speed advantage and cheap flights on the two routes between the LA Metro Area and the SF Bay Area (SCAG-MTC) and between the SF Bay Area and San Diego County (MTC-SANDAG) alone cost CHSRA 7.4Million forecasted riders – 20% of its 2033 ridership.¹¹³

Our findings about HSR's non-competitiveness on routes between California's major markets are clear and devastate CHSRA's 2018 ridership forecasts. During the SV-CV Period, of the 14.4Million forecasted riders, we expect that less than one-in-ten riders will show up because Auto or Air travel is faster and cheaper. During False Phase 1, less than one-in-five of the 36.2Million forecasted riders, are likely to show up since Auto or Air travel is faster and cheaper.

We doubt CHSRA can sustain losing 39%-45% of its forecasted riders – as Figure 11 shows – inside and between California's three major market regions – where 74% of the state lives – without its trains requiring an operating subsidy.



¹¹³ This does not include the 'losses' due to no service between the LA Metro Area and San Diego County (MTC-SANDAG) as addressed in Part Two. Figure 18 and Figure 19 count these losses when counting total route and total ridership losses.

PART FOUR

ROUTES WHERE THE AUTHORITY CAN CLAIM RIDERS BY HSR TRAVEL BEING FASTER THAN AUTO OR AIR TRAVEL

* * * * *

Part Four looks at high-speed rail's 'natural habitat' between Silicon Valley (MTC) and the Central Valley (SJV) where, reflecting the wisdom underlying the UIC/IUR-derived diagram, HSR always 'wins' unencumbered routes of >125miles (1 hour) and <400miles (2 and ½ hours). But it cautions about the SF Bay Area-San Joaquin Valley (MTC-SJV) and the possible ACE train routes being part of a successful solution to expensive SF Bay Area housing and high San Joaquin Valley unemployment.

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4.1 UNENCUMBERED HSR 'WINS' INSIDE THE UIC/IUR'S SWEET SPOT DURING ITS FIRST FOUR OPERATING YEARS – While not escaping the omnipresent, grim embrace of access+egress times nor DOT/FRA-regulated low speeds along the SF Peninsula, HSR has a favorable Total Travel Time advantage over Auto travel if it is

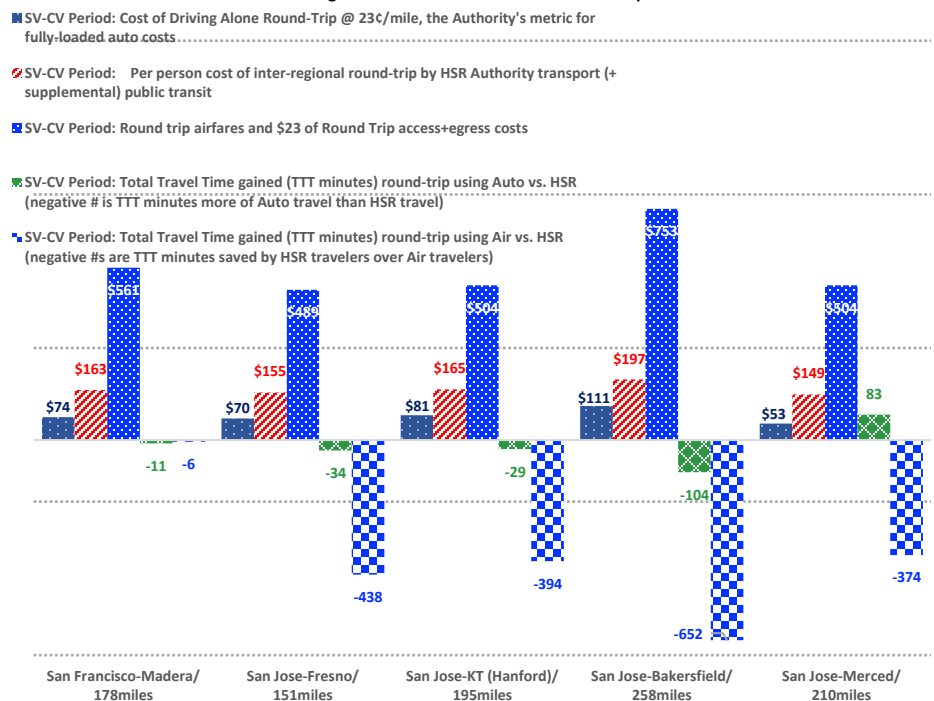
within the UIC/IUR-derived diagram's Sweet Spot and not encumbered. These circumstances uniquely define routes between the SF Bay Area (MTC) and the lightly populated, low density, far less wealthy San Joaquin Valley (SJV) – a market a fraction the size of MTC's.¹¹⁴

With no encumbrances south of San Jose, HSR 'wins' MTC-SJV routes in its first four operating years (2029-2032), as the downward-pointing,

green-hatched columns of Figure 12 show. In the first four column sets, south of San Jose to Madera (127miles) and all the way to Bakersfield (258miles), HSR 'wins' every route.¹¹⁵

Conversely, high-speed rail routes between the SF Bay Area and the San Joaquin Valley (MTC-SJV) cede 'wins' to Auto if encumbered by an Authority bus ride. Figure 12's San Jose-Merced's upward-pointing, green-hatched column verifies that even when a route is inside the UIC/IUR-derived diagram's Sweet Spot but is burdened by as little as a transfer and mandatory 40minute one-way

Figure 12- MTC-SJV - Inside HSR's Sweet Spot – 2029-2032



¹¹⁴ The San Joaquin Valley had a combined population of 3.9Million in 2009. Based on population alone, that is one-fifth (22%) of the LA Metro Area market and half (51%) of the SF Bay Area's (MTC). See: p.1 and Table 4 and Table 5 of [CA Department of Finance, New State Population Projections](http://www.dof.ca.gov/Forecasting/Demographics/projections/documents/P_PressRelease.pdf), March 8, 2017. Found at: http://www.dof.ca.gov/Forecasting/Demographics/projections/documents/P_PressRelease.pdf. However, the GDP/capita of the San Joaquin Valley (\$33,390) is only 45% of the SF Bay Area's (\$86,830) or 59% of the LA Metro Area's (\$66,477). See: http://www.dot.ca.gov/hq/tpp/offices/eab/index_files/2016/FullReport2016.pdf It is therefore correct to say that the San Joaquin Valley (SJV) market is a fraction of the size of either SCAG or MTC

¹¹⁵ Note that in the fifth column set, with a bus ride north to Merced, Auto wins the San Jose – Merced route.

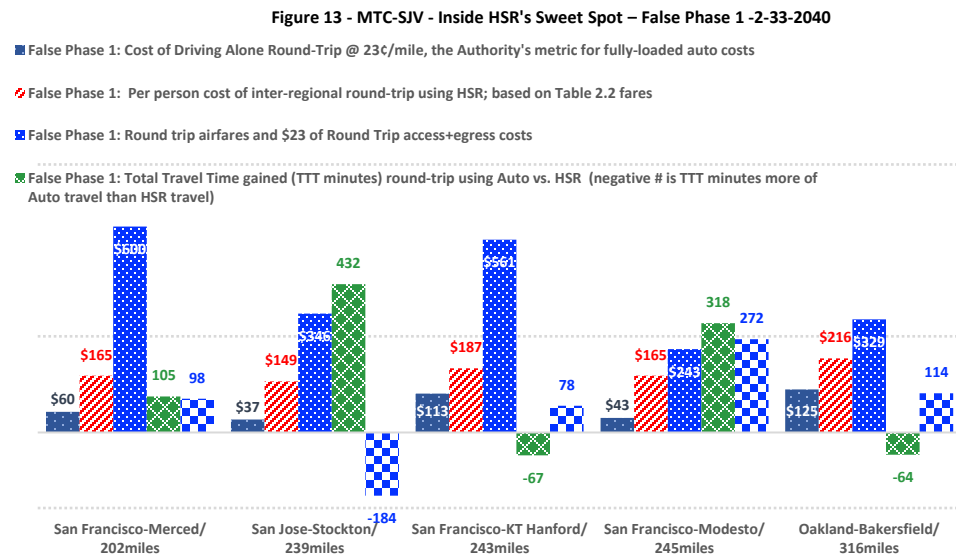
Authority bus ride,¹¹⁶ Auto travel is faster. That pattern is repeated on every route north of Madera before and after 2033. That is on routes to/from the SF Bay Area (MTC) that go to/from Merced, Turlock, Modesto, Stockton, Lodi, and Elk Grove;¹¹⁷ Auto's total Travel Time is less than HSR's since those MTC-SJV routes require taking an Authority dedicated bus.¹¹⁸

4.1.2 UNENCUMBERED HSR 'WINS' MTC-SJV ROUTES BETWEEN 2033 AND 2040 – During False Phase 1, HSR service starts or ends in Merced, about 33miles north of Madera in the San Joaquin Valley.

Consequently, as Figure 13 shows, unlike during the SV-CV Period, after 2033 the San Jose-Merced route is quicker by HSR than by Auto. Somehow, by increasing HSR's operating speeds $\pm 15\%$, southbound HSR passengers' on-board times decrease by as much as 11minutes on the San Jose-

Bakersfield route.¹¹⁹ But the shorter HSR ride doesn't cut a MTC-SJV HSR passengers' Total Travel Time; as without a direct connection to the SF Bay Area from Merced, they are still required to change transport modes, making Auto's Total Travel Time quicker, and as Figure 13 shows, always cheaper.

4.2 WHILE NOT DURING ITS LAUNCH YEARS, BUT BETWEEN 2033 AND 2040, UNENCUMBERED HSR 'WINS' SOME SCAG-SJV ROUTES – Although left unexplained, the Authority forecasted that its LA Metro Area (SCAG)-San Joaquin Valley (SJV) connection will carry 800,000 travelers in 2029.¹²⁰ That forecast defies reason: the Authority isolated SCAG's ± 19 Million inhabitants from all markets northward with up to a 2hour 40minute (140-160minutes) Authority bus ride connecting to HSR in Bakersfield.¹²¹ As explored in Part Two, the Authority's cross-Tehachapi bus plus no service to San Diego encumbrances



¹¹⁶ See Table A.1.1 p. A-1 [PDF 61] of the 2018 Ridership and Revenue Forecasting: Technical Supporting Document. Any transfer between HSR trains or between HSR trains and buses also carries a 15minute transfer time.

¹¹⁷ Nineteen Counties (or parts of several) define the San Joaquin Valley: Butte, Colusa, Glenn, El Dorado, Fresno, Kings, Madera, Merced, Placer, San Joaquin, Sacramento, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Yuba, Yolo, and the Southern California county of Kern. See: https://en.wikipedia.org/wiki/San_Joaquin_Valley The analyses of nine places in the San Joaquin Valley, with Sacramento's SACOG analyzed elsewhere, are those the Authority's HSR trains or dedicated buses will serve from 2029-2040, i.e. Fresno, Kings/Tulare and Bakersfield as well as Madera, Merced, Turlock, Modesto, Stockton, Lodi and Elk Grove. They are also where the Authority will displace the Amtrak San Joaquin's rail service in 2029. The Authority's, Draft 2014 Business Plan, February 7, 2014. Cambridge Systematics' (CS) final technical memorandum of Ridership and Revenue Forecasting of April 12, 2012 says, "Note that the existing San Joaquin service south of Merced to Bakersfield is assumed to be discontinued upon the initiation of HST service." See: Section 5.2, p. 5-5 of Connecting California, 2014 Business Plan, April 30, 2014 Exhibit 4.4 [PDF 43].

¹¹⁸ See figure 2.1, p. 2-2 [PDF 22] of the 2018 Ridership and Revenue Forecasting, Technical Supporting Document.

¹¹⁹ While the Authority's consultants give no explanation, HSR's 2032 Run Time Madera-Bakersfield is 81minutes: in 2033, that is reduced to 70minutes. The 11minute difference of Run Times is 15% faster. See: Run Times in Table A.1.2 and Table A.2.2 for the SV-CV Period and False Phase 1 respectively See pp. A-1 and A-2 [PDF 61-62] of the 2018 Ridership and Revenue Forecasting, Technical Supporting Document.

¹²⁰ See: Table 5.3, pp. 5-5 and 5-6 [PDF 41-42] of the 2018 Business Plan, Ridership and Revenue Forecasting, Technical Supporting Document.

¹²¹ See Table A.1.1 p. A-1 [PDF 61] of the 2018 Ridership and Revenue Forecasting: Technical Supporting Document. Any transfer between HSR trains or between HSR trains and buses also carries a 15minute transfer time.

exclude HSR from competitive route 'wins' to/from California's largest market during the SV-CV Period (2029-2032).

When CHSRA's cross-Tehachapi bus service is suspended, ridership is forecasted at 4.6Million in 2033. That nearly six-fold (5.75times) increase over five years (2029-2033) reflects a compound growth rate of $\pm 42\%$ per year; and if achieved, will be impressive by any business standard.

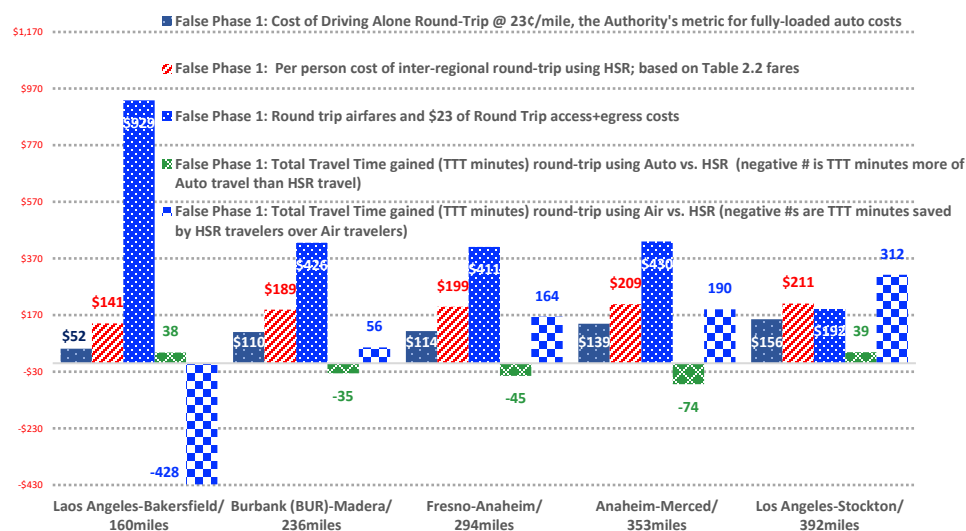
Figure 14 shows that, with one anomaly, a similar pattern for all journeys between the LA Metro Area and the San Joaquin Valley (SCAG-SJV).

That is, when the route's distance is within the UIC/IUR-derived Diagram's Sweet Spot (>125 and <400 miles (1 to 2 hours) and not encumbered by one or more bus rides, HSR's Total Travel Times are quicker than Auto's.¹²²

As the left-most columns of Los Angeles-Stockton (SCAG-SJV) in Figure 14 also show, as with the MTC-SJV routes, once time on mandatory Authority buses is added to the HSR-inclusive Total Travel Time equation, north of Merced, Auto travel is again cheaper and faster than HSR. As Part Two explained, this also applies to LA Metro Area-Sacramento (SCAG-SACOG) travel, where Air's Total Travel Time and Total Travel Costs are even less than Auto's.

4.3 CAUTION: AN HSR LINK BETWEEN SILICON VALLEY AND THE SAN JOAQUIN VALLEY WOULD NOT BE A SOLUTION TO SILICON VALLEY'S HOUSING PROBLEM – Our competitive analyses showed that on about two-in-five (42%) of the SF Bay Area-San Joaquin Valley (MTC-SJV) routes,¹²³ HSR's Total Travel Time was quicker (never cheaper) than Auto travel.¹²⁴ That is the only route that produces HSR does riders during the SV-CV Period (2029-2032). Perhaps that led to CHSRA's 2016 decision to prioritize connecting Silicon Valley and the San Joaquin Valley (MTC-SJV) as one solution to the imbalances of employment and housing costs between the regions¹²⁵ when it said ". . . a trip from Fresno to San

Figure 14 - False Phase 1 (2033-2040) - SCAG -SJV



¹²² The anomaly is Los Angeles-Bakersfield, where that the train must first climb $\pm 1,900$ feet to reach Palmdale, then descend $\pm 2,250$ feet to Bakersfield. The driving distance Burbank Airport-Bakersfield is 100miles. However, the HSR train must go both the 50miles BUR-Palmdale and the 96miles Palmdale-Bakersfield. That extra 50miles makes Auto's Total Travel Times shorter than HSR's.

¹²³ The Authors analyzed 24 SF Bay Area-San Joaquin Valley (MTC-SJV) routes for the 2029-2032 SV-CV Period. Ten of them (42%) showed that using HSR from San Jose (the northern-most HSR terminal terminal) with or without a Caltrain-speed ride on an HSR train took the riders to/from their destinations quicker than by Auto. The MTC-SJV routes included San Jose originated routes to Merced, Modesto, Lodi or Elk Grove, etc. – still within the San Joaquin Valley. On those routes, where slow Authority buses are required to start or finish a journey, the competitive analyses showed that all those routes to/from north of Madera were faster by Auto.

¹²⁴ Put another way, if competing against Auto travel, one in every eight (2029) and one in every fourteen of 2033's forecasted 2018 riders are likely to show up to use the MTC-SJV link for reasons of quicker Total Travel Time.

¹²⁵ Albeit a violation of AB3034, by theoretically creating a more affordable housing area for Silicon Valley employers, the Authority is violating its foundation law. AB3034, 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."

*Jose will take about an hour on high-speed rail which is a game changer . . . New job markets will be opened up for people living in the Central Valley . . .”*¹²⁶

We urge caution on supporting this CHSA argument because it is built on strategic misrepresentation or optimism-biased ridership and revenue forecasts and will require operating subsidies.

4.3.1 THE COSTS OF COMMUTING BY THE HSR LINK BETWEEN SILICON VALLEY AND THE SAN JOAQUIN VALLEY (MTC-SJV) – While the Authority admitted that even when using 100% of its own fares and ridership forecasts, its statistical modeling shows it will likely not breakeven financially in its first operating years;¹²⁷ but the 2018 Plan never mentions the word “subsidy”. However, the public has never been allowed know the size the of the projected Silicon Valley-San Joaquin Valley annual subsidy (or other routes’ subsidies) because state law ‘weaponizes’ the internal workings of the Authority’s ridership and revenue models against public scrutiny.¹²⁸

What are CHSRA’s annual fares between San Jose and the San Joaquin Valley (MTC-SJV)? It should be no shock that working 200 days/year would cost someone – commuters or the State of California – a great amount of money each year.

Figure 15 shows what the annual HSR fares would be based on CHSRA’s 2018 fare table and what a commuter would be paying to ‘keep the trains running’ based on using the per mile fares that Amtrak charges.¹²⁹ Since the per mile Amtrak fare is a multiple of the Authority’s fare tables, apparently the

¹²⁶ Page 12 [PDF 12] of the California High-Speed Rail 2016 Business Plan says, *“With this new connection, a trip from Fresno to San Jose will take about an hour on high-speed rail which is a game changer both for the people and the economy of the Central Valley and for Silicon Valley as well. New job markets will be opened up for people living in the Central Valley and creating a high-speed connection to the Central Valley would help address the affordable housing crisis in the Bay Area.”*

¹²⁷ “. . . the quantitative risk analysis demonstrates that the breakeven probability reaches 69% over the initial ramp-up period [then 2025-2029] for the Silicon Valley to Central Valley Line . . .” See p.94 [PDF 94] of Connecting and Transforming California, the California High-Speed Rail Authority’s 2016 Business Plan, May 2016. Also see: *“There is a 79 percent probability that the Silicon Valley to Central Valley Line farebox revenue covers its operations and maintenance costs in 2029; the breakeven probability rises to 96 percent by the opening year of Phase 1 and rises to >99 percent by 2040.”* See p.100 [PDF 100] of the California High-Speed Rail Authority’s 2018 Business Plan.

¹²⁸ Public Records requests for access to the data and assumptions actually used on ridership, revenues, O&M costs and profits, and the algorithms used for its computation, have been met with responses that say: *“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.”* See: email to Mr. Robert Prantis from Ms. Anne Parker of the Public Records Act Staff of the CA High-Speed Rail Authority, December 27, 2013. This email is included in the Comment Regarding Draft 2016 Business Plan, by Mr. William Warren, dated April 1, 2016, “Plaintiff’s Public Record Act Requests and Responses from the Tos – CHSRA Lawsuit”. See page 2, Table 1, Request 1, of the Comment document which can be found on PDF pages 296 to 298 of the Authority’s Comment File. See “Guide To Footnotes”. The content of the Public Record Request and the Authority’s Responses are on PDF pages 2 to 14 of the Thumb/Flash drive submitted with this Comment

¹²⁹ The 2017 Amtrak fare per passenger mile (PPM) of 94¢ PPM is based on calculations done by William Warren, a co-author of this paper as a Comment on the Authority’s 2018 Plan. He found that Amtrak’s revenue per passenger mile (PPM) was 94¢. CHSRA’s one-way fares are from Table 2.2, p. 2-5 [PDF 25] of the California High-Speed Rail Authority’s 2018 Business Plan, Ridership and Revenue Technical Supporting Document (June 2018). To get to an annual fare cost, we doubled both PPM fares to make a round-trip fare, then multiplied that by 200 working days per year. Mr. Warren’s Comment on the 2018 Plan can be found on page PDF 813. Also see Figure 2 of Mr. Warren’s Comment found at: http://www.hsr.ca.gov/docs/brdmeetings/2018/brdmtg_051518_Item2_Biz_Plan_Comment_051118.pdf.

Authority believes it can operate its HSR system at lower fares than Acela and simultaneously not require a subsidy.¹³⁰

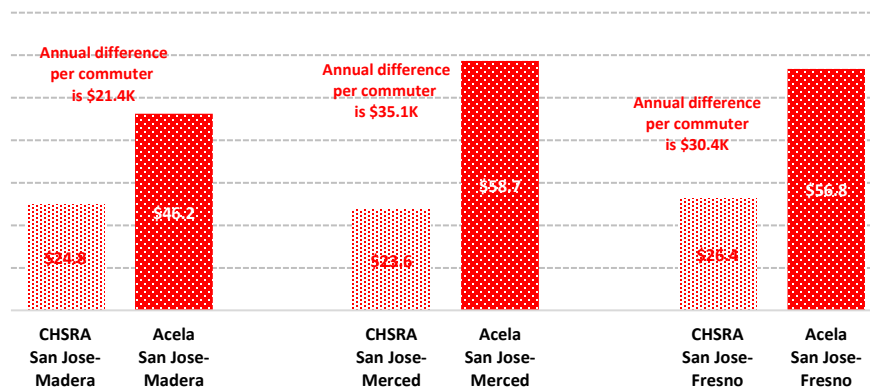
That's a mystery, wrapped in an enigma, shielding a inaccessible model.

The Authority forecasts the SF Bay Area-San Joaquin Valley (MTC-SJV) routes will carry 3.7Million travelers in 2029 and 4.9Million in 2033, one in every four, long distance (>100miles) riders in 2029 and one in every seven long distance riders in 2033.¹³¹ Our

competitive analysis found that during that 2029-2032 period, CHSRA's trains' Total Travel Times 'win' just 40% of the routes between the SF Bay Area and the San Joaquin Valley (MTC-SJV).¹³² That increases to 48% during False Phase 1 (2033-2040); but even this better of the two cases, only 2.4Million of the Authority's forecasted 4.9Million riders should be expected to choose HSR's Total Travel Time over Auto's.

With often longer Total Travel Times and always higher Total Travel Costs for the SF Bay Area-San Joaquin Valley (MTC-SJV) routes, we conclude that, it is highly probable the Authority will not be able to operate that route unsubsidized during the SV-CV Period (2029 to 2032). Similarly, during False Phase 1 (2033-2040) ridership will increase to nearly half (48%) of CHSRA's forecast, but that's still not enough for the trains to run without a prohibited operating subsidy.¹³³

**Figure 15 - Annual Commuting Fares of Round-Trips
San Jose to Three San Joaquin Valley Cities (\$s x 1,000)**
(Uses CHSRA Table 2...2 and Acela Per Passenger Mile Numbers)



¹³⁰ This claim is clear in Exhibit 6, p. 13 of Net Operating Cash Flow after Capital Replacement through Phase 1 (2017 dollars in millions) LOW case of the 2018 Plan's Technical Supporting Document, High, Medium and Low Cash Flow Analysis. The Exhibit shows six cases, all of which have positive cash flow, therefore supporting the claim of no need for an operating subsidy.

¹³¹ The MTC-SJV 2029 forecast is 3.7Million and 4.9Million in 2033. 2029's total long-distance ridership is forecasted to be 14.3Million and 2033's 35.6Million. See: Table 5.3, pp. 5-5 and 5-6 [PDF 41-42] of the 2018 Business Plan, Ridership and Revenue Forecasting, Technical Supporting Document.

¹³² See Figure 19, Part Five of this Paper.

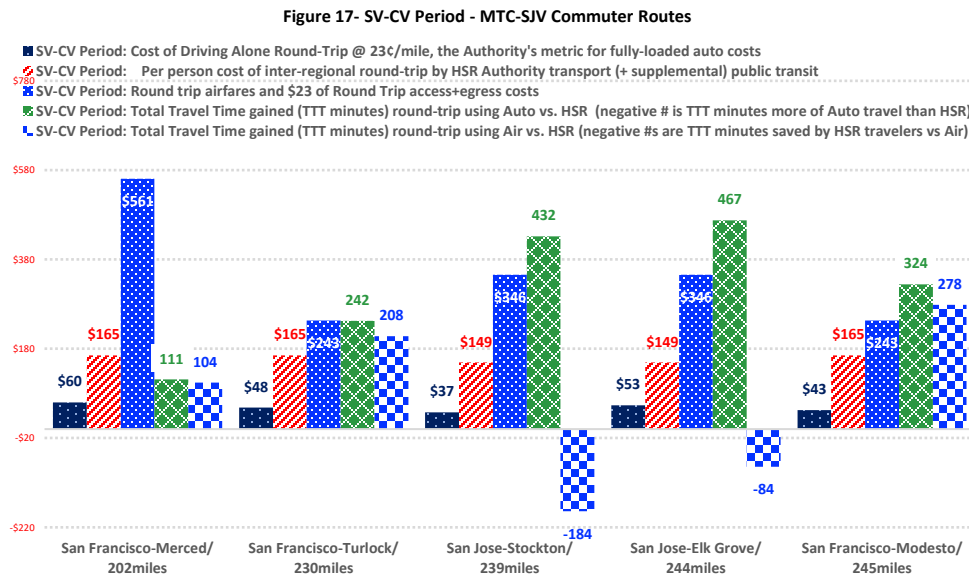
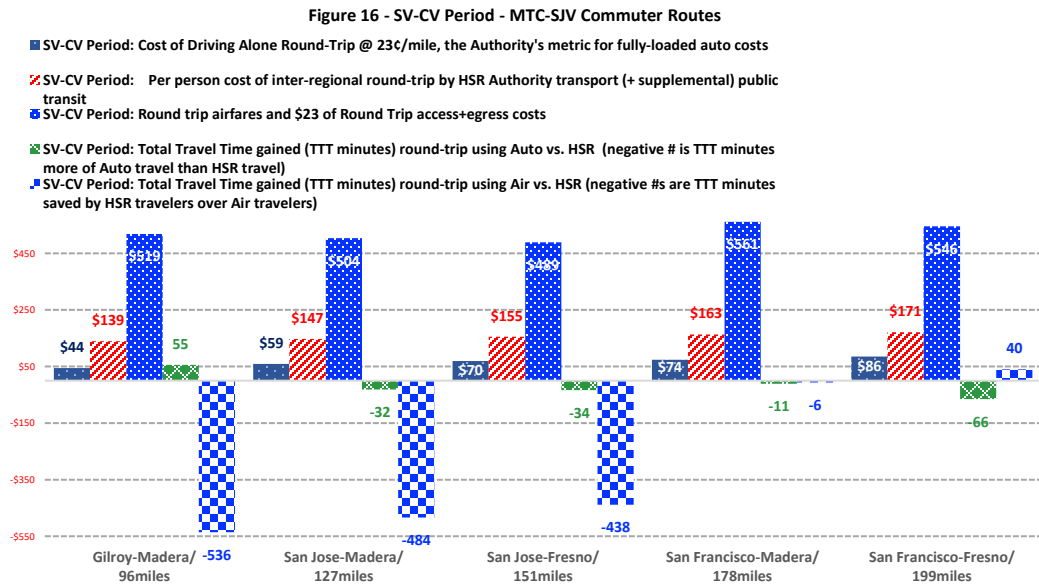
¹³³ This is shown in Figure 19 of this paper, where during the SV-CV Period (2029 – 2032) HSR 'won' only 1.5Million of the forecasted 14.3Million (10%) riders, all of which came solely from the SF Bay Area-San Joaquin Valley (MTC-SJV) route. Because it will only 'win' 48% of False Phase 1's SF Bay Area-San Joaquin Valley (MTC-SJV) route forecast, it is also doubtful that route will not need an operating subsidy.

4.3.2 WHAT THE COMPETITIVE ANALYSES OF ROUTES BETWEEN THE SF BAY AREA (MTC) AND THE SAN JOAQUIN VALLEY (SJV) TOLD US – During the SV-CV Period the UIC/IUR-derived diagram was prescient: Gilroy-Madera (96miles) is too short to compete with Auto, and when the route is greater than 125miles,

(>125miles), HSR ‘full-throttle’ overcomes access+egress times, as Figure 16 shows. HSR ‘wins’ those unencumbered routes over Auto, but not by much.

But during the SV-CV Period, of MTC-SJV routes north of Madera, such as Merced, Modesto, or Elk Grove, Stockton, and Turlock – which constitute six-of-the-

ten San Joaquin Valley CHSRA stops, ¹³⁴ and Figure 17 shows that Auto ‘wins’ all of those SF-Bay Area (MTV) San Joaquin Valley (SJV) routes. Adding those Authority bus stops is what makes CHSRA-offered travel less competitive with Auto during the SV-CV Period (2029-2033) and damages the chances of collecting revenue from passengers on buses.



¹³⁴ There have always been three San Joaquin Valley cities served by HSR (Fresno, Kings/Tulare and Bakersfield). Until 2018, CHSRA’s Business plans had its HSR trains turning west at Fresno with six (2012 and 2014) to eight (2016) HSR or bus service stops north of Fresno. In the 2018 Plan the turn west started at Madera with six San Joaquin Valley cities north of Madera served by bus. That means only four of the stops (Madera, Fresno, Kings/Tulare and Bakersfield) are served by HSR and during the SV-CV Period six (Merced, Turlock, Modesto, Stockton, Lodi and Elk Grove) are served by Authority bus.

4.3.3 WHAT PRACTICAL CONSIDERATIONS MIGHT POTENTIAL SF BAY AREA-SAN JOAQUIN VALLEY COMMUTERS MAKE? – Why would mission-critical employees relocate their households to the San Joaquin Valley? While living in SF Bay Area (MTC) is expensive, there are reasons it is that way. In general, the SF Bay Area's K-12 public schools are far better, there is access to free museums, coastal and natural parks and MTC's air quality is far superior to the San Joaquin Valley's – an underlying cause of respiratory illness there. As long as those 'benefits' remain, most mission critical employees will stay.

It's reasonable to assume that Silicon Valley employees who would live in the San Joaquin Valley (SJV) are not the mission-critical employees that the large IT firms pay well enough to live in the SF Bay Area (MTC). They may be analysts, accountants, or professionals', managers' and executives' support staff; or those who perform security, physical plant operations, maintenance or work in 'benefit' facilities (cafés, gyms, etc.) of companies such as Facebook, Google, Oracle and Apple.

It's also reasonable to assume that large and small retailers, hotels, restaurants, and other Silicon Valley service industries aren't likely to subsidize all or part of SJV-SV commuters. They don't now subsidize employees who must travel by Auto or rideshare, and these businesses don't have the profit margins of a Facebook, Google, Oracle or Apple to be able to consider the idea.

Therefore, most San Joaquin Valley- Silicon Valley (SJV-SV) commuters are, and would be middle class, or even more-lower-paid, therefore very budget-conscious. The Authority's proposition doesn't seem to 'fit their pocketbooks.' They will likely be unable to 'pay the freight' or reluctant to personally 'shell out' for a \$46K-\$58K annual commute – the costs to keep the HSR train running. Consequently, all or nearly all San Joaquin Valley-SF Bay Area (SJV-SV) commuters would need to be subsidized.

4.3.3.1 HOW LONG WILL THE VALLEY'S CHEAPER LAND HOUSING LAST? – Will today's cheaper land and housing prices remain static for middle-and-low income San Joaquin Valley residents who work in Silicon Valley? Nothing stimulates housing inflation like a housing boom that wasn't there last year or the year before.

Do proponents of the SV-CV link believe housing, land and construction costs will not rise rapidly in the San Joaquin Valley even before the Madera-Gilroy-San Jose link is completed? That should have been a lesson that proponents learned in Economics 101. While there may be a brief period when the San Joaquin Valley's rental and ownership housing prices are stable and cheaper than living in the SF Bay Area; but in a very short time the trend will be for housing costs to rise in the San Joaquin Valley. The net effects of making both such a SF Bay Area to San Joaquin Valley transfer less attractive and making the San Joaquin Valley's locally-employed population more housing-poor than they are now or homeless – 'blowback' that we doubt is the Authority's intention.

4.3.3.2 WHY LEAVE THE SAN JOAQUIN VALLEY? – Then there's the practical issue of whether San Joaquin Valley residents will elect to commute when they weigh the trade-offs between staying nearby 'home' to work, or for example, a daily Merced-San Jose round-trip commute whose Total Travel Time is over 4hours (258minutes).¹³⁵ A few example: round-trip Madera-San Jose annual HSR fare

¹³⁵ The Merced-San Jose HSR Run Time is 58minutes or 106minutes round-trip. To that must be added 71minutes to arrive at the Merced HSR station, board the train, then disembark in San Jose and arrive at work – the reverse 71minute trip being made after work. This brings the Total Travel Time to 258minutes/day. Why 142minutes to get to an HSR station then from that station to return home? In 2011 the Authority's Ridership Technical Advisory Panel (RTAP) Chair's presentation showed that HSR's SF-LA Total Travel Time was 231minutes. Subtracting AB3034's of 2hrs. 40minutes (160minutes) Run Time requirement leaves 71minutes, of access-egress time or round-trip access+egress times of 142minutes. See: PDF 47 of Polzin, Steven; Koppelman, Frank and Proussaloglou, Kimon: Forecasting Revenue and Ridership for High Speed Rail. High Speed Rail-Perspectives and Prospects, Fifth Annual William O. Lipinski Symposium on Transportation, November 14, 2011. Found at: <http://iti.northwestern.edu/publications/Lipinski/2011/Morning2.pdf>

(\$24,800)¹³⁶ is more than the \$22,800/year a California minimum wage employee makes.¹³⁷ Why also would Madera resident, whose \$40,034¹³⁸ household income equals Madera's pay nearly two-thirds (62%) of their pre-tax income in HSR fares¹³⁹ to commute to and from San Jose? Even a Middle Manager in Madera, grossing \$55,800/year¹⁴⁰ would pay over 40% of his/her pre-tax earnings commuting that route. Why would Registered Nurses in Fresno, with gross annual earnings of \$82,398,¹⁴¹ three times today's \$22,800 minimum wage, pay a third (32%) of their gross income to commute to and from San Jose?¹⁴²

Not taking into consideration that those San Joaquin Valley residents must pay Federal and California taxes on those gross incomes to commute to/from San Jose and spend ±900 hours annually commuting, this would be irrational behavior, particularly for low or moderate-income Valley residents – the very 'market' that cannot afford Silicon Valley's housing prices, nor would be able to afford 2029 or 2033's San Joaquin Valley's housing. Households are not irrational for long and the costs of commuting are not tax deductible.¹⁴³ So why not stay in the Valley and not face the stress of meeting HSR trains 'on both ends' plus losing nearly two weeks of time per year of a door-to-door transit time,¹⁴⁴ the costs of a week-day HSR commute – and remoteness from family and community?

4.3.4 CONSIDERATIONS SILICON VALLEY EMPLOYERS SHOULD GIVE TO THE SV-CV LINK – Facebook, Google, Oracle and Apple and a few other Silicon Valley companies are some of the world's most profitable firms. However, if they and other corporations consider subsidizing non-mission-critical employees' HSR travel, there is one knowable and one probable cost they need to consider.

First, like San Francisco Bay Area-Silicon Valley "Google Bus" riders,¹⁴⁵ commuters to/from the San Joaquin Valley need transport to/from the San Jose station. An early 2018 VTA study¹⁴⁶ pointed out that 'Google Buses' cost employers \$12,000-\$15,000 per rider. Assuming that's a round-trip/rider cost, not one-way, Figure 18 shows that the annual cost per employee to keep the HSR trains running

¹³⁶ The math is one-way Madera-San Jose cost \$62. See Table 2.2, p. 2-5 [PDF 25] of the 2018 Ridership and Revenue Forecasting, Technical Supporting Document (June 2018). Round-trip will be \$106/day. A working year of 200 days brings that to \$24,800. If the example were completed, another \$23 must be added to represent the costs of getting to a local HSR station and back after using HSR – another \$4,600/year or a total of \$29,600.

¹³⁷ Because both Authority fares and the minimum wage may increase before 2019, the comparison is based on 2018 data. California's 2018 minimum wage is \$11/hour or \$22,800/year. See: <https://www.minimum-wage.org/california>. The Madera-San Jose fare at \$62 is \$124 round-trip or \$24,800/200 working day year. The math is \$24,800/\$40,034. For fares, see Table 2.2, p. 2-5, [PDF 25] of the 2018 Ridership and Revenue Forecasting, Technical Supporting Document.

¹³⁸ See: <https://datausa.io/profile/geo/madera-ca/>

¹³⁹ These are fare-only comparisons. They do not include the \$23 that must be added to fares to arrive at the HSR station, then return to home or another origin. Why the \$23? The source of the average of \$23 for a round-trip of access and egress costs is: "As with air travel, both an access fee and an egress fee ranging from \$15 to \$31 round trip are part of the HST average total costs." found on p. 3-2-30 [PDF 261] Bay Area to Central Valley HST Final Program EIR/EIS, Volume 1: Report, May 2008; prepared by the US Dept. of Transportation/Federal Railroad Administration and the California High-Speed Rail Authority

¹⁴⁰ For a range and average gross income of a Madera-based corporate middle manager (\$55,802) see: <https://www.indeed.com/q-Manager-l-Madera,-CA-jobs.html>

¹⁴¹ See: <https://www.indeed.com/salaries/RN-Salaries,-Fresno%2C+CA>

¹⁴² The Fresno-San Jose fare at \$66 is \$132 round-trip or \$26,400/200 working day year. See Table 2.2, p. 2-5, [PDF 25] of the 2018 Ridership and Revenue Forecasting, Technical Supporting Document (June 2018). The math is \$26,400/\$82,398.

¹⁴³ See: <https://www.thebalancesmb.com/can-i-deduct-commuting-expenses-397634>

¹⁴⁴ Using Fresno as the example, the round-trip Run Times for 200 working days/year would be (99-41) = 58minutes per day x 200 days = 11,600minutes or 193hours/year, or over one week/year. Not counting time from home to the Fresno station, only the one-half hour round-trip between San Jose Diridon station and the place of work adds another 100hours/year; a total of 293 hours per year or nearly two weeks (1.8weeks) per year lost.

¹⁴⁵ Although other high-tech firms use such buses, the term "Google Bus" is widely used in the Bay Area to describe the fleets of buses shuttling workers into Silicon Valley and 'home' in the evening.

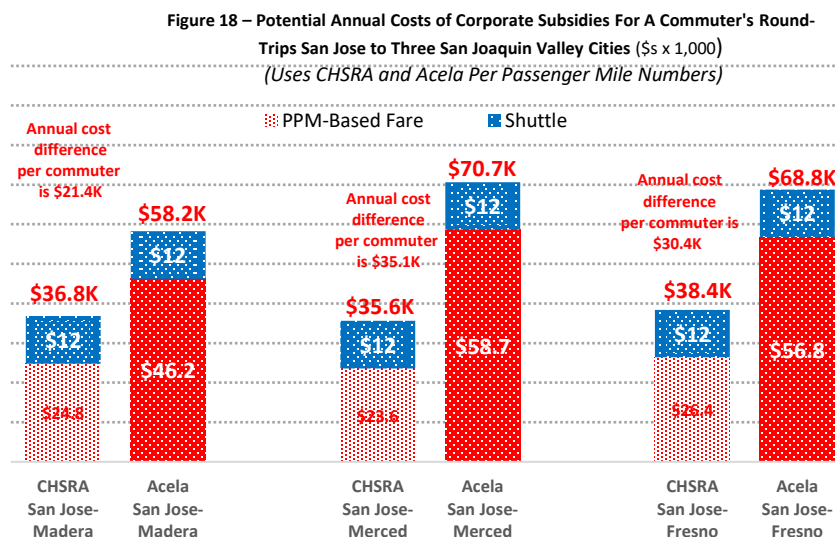
¹⁴⁶ See: Santa Clara Valley Transport Authority (VTA), State Route 85 Corridor Policy Advisory Board, presentation of SR 85 Transit Guideway Study Overview and Schedule, Board Meeting, February 26, 2018.

and subsidize the transport of one Silicon Valley employee living in the San Joaquin Valley would vary between \$58,200 (San Jose-Madera) and \$70,700 (San Jose-Merced).¹⁴⁷

Whether a few or many Silicon Valley firms will absorb these costs for lower paid, non-mission critical employees is questionable. While it takes 3 hours longer to make that round-trip daily commute by Auto or mini-bus,¹⁴⁸ until there's evidence that employers will partially or wholly subsidize Silicon Valley-to-San Joaquin Valley commutes, there is no evidence that employers will 'step up to the plate' to subsidize non-mission-critical employees.

Finally, there's another subsidy issue that Silicon Valley employers and the Authority should take-into-account. The Authority's 2016 words say it best. ". . . the quantitative risk analysis demonstrates that the breakeven probability reaches 69% over the initial ramp-up period [then 2025-2029] for the Silicon Valley to Central Valley Line . . ." ¹⁴⁹ That's Authority-speak for the need to subsidize operating costs. What happens to employers and employees when, like the Rust Belt's history teaches us, Silicon Valley's Alphabet, Apple, Facebook, etc. are no longer the economic engines of the Bay Area, or profits decline and companies back-out of subsidizing employees. Or what happens if HSR operations start and ". . . a local, state, or federal operating subsidy" ¹⁵⁰ is not forthcoming and employees have already located to the San Joaquin Valley and HSR service becomes less frequent or halts. How then will San Joaquin Valley resident employees get to/from work in Silicon Valley? That directly impacts productivity, therefore profitability, which creates a downward spiral for Silicon Valley.

4.4 The Consequences of Less Than 100% of The Forecasted SF Bay Area-San Joaquin Valley (MTC-SJV) and Los Angeles Metro Area-San Joaquin Valley (SCAG-SJV) Ridership – First, the only Los Angeles Metro Area-San Joaquin Valley (SCAG-SJV) connection before 2033 is via



¹⁴⁷ To keep the HSR trains running and move employees from the San Joaquin Valley homes and back, the math of annual commuting costs Madera-San Jose is as follows: \$46,200, is the full cost of keeping the HSR trains running 200 days/year of round-trip fares based on profitable Acela's per mile fare (94¢/mile) plus \$12,000 of "Google Buses" costs to and from the San Jose Station = \$58,200. Annual commuting costs Merced-San Jose would be \$58,700 + \$12,000.

¹⁴⁸ An Auto's Madera-San Jose round-trip Total Travel Time is 300minutes: by HSR the same round-trip route is 116minutes or 3 hours quicker. However, the ratios between HSR and Auto commuting strongly suggest there could be a 'niche' mini-bus business serving the Madera-San Jose-Madera market, one the Authority cannot control. For example, if the total costs of operating a minibus is 46¢/mile, twice the Authority's 23¢/mile for Autos, delivering passengers to/from Madera would cost the entrepreneur \$23,368/year. Assuming the owner-driver of a six-passenger mini-bus could collect \$40 per passenger from on average of 4 passengers/day, his/her annual gross income would be \$32,000, and the net after-tax income (with \$6,400 or 20% deductible for expenses on an S-Chapter business) would be \$25,600. That would be a daily net income of \$128, or \$21.33/hour assuming round trip driving plus pick-up and drop-off times total six hours. Google maps says a one-way trip is 2 hours 30 minutes or 5 hours round-trip, leaving one hour for boarding and disembarking passengers on each end.

¹⁴⁹ See p.94 [PDF 94] of Connecting and Transforming California, the California High-Speed Rail Authority's 2016 Business Plan, May 2016

¹⁵⁰ AB3034 Section 2704.08 (J) says, "The planned passenger service by the authority in the corridor or usable segment thereof will not require a local, state, or federal operating subsidy."

an Authority-dedicated bus. That cross-Tehachapi bus ride takes over 2hours (140-160minutes) between Bakersfield and the Los Angeles Metro Area. While that Authority bus is not the only reason HSR trains don't 'win' routes during the SV-CV Line Period, it should be no surprise that HSR captures none of SCAG-SJV riders.

4.4.1 HSR 'Wins' on MTC-SJV Routes During The SV-CV Period – Figure 19 shows that for

travel between SF Bay Area and San Joaquin Valley (MTC-SJV HSR 'won' two of every five (40%) of the SV-CV Period's routes with better Total Travel Times than Auto). HSR ceded MTC-SJV routes to Auto that were 'short' of the UIC/IUR-derived diagram's 'floor' and all that are destinations north of Madera, such as Modesto and Elk Grove, where CHSRA's patrons

Figure 19 MTC-SJV & SCAG-SJV - Routes Analyzed and HSR 'Wins' Counted						
<i>n.b. A summary of MTC-SJV and SCAG-SJV routes analyzed and HSR 'wins' See Adjacent Regions in Figure 22 of this Paper</i>	2029-2032			2033-2040		
	No. of Routes Analyzed	SV-CV Period Routes		No. of Routes Analyzed	False Phase 1 Routes	
		HSR 'wins'	% HSR 'Wins'		HSR 'Wins'	% HSR 'Wins'
SF Bay Area-San Joaquin Valley (MTC-SJV)	25	10	40%	30	14	47%
LA Metro Area-San Joaquin Valley (SCAG-SJV)	24	0	0%	29	20	69%
No. Of Routes Analyzed	49	10		59	34	
HSR's Route 'Win' Rate to/from San Joaquin Valley		20%			58%	

must ride an Authority bus. Forty percent is not 100% of the Authority's forecasted ridership for the SF Bay Area-San Joaquin Valley (MTC-SJV) between 2029 and 2032 and challenges the claims that CHSRA's trains will operate without a subsidy.

As pointed out above, HSR 'won' NO route between LA Metro Area and the San Joaquin Valley (SCAG-SJV) during its first four operating years. For that SV-CV Period, of the forty-nine Silicon Valley-Central Valley Period routes we analyzed between the LA Metro Area and the San Joaquin Valley (SCAG-SJV) and those between the SF Bay Area and the San Joaquin Valley (MTC-SJV) during SV-CV Line Period, HSR 'won' ten (20%).

4.4.1.1 BEREFT OF ANY OTHER ROUTE 'WINS' THE SV-CV PERIOD IS A DESIGNED BANKRUPTCY

– During 2029-2032, the Authority offers HSR service inside the SF Bay Area, the San Joaquin Valley and 'Other Regions,' and between all regions.¹⁵¹ But, **the SF Bay Area-San Joaquin Valley routes in Figure 19 are the ONLY HSR 'wins' during the SV-CV Period.**

That does not even translate into the HSR system being operationally breakeven on the SF Bay Area and San Joaquin Valley (MTC-SJV) routes. Why? An overall 40% 'win' rate in a competitive market – which HSR will be in – is far more proof of financial bankruptcy than solvency. Likewise, any 'win' rate on the LA Metro Area-San Joaquin Valley (SCAG-SJV) route, where the Authority claims that 0.8Million riders ¹⁵² will annually take its 2hour 40minute cross-Tehachapi bus to reach the San Joaquin Valley – or 2.4Million trips between SF Bay Area and the LA Metro Area (MTC- SCAG) route, are fantasies.

4.4.2 HSR 'Wins' on MTC-SJV AND SCAG-SJV ROUTES DURING FALSE PHASE 1 – Figure 19's False Phase 1 'win' rates of 48%-67% still fall far short of suggesting a private sector operator will be interested in the project's profit potential. Perhaps that explains why no private, at-risk investment has been forthcoming over the last decade and at least one potential investor/operator concluded that less than 3% of all HSR routes are profitable,¹⁵³ and not worth taking the risk.

¹⁵¹ See Table 5.3, pp. 5-5 and 5-6 [PDF41-42] of CHSRA's 2018 Business Plan, Ridership and Revenue Forecasting, Technical Supporting Document

¹⁵² See Table 5.3, pp. 5-5 and 5-6 [PDF41-42] of CHSRA's 2018 Business Plan, Ridership and Revenue Forecasting, Technical Supporting Document

¹⁵³ In 2008, 2009 and in 2015, corporations and individual parties were asked by the Authority's for their responses to its Request for Expressions Of Interest with a question like that in the 2015 Request, " . . . do you foresee any issues with

4.5 FOUR REASONS WHY THE LINKS BETWEEN SILICON VALLEY AND THE SAN JOAQUIN VALLEY AND THE LA METRO AREA AND THE SAN JOAQUIN VALLEY ARE A MARCH TO BANKRUPTCY – Even if HSR ‘wins’ 58% of the SF Bay Area and San Joaquin Valley (MTC-SJV) and LA Metro Area and the San Joaquin Valley (SCAG-SJV) routes, that doesn’t translate into being operationally profitable. First, fifty-eight percent is not 100%, nor is 70% or 80% of breakeven really breakeven – even if they Authority built in a ‘healthy’ contingency to its ridership forecasts.

Second, the Authority admits it may need to subsidize operating costs during its train’s first four operating years, the same years in which the SF Bay Area and San Joaquin Valley (MTC-SJV) routes are the only routes where HSR has a continued and substantial percent of ‘wins.’¹⁵⁴

Third: nor do we believe there is reason to put much faith into “. . . *the breakeven probability . . . rises to >99 percent by 2040*”¹⁵⁵ That statement is more incorrect than correct because proof of the Authority’s claim is inaccessible, and its above self-assessment is based on achieving the full complement (100%) of 2018’s forecasted riders. Surely our competitively-derived ridership estimates will not produce the revenue to breakeven when the Authority’s 2029-2032 and 2033-2040 forecasts can only legitimately claim 20%-58% as route ‘wins’ for high-speed rail.

Finally, after at least a decade of planning, enough time that the Authority’s consultants should have had full confidence in their ridership models; in 2018 they still chose to forecast ridership and revenues based only on a 50% confidence that 14.5Million and 36.1million would likely show up in 2029 and 2033 respectively.¹⁵⁶ When the forecasters confidence in their forecasts was increased to a 75% Confidence Level, it lowered their forecasts to 10.8Million and 27.4Million riders.¹⁵⁷ A private sector due diligence would have dictated something better than a 50:50 coin-toss to decide the financial fate of a mega-project investment.¹⁵⁸

While we have no way to judge whether the state government will “step up to the plate” and subsidize the HSR train once it discovers that having built too much to stop, the 50:50 gamble has

raising the necessary financing to fund the IOS-South project scope? IOS-North project scope?” Thirty-five responded, most with a polite ‘no thanks’ answer. See:

http://www.hsr.ca.gov/docs/programs/construction/List_of_Respondents_to_RFEI_March_2011.pdf. The Cintra-Ferrovial consortium said that after reviewing 111 high-speed rail routes, it found only three were profitable. That statement was altered prior to the consortium being awarded a contract of more than \$300Million. But there are two versions of the Cintra-Ferrovial Report. See: pp. 15 of Cintra-Ferrovial’s Response to Expression of Interest – RFEI HSR#15-02. The two versions carry the September 14, 2015 date. However, the pp. 15-16 wording was changed in a later version posted on the Authority’s website. The original version is found at:

<https://drive.google.com/open?id=0B9m407yyFerMbJhFQVpMdE1XR1U> or <https://drive.google.com/file/d/0B9m407yyFerMbJhFQVpMdE1XR1U/view?pref=2&pli=1> The altered version of Cintra-Ferrovial’s response is found at the Authority’s website:

http://www.hsr.ca.gov/docs/about/doing_business/EOI/EOI_Cintra_Ferrovial.pdf

¹⁵⁴ “*There is a 79 percent probability that the Silicon Valley to Central Valley Line farebox revenue covers its operations and maintenance costs in 2029; the breakeven probability rises to 96 percent by the opening year of Phase 1 and rises to >99 percent by 2040.*” See p.100 [PDF 100] of the High-Speed Rail Authority’s 2018 Business Plan, June 1, 2018.

¹⁵⁵ See p.100 [PDF 100] of the California High-Speed Rail Authority’s 2018 Business Plan, June 1, 2018.

¹⁵⁶ See Table ES.1 p. ES-2 [PDF 16] of the 2018 Ridership and Revenue Forecasting, Technical Supporting Document

¹⁵⁷ The method by which confidence intervals are presented in Table ES.1 p. ES-2 [PDF 16] of the 2018 Ridership and Revenue Forecasting, Technical Supporting Document reverses the logic that readers may assume by headlining “Confidence Level That Ridership Will Be Less Than Stated Value” not more than would be expected by a higher Confidence Level. Therefore, a higher percent means the Authority is less confident that number of riders will show up than a lower percent, i.e. lower is up and higher is down. Example: in Table ES.1 the 1% Confidence Level means the Authority’s consultants are fully in agreement that 5.6Million riders will come in 2029, while with a 10% Confidence Level, only 8.3Million riders will come in 2029.

¹⁵⁸ Also, bus-only service to the five San Joaquin Valley destinations north of Merced after 2033, not only increases an HSR patron’s Total Travel Times, those bus fares are also highly subsidized. See p. 2-6 [PDF 26] of 2018 Business Plan, Ridership and Revenue Forecasting, Technical Supporting Document that says “\$1 from Stockton/Modesto/Denair/Merced/Madera/Fresno Amtrak to Madera.” Note: Authority bus fares are subsidized: by contrast the Greyhound Sacramento-Merced fare cost \$12, not the Authority’s \$1.00. See: <https://www.greyhound.com/en/ecommerce/schedule>. Using that type of ‘fudge factor’ doesn’t inspire trust in the forecasters or their oversight institutions.

become “Too Big To Fail” and operations must be subsidized forever. But this Paper is another ‘shot over the bow’ that warns of that trap.

4.6 AFTERWORD – ON CONNECTING HSR WITH ACE – In a recent [LA Times](#) article, commuter rail executives introduced having HSR connect with the Altamont Corridor Express (ACE) at Merced as a less expensive capital cost way of connecting Silicon Valley to the San Joaquin Valley.¹⁵⁹ However, this proposal runs into the same problematic realities of the Pacheco Pass option.

At first glance, using the ACE-option may be attractive to Merced residents, but it certainly not for Fresno residents. That’s because the daily Merced-San Jose round-trip ACE-option fares would be \$60.50, but the HSR fare would be \$118.¹⁶⁰ While the Fresno daily round-trip by HSR would be \$132 (\$66 x 2), a Fresno resident will have to pay \$94 (2 x \$47 one-way) to travel Fresno-Merced-Fresno, then \$60.50 Merced-San Jose-Merced on the ACE train: \$154/day of round-trip ACE-option fares, 17% higher than a one-seat-ride HSR fare.¹⁶¹ A year of HSR fares isn’t cheap, as Figure 15 shows; but the ACE-option makes those fares at least a quarter more than HSR’s.¹⁶²

The Total Travel Time of using ACE to complement HSR would be even less attractive than HSR to both the Merced and Fresno commuter than HSR’s single-seat ride.¹⁶³ That’s because the daily round-trip commute Merced-San Jose would take nine hours daily of a commuter’s time.¹⁶⁴ Worse, using the HSR-ACE-option, the Fresno-San Jose would be a daily round-trip of 10hours 20minutes.¹⁶⁵ Those daily round-trips would add another 4-5hours to the Authority’s 2018 Merced-San Jose and Fresno-San Jose HSR round-trips respectively.¹⁶⁶ Asking a Valley resident to give up nearly all – or all of a working day to sitting and changing trains is a non-starter.¹⁶⁷

¹⁵⁹ See: *Among the headaches Gavin Newsom will inherit as governor: California's troubled bullet train project*, by Ralph Vartabedian, December 28, 2018.

¹⁶⁰ For HSR fares see: Table 2.2, p. 2-5 [PDF 25] of 2018’s Ridership and Revenue Forecasting, Technical Supporting Document. For ACE fares see: <https://www.acerail.com/shopping/cart> For Amtrak San Joaquin fares (Merced-Stockton) see: <https://tickets.amtrak.com/itd/amtrak>

¹⁶¹ For HSR fares see: Table 2.2, p. 2-5 [PDF 25] of 2018’s Ridership and Revenue Forecasting, Technical Supporting Document. For ACE fares see: <https://www.acerail.com/shopping/cart> For Amtrak San Joaquin fares (Merced-Stockton) see: <https://tickets.amtrak.com/itd/amtrak>

¹⁶² An HSR commuter’s annual fares on CHSRA’s route through the Pacheco Pass would be \$23,600/year round-trip Merced-San Jose or \$26,400/year round-trip Fresno-San Jose; but these fares are unlikely to cover HSR’s operating costs raising the specter of an HSR bankruptcy with consequences discussed above. To resemble paying the operating costs, those round-trip annual fares should be \$58,700/yr. and \$56,800 between San Jose and Merced and Fresno respectively – also shown in Figure 15. Even assuming a commuter gets a ‘freebee’ from ACE between Merced and Stockton, the daily round-trip commute increases by \$30.30 [See: <https://www.acerail.com/shopping/cart>] making the annual round-trip ACE-option totals of \$29,800 and \$32,600 for San Jose to Merced and Fresno respectively. If ACE/Amtrak San Joaquin added its round-trip Merced-Stockton fares, a commuter’s annual costs would be \$35,700 and \$38,500 for Merced-San Jose-Merced and Fresno-Merced-San Jose-Fresno respectively. [A one-way, two-week advance purchase, weekday Amtrak San Joaquin ticket Merced-Stockton is \$14.75. See: <https://tickets.amtrak.com/itd/amtrak>]

¹⁶³ Section 2704.09 (f) says, “For each corridor described in subdivision (b), passengers shall have the capability of traveling from any station on that corridor to any other station on that corridor without being required to change trains.” Both the Merced-San Jose route and the Fresno-San Jose route are supposedly single-seat ride routes, although there is some uncertainty about the former route. The ACE-option violates that provision of AB3034.

¹⁶⁴ Assuming the ACE-operated train will go no faster than it’s Amtrak San Joaquin line ‘cousin’ the shortest one-way Run Time between Merced and Stockton is 1hour 8minutes. [See: <https://tickets.amtrak.com/itd/amtrak>]. The quickest ACE trains make the Stockton-San Jose Run in 2hours 12minutes (132minutes); making the Merced-San Jose (Merced-Stockton, Stockton-San Jose) 3hours 20minutes (200minutes) – 6hours and 40minutes daily on-board the ACE train. However, to that an access+egress times of 70minutes one-way must be added, bringing the Merced-San Jose-Merced commute to 540minutes or 9hours.

¹⁶⁵ The HSR+ACE-option Fresno-San Jose round-trip would be another 80minutes above the 540minutes of Merced-San Jose, i.e. (2x25minutes of Fresno-Merced HSR Run Time + 2x15minutes of Transfer Time and another 2x70minutes of access+egress times) – a daily Fresno-San Jose round-trip of 10hours 20minute (620minutes).

¹⁶⁶ In 2033 the Merced-San Jose HSR train will take 66minutes and Fresno-San Jose HSR will take 91minutes – or round trips of 132minutes and 182minutes. See: A.2.1 and A.2.2, p. A-2 [PDF 62] of the 2018 Plan’s Ridership and Revenue Forecasting, Technical Supporting Document.

¹⁶⁷ While not in our time calculations above, the Fresno-San Jose commuter will have to change trains at least twice in his/her daily round-trip, opening the possibility of missing connections in one or both directions. Also, to add to the ACE-option’s woes, CHSRA’s proposed closure of the subsidized San Joaquin Valley line will make a Fresno-Merced-San

Then there are policy issues. Through its efforts to 'win' the Heavy Maintenance Center, Fresno remains the only San Joaquin Valley City Council (not County Council) still supporting HSR. The Authority may want to re-think the practicalities of the market's reactions to the ACE-option; (i.e., low ridership due to longer Total Travel Times and for Fresno-San Jose both that and higher fares) because Fresno's likely market is more than six times Merced's.¹⁶⁸ Second, extending ACE to Madera means extending ACE's deep subsidies – another 'burden' on the state's budget.

Finally, and perhaps most important, policy makers should ask: What kind of national and international image does California want to project with a high-speed rail system that runs only 165 miles between Merced and Bakersfield – while not quite from-nowhere-to-nowhere ¹⁶⁹ it certainly doesn't serve a major population center. Not only would the result *not* reflect the vision portrayed to 2008's voters; in other states and nations would become, if not risible, an example of 'throwing good money after bad.'

Conclusion: There is little evidence that either the all-HSR, or the HSR/ACE version of the San Joaquin Valley-San Jose HSR link, are financially viable. Neither will solve even a portion of the high-demand for housing in Silicon Valley and will open up the San Joaquin Valley to housing inflation. The long-term implications that support the Valley-to-Valley link are poorly thought out.

Jose HSR commute even more expensive. See Cambridge Systematics' (CS) final technical memorandum of Ridership and Revenue Forecasting of April 12, 2012 that said, "*Note that the existing San Joaquin service south of Merced to Bakersfield is assumed to be discontinued upon the initiation of HST service.*" See: Section 5.2, p. 5-5 of Connecting California, 2014 Business Plan, April 30, 2014 Exhibit 4.4 [PDF 43].

¹⁶⁸ Fresno city's 2017 population was 527,483; Merced's was 83,081. See:

<https://www.census.gov/quickfacts/fact/table/mercedcitycalifornia,fresnocitycalifornia,US/PST045217>

¹⁶⁹ 'The Train To Nowhere' moniker was given that title by Congressman Dennis Cardoza (D-CA). See: Letter from then-Democratic Congressman Dennis Cardoza (California District 18) to then-DOT Secretary Ray LaHood and FRA Administrator Joseph Szabo; November 30, 2010

PART FIVE

THE CONSEQUENCES OF HSR BEING UNCOMPETITIVE ON SO MANY ROUTES BETWEEN 2029 AND 2040

* * * * *

AB304, the underlying law to build California's HSR project, requires the CHSRA's system to operate without a subsidy.¹⁷⁰ To financially survive, HSR trains must compete successfully for customers, i.e. enough riders must be taken from Auto, Air and Conventional Rail (CVR) to produce enough revenue to pay the HSR system's operating costs. Since a private operator, not the Authority, will operate and maintain the system,¹⁷¹ that revenue must also provide a profit margin large enough to attract a private investor/operator, particularly if that private company must rapidly recover capital investments it has made in the system that the State of California will own.¹⁷²

After 140 empirical route analyses for the SV-CV Period and 180 for False Phase 1, we believe that ridership between 2029 and 2040 will not be great enough to either meet or attract a private operator or meet AB3034's financial sustainability requirement.¹⁷³ Because California's government has 'weaponized' the data, assumptions and algorithms that underlie CHSRA's claims about ridership, revenue, operating and maintenance (O&M) cost: now, a decade after Prop1A passed, no one outside the state government can conclusively prove or disprove our belief. That 'fig leaf' seems to be a crude, short-term effort to keep the project alive in the confident hope of a miracle.¹⁷⁴

The 'Big Picture' turned out to be relatively simple. Between 2029 and 2033, HSR only outperforms Auto and Air on SF Bay Area-San Joaquin Valley (MTC-SJV) routes. HSR still doesn't 'win' a majority of MTC-SJV routes and only about one-in-ten of all routes during the SV-CV Period. Afterwards HSR on both the MTC-SJV and the LA Metro Area-San Joaquin Valley (SCAG-SJV) routes outperform Auto and Air. But other than those two routes (MTC-SJV and SCAG-SJV), at no other time

¹⁷⁰ AB3034 Section 2704.08 (J) says "*The planned passenger service by the authority in the corridor or usable segment thereof will not require a local, state, or federal operating subsidy.*"

¹⁷¹ Even before 2014 not one investor ever committed to any at-risk investment to building the project or operating the system. Then the Authority said the State of California would own privately-financed infrastructure. See: Connecting California, Draft 2014 Business Plan, February 7, 2014, pg. 31 [PDF 31] that says, "*While the Authority will rely heavily on the private sector to bring innovation and investment into the project, the state will maintain its lead organizational role, retaining ownership and governance functions.*" Private capital participation is now scheduled for later phases. See p. 57 [PDF 57] of the 2018 Business Plan, June 1, 2018 that says, ". . . *increasing the public funding . . .*" supposedly fills the funding gap. "*The program's expansion depends on ridership revenues to support access to private capital as the program matures. Inaccurate ridership forecasts could create consequences . . . including decreasing the level of private sector investment, increasing the public funding required. . .*"

¹⁷² Connecting California, 2014 Business Plan, April 30, 2014, pg. 31 [PDF 31] says, "*While the Authority will rely heavily on the private sector to bring innovation and investment into the project, . . . it goes on to negate any potential private second interest in the HSR project by saying, '. . . the state will maintain its lead organizational role, retaining ownership and governance functions.'*"

¹⁷³ The SV-CV Period calculations, based on a sample of 140 analyses of a potential universe of 187 Origins-Destinations, has a 99% chance of being $\pm 4\%$ of equal to our findings; while the False Phase 1 calculations, based on a sample of 180 analyses of a potential universe of 234 Origins-Destinations, has a 99% chance of being $\pm 5\%$ of our findings. To compute those confidence intervals, we used the confidence interval formula at:
<https://www.surveysystem.com/sscalc.htm>

¹⁷⁴ Public Records requests for access to the data and assumptions actually used on ridership, revenues, O&M costs and profits, and the algorithms used for its computation, have been met with responses that say: "*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.*" See: email to Mr. Robert Prantis from Ms. Anne Parker of the Public Records Act Staff of the CA High-Speed Rail Authority, December 27, 2013. This email is included in the Comment Regarding Draft 2016 Business Plan, by Mr. William Warren, dated April 1, 2016, "Plaintiff's Public Record Act Requests and Responses from the Tos - CHSRA Lawsuit". See page 2, Table 1, Request 1, of the Comment document which can be found on PDF pages 296 to 298 of the Authority's Comment File. See "Guide To Footnotes". The content of the Public Record Request and the Authority's Responses are on PDF pages 2 to 14 of the Thumb/Flash drive submitted with this Comment.

does HSR capture more than 2% of all of the other city-pair routes, including between California's three largest markets.¹⁷⁵

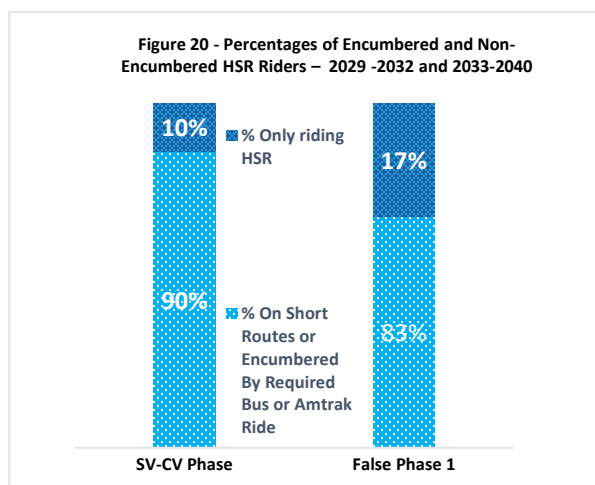
Translated into the efficacy of HSR's ridership to financially breakeven, winning 48%-67% of the SF Bay Area-San Joaquin Valley (MTC-SJV) and SF Bay Area-San Joaquin Valley (MTC-SJV), doesn't count for much since the riders on those Adjacent routes are a fraction (10-15%) of the total forecasted ridership for the SV-CV Period and False Phase 1 respectively.¹⁷⁶ That small percent is unlikely to 'turn the tide' and make the HSR trains financially sustainable. Put another way, CHSRA's trains capture so few routes and riders between 2029 and 2040 that the risk of bankruptcy or the need for an operating subsidy, while hard to discover, once found was easily understood.

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5.1 WHAT DOES THE AUTHORITY OFFER POTENTIAL PATRONS IN 2029-2032 AND 2033-2040? – We

can't explain why the Authority's planners encumbered the ability to 'win' routes with slow-poke buses to/from Sacramento. We also can't understand why CHSRA persists in claiming riders on short (<100miles) or very short (<50miles) routes inside regions, nor its claim to riders whose routes begin or end long distances (e.g. Other Regions) from where HSR trains will run and subsequently spend less than half their journey on high-speed trains.¹⁷⁷ A competitive analyses, as underlies this Paper, would have told those planners that on such routes high-speed rail has no chance of 'winning' against Auto or Air travel.

Figure 20 shows that nine-out of 10 travelers forecasted to use HSR 2029-2032,¹⁷⁸ will find themselves faced with an Authority Dedicated Bus ride, a Greyhound bus ride (or both) or/and a Metrolink/ Amtrak train LA Union-San Diego.¹⁷⁹ These impediments to HSR travel during its four first years (2029-2032) will quickly become 'horror stories' and make later HSR patrons more likely to be more skittish or reject the offer to take a



¹⁷⁵ Extracting both the SF Bay Area-San Joaquin Valley (MTC-SJV) and the LA Metro Area- San Joaquin Valley (SCAG-SJV) routes from our 320 route analyses, left 212 route analyses – or 66% between other city pairs. Within that grouping, which includes all intra-regional, "Other Regions" and Non-Adjacent Regions, HSR 'won' no more than 1%-2% of that grouping's routes.

¹⁷⁶ During the SV-CV Period, LA Metro Area (SCAG) is isolated without HSR service and 'wins' no riders in our competitive analyses. But the Authority claims it will win 800,000 riders between SCAG and the San Joaquin Valley (SCAG-SJV) – 6% of all riders. The only HSR 'wins' during the SV-CV Period are MTC-SJV's 10% of the 14.4Million forecasted riders. During False Phase 1, the SF Bay Area-San Joaquin Valley (MTC-SJV) and the LA Metro Area- San Joaquin Valley (SCAG-SJV) routes 'win' 5.5Million riders, 16% of the 36.2Million forecasted. See Table 5.3, p. 5-5 [PDF 41] of the 2018 Ridership and Revenue Forecasting, Technical Supporting Document.

¹⁷⁷ For example, travelers yearning to use HSR to go from Redding to LA, starts that journey with a 2hour 25minute (162miles) drive to Sacramento: from the western side of the Sierra Nevada range (Truckee) to Sacramento a 1hour 44minute (100miles) drive. During False Phase 1, why would they stop, change to a 3hour 20minute bus to Merced, then a 2hour 22minute HSR ride to LAUS, then 35minutes to rent a car and proceed to their destination. Their time on-board HSR is 5hours 42minutes (342minutes): the one-way HSR-inclusive trip from Redding would be 8hours 24minutes; from Truckee the time would be 7hours 26minutes. They could have driven those routes in slightly less time (8hour 5minutes and 7hours 20minutes).

¹⁷⁸ The Authority forecasts 14.3Million riders during 2033. From a route-by-route analysis, using figures in Table 5.3, p. 41 [PDF 41] of the 2018 Ridership and Revenue Forecasting, Technical Supporting Document, the authors found that 7.4Million (52%) of those riders will take either an Authority Dedicated Bus Ride, an Amtrak Pacific Surfliner ride, or both during a one-way trip. While SACOG-SCAG riders will take two sets of Authority buses (Sacramento-Madera and Bakersfield-LA), those are only counted as one in the analysis.

¹⁷⁹ Not only did Prop 1A brand itself as the "Safe, Reliable High-Speed Passenger Train Bond Act" and AB3034 was named the Safe, Reliable High-Speed Passenger Train Bond Act for the 21st Century, it also said that high-speed rail "Provides long-distance commuters with a safe, convenient, affordable, and reliable alternative to driving and high gas prices." See AB3034, Ch. 267, p. 16 (or 91) [PDF 15]

'risk of the new.' Even in 2033-2040 when four of every five (83%) False Phase 1 HSR riders still confront a bus or Amtrak ride and there is no known plan to eliminate those encumbrances before 2040, conditions for most HSR travelers only become marginally better. If +80% of the 2018's forecasted riders still face still some form of encumbrance, are they likely to try a high-speed rail trip or return to HSR?

Figure 21 first summarizes what our route analyses found for both the SV-CV Period and False Phase 1. But 'not all routes are created equal.' A more accurate way to portray the impact of HSR competitiveness requires translating the findings on each route into the number of riders HSR will actually attract because HSR is Total Travel Time competitive¹⁸⁰ with Auto or Air travel. The translation, summarized and displayed in Figure 22, is exactly what the latter part of Part Five does.

5.2 A LOOK AT OUR ROUTE ANALYSES' OUTCOMES – As Figure 21 shows, **starting with the 2029-2032 'launch,' HSR captures less than one-in-ten (7%) of the SV-CV Period's 140 analyzed routes.**¹⁸¹ HSR captures so few routes because in addition to the bus-encumbered Sacramento-Madera/Merced routes are routes to/from California's three largest markets, the LA Metro Area (SCAG), the SF Bay Area (MTC) and the totally unserved San Diego County (SANDAG).¹⁸²

As Figure 21 also shows, during False Phase 1 HSR 'won' about one-in-five (21%) of the total of 180 analyzed routes on the basis of Total Travel Time; routes that are either the SF Bay Area-San Joaquin

Figure 21 O-D Routes Analyzed and Route "Winners" Counted								
<i>Legend: If HSR is either Total Travel Time or Total Travel Cost (TTT or TTC) quicker or faster than Auto or Air, HSR 'wins' that route. Auto or Air must win both. RT= Round-Trip</i>	2029-2032				2033-2040			
	No. of Routes Analyzed	SV-CV Period 'Winners'			No. of Routes Analyzed	False Phase 1 Winners		
		HSR	Auto	Air		HSR	Auto	Air
1. RT Intra-Regional Travel	11		11		17	1	16	
2. RT Travel to Adjacent Regions	63	10	53		73	35	38	
3. RT Travel to Non Adjacent Regions	39		9	30	51	1	1	49
4. RT Travel 'Other Regions'	27		27		26		26	
5. RT <50Miles SCAG+MTC	n.a.				13		13	
No. Of Routes Analyzed	140	10	100	30	180	37	94	49
HSR's Win Rate		7%				21%		

Valley (MTC-SJV) or LA Metro Area-San Joaquin Valley (SCAG-SJV) routes. Unless a bus route was subsidized, CHSRA services never won a route based on Total Travel costs.¹⁸³

5.3 HSR'S LARGEST ROUTE AND RIDERSHIP LOSSES ARE BETWEEN THE STATE'S THREE BIGGEST MARKETS – Through a combination of long distances between two of them (SCAG-MTC and SANDAG-MTC) and CHSRA's choice to not build infrastructure to connect the LA Metro Area and San Diego County (SCAG-SANDAG) HSR 'wins' only one route between the state's three major population centers, the LA Metro Area (SCAG), the SF Bay Area (MTC) and San Diego County (SANDAG), home to 74% of

¹⁸⁰ Readers will remember that to 'win' a route, HSR only has to be Total Travel Time faster than Auto or Air travel; while one of the other two transport modes must be both Total Travel Time and Total Travel Cost faster and quicker than HSR to 'win' the route.

¹⁸¹ As a prior footnote explained, our analyses have a ±5% probability of 99% accurately portraying those periods.

¹⁸² Most significantly, Air 'won' slightly over a fifth (21%), of all Non-Adjacent routes longer than the UIC/IUR-derived diagram's Sweet Spot, i.e. LA Metro Area-SF Bay Area (SCAG-MTC), San Diego-SF Bay Area (SANDAG-MTC) and San Diego-Sacramento (SANDAG-SACOG).

¹⁸³ With the exception of routes with highly-subsidized Authority buses between Sacramento and smaller cities southwards toward Madera and Merced, HSR never 'won' on a Total Travel Cost Basis. The 2029-2040 \$1.00 Authority Bus fares from, "Stockton/Modesto/Denair/Merced/Fresno Amtrak to Madera" are heavily subsidized. Example: Greyhound's Madera-Stockton fare is \$28, not the Authority's \$1.00. That citation also says "\$10 from Sacramento, Elk Grove and Lodi to Madera" meaning the \$10.00 one-way Sacramento-Merced Authority Bus fares are subsidized. For Authority fares, see p. 2-6 [PDF 26] of 2018 Business Plan, Ridership and Revenue Forecasting, Technical Supporting Document. Greyhound's Sacramento-Merced fare cost \$29, not the Authority's \$10 cited above. The Authority's \$1.00 Merced-Madera fare would cost \$15 if on Greyhound. See: <https://www.greyhound.com/en/ecommerce/schedule>

Californians.¹⁸⁴ HSR would not have 'won' even the Gilroy-Palmdale route or ridership,¹⁸⁵ if we had not included an extra 45minutes of airport security to Air's Total Travel Time¹⁸⁶ and none to HSR's.

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For the 74% of California's population living in its three major markets (SCAG, MTC, SANDAG) 98% of HSR's Total Travel Times were longer and, when not subsidized, HSR's Total Travel Costs are always are more expensive than Auto or Air's.

Readers should ask: if high-speed rail is virtually 'shut out' of serving the state's three largest markets, even it somehow 'won' all of the riders between the remaining markets – which CHSRA's slow-poke Sacramento-Madera/Merced buses¹⁸⁷ guarantee it can't on Sacramento routes¹⁸⁸ – where are all the riders coming from to 'fill the gap' and allow CHSRA's trains to not need a subsidy?

5.4 ROUTES ≠ RIDERS: FROM ROUTES TO RIDERSHIP: THE RECKONING – Some routes, carry far more forecasted riders than others, some routes far fewer. Example: after 2033, the LA Metro Area-SF Bay Area route, (SCAG-MTC), is forecasted to carry 19% of all riders, while the combined traffic to/from all 'Other Regions' is 13% of that year's total.¹⁸⁹ To understand the impacts of our route analyses (Figure 21) on ridership forecasts (Figure 22) required reconciling our route findings' impacts on CHSRA's 2018 ridership forecasts.

¹⁸⁴ California's three major population centers are (2016) the Los Angeles Metro Area (SCAG) at 18Million, the SF Bay Area (MTC) at 8Million, San Diego Metro Area at 3Million. The three largest represent 29Million people or 74% of California's 39.4Million. Taken from p.1 and Table 4 and Table 5 of CA Department of Finance, New State Population Projections, March 8, 2017. Between the SF Bay Area and LA Metro Area (MTC-SCAG), Air travel's Total Travel Time and Total Travel Costs 'wins' the 'Premier' routes between the state's largest (SCAG) and second largest (MTC) markets. Those routes connect over 25Million of the 39Million Californians– nearly two-thirds (64%) of state's population. Also, the ±600mile distance on the San Diego-SF Bay Area (SANDAG-MTC) route, shuts out chances of HSR winning routes between the state's second and third largest markets. Found at:

http://www.dof.ca.gov/Forecasting/Demographics/projections/documents/P_PressRelease.pdf CHSRA's hope of serving a large part of the LA Metro Area-SF Bay Area (SCAG-MTC) or the (MTC-SANDAG) markets will vanish because travelers will know that Air Travel between the state's largest two markets and between the second and third largest markets (SF Bay Area-San Diego) will be dominated by Air's faster and cheaper Total Travel Times and Total Travel Costs. Also, the LA Metro Area-San Diego (SCAG-SANDAG) market, the largest and third largest, is ceded to Auto travel since there is no HSR service between those Adjacent Regions.

¹⁸⁵ The Gilroy-Palmdale route is one of thirty-one (3%) of the SCAG-MTC city-pairs we analyzed in False Phase 1.

¹⁸⁶ There are 10 major airports between the five California markets analyzed. The five major airports in SCAG are LAX, ONT, SNA, BUR and LGB. The three in MTC are SFO, SJC and OAK. SAN serves San Diego County (SANDAG) and SMF serves Sacramento (SACOG). Airfares are almost always cheaper between any of the ten airports than CHSRA's posted fares in Table 2.2, p. 2-5 [PDF 25] of the 2018 Ridership and Revenue Forecasting, Technical Supporting Document (June 2018)

¹⁸⁷ While HSR performs well on the MTC-SJV and SCAG-SJV routes up to Merced, points north of Merced, like Turlock and Elk Grove, Authority bus encumbrances 'kick in' and HSR always loses. Similarly, on the SF Bay Area-Sacramento route (MTC-SACOG) between the second and fifth largest markets, Auto travel 'wins' every time, as the 3hour 20minute mandatory Authority bus to/from Merced on HSR-inclusive trips are about twice as long as an Auto trip.

¹⁸⁸ Although technically part of the San Joaquin Valley (SVJ), the Authority separated the Sacramento Area Region Council of Government's (SACOG) region from the SVJ as an Origin-Destination of HSR trips. The six counties that make up SACOG have a combined population of about 950,000. See: Found at: <https://www.sacog.org/publication/sacog-handbookk> The San Joaquin Valley is defined as of nineteen Counties (or parts of several): Butte, Colusa, Glenn, El Dorado, Fresno, Kings, Madera, Merced, Placer, San Joaquin, Sacramento, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Yuba, Yolo, and the Southern California county of Kern. See: https://en.wikipedia.org/wiki/San_Joaquin_Valley The analyses of nine places in the San Joaquin Valley, with Sacramento's SACOG analyzed elsewhere, are those the Authority's HSR trains or dedicated buses will serve from 2029-2040, i.e. Fresno, Kings/Tulare and Bakersfield as well as Madera, Merced, Turlock, Modesto, Stockton, Lodi and Elk Grove. They are also where the Authority will displace the Amtrak San Joaquin's rail service in 2029. The Authority's, Draft 2014 Business Plan, February 7, 2014. Cambridge Systematics' (CS) final technical memorandum of Ridership and Revenue Forecasting of April 12, 2012 says, "Note that the existing San Joaquin service south of Merced to Bakersfield is assumed to be discontinued upon the initiation of HST service." See: Section 5.2, p. 5-5 of Connecting California, 2014 Business Plan, April 30, 2014 Exhibit 4.4 [PDF 43].

¹⁸⁹ See Table 5.3, p. 5-5, 5-6 [PDF 41-42] of the 2018 Ridership and Revenue Forecasting, Technical Supporting Document. For 2033, MTC-SCAG is forecasted to carry 6.7Million riders, 19% of the 36.2Million forecasted. The sum of all travel to/from 'Other Regions' is forecasted to be 4.7Million, 13% of the total and only 70% of the MTC-SCAG route.

The Authority no longer publishes ridership forecasts between city pairs.¹⁹⁰ The only way to reconcile a route's competitiveness' findings with how many HSR riders that route may capture is to use the percent of HSR 'wins' on each intra-region and inter-regional city-pair's Origin-Destination routes (e.g. San Jose-Fresno) in the Authority's forecasted ridership for 2029 and 2023 and apply that percent of 'wins' to the Authority's 2018 'mature ridership forecasts' in its Ridership and Revenue Forecasting Document for the SV-CV Period and False Phase 1. That is what Figure 22 does.

Figure 22 displays CHSRA's 2018 ridership forecasts, then applies the percent of route 'wins' to the Authority's ridership 2018 forecasts. It is not the same as Figure 21 because 'not all routes are created equal.' For example, we see Figure 21's conclusions that the Authority's trains will 'win' 7% and 21% of the routes for the SV-CV Period and False Phase 1 respectively. But Figure 22 shows that CHSRA's trains' Total Travel Times (TTT) will 'win' 10% of the SV-CV Period's forecasted riders but only 17% of False Phase 1's forecasted 2033 riders.¹⁹¹

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Whether measuring routes or ridership under competitive conditions, HSR 'wins' are small fractions of CHSRA's forecasted 14.4Million and 36.2Million riders in the SV-CV Period and False Phase 1. As Part One outlined and Appendix A examines, with a larger and more densely populated market Acela has 'topped out' at ±3.5Million annual riders.¹⁹² Nor is there much reason to believe enough Auto or Air travelers will switch modes to 'fill the gap' between our findings and CHSRA's forecasts. That suggests the 6.1Million riders our analyses have calculated who would select HSR on intra-California routes during False Phase 1 (2033) could be an optimistic scenario.

5.4 WHAT WOULD THE IMPACTS BE ON OUR COMPETITIVE RIDERSHIP FORECASTS IF SOME OF OUR ANALYSES WERE WRONG? – A facetious, Willie Sutton answer would be 'HSR wins more routes.'¹⁹³

While true, our findings have been checked, double-checked and rechecked, but there could be mistakes. We could have under-or-overestimated HSR's route-by-route competitiveness by 10% or even 20% or 30%. But we may never know because it's fairly clear CHSRA never conducted competitive empirical analyses based on its own data and 'outsiders' have no access to how the Authority's consultants built their ridership forecasts.¹⁹⁴ We can only see what is claimed to be results of the forecasts and listen to 'trust us' blandishments. By not allowing public access to the data, assumptions and algorithms used by the Authority to claims financial viability, the State has 'weaponized' to its advantage the data and information that lies behind the Authority's claims of not

¹⁹⁰ While the Authority's business plans give us access to intra-regional and region-to-region ridership, since 2009/2010 no one outside the Authority and its consultants has had access to origin-destination station boardings. Consequently, we can only know what the origins-destinations are for broadly-defined regions such as the LA Metro Area (SCAG) or the SF Bay Area (MTC). This 'granulation' of data gives a reasonable picture of ridership both inside and between the broadly-defined regions but does not let outsiders know the Authority's assumptions on the boardings and discharging of passengers between specific high-speed rail stations. The 2009/2010 data source cited is a Cambridge Systematics memorandum to Nick Brand from Michael Snavelly, et. al. dated March 9, 2010. Found at: http://www.hsr.ca.gov/docs/about/ridership/ridership_PR_CS_IncrePrkgCost.pdf. Table 4 and Table 5 of that memo show forecasts based on a May 2009 Operating Plan for 2030 and 2035's riders between specific high-speed rail stations.

¹⁹¹ In 2040, the last year ridership is forecasted, our competitive analyses concluded that 6.8Million riders – 17% of the forecasted 40Million riders – will year show up. While the forecast is higher, the percent of 'wins' remain the same because there is no stated improvement of CHSRA's services between 2033 and 2040.

¹⁹² See Appendix A of this Paper.

¹⁹³ When asked about why he robbed banks, Sutton purported said, *'That's where the money is.'* Found at: <https://www.snopes.com/fact-check/willie-sutton/>

¹⁹⁴ Public Records requests for access to the data, assumptions and algorithms on ridership, revenues, O&M costs and profits, used for the Authority's computations have been met with responses that, for example, say: *"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."* See email to Mr. Robert Prantis from Ms. Anne Parker of the Public Records Act Staff of the CA High-Speed Rail Authority, December 27, 2013.

needing an operating subsidy. No 'outsider' can know the truth of those claims, although our 320 route analyses indicate there will be a need for substantial operating subsidies.¹⁹⁵

But even if our calculations erred, the odds are small that the outcomes would be materially different. For example: suppose that half again as many routes as we found to be HSR Total Time competitive against Auto or Air are actually HSR competitive. That is, instead of Figure 21's one-in-every five (21%) or 37 of the 180 False Phase 1 routes we analyzed being competitive, 74 of those 180 routes (41%), were competitive. Even if HSR were Total Travel Time competitive on 41% of the routes, the overall result would still be that ridership, and in all probability revenue, would still be far too low to support operations without a legally-prohibited subsidy.¹⁹⁶

¹⁹⁵ The Authority's 2016 Plan admitted False Phase I will probably need operating subsidies up through 2039. See: Table 38, p.63 [PDF 75] of the Operations & Maintenance Cost Model-Draft 2016 Business Plan: Technical Supporting Document.

¹⁹⁶ In 2014 the Authority claimed ridership and revenue were 'joined at the hip.' *"Revenue and ridership were closely correlated with a R^2 of more than 0.999 for each year."* See: p. B-9 [PDF 80] of the 2014 Business Plan, Ridership and Revenue Forecasting, Technical Supporting Document. That is, for every increase or decrease in ridership, revenues will reflect a nearly exact increase or decrease. If this is still true, then as a derivative of such poor competitive performance shown in Figure 13, forecasted revenues plunge. Instead of 0.82Billion in 2029 and \$2.1Billion of 2033 revenue, the Authority would have less than \$100Million (\$82.4Million) in 2029 and less than half-a-Billion dollars (\$420Million) of 2033 revenue. If operating and maintenance costs remain nearly the same on the proposed routes – running an empty HSR train is about as costly as running a full one – then financial disaster beckons.

Figure 22 - Reconciliation Of Competitive HSR Route Findings To CHSRA's 2029 and 2033 Ridership Forecasts in 2018

This is a reconciliation of competitive HSR route findings to CHSRA's 2029 and 2033 ridership forecasts found in Table 5.3 [PDF 41-42] of the 2018 Ridership and Revenue Forecasting, Technical Supporting Document.

	2029 CHSRA Forecast (Millions)	2029 HSR TTT Competitive (Millions)	2033 CHSRA Forecast (Millions)	2033 HSR TTT Competitive (Millions)	Principal reason why HSR not competitive with Auto or Air
INTRA-REGIONAL+ SHORT ROUTES <50miles –Total of 28 Routes Analyzed -11 routes analyzed for 2029-2033 and 17 for 2033-2040					
Intra-SACOG	0.0	0.0	0.0	0.0	No riders or revenue claimed by CHSRA
Intra-SANDAG	0.0	0.0	0.0	0.0	No riders or revenue claimed by CHSRA
Intra-MTC	1.9	0.0	2.3	0.0	Auto 'Wins' – Route is too short against Auto's TTT and TTC
Intra-SCAG	0.0	0.0	4.7	0.0	Auto 'Wins' – Route is too short against Auto's TTT and TTC
Intra-SJV	1.1	0.0	1.7	0.4	HSR 'Wins' 0/8 SV-CV Period routes-1/4 in False Phase 1.
1. TOTAL INTRA-REGIONAL ROUTES	3.0	0.0	8.7	0.4	
ADJACENT REGIONS ROUTES - Total of 136 Routes Analyzed - 63 routes analyzed for 2029-2033 and 73 for 2033-2040					
SACOG-MTC	0.5	0.0	0.9	0.0	HSR 'Wins' on 0/3 SV-CV Period + 0/5 False Ph. 1 routes
SACOG-SJV	0.2	0.0	0.2	0.1	HSR 'Wins' 0/7 SV-CV Period + 1/4 False Ph. 1. routes
SANDAG-SCAG	0.0	0.0	2.8	0.0	Auto 'Wins' – Only Metrolink or Amtrak service
MTC-SJV	3.7	1.5	4.9	2.3	HSR 'Wins' 10/25 SV-CV Period + 14/30 in False Ph. 1
SCAG-SJV	0.8	0.0	4.6	3.2	HSR 'Wins' 0/24 SV-CV Period + 20/29 False Ph. 1. routes
2. TOTAL - ADJACENT REGIONS ROUTES	5.2	1.5	13.4	5.5	
NON-ADJACENT REGIONS ROUTES – Total of 90 Routes Analyzed - 39 routes analyzed for 2029-2033 and 51 for 2033-2040					
SACOG-SANDAG	0.0	0	0.1	0.0	Air 'Wins' - Authority buses + Amtrak/Metrolink SCAG-SANDAG
SACOG-SCAG	0.2	0	0.8	0.0	Air 'Wins' - Authority bus rides before and after 2033
SANDAG-MTC	0.2	0	0.7	0.0	Air 'Wins' - Authority buses + Amtrak/Metrolink SCAG-SANDAG
SANDAG-SJV	0.1	0	0.4	0.0	Air 'Wins' - Authority buses + Amtrak/Metrolink SCAG-SANDAG
MTC-SCAG	2.4	0	6.7	0.2	HSR 'Wins' 0/20 SV-CV Period + 1/31 False Ph. 1. routes
3. TOTAL - NON ADJACENT REGIONS ROUTES	2.9	0.0	8.7	0.2	
OTHER REGIONS ROUTES – Total of 53 Routes Analyzed - 27 routes analyzed for 2029-2033 and 26 for 2033-2040					
SACOG-Other Regions	0.1	0	0.1	0.0	TTT encumbered by Greyhound and Authority bus rides
SANDAG-Other Regions	0.0	0	0.1	0.0	Never any form of CHSRA service - only Amtrak/Metrolink
MTC-Other Regions	2.1	0	2.5	0.0	TTT encumbered by Greyhound and Authority bus rides
SCAG-Other Regions	0.4	0	1.2	0.0	TTT encumbered by Greyhound and Authority bus rides
SJV-Other Regions	0.5	0	0.7	0.0	TTT encumbered by Greyhound and Authority bus rides
Other Regions-Other Regions	0.1	0	0.1	0.0	TTT encumbered by Greyhound and Authority bus rides
4. TOTAL - OTHER REGIONS ROUTES	3.2	0.0	4.7	0.0	
MTC + SCAG ROUTES of <50miles – Total of 13 Routes Analyzed – 0 for 2029-2033 and 13 for 2033-2040					
Total MTC + SCAG Routes <50miles	0.0	0.0	0.6	0.0	Route too short against Auto's TTT + Total Travel Costs
TOTAL FORECASTED RIDERSHIP (2029)	14.3		36.1	TOTAL FORECASTED RIDERSHIP (2033)	
2029-% of Riders on Encumbered routes	90%		83%	2033-% Of Riders On Encumbered Routes	
2029- & on HSR TTT Competitive Routes	10%		17%	2033-% on HSR TTT Competitive Routes	
2029-Riders On HSR TTT-Competitive Routes (MM)		1.5		6.2	2033-Riders On HSR TTT-Competitive Routes (MM)
2029-% of Riders On HSR TTT-Competitive Routes		10%		17%	2033-% of Riders On HSR TTT-Competitive Routes

PART SIX

EXAMPLES OF THE TIME AND MONEY LEGISLATORS WILL WASTE TRAVELING TO/FROM THEIR DISTRICTS BY HIGH-SPEED RAIL – AND A PLEA FOR LEADERSHIP

* * * * *

AB3034's Section 2704 (8) (j) threw high-speed rail in California into competition with Auto and Air for riders to produce enough revenue to not require an operating subsidy. What should have been clear a decade ago – the lack of interest of private, at-risk capital to invest in and take the perceived operating risks that determine the project's fate – seems to not have resonated inside Sacramento. No such investment has come forth in a decade of the Authority asking; and instead the delusion that more federal monies will 'fill the gap' seems to prevail in late 2018.

Until its 2018 Plan, the Authority repeatedly claimed it could raise private capital for the HSR project. In at least 2008, 2009 and 2015,¹⁹⁷ it asked investors to perform their due diligence and join in funding the HSR project. Most politely responded with variations of 'thanks but no thanks.' But, in 2015, a not-so-polite investment group basically said 'we found that less than 3% of HSR systems are

¹⁹⁷ In a June 11, 2008 presentation to the Authority's Board, its consultants, the Infrastructure Management Group (IMG), reported that 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. In September 2009 IMG and Goldman Sachs, a company that has raised over \$100Billion for an at-risk investment, [In 2000, Goldman Sachs – an advisor to the Authority in 2009 – led Vodafone's \$183 billion purchase of Mannesmann. Vodafone AirTouch took control of Mannesmann in February 2000. The £112bn (\$183bn) all-share deal is was the largest corporate merger at that time. See: <http://news.bbc.co.uk/2/hi/business/630293.stm>] told the Authority, "Private appetite for ridership risk is limited without revenue guarantee or until ridership proven." See p. 9 [PDF 9] of California High-Speed Rail Authority, Board Financing Workshop, September 2, 2009. In 2015, more than 800 corporations and individual parties were asked by the Authority's for their responses to its Request for Expressions Of Interest question, ". . . do you foresee any issues with raising the necessary financing to fund the IOS-South project scope? IOS-North project scope?" Thirty-five responded, most with a polite 'no thanks' answer. See: http://www.hsr.ca.gov/docs/programs/construction/List_of_Respondents_to_RFEI_March_2011.pdf. In at least its third Request for Expressions of Interest (RFEI) of 2015, [See: Question 7 of the Request for Expressions of Interest, RFEI HSR#15-02 is "Given the delivery approach and available funding sources, do you foresee any issues with raising the necessary financing to fund the IOS-South project scope? IOS-North project scope? Both?" [One consortium, Cintra-Ferrovial, told CHSRA that less than three percent of HSR routes (not systems) were profitable [See: pp. 15-16 of Response to Expression of Interest – RFEI HSR#15-02, September 14, 2015. Found at <https://drive.google.com/open?id=0B9m407yyFerMbJhFQVpMdE1XR1U> The full quotation is "Comment: We have reviewed data from the International Union of Railways (Sept. 2014) which analyzed all 111 high speed rail lines in the world. Of the 111 train lines, only 3 make an operating profit and one breaks-even. The remaining 107 high-speed rail lines require large government subsidies from both general taxpayers and drivers. The HSR lines that break-even or turn an operating profit have a different dynamic than CHSR, in that these lines are 30-50 years old and have much higher density of population in the areas that the train would serve. We believe it is highly unlikely that the CHSR will turn on operating profit within the first 10 years of operation. More likely, CHSR will require large government subsidies for years to come." A footnote on profits and break-even says: "Make an Operating Profit: France/TGV (Paris Sud), Japan (Shin Osaka), US (Acela Northeast Corridor). Break-even: Japan (Hakata)" The September 2015 response, based on UIC/IUR's group's data, was eliminated and later in 2015 replaced with Cintra-Ferrovial's less evidence-based reasons.]

operationally profitable’¹⁹⁸ and declined the invitation.¹⁹⁹

Even before 2014, when the Authority said it “*would rely heavily*” on private investment, but the state would own those privately-purchased assets,²⁰⁰ not one investor has ever committed to any at-risk investment to building the project. Private capital participation is now scheduled for later phases:

*“The program’s expansion depends on ridership revenues to support access to private capital as the program matures. Inaccurate ridership forecasts could create consequences . . . including decreasing the level of private sector investment, increasing the public funding required. . .”*²⁰¹

Our 320 analyses showed that when less than one-in-five forecasted riders are likely to use HSR, not only has the Authority’s work depended on, “*Inaccurate ridership forecasts*” but also that those forecasts “. . . *could create consequences. . .*” For the last decade private investors have told the Authority they have no interest in losing their backers’ savings; but that message fell on deaf ears.

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6.1 EXAMPLES FOR LEGISLATORS TO PERSONALLY UNDERSTAND HSR’S LACK OF COMPETITIVENESS ON ROUTES FAMILIAR TO THEM – State Senators and Assembly Members travel frequently between Sacramento and their Districts. Assuming there will be no new Assembly or Senate Districts, throughout the Authority’s entire forecast period (2029-2040), three-fourths (75%) of the State Senators and over ninety percent (90%) of State Assembly Members²⁰² will pay more to travel longer times to/from the Capital or to/from their Districts using HSR than by driving or flying.

What will happen to Legislators after the Launch Years when obligatory Sacramento, Authority-dedicated bus rides still require 3.3-4hours each way²⁰³ and the only way south of the LA Metro Area (SCAG) is still Metrolink or Amtrak. If they support high-speed rail, state legislators will be asking every Californian to ignore their wasting time on longer HSR Total Travel Times while subsidizing their more expensive high-speed rail trips’ Total Travel Costs between Sacramento and their Districts. Whether this politically defensible might not be an open question.

Appendix F (available by 15 March 2019), Total Travel Times By Legislature Committee Leaders and CHSRA Board Members Using HSR, Auto and Air, shows specifically what will happen to the Total Travel Times of key members of the Legislature’s oversight committees of CHSRA and the Authority’s Board. But the following descriptions are generally what will happen to the Total Travel Times of Legislators representing Districts within the three major markets: the LA Metro Area (SCAG), the SF

¹⁹⁸ The Cintra-Ferrovial consortium said that after reviewing 111 high-speed rail routes, it found only three were profitable. That statement was altered prior to the consortium being awarded a contract of more than \$300Million. But there are two versions of the Cintra-Ferrovial response. See: pp. 15 of Cintra-Ferrovial’s Response to Expression of Interest – RFEI HSR#15-02. The two versions carry the September 14, 2015 date. However, the pp. 15-16 wording was changed in a later version posted on the Authority’s website. The original version is found at: <https://drive.google.com/open?id=0B9m407yyFerMbJhFQVpMdE1XR1U> or <https://drive.google.com/file/d/0B9m407yyFerMbJhFQVpMdE1XR1U/view?pref=2&pli=1> The altered version of Cintra-Ferrovial’s response is found at the Authority’s website: http://www.hsr.ca.gov/docs/about/doing_business/EOI/EOI_Cintra_Ferrovial.pdf Both versions of the Cintra-Ferrovial document are in the 2016 Business Plan Comment file maintained by the CHSRA.

¹⁹⁹ The Authority later awarded Cintra a +\$300Million contract for work near the southern end of the San Joaquin Valley.

²⁰⁰ “*While the Authority will rely heavily on the private sector to bring innovation and investment into the project, the state will maintain its lead organizational role, retaining ownership and governance functions.*” See: Connecting California, 2014 Business Plan, April 30, 2014, pg. 31 [PDF 31]

²⁰¹ See p. 57 [PDF 57] of the Authority’s 2018 Business Plan, June 1, 2018

²⁰² By count, as of December 2017, 30 of California’s 40 State Senators’ Districts (75%) are in the SF Bay area, the Joaquin Valley, the LA Metropolitan Area or San Diego County, while 75 of the 80 (93%) Assembly Members’ Districts are in those four areas. See: <http://senate.ca.gov/senators> and <http://assembly.ca.gov/assemblymembers> Each of the 40 Senators represent 931,349 Californians, while each Assembly member represents approximately 465,000 Californians.

²⁰³ For the 240 and 200minute Run Times of the Authority dedicated buses during the 2025 and 2029, see pp. A-1 and A-2 [PDF 61-62] of the 2018 Business Plan, Ridership and Revenue Forecasting, technical supporting document. Technical Supporting document. Both are Run Times and neither includes a 15 Transfer Time between the bus and HSR rail.

Bay Area (MTC), San Diego County (SANDAG) and the San Joaquin Valley (SJV), Legislative Districts of nearly nine-of-every-ten Californians.²⁰⁴

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For these graphic descriptions, we chose to show one-way trips' Total Travel Times during False Phase 1 (2033-2040), the period during which southbound and westbound travel from Sacramento to particular State Senators and Assembly Members' Districts is faster than during the SV-CV Period (2029-2032).²⁰⁵ Since the Authority has made no commitment to build north of the HSR link at Merced to Sacramento before 2040, we assume that situation lasts at least through 2040. Therefore all travel starts in Sacramento with a one-way 3hour 20minute, (200minutes) heavily subsidized²⁰⁶ bus ride to Merced and a 15minute transfer there to HSR.²⁰⁷ To compute Total Travel Times, both HSR and Air travel must count 71minutes of one-way access+egress times, while we added another 45minutes to Air travel for airport security and 15-30minutes if the Legislator's District were distant from a commercial airport.²⁰⁸ All Auto Total Travel Times include a 15% increase above Google's times to account for congestion; obviously a heavy penalty on Auto travel for longer trips.

For simplification, we chose to graphically show three graphic examples for the LA Metro Area (SCAG) and the SF Bay Area (MTC), one for San Diego County (SANDAG) and two of the San Joaquin Valley's (SJV) largest cities. Each is a detailed examination of how much time is spent on access+egress times, how much on Authority buses as well as the high-speed train, in the Auto or on the Airplane from Sacramento to their District.

²⁰⁴ The Authority also vaguely defined 'Other Regions' as being CA's Central Coast, Western Sierra, and North – but defined no HSR stations within those. It also claims riders on short routes inside MTC, SCAG and SJV, again without stations.

²⁰⁵ Starting in 2033, the Sacramento bus Run Time is decreased by 40minutes by going to Merced instead of Madera, HSR service crosses the Tehachapi Range, eliminating a 160minute bus ride into SCAG and the Fresno-Bakersfield Run Time somehow decreases from 58 to 45 minutes (-13minutes). See pp. A-1 and A-2 [PDF 61-62] of the 2018 Business Plan, Ridership and Revenue Forecasting, technical supporting document.

²⁰⁶ The \$10.00 one-way Sacramento-Merced Authority Bus fares are subsidized because Greyhound's fares from Sacramento to Merced is \$21. For Authority bus fares, see p. 2-6 [PDF 26] of 2018 Business Plan, Ridership and Revenue Forecasting, Technical Supporting Document. Greyhound's Sacramento-Merced fare cost \$29. See: <https://www.greyhound.com/en/ecommerce/schedule>

²⁰⁷ See A.2.1, p. A-2 [PDF 62] of CHSRA's 2018 Business Plan, June 1, 2018

²⁰⁸ In November 2011, Dr. Koppelman, Chair of the Authority's RTAP, co-presented a paper that spoke clearly to the need for and size of the non-Run Times (aka Line Haul In-Vehicle times) required in HSR Auto and Air Travel between South San Francisco and Central LA. That diagram showed that HSR's SF-LA Total Travel Time was 231minutes. Subtracting AB3034's required 2hrs. 40minutes (160minutes) Run Time requirement leaves 71minutes or round-trip access+egress times (including 15minutes on each end as the Authority says for Transfer Times) of 142minutes. See: PDF 47 See PDF 7 of Polzin, Steven; Koppelman, Frank and Proussaloglou, Kimon: Forecasting Revenue and Ridership for High Speed Rail. High Speed Rail-Perspectives and Prospects, Fifth Annual William O. Lipinski Symposium on Transportation, November 14, 2011. Found at: <http://iti.northwestern.edu/publications/Lipinski/2011/Morning2.pdf>

6.1.1 LOS ANGELES METRO AREA STATE LEGISLATORS – When the 2hour 40minute (160minutes) cross-Tehachapi bus is ‘retired’ at False Phase 1’s start in 2033, travel by Air still ‘wins’ the Sacramento- City of Los Angeles (SACOG-SCAG) route, as Figure 23 shows. Even with HSR at ‘full throttle’ south of Merced, an HSR one-way trip takes over 7hours. Losing nearly a working day traveling by HSR. Compared with less than half a day of travel by Air between Sacramento and a District office in Los Angeles, Santa Monica or Long Beach, etc., taking HSR seems a waste of a legislators’ time.

Figure 23 also shows that using the bus for Sacramento-Merced takes a half (50%) of the Total Travel Time of the Los Angeles’ area Legislators’ trips to their Districts. Not counting the time spent on the high-speed train, that means Legislators would spend more than two weeks per year transferring to and sitting on Authority buses to travel between their constituents and the state’s Capital. ²⁰⁹

The same is pretty much true of state Legislators with Districts near the Burbank Airport, an HSR station. Figure 24 shows that, while Auto is a half-hour quicker than HSR, Air’s Total Travel Time is half HSR’s nearly seven hours of traveling. Again, the logic of wasting time and money holds, since, like the Sacramento-Los Angeles air route (SMF-LAX), the

Sacramento-Burbank air route’s (SMF-BUR) is faster and Air fares are cheaper than HSR’s. Why should a Legislator serving Burbank, Glendale, Ventura or San Fernando Valley spend almost an extra week a year riding an HSR train instead of flying and using that time to visit with constituents or work in the Capital. If there is justification for choosing HSR, it is not apparent from this paper’s route or ridership analyses.

Figure 23 - Legislators' Total Travel Time On A One-Way Sacramento-City of Los Angeles Trip

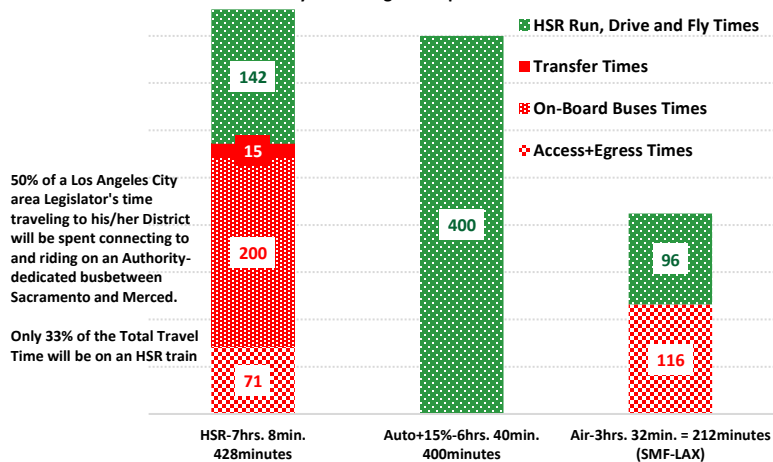
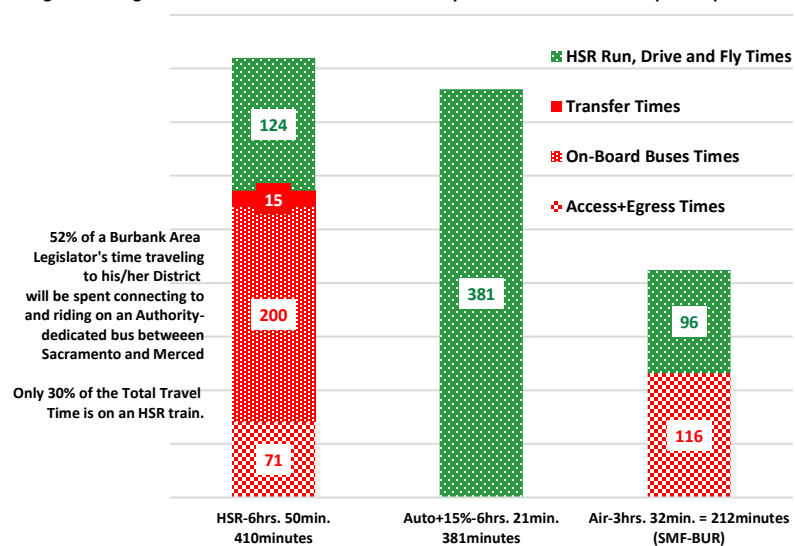
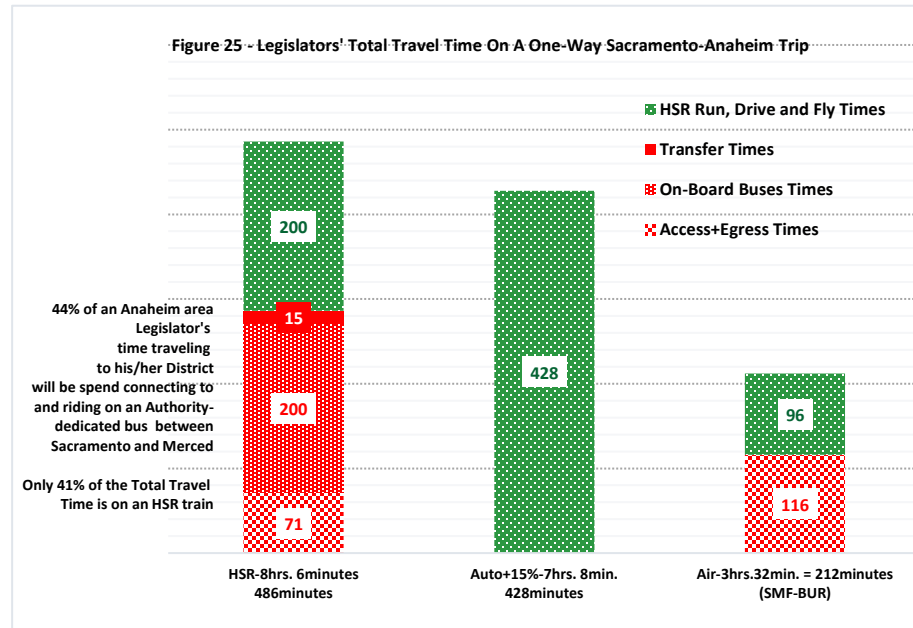


Figure 24 - Legislators' Total Travel Time On A One-Way Sacramento-Burbank Airport Trip



²⁰⁹ About 215 minutes of each 7hour one-way trip is meeting and sitting on an Authority bus. Assuming 50 round-trips/year, or 21,570minutes/per year or more than 15days/year consists of meeting and sitting on an Authority bus between Sacramento and Los Angeles.

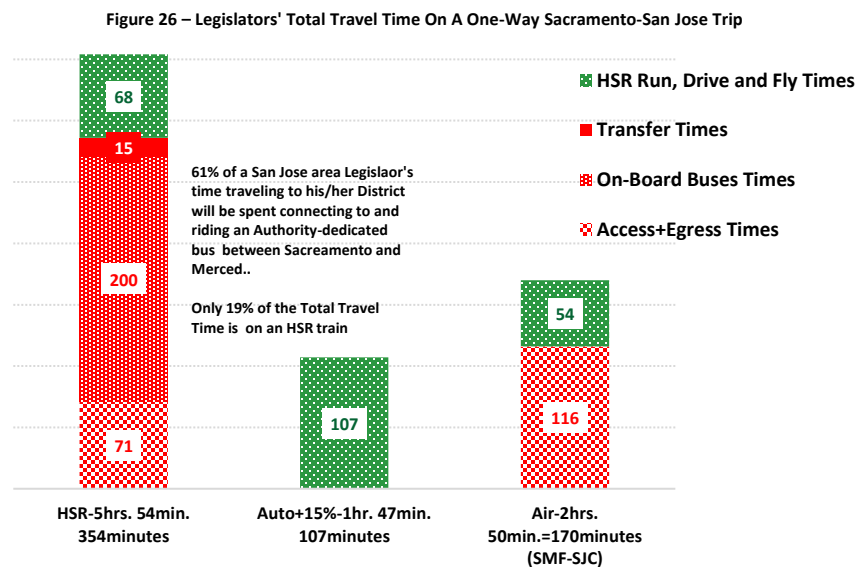
Likewise, for Legislators and other Californians' Sacramento-Anaheim travel, shown in Figure 25. For legislators serving Districts near Anaheim, Irvine, Huntington Beach or San Clemente, Air travel's Total Travel Time is half or less that of CHSRA's 2029-2040 offerings. Being the furthest distance from Sacramento, therefore the longest to travel to by HSR, Auto or Air, indicates that for all travel between Sacramento and anywhere inside the LA Metro Area (SCAG) Air travel's Total Travel Time will always be about twice as fast as using the Authority's bus and train.



6.1.2 SF BAY AREA STATE LEGISLATORS – To almost anyone who has driven the 90-150minutes between Sacramento and almost any destination in MTC's nine SF Bay Area counties, Figures 26, 27

and 28 should be no surprise. They show that Bay Area State legislators traveling one-way by Auto will arrive in their Districts or Sacramento four-to-six hours quicker than what that trip would take by Authority bus and high-speed rail. Since there is no direct Merced-Gilroy (SJV-MTC)

connection, Legislators and all other Californians will have to take the 3hour 20minute bus from Sacramento, then transfer in Merced, to a westbound HSR train over an hour (66 minutes) to San Jose, an hour and three-fourths to San Francisco (107minutes) or arrive in San Francisco and face another 45minutes getting to BART and then towards the Oakland District office. Auto travel's Total Travel Times stay roughly the same.



The net result of CHSRA's self-imposed encumbrances is that state legislators from in or near San Jose, San Francisco, or Oakland could travel by Auto back and forth to Sacramento before they would go one-way between Sacramento and their District offices if they were using CHSRA's buses and high-speed rail. On every trip SF Bay Area (MTC) legislators traveling by Auto to/from Sacramento, could gain 4-5 hours with local constituents, back at the Capital, campaigning or being with their families.

Over the course of one-year (180 days assumed) SF Bay legislators would gain between nine and nearly thirteen weeks traveling round-trip by Auto versus by Authority bus and HSR train.²¹⁰ For anyone who thinks about the routing HSR proposes to take, a Sacramento-SF Bay Area Auto trip that takes less than one-third an HSR trip's time would take seems the obvious choice.

If Bay Area legislators or their constituents care about elected officials' travel costs, they would discover that even using the Authority's highly subsidized bus fares + HSR train fares, on each round-trip between the Capital and their Districts, legislators using CHSRA's offerings will pay 3-4 times more than Auto's Total Travel Costs, not to mention how much less expensive it would be to rideshare with staff or other legislators.

Figure 27 – Legislators' Total Travel Time On A One-Way Sacramento-San Francisco Trip

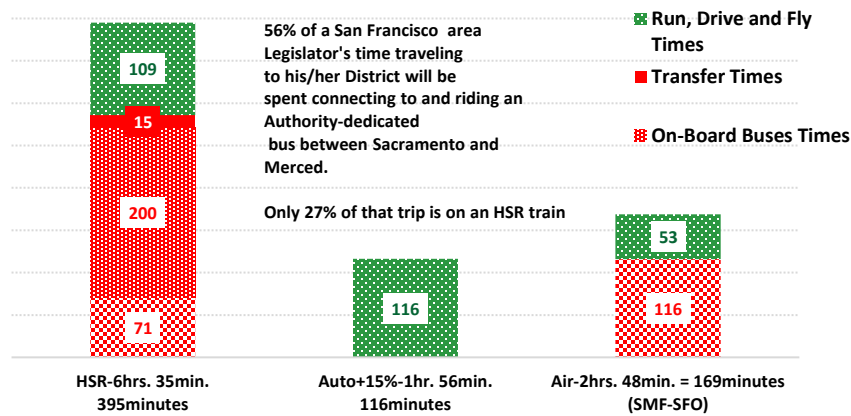
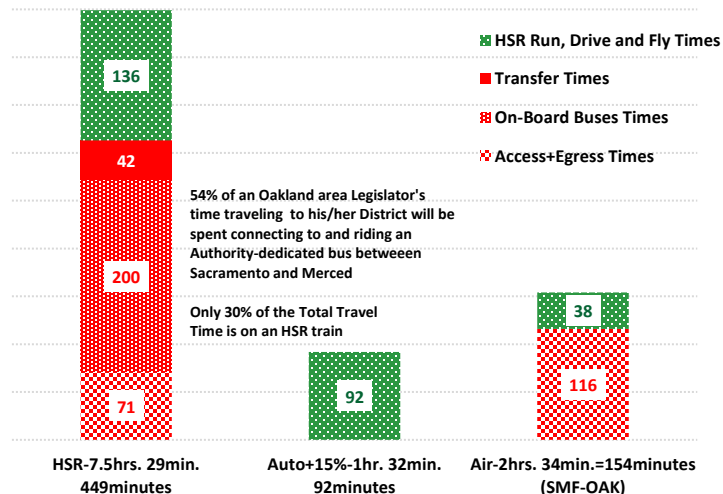


Figure 28– Legislators' Total Travel Time On A One-Way Sacramento-Oakland Trip



²¹⁰ Using an Auto, a one-way trip by a legislator from the San Jose area would yield him/her an extra 4 hours 7 minutes (247 minutes) over taking the bus and HSR. The San Francisco based legislator gains 4 hours 39 minutes (279 minutes) and the Oakland-Alameda County legislator gains nearly 6 hours (359 minutes) using Auto for the Sacramento-District trip over using the bus and HSR on a one-way trip. Assuming 180 days per year of making that round-trip, the San Jose legislators would gain nearly nine weeks (88,920 minutes) of time each year in his/her District or at the Capital over taking the HSR train; a San Francisco legislator would gain nearly 10 weeks (100,440 minutes) and an Oakland-Alameda County legislator would gain twelve and three-quarters weeks (128,520 minutes) over using the bus and HSR on round-trips.

6.1.3 SAN DIEGO COUNTY STATE LEGISLATORS – While HSR’s competitive position gets better during False Phase 1, Figure 29 shows that Legislators traveling from Sacramento to their San Diego County (SANDAG)

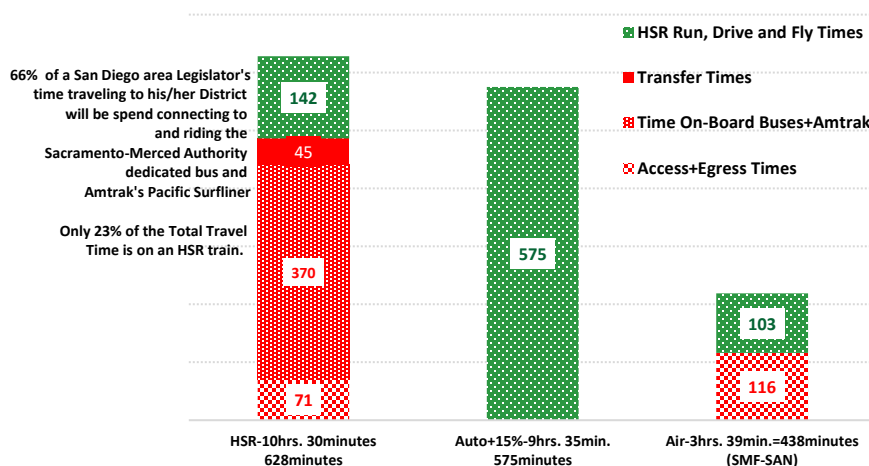
Districts by the Authority bus + HSR + Amtrak’s Pacific Surfliner will find their one-way Total Travel Time will be 10.5hours (628minutes); more than driving’s Total Travel Time, while an Air trip’s Total Travel Time is about two thirds of an HSR trip.

Whether representing the areas near Oceanside, Del Mar, Escondido or the City of San Diego, the decision to spend about three and a half hours by Air versus ten and a half using CHSRA’s bus, then HSR, then Metrolink or Amtrak should be ‘slam dunk’ based on comparative Total Travel Times.

An Air trip’s Total Travel Cost will be a third less than taking the Authority bus + HSR train + Amtrak’s Pacific Surfliner’s Total Travel Costs. Will San Diego legislators or their constituents argue that those time and dollar savings traveling by Air aren’t savings on the wear and tear of their Representatives, their families and the state’s treasury?

6.1.4 SAN JOAQUIN VALLEY STATE LEGISLATORS – During the SV-CV Period, state Legislators representing any District of the San Joaquin Valley that use the Authority’s offerings will also be forced to use a one-way 3hour 20minute Sacramento-Merced bus on trips to/from their District if they use HSR. It will only take legislators a few key strokes to find that driving Sacramento-Merced takes less time – about 2hours. ²¹¹ That comparison puts HSR far behind the ‘starting line’ from the beginning of any trip.

Figure 29 – Legislators' Total Travel Time On A One-Way Sacramento-San Diego Trip



²¹¹ See <https://www.drivingdirectionsandmaps.com/route-planner/>

Figure 30 shows that Legislators representing Fresno, the San Joaquin Valley's largest city, gain nothing by using high-speed rail to 'commute' to Sacramento. In fact, on each trip they gain over two hours, or about a day and a half per year, by commuting to Sacramento by Auto.²¹²

Figure 31 shows that high-speed rail's competitive speed advantage over Auto doesn't overcome the Authority's self-imposed encumbrance of a slow-poke Sacramento-Merced bus. Driving the length of the San Joaquin Valley, nearly five hours, may seem tedious but it shouldn't when compared with getting to the CHSRA's Sacramento bus station, 2hours 20minutes on a highly-subsidized Authority bus,²¹³ waiting to transfer in Merced, then a little over an hour and a half on a high-speed train.

That 6hour 22minute on-the-bus, off-the bus, on-the-train, off-the-train then somehow get to the District office makes Auto clearly the logical choice.

Taking the better-for-HSR of the two operating periods, False Phase 1, Figure 28 and Figure 29 show conclusively that Auto travel will always be faster than HSR travel to/from Sacramento to all the San Joaquin Valley's destinations between 2029 and 2040.

6.2 LAWMAKERS' USE OF HIGH-SPEED RAIL WOULD REPRESENT A SIGNIFICANT WASTE OF TIME AND THE LEGISLATURE'S TRAVEL BUDGET – Figures 21-29, from our empirical analyses, showed that no matter how near or far from Sacramento, Legislators traveling to and from their Districts will find that either Auto or Air is always faster than using CHSRA's bus and HSR offerings. By our method of counting

Figure 30 – Legislators' Total Travel Time On A One-Way Sacramento-Fresno Trip

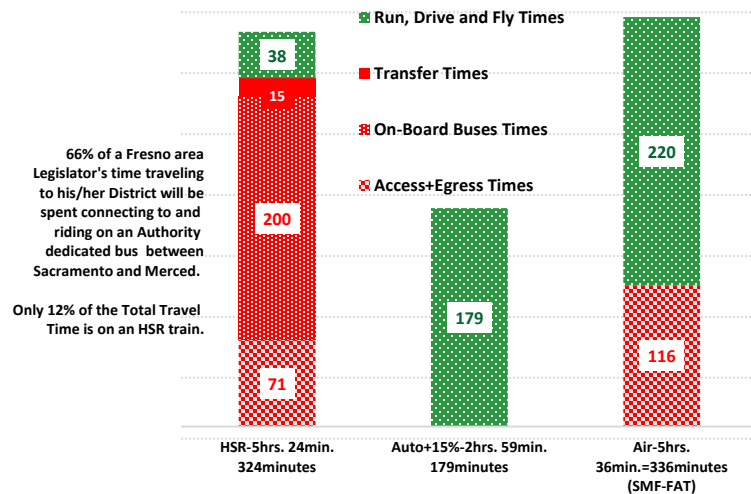
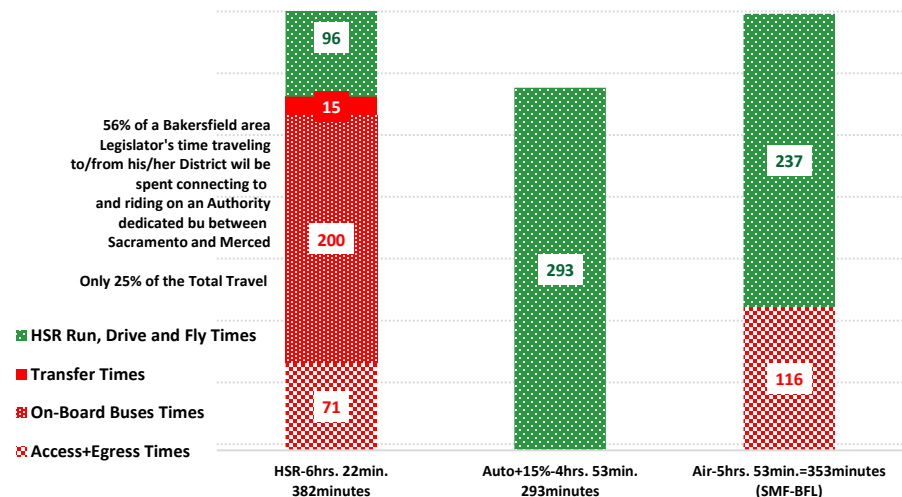


Figure 31 – Legislators' Total Travel Time On A One-Way Sacramento-Bakersfield Trip



²¹² On each one-way trip a Fresno-based Legislator gains 145minutes traveling by Auto versus HSR. Assuming 50 round-trips per year, he/she gains 1,450minutes, i.e. 24.16hours – nearly a day and a half (1.44 days) per year.

²¹³ The \$10.00 one-way Sacramento-Merced Authority Bus fares are subsidized. For example, Greyhound's Sacramento-Merced fare cost \$26, not the Authority's \$10. The Authority's \$1.00 Merced-Madera fare would cost \$12 if on Greyhound. For Authority bus fares see p. 2-6 [PDF 26}] of the 2018 Ridership and Revenue Forecasting, Technical Supporting Document. For Greyhound bus fares see: <https://www.greyhound.com/en/ecommerce/schedule>

'winners' where HSR only has to 'win' on the basis of Total Travel Time, the Authority's chosen metric,²¹⁴ that means that unless the legislator uses only the CHSRA-subsidized bus,²¹⁵ either Auto or Air is both Total Travel Time and Total Travel Costs are quicker and cheaper than traveling by high-speed rail on routes that serve nearly nine-of-every ten (88%) of state Legislators.

Section 6.1's analyses demonstrate some of the travel rigors of 105 of the 120 State Senators and Assembly Members.²¹⁶ Together, those legislators from the state's three largest metropolitan areas, the LA Metro Area (SCAG), the SF Bay Area (MTC) and San Diego (SANDAG) plus the San Joaquin Valley represent 83% of California's population.²¹⁷ All of them would be wasting time and money using high-speed rail instead of more time and cost-efficient Auto or Air to get to and from their Districts.

Should nearly nine-out-of-ten of California's lawmakers ask their constituents to annually 'turn a blind eye' to such waste? Should constituents support politicians who promote such waste? On the other hand, how will they justify spending over \$100Billion to build something they have no earthly reason to use?

6.3 A DECADE OF OPTIMISM BIAS AND STRATEGIC MISREPRESENTATIONS ON RIDERSHIP HAS DISCREDITED THE AUTHORITY AND ITS SUPPORTERS – Millions have been spent on sophisticated-but-compromised computer-based ridership models. However, the type of approach underpinning this Paper, i.e. using empirical, detailed, door-to-door route analyses, seems to have been lost on the Authority's modelers. Despite having the means, method and opportunity to show what an empirical approach produces, none seems to have been done. Yet we found that the Authority's own publicly-available information and data, exactly what we used, challenge the notion that the Authority's trains and buses will provide " . . . a safe, convenient, affordable, and reliable alternative."

We have no paymasters, no interest other than keeping Californians out of 'harms' way' if the state wastes \$77-+\$100Billion building and untold sums subsidizing the operations of a high-speed rail system that not many will use. The facts we present in this paper derive from using unbiased real time and real cost sources for Auto and Air travel and the Authority's own documents and advisors' statements for high-speed rail's Total Travel Time and Total Travel Costs. And as Part One also shows, our 'scales' on whether HSR, Auto or Air 'wins' a route are weighted to favor high-speed rail.

The 320 analyses, available at the web site above, that underpin this report's findings strongly suggest that high-speed rail will not be either a time-efficient nor cost-efficient transport mode. We recognize that California has a metropolitan traffic congestion problem and delays mean lost time. Even if seven of the USA's ten most congested roads are inside the LA metropolitan area, and two

²¹⁴ Total Travel Time is the Authority's key competitive metric. The Authority's ridership consultants' 2013-2014 RP/SP surveys said, " . . . the more competitive HSR travel times are, the higher share HSR attracts . . ." See p. 2-40 [PDF 72] of Final Report, California High-Speed Rail Ridership and Revenue Model, Business Plan Model-Version 3 Model Documentation, prepared for California High-Speed Rail Authority, prepared by Cambridge Systematics, Inc.; February 17, 2016

²¹⁵ There is only one exception to HSR being cheaper than Auto travel on a route to/from Sacramento. Because the Authority's bus ride between Sacramento is subsidized, and our rule that Auto and Air must win both TTT and TTC to 'win' a route, readers will find in the analyses of False Phase 1, that the Sacramento-Merced route is 'won' by high-speed train (actually a subsidized, low speed bus). For the Authority bus fare subsidy see p. 2-6 [PDF 26] of the 2018 Ridership and Revenue Forecasting, Technical Support Document that says, "High-speed rail bus fares in 2017 dollars . . . \$1 from Stockton/Modesto/Denair/Madera/Fresno Amtrak to Madera." For the \$31, Greyhound Sacramento-Merced fare, see: <https://www.greyhound.com/en/ecommerce/schedule>

²¹⁶ By count, as of October 2018, 30 of California's 40 State Senators' Districts (75%) are in the SF Bay area, the Joaquin Valley, the LA Metropolitan Area or San Diego County, while 75 of the 80 (93%) Assembly Members' Districts are in those four areas. See: <http://senate.ca.gov/senators> and <http://assembly.ca.gov/assemblymembers>

²¹⁷ The combined populations of the three metropolitan areas is 28.8Million. See: Taken from p.1 and Table 4 and Table 5 of [CA Department of Finance, New State Population Projections](http://www.dof.ca.gov/Forecasting/Demographics/projections/documents/P_PressRelease.pdf), March 8, 2017. Found at: http://www.dof.ca.gov/Forecasting/Demographics/projections/documents/P_PressRelease.pdf. The population of the San Joaquin Valley is 3.95Million. See: <https://www.google.com/search?q=What+is+the+population+of+the+san+joaquin+valley&ie=utf-8&oe=utf-8&client=firefox-b-1-ab> Together these represent 83% of all Californians.

²¹⁷ See AB3034, Ch. 267, p. 16 (or 91) [PDF 15]

more are inside the SF Bay Area,²¹⁸ these congestion points are only 4-15miles long and travelers aren't likely to add over two hours of access+egress times ²¹⁹ to a round-trip to avoid short-mileage congestion. High-speed rail cannot relieve metropolitan congestion because every stop makes high-speed rail less-than-high-speed rail.

Nor would high-speed rail be a cost-efficient transport mode for Californians.²²⁰ Nearly all intra-California travel ²²¹ is now and will be by Auto in 2040. For example, using Google's driving miles between SF and LA's downtowns, the total round-trip ownership and operating costs at 23¢/mile for a driver alone would be \$175.²²² The Authority said that \$15-\$31 of access+egress costs ²²³ should be part of the tally of an HSR trip's costs. Selecting, as the Authors did, the average of those Authority-defined access+egress costs (\$23) and its 2018 Plan's \$93 one-way fare,²²⁴ HSR's round-trip Total Travel Costs between downtown SF and LA will be nearly 20% higher (\$209).²²⁵ Not to mention the

²¹⁸ The other is inside metropolitan New York City See: The Ten Most Congested Highways in America:

<http://www.businessinsider.com/most-congested-roads-america-2011-10?op=1/#los-angeles--harbor-fwyt-110-nb-9>

²¹⁹ In early 2011 the Authority employed the professional services of a Ridership Technical Advisory Panel (RTAP). At least six months after its first meeting, RTAP's Chair presented a diagram that showed that HSR's SF-LA Total Travel Time was 231minutes. Subtracting AB3034's required 2hrs. 40minutes (160minutes) Run Time requirement leaves 71minutes or round-trip access+egress times (including 15minutes at each end as the Authority says for Transfer Times) of 142minutes. See: PDF 47 of Polzin, Steven; Koppelman, Frank and Proussaloglou, Kimon: Forecasting Revenue and Ridership for High Speed Rail. High Speed Rail-Perspectives and Prospects, Fifth Annual William O. Lipinski Symposium on Transportation, November 14, 2011. Found at:

<http://iti.northwestern.edu/publications/Lipinski/2011/Morning2.pdf>

²²⁰ There are two basic reasons for travel, business and recreation/other reasons. Of 147,500 non-commuting business trips, 134,881 (91%) were by auto; and 97% of those were ridesharing arrangements. These data are from the California Household Travel Survey. See p. 34 [PDF 34] and p. 38 [PDF 38] of California High-Speed Rail Authority Ridership and Revenue Peer Review Panel Calibration and Validation Briefing Book, January 10, 2014. Quoting the California Household Travel Survey Data, the Authority found that 99% of recreation travel is ridesharing via autos. See p. 38 [PDF 38] of the California High-Speed Rail Version 2 Ridership and Revenue Model, Calibration and Validation Briefing Book, Cambridge Systematics (CS), January 10, 2014 that found that 100% of recreation travelers will stay with their autos for trips up to 200miles and 75% of them say they will stay in their autos for any distance. See Figure 8.3, p. 8-3 [PDF 209] of California High-Speed Rail Ridership and Revenue Model, Version 2.0 Model Documentation, April 11, 2014.

²²¹ "One hundred miles was chosen as . . . the lower limit for long-distance trips in the 1995 American Traveler Survey (ATS). This value was also used in the past as conducted by the U.S. Departments of Transportation and Commerce." See p. 1-4 [PDF 14] of the California High-Speed Rail 2012 Business Plan Final Technical Memorandum – Ridership and Revenue Forecasting.

²²² For 23¢ per mile as the total operating costs see Table 3.3, p. 3-4 [PDF 32] of the 2018 Business Plan's Ridership and Revenue Forecasting, Technical Memorandum. More than eight years ago, the Authority admitted its fares will not be able to compete with cheaper driving costs. "Train fares were assumed to be somewhere between the cost of driving and of taking an airplane or train" See p. 64 [PDF 66] of the California High Speed Rail Authority: Report to the Legislature, December 2009. It also emphasized that its HSR trains cannot compete with the out-of-pocket costs of driving. "Fare levels are assumed to be . . . well above the out-of-pocket cost of driving . . ." See: California High-Speed Rail Program Revised 2012 Business Plan, April 2012, page 5-11 [PDF 119]. In 2016, the Authority said auto operating costs for 2029 were \$26¢ per mile. See Table 4-4, p. 4-4 [PDF 30] of the California High-Speed Rail 2016 Business Plan, Ridership and Revenue Forecasting, Draft 2016 Business Plan: Technical Support Document. In 2018, the Authority lowered the full costs of driving to 23¢/mile. Google says the distance between the SF Transbay Terminal and Los Angeles Union Station is 381miles and at 3pm on 28 January 2018, could be driven in 5hours 30minutes. On July 8, 2018, that route could be driven in 5hours 30minutes. See:

<https://www.google.com/maps/dir/101+1st+Street,+San+Francisco,+CA/Union+Station,+North+Alameda+Street,+LA,+CA/> The calculation is therefore [(381miles*(2*\$0.23))] = \$175

²²³ "In some locations, such as LAUS [LA Union Station] and San Francisco Transbay Transit Center, the parking charges are \$25 and contribute significantly to the overall cost of the trip. . . As with air travel, both an access fee and an egress fee ranging from \$15 to \$31 round trip are part of the HST average total costs." See: p. 3.2-30 [PDF 261] of Final: Bay Area to Central Valley High-Speed Train (HST) Program Environmental Impact Report/ Environmental Impact Statement (EIR/EIS) Volume 1: Report, May 2008. Found at:

http://www.hsr.ca.gov/docs/programs/bay_area_eir/BayCValley08_EIR_finalHST_vol1.pdf.

²²⁴ See Table 2.2, p. 2-5 [PDF 25] of the California High-Speed Rail 2018 Business Plan, Ridership and Revenue Forecasting, Technical Support Document.

²²⁵ The Authority's 2018 Plan's SFTBT-or San Jose to LA Union/Anaheim fare was \$93. See Table 2.2 [PDF 25] of the 2018 Business Plan's Ridership and Revenue Forecasting, Technical Supporting Document. The average round-trip access+egress cost, suggested in the 2008 EIR/EIS, co-authored with the US DOT is \$23. The Total Travel Costs calculation for that round-trip would be \$209 [(\$93*2) + \$23].

lower per passenger Total Travel Costs of driving California's 2.9member family,²²⁶ a LAUS-SFTBT round-trip by HSR will cost \$34 more than driving that route alone. Using these and this paper's preceding facts, there will no logical reason to choose high-speed rail over Auto travel's cheaper Total Travel Cost on that and the vast majority of high-speed rail's routes.

6.4 HSR FOR CALIFORNIA MAY HAVE BEEN A BOLD VISION IN THE 1970s, BUT NOT FORTY YEARS LATER

– Unlike advancements in GPS-enabled directions and more-automated driving, high-speed rail is not a new or innovative travel mode: Japan's Shinkansen began operations fifty-four years ago, France's TGV's thirty-eight. By the late 1990s the limits of high-speed rail's competitive advantages over Auto and Air were well known, as the 2007 UIC/IUR diagram showed.

This paper has shown that whether a vision is old or new, 'the Devil is in the details.' The cold reality is that the California's high-speed rail's trains is neither a Total Travel Time nor a Total Travel Cost-efficient transport system for California – not even close. Future metro area congestion will still worsen, while Californians will 'do the math' and still travel by Auto or Air.

We have every reason to believe in the conclusions in this empirically-based paper: that even when False Phase 1 is completed, with high-speed rail being Total Travel Time competitive on about one in every five routes creates a derivative effect that about one in every five forecasted passengers is likely to show up in 2029-2040. If the project, or any Segment of it is built, there is little if any reason to believe that what voters were promised, and law requires, will be true.²²⁷

California will inherit the legacy of high-speed rail's operating bankruptcy. From its presently forecasted 2029 launch onward, this self-inflicted tragedy brought on by ignoring critics and public surveys²²⁸ will continue to 2040 and onward. It will not link, as AB3034 demands, San Francisco and Los Angeles' downtowns with ±200mph trains²²⁹ that provide ". . . long-distance commuters with a safe, convenient, affordable, and reliable alternative to driving."²³⁰ There is also little chance HSR will ever meet AB3034's statutory requirement to deliver passengers between the state's largest metropolitan centers in 2hours 40minutes or be operationally profitable.²³¹

.....

6.5 A PLEA FOR SANITY BEFORE CALIFORNIANS DISCOVER THE PROJECT IS TOO BUILT TO STOP, THEN TOO BIG TO FAIL – California's Legislature and Administration can choose to recognize the ugly realities this paper sheds light on and halt funding a series of already broken and to-be broken promises. Or, it can cynically follow the former Assembly Speaker's suggestion and continue ". . . digging a hole and

²²⁶ For California family size, see: https://www.census.gov/newsroom/releases/archives/2010_census/cb11-cn137.html

²²⁷ The Prop 1A ballot description said: "It's simple and fair—once completed, THE USERS OF THE SYSTEM PAY FOR THE SYSTEM. That's why taxpayer watchdog groups support Proposition 1A." See: Section 1:7, Prop 1A, Safe, Reliable High-Speed Passenger Train Bond Act, Rebuttal to Argument Against Proposition 1A. AB3034, Section 2704.08 (J) says: "The planned passenger service by the authority in the corridor or usable segment thereof will not require a local, state, or federal operating subsidy."

²²⁸ For several years the Public Policy Institute of California has said a majority of adults favor the high-speed rail project. This good 'headline' is manufactured by a 'push survey' seeking that answer. But if a respondent opposed the project, surveyors were told, "If oppose, ask: "What if the high-speed rail system cost less, would you favor or oppose building it?" If the survey had been unbiased, the surveyors would have been told to ask, "What if the high-speed rail system cost more, would you favor or oppose building it?" but PPIC didn't give surveyors that question. See: Californians and Their Government, A PPIC Statewide Survey, March 2018, both [PDF 14] and Q. 24 [PDF 27] Found at: <http://www.ppic.org/wp-content/uploads/s-323mbs.pdf>

²²⁹ Section 2704.04 (b) (2) of AB3034 defines what Phase 1 must be: "As adopted by the authority in May 2007, Phase 1 of the high-speed train project is the corridor of the high-speed train system between San Francisco Transbay Terminal and Los Angeles Union Station and Anaheim." It does not allow the Authority to by-pass that requirement without winning another statewide proposition.

²³⁰ AB3034 was named the Safe, Reliable High-Speed Passenger Train Bond Act for the 21st Century that "Provides long-distance commuters with a safe, convenient, affordable, and reliable alternative to driving and high gas prices." See AB3034, Ch. 267, p. 16 (or 91) [PDF 15]

²³¹ AB3034 Section 2704.08 (J) says, "The planned passenger service by the authority in the corridor or usable segment thereof will not require a local, state, or federal operating subsidy." AB3034, Section 2704.09 (b) (1) says: "Maximum nonstop service travel times for each corridor that shall not exceed the following: San Francisco-Los Angeles Union Station: two hours, 40 minutes."

make it so big, there is no alternative to coming up with the money to fill it in." ²³² If it chooses the later, Californians and their lawmakers will inherit the legacy of high-speed rail's bankruptcy. An operating subsidy, unacceptable to the high-speed rail project's foundation law, AB3034, should also be unacceptable to those that made the law.

The sadness of when these truths finally arrive in Sacramento will not only be the many billions of dollars squandered, or the lost livelihoods and heritage of thousands of the San Joaquin Valley residents; nor that California will become the brunt of jokes about the incompetence of liberal government, but an amplified legacy of distrust in the state government's competence and willingness to be truthful.

²³² *"If people knew the real cost from the start nothing would ever get approved. The idea is to get going. Start digging a hole and make it so big, there is no alternative to coming up with the money to fill it in."* Former Assembly Speaker Willie Brown SF Chronicle, July 28, 2013.

GLOSSARY OF TERMS USED IN THIS PAPER

False Phase 1 – We call the Authority’s Phase 1 a ‘False Phase 1’ because it does not conform to AB3034’s Section 2704 (b) (2) provision on Phase 1, *“As adopted by the authority in May 2007, Phase 1 of the high-speed train project is the corridor of the high-speed train system between San Francisco Transbay Terminal and Los Angeles Union Station and Anaheim.”* But the Authority has no intention of building AB3034’s Phase 1. In 2012 said it will do so only, *“If required, a Full Build option for Phase 1 could be completed by 2033 . . . for a cumulative cost of \$91.4 billion.”* See p. ES-14 [PDF 22] of the California High-Speed Rail Authority Revised 2012 Business Plan. Denying that AB3034 was its governing law, in 2012, the Authority’s Plan also said, *“If a decision is made in the future to construct the Phase 1 Full Build system, this would involve constructing fully dedicated high-speed rail infrastructure between San Jose and San Francisco and between Los Angeles and Anaheim.”* See p. 3-12 [PDF 92] of the California High-Speed Rail Authority Revised 2012 Business Plan. The Authority seems to think it can decide whether to build to the legal specification of Phase 1. No Legislature Act and no Ballot proposition allowed the Authority the right to equivocate.

HSR, Auto and Air Travel Wins – We ‘set a low bar’ when declaring HSR the ‘winner’ of all of a route’s riders; and a ‘high bar’ if declaring Auto or Air a ‘winner’.

- On a specific route, if HSR is either Total Travel Time OR Total Travel Cost more competitive than Auto and Air’s Total Travel Times or Total Travel Cost, i.e. faster or cheaper than Auto and Air travel, that route is a ‘win’ for HSR. [n.b. In practical terms we found no un-subsidized route where HSR was cheaper than driver-only Auto travel.]
- Conversely, only if Auto’s Total Travel Time and its Total Travel Cost is both quicker and cheaper than HSR’s is, that route is considered a ‘win’ for Auto
- Likewise, only if Air’s Total Travel Time and its Total Travel Cost is both quicker and cheaper than HSR’s, that route is considered a ‘win’ for Air

ORIGIN-DESTINATION REGIONS – Since 2009/2010 no one outside the Authority and its consultants has had access to origin-destination station boardings. Consequently, we can only know what the origins-destinations are for broadly-defined regions such as the LA Metro Area (SCAG), the SF Bay Area (MTC) or San Diego County (SANDAG). This ‘granulation’ of data gives a reasonable picture of ridership both inside and between the broadly-defined regions but does not let outsiders know the Authority’s assumptions on the boardings and discharging of passengers between specific high-speed rail stations. The five following are the regions used by the Authority

LA METRO AREA (SCAG) – The Southern California Association of Governments (SCAG) is the Metropolitan Planning Organization (MPO) of six of Southern California’s ten counties: Imperial, Los Angeles, Orange, Riverside, San Bernardino and Ventura.

SF BAY AREA (MTC) – MTC is the transportation planning, financing and coordinating agency for the nine-county San Francisco Bay Area. The counties are: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano and Sonoma

SAN DIEGO COUNTY (SANDAG) – San Diego County’s Metropolitan Planning Organization (MPO) is the San Diego Association of Governments.

SAN JOAQUIN VALLEY (SJV) – SJV is comprised of seven counties of all of San Joaquin and Kings counties, most of Stanislaus, Merced, and Fresno counties, parts of Madera and Tulare counties, and a majority of Kern County.

OTHER REGIONS – ‘Other Regions’ was broadly defined as: to/from the Monterey/Central Coast, To/From Far North, To/From W. Sierra Nevada. None of these have nearby high-speed rail stations. See: p. 3.2-25 [PDF 252] of the Final: Bay Area to Central Valley High-Speed Train (HST) Program Environmental Impact Report/ Environmental Impact Statement (EIR/EIS) Volume 1: Report, May 2008, at: http://www.hsr.ca.gov/docs/programs/bay_area_eir/BayCValley08_EIR_finalHST_vol1.pdf

OUTSIDERS – Persons or institutions that are not privy to the internal assumptions, data or algorithms used by the California High-Speed Rail Authority or its contractors and consultants. Specifically, Public Records Requests we made were often met with vague answers or supplied already known and used documents. More egregious were the responses cited that many describe as the ‘curtain’ the CHSRA hides behind, notably when Public Records requests for access to the data and assumptions actually used on ridership, revenues, O&M costs and profits, and the algorithms used for its computation, have been met with responses that say: *"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."* This type of response should not come from a state government that advertises its transparency.

Regions and Routes – Regions are the five geographic areas defined and used in CHSRA’s Ridership and Revenues documents, and in 2018 were shown on Table 5.3. The five are: SCAG (the Los Angeles Metropolitan Area or Southern California Association of Governments), MTC (the San Francisco Bay Area or the Metropolitan Transportation Commission), SANDAG (San Diego Association of Governments), SACOG (Sacramento Association of Governments) and the San Joaquin Valley (abbreviated herein as SJV). Routes are the paths traveled between a pair of cities (often called “city-pairs”). Two or more cities could be in the same Region (such as San Francisco and San Jose), or they could be in different Regions (such as San Francisco and Los Angeles)

RUN TIMES (FLIGHT TIMES) – Run Times are the rough equivalent of airline’s flight times. They are used by the Authority in its Ridership and Revenue, Technical Supporting Documents, Run Times is also equated to Line Haul Times or On-Board Times. Neither Run Times nor Flight Times include times (minutes) a train or an aircraft stops to discharge and board passengers, nor the access+egress times that form Total Travel Times.

SHORT INTRA-REGIONAL ROUTES – There are two types of Authority ridership claims from short routes; the Intra-Regional Route for four of the five Origin-Destination regions, and routes of less than 50miles (<50miles) only for SCAG and MTC starting in 2033. Both types of ridership claims violate the Authority and the US DOT/FRA rules. First, in 2016, CHSRA said, “. . . because high-speed rail is not as competitive in shorter-distance markets where autos are the dominant mode.” See p. 6-3 [PDF 39] of the California High-Speed Rail Authority, 2016 Business Plan, Ridership and Revenue Forecasting Final Technical Memorandum. Next in 2022 the Authority said, *"One hundred miles was chosen as the breakpoint for segmenting short distance from long-distance trips. This breakpoint was selected based upon an evaluation of the trip length frequency distributions for interregional trips for each trip purpose from the surveys along with judgment about behavior for short versus long trips. This value was also used in the past as the lower limit for long-distance trips in the 1995 American Traveler Survey (ATS) conducted by the U.S. Departments of Transportation and Commerce."* See p. 1-4 [PDF 14] of the California High-Speed Rail 2012 Business Plan Final Technical Memorandum – Ridership and Revenue Forecasting

Silicon Valley-Central Valley Period – This SV-CV Period is the period 2029-2032 when the High-Speed Rail system only operates with high-speed trains between Bakersfield and San Jose.

SUBSIDIZED AUTHORITY BUS RIDES – The 2029-2040 \$1.00 Authority Bus fares from, *"Stockton/Modesto/Denair/Merced/Fresno Amtrak to Madera"* are heavily subsidized. Example: Greyhound’s Madera-Stockton fare is \$28, not the Authority’s \$1.00. That citation also says *"\$10 from Sacramento, Elk Grove and Lodi to Madera"* meaning the \$10.00 one-way Sacramento-Merced Authority Bus fares are subsidized. For Authority fares, see p. 2-6 [PDF 26] of 2018 Business Plan, Ridership and Revenue Forecasting, Technical Supporting Document. Greyhound’s Sacramento-Merced fare cost \$29, not the Authority’s \$10 cited above. The Authority’s \$1.00 Merced-Madera fare would cost \$15 if on Greyhound. See: <https://www.greyhound.com/en/ecommerce/schedule>

TOTAL AUTO OPERATING COSTS – For 23¢ per mile as the total operating costs see Table 3.3, p. 3-4 [PDF 32] of the 2018 Business Plan’s Ridership and Revenue Forecasting, Technical Memorandum. More than eight years ago, the Authority admitted its fares will not be able to compete with cheaper driving costs. *"Train fares were assumed to be somewhere between the cost of driving and of taking an airplane or train"* See p. 64 [PDF 66] of the California High Speed Rail Authority: Report to the Legislature, December 2009 It also emphasized that its HSR trains cannot compete with the out-of-pocket costs of driving. *"Fare levels*

are assumed to be . . . well above the out-of-pocket cost of driving . . ." See: California High-Speed Rail Program Revised 2012 Business Plan, April 2012, page 5-11 [PDF 119].

TOTAL TRAVEL COSTS – Volume 1 Bay Area to Central Valley HST Final Program EIR/EIS of 2008, [pp. 3.2-28 [PDF 255], says "Passenger cost for this analysis means the total cost of the trip, including the cost of traveling to the airport or station, the airplane or train fare, and other associated expenses. . . All-day parking in downtown San Francisco or Los Angeles was set at \$25. As shown in the table, the door-to-door average perceived one-way cost per person for traveling between representative city pairs by highway range from \$40 to \$137 for total costs." Later, the same study, p. 3-2.30 [PDF 261] it says, "As with air travel, both an access fee and an egress fee ranging from \$15 to \$31 round trip are part of the HST average total costs." We could have quoted the Authority on one-way Total Travel Costs using \$137 or \$40 or \$31 as access+egress costs. We chose \$23, the average of \$15-\$31. Volume 1 is found at: http://www.hsr.ca.gov/Programs/Environmental_Planning/bay_area_2008.html

TOTAL TRAVEL TIME – The decade-old DOT/FRA-Authority report defined the metrics for competitiveness, "Total travel time includes the time spent getting to a station or an airport, waiting for the next scheduled train or flight, getting to the boarding area, checking and retrieving luggage, getting a rental car or taxi, and getting to the final destination." [See: p. 1-8 [PDF 79] of Volume 1 Bay Area to Central Valley HST Final Program EIR/EIS of May, 2008, at: http://www.hsr.ca.gov/Programs/Environmental_Planning/bay_area_2008.html

ACCESS+EGRESS TIMES – This paper uses the term 'access+egress times' to describe the time to get to an HSR station to on-board, then disembark from the train arrive at a final destination. In November 2011, ten months after its first meeting, the Ridership Technical Advisory Panel's (RTAP) Chair's presentation showed that HSR's SF-LA Total Travel Time was 231minutes. Subtracting AB3034's of 2hrs. 40minutes (160minutes) Run Time requirement leaves 71minutes, of access-egress time or round-trip access+egress times of 142minutes. See: PDF 47 of Polzin, Steven; Koppelman, Frank and Proussaloglou, Kimon: Forecasting Revenue and Ridership for High Speed Rail. High Speed Rail- Perspectives and Prospects, Fifth Annual William O. Lipinski Symposium on Transportation, November 14, 2011. Found at: <http://iti.northwestern.edu/publications/Lipinski/2011/Morning2.pdf>

UIC/IUR DIAGRAM – Iñaki Barron de Angoit, Director of High-Speed Rail at the International Union of Railways/UIC, presented this chart to the US Congress on April 19th 2007 See Mr. de Angoit's presentation [PDF 50-79] of 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://link.umsi.edu/portal/International-high-speed-rail-systems--hearing/wzsgylFIgjc/>. The Diagram is on page 26, and an enlarged copy is on our Web site as Appendix E. While the website has been taken down, the document, Library of Congress number, 9780160795497, is available for purchase through the Supt. of Docs., U.S. G.P.O., 2007.

UIC/IUR-DERIVED DIAGRAM – The UIC/IUR diagram, as we confirmed by an investigation of timetables, only refers to Run Times: i.e. it did not include access+egress times. It showed a gap between 0hours and 1.5hours, which when access+egress times are added gave Auto travel an advantage on routes up to ±125miles. Then instead of HSR market share against Air travel falling at "4 hrs. or less" as the title says, the share began a precipitous fall at 2.5hours or ±400miles. This decline in market share at higher mileage would be even more precipitous if access+egress times had been shown. Though our empirical data investigations, we found that routes up to ±125miles Auto travel was always quicker than HSR travel, mainly because Auto travel does not have to include access+egress time. We also found that routes >400miles were Air travel's forte. We use the term UIC/IUR-derived diagram to recognize the UIC/IUR's diagram, but to reflect the inclusion of access+egress times into the Total Travel Time equation.