ANALYSIS OF CALIFORNIA HIGH SPEED RAIL AUTHORITY'S

RIDERSHIP/REVENUE AND PROJECTED CASH FLOW

Draft 2016 Business Plan
and
Technical Supporting Document

March 9, 2016 Revised March 28, 2016
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ABSTRACT

On February 18, 2016, the California High Speed Rail Authority (CHSRA) released its draft 2016 Business Plan (2016 Draft BP), which is comprised of several documents, including *Ridership and Revenue Forecasting* and *High, Medium and Low Cash Flows*. These documents are vital in convincing private investors to provide equity capital for the venture as soon as possible so that the California State Legislature can approve the sale of the $9 billion in bonds to help fund the $64.2 billion project. CHSRA is in a catch-22: They need the Prop 1A bond money to build the system to attract private investors but in order to be in compliance with Prop 1A, they need private investors to issue the bonds to build the system. The ridership revenue projections and cash flow models must provide enough of a return on investment to assuage potential private investors' fears and persuade them to invest. This analysis suggests the CHSRA has exercised liberties in inflating the 2016 Draft BP revenue numbers in order to achieve this goal.

EXECUTIVE SUMMARY

CHSRA has essentially turned their statewide high-speed train into a high-cost commuter train for the revised IOS although few people could afford it (a commuter from Fresno to San Jose would spend $27,000 annually on train fare).

When dissected, the 2016 Draft BP's first year of operation breaks down to 11,233 (high), 7,794 (medium), and 6,027 (low) passengers riding *daily* within the IOS that runs from one metropolitan area (San Jose) to the agricultural Central Valley. CHSRA's "high scenario" is claiming that their initial operating system with one terminus station in Shafter, population of 17,000, will service more passengers than Bob Hope Airport, a regional airport that covers the entire U.S. It serviced 5,400 inbound and 5,479 outbound daily passengers in 2015.

Average ridership increases from the 2014 BP to the 2016 Draft BP range from 22% to 29%--double-digit increases--with no legitimate explanation. CHSRA merely states, "Forecasts reflect an enhanced travel demand model."

The ridership farce flows through to its cash flow projections. There is no explanation why the 2016 Draft BP net cash flow increased 66% to 132% over the 2014 BP. It is even loftier based on a 5% discounted cash flow, ranging from 83% to 150%. While the 2014 BP includes the capital cost as part of it cash flow, it is suspiciously absent from the 2016 Draft BP's cash flow projection.

If CHSRA actually meets their incredibly aggressive ridership targets, they will be forced to purchase and operate more train sets at a cost of $49 million each beyond the budgeted 70 at full build-out.

It is clear that in CHSRA's desperation, they inflated their ridership/revenue figures in order to present a picture of fiscal viability to (1) prospective investors and (2) taxpayers.

INTRODUCTION

The *Ridership and Revenue Forecasting* is a very statistical, and difficult to follow document. It was prepared by Cambridge Systematics, Inc., a transportation modeling and analytics firm for Parsons Brinckerhoff. Rather than using straight-forward and verifiable traditional financial forecasting models, it instead relied exclusively on multiple input variables through multiple regression analyses; the last step was running the data through a simulation program 50,000 times. These tools, while helpful, only add to the convoluted ridership and resultant revenue figures that became the basis for the cash flow document. While probabilities can be useful, it is similar to forecasting the weather. If there is a 30% chance of rain, the end result ultimately is that it either rained or it didn't. The same can be said for the revenue and ridership projections. Even if there is a 95% chance that the project will achieve break-even or surplus in any given year: either it will – or it won't.

Operating revenue is the backbone of every company. Every company at minimum is measured by its revenue, profit and cash flow. It uses these key ratios to compare its own earnings year over year, and to other companies within the same industry. If any of these items are deficient or trending downwards, a company cannot sustain its operations and will eventually be faced with the daunting and difficult decision of how to proceed. The most immediate strategy is to reduce expenses but if this solution is insufficient, a company may seek a buyer, merge with another company, declare bankruptcy, or in the worst case, go out of business.

CHSRA is not a privately held company, but instead is a governmental agency that is managing the construction of the largest infrastructure project in the history of the United States and is not held to the rigorous universally accepted accounting standards imposed in private industry. There are other governmental public works projects, such as freeways, road and bridges, that are also not subject to profit and loss or cash flow measurements as they provide the infrastructure for others to utilize. There are, however, other projects' whose operations are sustained by user fees, for example water reclamation plants, power plants, etc. These projects intend to be self-sustaining and have the ability to raise rates in order to cover their costs. Most public works projects during the construction phase are funded in large part by debt (bonds) and are subject to reporting requirements in order to maintain their bond rating and other compliance issues. For CHSRA to successfully complete the high-speed train project, it must present positive cash flow, otherwise: (1) it cannot attract private investment dollars to assist the funding of construction; (2) without these private investment dollars, it also cannot unlock the balance of the $9 billion in Prop 1A bonds in order to fund construction; and (3) it will be unable to sell the concession once the infrastructure is built. It is also required to provide matching funds for several federally funded grants and could potentially lose several billion dollars if it fails to meet its deadlines. If any of these criteria are not met, the project is doomed.

PURPOSE

The purpose of this report is to scrutinize the 2016 Draft BP's ridership revenue and resultant cash flow projections while also attempting to answer the following questions:

1. Are the ridership (number of passengers) projections attainable and/or reasonable?
2. Are the ridership revenue projections attainable and/or reasonable?
3. Is the projected cash flow attainable and/or reasonable?

SCOPE AND METHODOLOGY

The 2016 Draft BP is comprised of several documents:

- Connecting and Transforming California (100 pages, main document)
- Capital Cost Basis of Estimate Report (49 pages)
- High, Medium, Low Cash Flows (12 pages)
- 50-Year Lifecycle Capital Cost Model Documentation (74 pages)
- Service Planning Methodology (18 pages)
- Ridership and Revenue Forecasting (62 pages)

This analysis examines the revenue portion of the *Connecting and Transforming California*, *Ridership and Revenue Forecasting*; and *High, Medium, Low Cash Flows*. This report will not address the Initial Operation Section Extended because it is contingent upon CHSRA securing additional federal funding to complete.

DRAFT 2016 BUSINESS PLAN CORRIDOR SUMMARY

Section	Length in Miles	From/To	Operational	Cumulative Cost (billions) 2015$ / YOE[1]
IOS[2]	250	San Jose and North of Bakersfield (aka Valley to Valley/ Silicon Valley to Central Valley)	2025	$18.7 / $20.7
Initial Operation Section Extended	321	San Francisco to Bakersfield (aka Valley to Valley Extension/ Silicon Valley to Central	2025	Unk / $22.7

[1] Year of Expenditure, adjusted for future inflation

[2] Formerly was Merced to San Fernando Valley

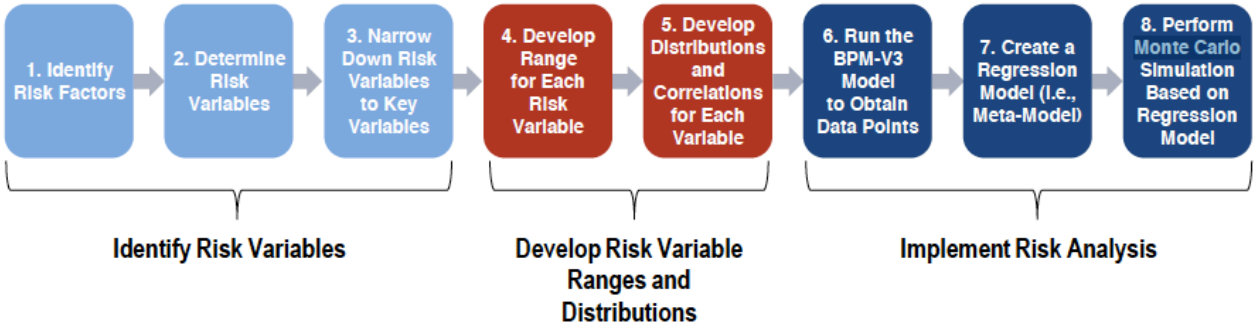
		Valley Extension)		
Phase 1	***520***	***San Francisco/Merced to Anaheim***	***2029***	***$55.3 / $64.2***
Phase 2	280	Merced to Sacramento; Los Angeles to San Diego		

2014 ADOPTED BUSINESS PLAN CORRIDOR SUMMARY

Section	Length in Miles	From/To	Operational	Cumulative Cost (billions) YOE
IOS	300	Merced to San Fernando Valley	2022	$31
Bay to Basin	410	San Jose and Merced to San Fernando Valley	2026	$51
Phase 1 Blended	***520***	***San Francisco to Los Angeles/Anaheim***	***2028***	***$68***

CHSRA utilized a very complex methodology to arrive at their ridership, revenue, and cash flow estimates as illustrated in Figure 7.1. Although it appears to be a very comprehensive approach, the problem is that it is over-complicating the process and over calculating by averaging averages. The final process, the Monte Carlo Simulation, was run 50,000 times. It is unclear whether or not CHSRA or its contractor, Cambridge Systematics, Inc., kept running the simulation until they came up with projections that met their goals or whether 50,000 is considered a standard number of times to run the simulation model.

Figure 7.1 Risk Analysis Approach



The 2016 Draft BP contains projections in 2015 dollars (2015$) and Year of Expenditure dollars (YOE$)[3]. For easy comparison and familiarity to today's travel fares, unless otherwise stated,

[3] The familiar $64.2 or $68 billion figure for capital costs is in YOE$

this report uses 2015$ instead of YOE$. CHSRA uses two sets of forecasts and cost estimates below:

- Silicon Valley to Central Valley line – (Valley to Valley) - One scenario assumes that operations begin on the Silicon Valley to Central Valley line from San Jose to a station north of Bakersfield in 2025 (construction completed in 2024) and on the entire Phase 1 system from San Francisco and Merced to Los Angeles and Anaheim in 2029.

- Silicon Valley to Central Valley Extension (not included in the scope of this study) - A second scenario runs from Silicon Valley to Central Valley to San Francisco and Bakersfield. This scenario also assumes operations starting in 2025 and the Phase 1 system opening in 2029. Together these extensions would provide a one-seat ride from Bakersfield to San Francisco. Because this scenario is dependent upon securing additional funding, it is not examined in this report.

Ridership and revenue forecasts in the 2016 Draft BP reflect an "enhanced" travel demand model and changes to some key assumptions. There are several key differences between the forecasts presented in the 2014 BP and the forecasts presented in the 2016 Draft BP including:

- The 2016 Draft BP assumes that service will start on the line from San Jose to north of Bakersfield (to an interim facility that functions as a temporary station) and evaluates an additional scenario extending service to San Francisco and Bakersfield that had not been analyzed in the 2014 BP (not within the scope of this report). It also assumes a Phase 1 system that offers a one-seat ride to Anaheim; ridership and revenue forecasts in the 2014 BP assumed a Phase 1 southern terminal in Los Angeles.

- Forecasts reflect an "enhanced" travel demand model that incorporates the latest available input data, new variables that better reflect travel behavior and adjustments to the transit access network and station locations.

VALLEY TO VALLEY MAP

Figure 3.1 Silicon Valley to Central Valley Line

PROJECTED HIGH SPEED TRAIN FARES AND REVENUE

While other comparisons were utilized in order to estimate projected fares, airfare prices were the governing basis and CHSRA used 77% to 80% of these current prevailing airfare prices within or close to the same travel corridors. The following chart contains the presumed fares in 2015 dollars. Although the IOS is actually "North of Bakersfield," the following chart has no fare for this as a terminus station[4]. According to Table 3.1, for the IOS, a one-way fare from San Jose ranges from a low of $19 (Gilroy) to a high of $83 (Bakersfield).

[4] This will be a temporary station

Table 3.1 Assumed High-Speed Rail Fares

2015 Dollars

High-Speed Rail Stations	San Francisco (Transbay)	Millbrae	San Jose	Gilroy	Merced	Fresno	Kings/Tulare	Bakersfield	Palmdale	Burbank Airport	Los Angeles Union Station	Gateway Cities/ Orange County	Anaheim
San Francisco (Transbay)		$18	$23	$25	$59	$70	$78	$89	$89	$89	$89	$89	$89
Millbrae			$20	$24	$59	$70	$77	$89	$89	$89	$89	$89	$89
San Jose				$19	$56	$63	$68	$83	$89	$89	$89	$89	$89
Gilroy					$52	$59	$65	$78	$89	$89	$89	$89	$89
Merced						$45	$52	$67	$85	$86	$89	$89	$89
Fresno							$40	$56	$74	$75	$78	$81	$84
Kings/Tulare								$51	$67	$68	$74	$76	$78
Bakersfield[9]									$51	$52	$56	$58	$60
Palmdale										$32	$33	$34	$36
Burbank Airport											$27	$30	$32
Los Angeles Union Station												$27	$30
Gateway Cities/ Orange County													$27
Anaheim													

Source: Cambridge Systematics, Inc.

The following is the projected revenue that was used to calculate average fares. For example, year 2025: $255,000,000 (revenue) divided by 4,100,000 (ridership) = $62.20.

FAREBOX REVENUE: SAN JOSE - NORTH OF BAKERSFIELD (2015 dollars)

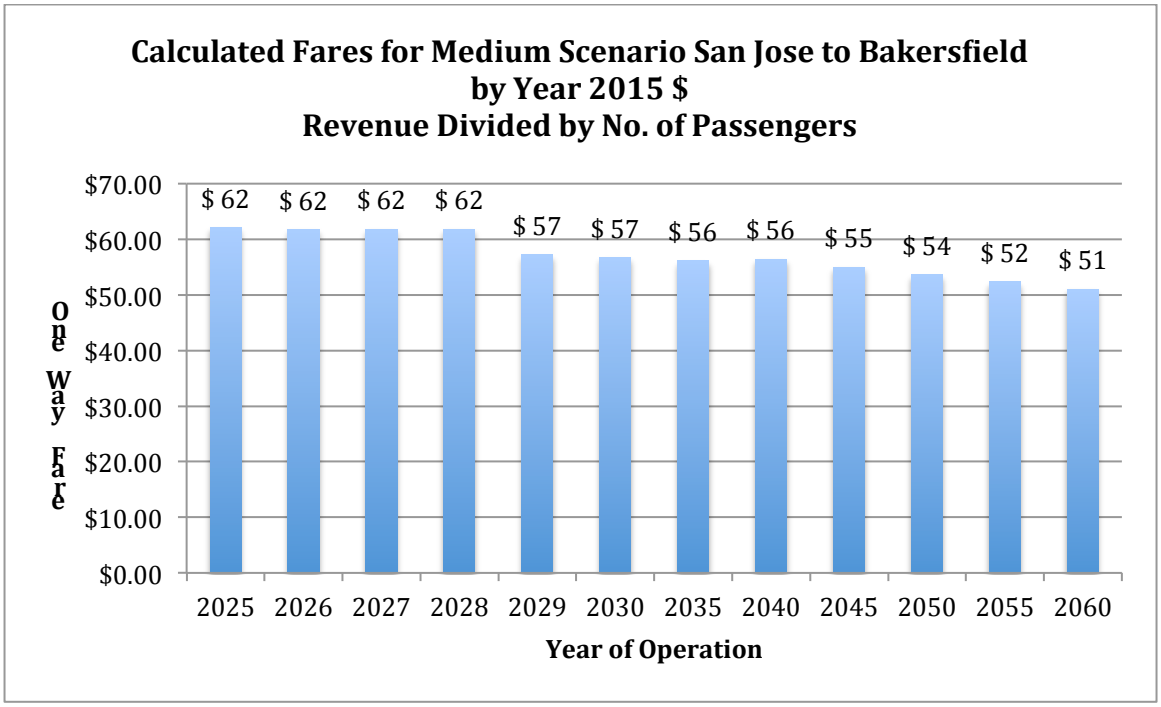
(SILICON VALLEY TO CENTRAL VALLEY LINE) THROUGH PHASE 1 (IN MILLION OF 2015 $)

	2025 VALLEY TO VALLEY	2026 VALLEY TO VALLEY	2027 VALLEY TO VALLEY	2028 VALLEY TO VALLEY	2029 PHASE 1	2030 PHASE 1	2035 PHASE 1	2040 PHASE 1	2045 PHASE 1	2050 PHASE 1	2055 PHASE 1	2060 PHASE 1
High	$255	$351	$447	$543	$1,460	$1,793	$2,927	$3,139	$3,218	$3,299	$3,383	$3,468
Medium	$180	$247	$315	$383	$1,098	$1,360	$2,250	$2,413	$2,474	$2,537	$2,601	$2,666
Low	$140	$193	$246	$299	$859	$1,064	$1,761	$1,889	$1,936	$1,985	$2,035	$2,087

When backing into an average fare based on total revenue and ridership, the average fare comes to around $62 for the IOS (2025 through 2028). This implies that Fresno would be the most common origin or destination. As the years progress, the fare prices trend downwards, meaning that more passengers are opting for shorter routes. There are several station-to-station permutations that fall within $50 - $57 fare range.

AVERAGE TICKET PRICE (CALCULATED: RIDERSHIP DIVIDED BY REVENUE)

	2025 VALLEY TO VALLEY	2026 VALLEY TO VALLEY	2027 VALLEY TO VALLEY	2028 VALLEY TO VALLEY	2029 PHASE 1	2030 PHASE 1	2035 PHASE 1	2040 PHASE 1	2045 PHASE 1	2050 PHASE 1	2055 PHASE 1	2060 PHASE 1
High	$62.20	$61.58	$61.23	$61.01	$56.37	$55.86	$55.02	$55.26	$53.90	$52.62	$51.34	$50.04
Medium	$62.07	$61.75	$61.76	$61.77	$57.19	$56.67	$56.11	$56.38	$54.98	$53.64	$52.33	$50.98
Low	$63.64	$62.26	$63.08	$62.29	$57.65	$57.20	$56.62	$56.90	$55.47	$54.09	$52.86	$51.53



Since there is limited air service between many of the cities, the train would fill that gap, however, at a relatively high cost when compared to taking a bus or driving. While conventional trains are also an alternate mode of transportation, they are not addressed.

RIDERSHIP VOLUME

The 2016 Draft BP uses three scenarios for ridership: high, medium and low, starting in 2025. Phase 1 (San Francisco to Anaheim) becomes operational in 2029. In each scenario, the annual increase in ridership is aggressive through 2035. From 2025 to 2028, the average annual increase over the prior year ranges from 22% to 41%. Then, in 2029 when Phase 1 becomes operational, the increase over 2028 ranges from 191% to 210%.

RIDERSHIP: SAN JOSE - NORTH OF BAKERSFIELD
(SILICON VALLEY TO CENTRAL VALLEY LINE) THROUGH PHASE 1 (IN MILLIONS OF RIDERS)

	2025	2026	2027	2028	2029	2030	2035	2040	2045	2050	2055	2060
	VALLEY TO VALLEY	VALLEY TO VALLEY	VALLEY TO VALLEY	VALLEY TO VALLEY	PHASE 1	PHASE 1	PHASE 1*	PHASE 1*	PHASE 1*	PHASE 1*	PHASE 1*	PHASE 1*
High Ridership	4.1	5.7	7.3	8.9	25.9	32.1	53.2	56.8	59.7	62.7	65.9	69.3
Yrly Increase in volume		1.6	1.6	1.6	17.0	6.2	4.2	0.7	0.6	0.6	0.6	0.7
Increase in %		39%	28%	22%	191%	24%	13%	1%	1%	1%	1%	1%
Medium Ridership	2.9	4.0	5.1	6.2	19.2	24.0	40.1	42.8	45.0	47.3	49.7	52.3
Yrly Increase in volume		1.1	1.1	1.1	13.0	4.8	3.2	0.5	0.4	0.5	0.5	0.5
Increase in %		38%	28%	22%	210%	25%	13%	1%	1%	1%	1%	1%
Low Ridership	2.2	3.1	3.9	4.8	14.9	18.6	31.1	33.2	34.9	36.7	38.5	40.5
Yrly Increase in volume		0.9	0.8	0.9	10.1	3.7	2.5	0.4	0.3	0.4	0.4	0.4
Increase in %		41%	26%	23%	210%	25%	13%	1%	1%	1%	1%	1%

*divided by 5 due to projection changing from annual to every 5 years

The daily ridership seems unattainable, especially in the "High" scenario. CHSRA asserts that over 11,000 passengers will ride the IOS the first year of operation, increasing to nearly over 24,000 by year 2028. When Phase 1 becomes operational, their estimate soars to almost 71,000 daily passengers.

In comparison, Bob Hope Airport served nearly 2 million outbound passengers (5,479 per day) and nearly 2 million inbound (5,400 per day) for 2015. CHSRA is claiming that it will serve more passengers in its first year of operation for a segment that is only 250 miles long and only serves one metro area (San Jose). The other terminus station isn't even in Bakersfield—it is 20 miles north of Bakersfield in the town of Shafter, population of 17,000. In contrast, Bob Hope Airport is a regional airport with service to the entire country, including Hawaii and Alaska.

RIDERSHIP IN MILLIONS

	VALLEY TO VALLEY	VALLEY TO VALLEY	VALLEY TO VALLEY	VALLEY TO VALLEY	PHASE 1	PHASE 1	PHASE 2	PHASE 3	PHASE 4	PHASE 5	PHASE 6	PHASE 7
Scenario	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2035**	**2040**	**2045**	**2050**	**2055**	**2060**
High	4.1	5.7	7.3	8.9	25.9	32.1	53.2	56.8	59.7	62.7	65.9	69.3
Medium	2.9	4.0	5.1	6.2	19.2	24.0	40.1	42.8	45.0	47.3	49.7	52.3
Low	2.2	3.1	3.9	4.8	14.9	18.6	31.1	33.2	34.9	36.7	38.5	40.5

RIDERSHIP PER DAY (WEEKDAYS AND WEEKENDS)

Scenario	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2035**	**2040**	**2045**	**2050**	**2055**	**2060**
High	11,233	15,616	20,000	24,384	70,959	87,945	145,753	155,616	163,562	171,781	180,548	189,863
Medium	7,945	10,959	13,973	16,986	52,603	65,753	109,863	117,260	123,288	129,589	136,164	143,288
Low	6,027	8,493	10,685	13,151	40,822	50,959	85,205	90,959	95,616	100,548	105,479	110,959

How do these ridership estimates compare to the ridership estimates in the 2014 BP? In order to compare apples to apples, this analysis will examine Phase 1 because both business plans have Phase 1 running from San Francisco to Anaheim and covering 520 miles. In order to be further comparable, the "matching" is based on year of operation, not calendar year.

2016 Draft Business Plan Ridership Estimates (Millions) - PHASE 1									
Operation Year No.	**Year 1**	**Year 2**	**Year 7**	**Year 12**	**Year 17**	**Year 22**	**Year 27**	**Year 32**	**Average**
Year of Operation	**2029**	**2030**	**2035**	**2040**	**2045**	**2050**	**2055**	**2060**	
High Ridership	25.9	32.1	53.2	56.8	59.7	62.7	65.9	69.3	**53.2**
Medium Ridership	19.2	24.0	40.1	42.8	45.0	47.3	49.7	52.3	**40.1**
Low Ridership	14.9	18.6	31.1	33.2	34.9	36.7	38.5	40.5	**31.1**

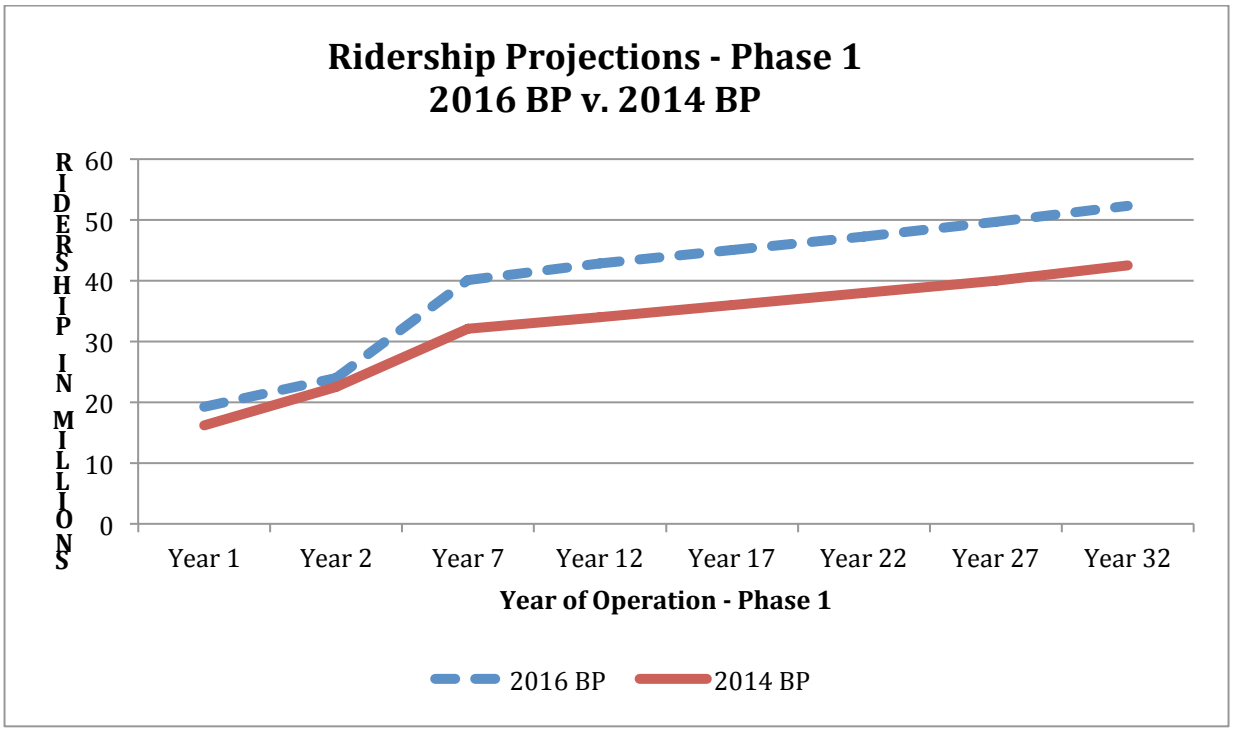
2014 Adopted Business Plan Ridership Estimates (Millions) - PHASE 1									
Operation Year No.	**Year 1**	**Year 2**	**Year 7**	**Year 12**	**Year 17**	**Year 22**	**Year 27**	**Year 32**	**Average**
Year of Operation	**2028**	**2029**	**2034**	**2039**	**2044**	**2049**	**2054**	**2059**	
High Ridership	23.0	28.0	41.4	44.9	47.0	49.5	52.0	54.9	**42.6**
Medium Ridership	16.2	22.5	32.1	34.0	36.0	38.0	40.0	42.5	**32.7**
Low Ridership	13.0	12.5	24.1	26.0	27.0	28.0	30.0	31.9	**24.1**

Change in Ridership Figures (Millions) 2016 versus 2014 - PHASE 1									
	Year 1	**Year 2**	**Year 7**	**Year 12**	**Year 17**	**Year 22**	**Year 27**	**Year 32**	**Average**
Year of Operation 2016	**2029**	**2030**	**2035**	**2040**	**2045**	**2050**	**2055**	**2060**	
Year of Operation 2014	**2028**	**2029**	**2034**	**2039**	**2044**	**2049**	**2054**	**2059**	
High Ridership	2.9	4.1	11.8	11.9	12.7	13.2	13.9	14.4	**10.6**
2016 +/- 2014 %	13%	15%	29%	27%	27%	27%	27%	26%	**24%**
Medium Ridership	3.0	1.5	8.0	8.8	9.0	9.3	9.7	9.8	**7.4**
2016 +/- 2014 %	19%	7%	25%	26%	25%	24%	24%	23%	**22%**
Low Ridership	1.9	6.1	7.0	7.2	7.9	8.7	8.5	8.6	**7.0**
2016 +/- 2014 %	15%	49%	29%	28%	29%	31%	28%	27%	**29%**

With no plausible explanation except for the word "enhanced," the 2016 Draft BP increased its ridership figures over the 2014 BP for Year 1 of operation by 2.9 million, 3 million, and 1.9 million for the high, medium, and low scenarios respectively. The average increase ranges from 22% (medium scenario) to 29% (low scenario) (note that these are done in 5 year increments with the exception of years 1 and 2).

The increase in daily ridership for 2016 Draft BP over 2014 BP is aggressive. Even the "low scenario" of an increase of 5,205 is nearly the same number of Bob Hope Airport's daily outbound passenger figure of 5,479.

Change in Ridership Figures 2016 versus 2014 - PHASE 1 DAILY									
Operation Year No.	**Year 1**	**Year 2**	**Year 7**	**Year 12**	**Year 17**	**Year 22**	**Year 27**	**Year 32**	**Average**
Year of Operation	**2028**	**2029**	**2034**	**2039**	**2044**	**2049**	**2054**	**2059**	
High Ridership	7,945	11,233	32,329	32,603	34,795	36,164	38,082	39,452	**29,075**
Medium Ridership	8,219	4,110	21,918	24,110	24,658	25,479	26,575	26,849	**20,240**
Low Ridership	5,205	16,712	19,178	19,726	21,644	23,836	23,288	23,562	**19,144**



According to CHSRA's incredible ridership projections, it would not have enough trains to satisfy demand. The 2016 Draft BP states it will have 70 trains at full build-out, which is consistent with the number of trains per hour during peak (3 hours in the morning and 3 hours in the evening) and non-peak (10 hours). According to the Request For Expressions of Interest (RFEI) for train sets, each train must have a minimum of 450 passenger seats.

RIDERSHIP PER DAY (WEEKDAYS AND WEEKENDS)												
Scenario	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2035**	**2040**	**2045**	**2050**	**2055**	**2060**
High	11,233	15,616	20,000	24,384	70,959	87,945	145,753	155,616	163,562	171,781	180,548	189,863
Medium	7,945	10,959	13,973	16,986	52,603	65,753	109,863	117,260	123,288	129,589	136,164	143,288
Low	6,027	8,493	10,685	13,151	40,822	50,959	85,205	90,959	95,616	100,548	105,479	110,959
No. of Runs	44	44	44	44	196	196	196	196	196	196	196	196

Passengers per train												
High	255	355	455	554	362	449	744	794	834	876	921	969
Medium	181	249	318	386	268	335	561	598	629	661	695	731
Low	137	193	243	299	208	260	435	464	488	513	538	566
% Train Capacity Based on 450 Seats per Train												
High	57%	79%	101%	123%	80%	100%	165%	176%	185%	195%	205%	215%
Medium	40%	55%	71%	86%	60%	75%	125%	133%	140%	147%	154%	162%
Low	30%	43%	54%	66%	46%	58%	97%	103%	108%	114%	120%	126%

To meet this astonishing demand, and assuming that each train has exactly 450 seats, additional train sets would need to be purchased at a cost of $49 million each. Not only will additional train sets have to be purchased, but also they will require additional recurring O&M including operating personnel expense. At an average fare of $57, it would require 860,000 tickets to pay for 1 train set, excluding recurring O&M.

Additional Number of Trains Needed to Satisfy Demand												
High	-	-	1	1	-	-	1	1	1	1	2	2
Medium	-	-	-	-	-	-	1	1	1	1	1	1
Low	-	-	-	-	-	-	-	1	1	1	1	1
Additional Capital Cost to Purchase Train Sets @ $49 million each (2015 $)												
High	$0	$0	$49	$49	$0	$0	$49	$49	$49	$49	$98	$98
Medium	$0	$0	$0	$0	$0	$0	$49	$49	$49	$49	$49	$49
Low	$0	$0	$0	$0	$0	$0	$0	$49	$49	$49	$49	$49

Comparison to Eurostar service from London to Paris. In 1996, London and Continental Railways (which have true expertise in forecasting ridership figures) predicted that passenger numbers would reach 21.4 million annually by 2004, 10 years after its opening in 1994, but only 7.3 million (34%) was achieved. This is particularly important to realize because, unlike the CHSRA high-speed train, the only transportation competition that the Eurostar has is air service. As airlines reduced their fares, the Eurostar had to reduce theirs in order to maintain competitive.

Only 2 of the 99 current high-speed lines in the world are fiscally self-sustaining, Tokyo-Osaka and Paris-Lyon, and they required considerable subsidies at the beginning.

WHO ARE THESE PASSENGERS?

CHSRA assumes that their passengers will include business travelers, commuters, and recreational travelers. The noted variables that affect ridership include auto operating costs, high-speed rail fares, frequency of service, bus connections, high-speed train station proximity to passengers' points of origin and destination, and airfares. CHSRA contends that the initial operating section from San Jose to North of Bakersfield[5] (Valley to Valley) will allow residents in the now affordable Central Valley to commute to jobs in Silicon Valley, providing them with a relatively short commute when compared to driving. It is true that travel time is greatly reduced, but it is an expensive mode of transportation for commuting. Additionally, once one arrives at his/her destination, additional transportation may be needed in order to get to one's place of employment. The time "savings" could be greatly reduced if the passenger has to endure additional time getting to/from the HSR station on either or both ends of their journey.

The following chart illustrates how much it would cost for a commuter to travel from/to San Jose to/from various stations along the Valley to Valley segment.

[5] 20 miles north of Bakersfield which means a passenger must somehow get there to catch a high-speed train

COST OF COMMUTING USING HIGH SPEED TRAIN - IOS

No. of weeks (assumes 2 vacation weeks/yr and 10 holidays/yr): 48

Round trip; assumes 10% discount for a pre-paid pass for monthly and annual[6]

San Jose to/from:	Gilroy	Fresno	Kings/Tulare	Bakersfield
Daily	$38	$126	$136	$166
Weekly	$190	$630	$680	$830
Monthly	$735	$2,438	$2,632	$3,212
Annually	$8,208	$27,216	$29,376	$35,856
Annual Median Income	$81,056	$45,201	$42,863	$48,574
After-tax	$71,329	$37,517	$35,576	$40,316
HSR Cost as % after tax	12%	73%	83%	89%

It becomes clear that using the high-speed train is *not* an affordable commute. It is possible that an employer would provide a commuting subsidy but that is outside the scope of this report. Let us further assume that the commuter who lives in the Central Valley is traveling to San Jose because he/she secured a higher paying job in Silicon Valley:

COST OF COMMUTING USING HIGH SPEED TRAIN – IOS – ASSUMING HIGH PAID JOB IN SILICON VALLEY

No. of weeks (assumes 2 vacation weeks/yr and 10 holidays/yr): 48

Round trip; assumes 10% discount for a pre-paid pass for monthly and annual

San Jose to/from:	Gilroy	Fresno	Kings/Tulare	Bakersfield
Daily	$38	$126	$136	$166
Weekly	$190	$630	$680	$830
Monthly	$735	$2,438	$2,632	$3,212
Annually	$8,208	$27,216	$29,376	$35,856
Annual Median Income*	$81,056	$93,854	$93,854	$93,854
After-tax	$71,329	$82,592	$82,592	$82,592
HSR Cost as % after tax	12%	33%	36%	43%

*Santa Clara County (Silicon Valley) median income for Central Valley commuters only; no adjustment for Gilroy

Even if commuters now earned a Silicon Valley salary, the high-speed train commute is still unaffordable for most commuters.

With the exception of to/from San Jose to/from Gilroy, a high-speed train will be faster than a bus or car[7] and it is doubtful that one would spend $19 one-way for a 33-mile trip:

[6] Not included in CHSRA documents but it is common to offer discounted passes for public transportation

[7] "Car" includes SUVs, trucks and other motorized vehicles

TRAVEL SAVINGS IN MINUTES BY USING HIGH SPEED TRAIN

San Jose to/from:	Gilroy	Fresno	Kings/Tulare	Bakersfield
Bus	9	173	344	435
Car	2	127	171	208

The main factor for choosing a high-speed train for transportation is how it compares in terms of cost, convenience, and time saved to other modes of transportation. CHSRA is attempting to schedule its service times to coincide with bus and conventional rail schedules so that passengers can link to these if they need to continue their travels beyond high-speed rail stations and/or to get to their final destination within a short distance of the high-speed train station.

It is uncertain if passengers would be willing to pay $83 each way ($53[8] more than driving) to/from Bakersfield to/from San Jose, and then deal with the inconvenience and additional cost of finding short-distance transportation from point of origin and again at the destination, to save less than 2 hours (and less than that if additional transportation is needed to travel to/from the high speed rail station).

San Jose to/from:	Gilroy	Fresno	Kings/Tulare	Bakersfield
HSR No. Minutes	32	72	93	128
Cost	$19.00	$63.00	$68.00	$83.00
Cost per Minute	*$0.59*	*$0.88*	*$0.73*	*$0.65*
Bus No. Minutes	41	205	376	467
Cost	$10.50	$33.00	$45.00	$55.00
Cost per Minute	*$0.26*	*$0.16*	*$0.12*	*$0.12*
Car	34	159	203	240
Cost	$4.00	$19.50	$24.50	$30.00
Cost per Minute	*$0.12*	*$0.12*	*$0.12*	*$0.13*
HSR Cost above in $				
Bus	$9	$30	$23	$28
Car	$15	$44	$44	$53
HSR Cost above %				
Bus	81%	91%	51%	51%
Car	375%	223%	178%	177%
HSR Cost Per Minute above in $				
Bus	$0.34	$0.71	$0.61	$0.53
Car	$0.48	$0.75	$0.61	$0.52
HSR Cost above %				

[8] This is on the high end, assuming peak prices for gasoline

San Jose to/from:	Gilroy	Fresno	Kings/Tulare	Bakersfield
Bus	132%	444%	511%	451%
Car	405%	613%	506%	419%

CASH FLOW ANALYSIS

The 2016 Draft BP's cash flow unashamedly excludes the capital investment/cost while the 2014 BP included it. Why? Simple: It scared off potential investors. At several community outreach meetings, CHSRA representatives stated that it does not include any investment cost as part of their return on investment (ROI) calculation; it is no wonder that CHSRA refuses to perform an ROI measured as an internal rate of return (IRR), as this is the result:

	IRR
High Revenue	0.64%
Medium Revenue	-1.18%
Low Revenue	-3.09%

Since the core reason for CHSRA to provide an attractive cash flow projection is to entice private investors to (1) become an equity partner during the construction phase and (2) to take over operations once the infrastructure has been completed, it is a certain project failure if that the cash flow projections fail to deliver satisfactory rates of return on investment.

According to CHSRA, even the "low" forecast will show positive cash flow from 2025 to 2060. The 2016 Draft BP cash flow projections also include ancillary revenue (1% of the total), which includes on-board sales, advertising, asset and right-of-way utilization and transit-oriented development opportunities[9]. Note that operation and maintenance (O&M) and capital replacement costs vary between the scenarios. It is presumed that the variance is due to the number of trains increasing or decreasing based on passenger demand.

2016 Draft Business Plan

Scenario	High	Medium	Low
Revenue in Millions	$100,572	$77,151	$60,376
Less: O&M	-$31,411	-$28,704	-$27,505
Net Cash Flow from Operations	$69,161	$48,447	$32,871
Capital Replacement	-$6,043	-$5,549	-$5,033
Net operating cash flow after Capital Replacement	**$63,118**	**$42,898**	**$27,838**
Breakeven or Profit Occurs	*2025*	*2027*	*2029*
Ancillary Revenue only	*$1,006*	*$772*	*$604*

[9] A type of community development that includes a mixture of housing, office, retail and/or other amenities integrated into a walkable neighborhood and located within a half-mile of quality public transportation.

In order to make a meaningful analysis, the 2016 Draft BP must be compared to the 2014 BP. Note that the 2014 BP *includes* the capital cost investment wherein the 2016 Draft BP *excludes* it.

2014 Business Plan-Adjusted to 2015$

Scenario	High	Medium	Low
Revenue in Millions	$82,359	$63,922	$47,650
Less: O&M	-$36,385	-$32,318	-$29,019
Net Cash Flow from Operations	$45,974	$31,604	$18,631
Capital Replacement	-$7,965	-$7,313	-$6,634
Net operating cash flow after Capital Replacement	**$38,009**	**$24,291**	**$11,998**
Breakeven or Profit Occurs w/o Capital Cost	*2022*	*2022*	*2024*
Capital Cost	-$57,239	-$57,239	-$57,239
Net Cash Flow After Capital Cost	**-$17,208**	**-$30,925**	**-$43,217**
Breakeven or Profit Occurs	*Never*	*Never*	*Never*

It is shocking to see that the 2016 Draft BP's revenue estimates range from $12.7 to $18.2 billion *higher* (22% to 27%) than the 2014 BP which was prepared *only two years previously*. The net operating cash flow ranges from nearly $16 to $25 billion higher (66% to 132%).

2016 Draft Business Plan +/- 2014 Business Plan

Scenario	High	Medium	Low
Revenue in Millions	$18,213	$13,229	$12,726
Less: O&M	$4,974	$3,614	$1,514
Net Cash Flow from Operations	$23,187	$16,843	$14,240
Capital Replacement	$1,922	$1,764	$1,601
Net operating cash flow after Capital Replacement	**$25,109**	**$18,607**	**$15,840**
2016 +/2014 Business Plan	**66%**	**77%**	**132%**
Breakeven or Profit Occurs	3 yrs later	5 yrs later	5 yrs later

Another useful measurement is to compare 2016 Draft BP to the 2014 BP in discounted cash flow or Net Present Value (NPV). This measurement takes into account the time value of money, based on the assumption that a dollar today is worth less than a dollar next year, the year after, and so on. For example, if two competing projects ultimately bring in $50,000, but one provides positive cash flow earlier, that is the better investment. Typically, assessing discounted cash flow is one of the items that potential investors examine in making a decision whether or not to invest in a project.

The following chart illustrates that CHSRA has inflated discounted its cash flow (assuming a 5% discount rate) for the 2016 Draft BP to the extent that is nearly double of that in the 2014 BP

(ranging from 83% to 150% [versus non-discounted 66% to 132%]). Assuming the "low scenario," it is no surprise that potential investors ran away from this project based on the 2014 BP. Their return would be a pitiful $4.3 billion (*excluding* their initial investment). If they had been foolish enough to invest $9 billion (matching the Prop 1A bond issue), they would have lost $4.6 billion ($9 billion minus $4.4 billion). Although the 2016 Draft BP is more palatable, the "low scenario" only returns a net $10.9 billion (again, excluding an initial investment).

Cash Flow NPV at 5% ($ in Millions)			
Scenario	**High**	**Medium**	**Low**
2016 Draft Business Plan NPV	**$24,745**	**$16,777**	**$10,869**
Non-Discounted 2016 Draft BP	*$63,118*	*$42,898*	*$27,838*
Cost of Time	*$38,373*	*$26,121*	*$16,969*
2014 Draft Business Plan NPV	**$13,533**	**$8,687**	**$4,355**
Non-Discounted 2016 Draft BP	$38,009	$24,291	$11,998
Cost of Time	*$24,476*	*$15,604*	*$7,643*
2016 Draft BP +/- 2014 BP	**$11,212**	**$8,089**	**$6,514**
2016 +/2014 Business Plan	**83%**	**93%**	**150%**

CONCLUSION

In order for the high-speed train project to survive, it is imperative that CHSRA demonstrate positive cash flow within a few short years of the start of operation to secure private investment—both as equity capital partners for construction and for operation of the train concession once construction is completed. CHSRA was shrewd to exclude the capital investment as part of their presentation, especially to potential investors, because the IRR ranges from .64% (high) to -3% (low). In order to achieve its goal, CHSRA has turned their high-speed train into a high-cost commuter train for the revised IOS. While on its face this appears to be a good strategy, the reality is that very few, if any, people could afford it (a commuter from Fresno to San Jose would spend $27,000 annually on train fare). The average one-way fare of $62 skews close to the San Jose and Fresno route fare of $63 and supports the "commuter train" designation. Then as Phase 1 comes online, the calculated fares trend downwards, meaning that the bulk of ridership will be for shorter trips as time progresses.

CHSRA has omitted some key inputs, for example, excluding passenger fares in Table 3.1 for San Jose to North of Bakersfield that is part of the IOS. Also, some of their assumptions are inconsistent between the figures published in the *Ridership and Revenue Forecasting* document and their main 2016 Draft BP document.

CHSRA utilized a convoluted methodology to arrive at its ridership and revenue projections. Incorporating key input variables, using multiple regression analysis, and then running a Monte Carlo simulation 50,000 times in order to arrive at its ridership, revenue, and resultant cash flow, the financial models' components become nearly impossible to scrutinize. It is hubris to believe that in year 1 of operation that 11,233 (high), 7,794 (medium), and 6,027 (low)

passengers will ride *daily* within the IOS which runs from one metropolitan area (San Jose) to the Central Valley, California's agricultural area.

Average ridership increases from the 2014 BP to the 2016 Draft BP range from 22% to 29%--double-digit increases--with no legitimate explanation. CHSRA merely states, "Forecasts reflect an enhanced travel demand model."

The farce continues to its cash flow projections. There is no reasonable explanation as to why the 2016 Draft BP net cash flow (after capital replacement but excluding capital investment) increased from 66% to 132% over the 2014 BP. On a discounted cash flow basis, the increase is even larger: 83% to 150%.

If CHSRA meets their projected ridership targets, they will have to purchase and operate more train sets[10] beyond the budgeted 70 at full build-out to meet their incredible passenger demand. These additional train sets require increased operating costs for O&M, including employees' salaries, benefits, etc.

In conclusion, in CHSRA's desperation, they inflated their ridership/revenue figures in order to present a picture of fiscal viability of the high-speed train project to potential private investors and taxpayers.

[10] The RFEI for train sets specifies a minimum of 450 passenger seats per train

HIGH-SPEED RAIL SYSTEM MAP