APPENDIX A 3.1.1

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

EXECUTIVE SUMMARY

COMPARING ACTUAL AND FORECASTED RIDERSHIP ON AMERICA'S ONLY OPERATING HIGH-SPEED RAIL (HSR) SYSTEM WITH CALIFORNIA'S PROPOSED HSR SYSTEM'S PROPOSED RIDERSHIP

Analyses of Acela's comparative advantages to capture riders over a larger, more populated Northeast Corridor (NEC) show that Acela's market is – and probably will continue to be – 50% larger than California's (60Million vs. 39Million) and that Acela-served cities have population densities 50% greater than those the Authority's train is projected to serve – a distinct advantage when busses, subways, trolleys etc. 'feed' passengers into or from Acela stations.

But in Acela's 18 years of service, with 61% of its passengers traveling on business, most-likely passing on their travel costs to their company or clients, profitable Acela's ridership has 'topped out' out at about ±3.5Million/year.

But as the adjacent chart, Figure A1 shows, Acela management thinks it can increase ridership nearly-tenfold in twenty-two years.[1] But that ambition pales when compared with the Authority's forecast to go from no operations with no passengers in 2028 to

Figure A1 – Ridership Forecasts By Acela and CA High-Speed Rail Authority 20011-2040

14.4Million riders a year later, 36.2Million in five years and 40Million riders[2] in 11 years!

These facts should have tempered the Authority's ridership forecasts. They didn't. In addition, the significant differences between the urban structures and densities of the high-speed rail corridors of Spain and California have been ignored. In section A2.3 of this paper, a third-party publication highlights these dramatic differences.

Defying the lessons behind Acela's success in attracting about ±3.5Million annual riders and those of both California's urban geography and its self-imposed encumbrances on competitive travel times will bring the Authority far fewer riders than forecasted and create painful and never-ending financial consequences for California.
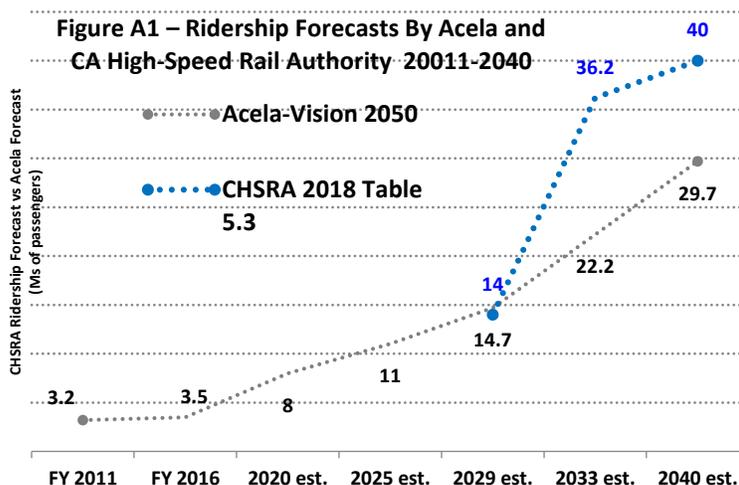
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[1] See: Amtrak Vision for the Northeast Corridor – 2012 Update Report (July 2012), found at
https://www.amtrak.com/ccurl/453/325/Amtrak-Vision-for-the-Northeast-Corridor.pdf.
[2] See Table 5.3, p. 5-6 [PDF 42] of the 2018 Plan's Ridership and Revenue Forecasting, Technical Supporting Document.

COMPARING ACTUAL AND FORECASTED RIDERSHIP ON AMERICA'S ONLY OPERATING HIGH-SPEED RAIL (HSR) SYSTEM WITH CALIFORNIA'S PROPOSED HSR SYSTEM'S FORECASTED RIDERSHIP

Acela's financial performance is an open book. The US Department of Transportation (DOT) publicly posts the USA's only high-speed rail systems' Generally Accepted Accounting Principles (GAAP) financial performance. The data and calculations behind California High-Speed Rail Authority's financial performance's metrics – ridership, revenue, operating and maintenance costs – are closed to the public. The State has 'weaponized' to its advantage the information behind the Authority's claims of not needing an operating subsidy, and requests for those metrics are met with statements of such information being proprietary.[3]

In 2009, a year after the voters approved a state bond issue with the requirement that the CA high-speed rail system be operationally profitable,[4] the Authority (CHSRA) recognized Acela as a profitable high-speed rail service and did so again in 2016.[5] That year, it also knowingly ignored the Pew Charitable Trust's important findings on Acela's profit.[6] While its Peer Review Group (PRG) said Acela was the HSR system most akin to the Authority's,[7] and six years ago (2012) we showed that Acela's per mile fares and O&M costs are several multiples of the Authority's,[8] the Authority spurned Acela as a model for its HSR system's potential to be legal and financially sustainable. This appendix outlines some lessons the Authority should have learned before starting construction in 2013/2014.

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A1.0 THE COMPOSITION OF ACELA'S MARKET IS FAR MORE CONDUCIVE TO ATTRACTING HIGH-SPEED RAIL PATRONS THAN THE CALIFORNIA' TRAINS – Because high-speed rail (HSR) trains operate more effectively when they serve large, concentrated urban populations, Acela's Boston-WDC route is only one of two or three HSR routes that are profitable in the world.[9] Because California's high-speed rail will confront much the same challenges to attracting enough passengers to have its revenues exceed operating

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[3] 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.

[4] See: AB3034, 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."*

[5] For the 2009 recognitions see the 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."* On April 6th, 2016 during an Assembly Budget Hearing, Authority Chairman Dan Richard confirmed that Acela was profitable. However, he failed to mention that Acela's per mile (PPM) fares are about 2.6 times higher than the Authority's 2016 Plans. See discussion between the Chairman and Assembly Member Patterson, starting at 12min. 30seconds in the following link: https://youtu.be/iBziL_H0xOc

[6] The Authority's 2009 Plan quoted a Pew Charitable Trust study about Acela's profitability. The Trust's calculations, based on GAO studies, had a calculated $40.50 "profit" (i.e. positive cash flow) per passenger on Acela, after depreciation and other unallocated costs. See: Studyscope, An Initiative of the Pew Charitable Trust, October 27, 2009 [PDF 27, FN 28]. http://subsidyscope.com/transportation/amtrak/] Found at: http://www.pewtrusts.org/en/research-and-analysis/reports/0001/01/01/subsidyscope-transportation-sector

[7] Connecting California, 2014 Business Plan, April 30, 2014 says, "*. . overall results of the model appear optimistic by comparison with readily available data on the closest comparable U.S. HSR operations (Amtrak's operations in the Northeast Corridor)."*

[8] See Figure 5, p. 7 [PDF 7] of To Repeat – The Authority's Train Will Need A Subsidy Forever, August 22, 2012. Found at: www.sites.google.com/site/hsrcaliffr
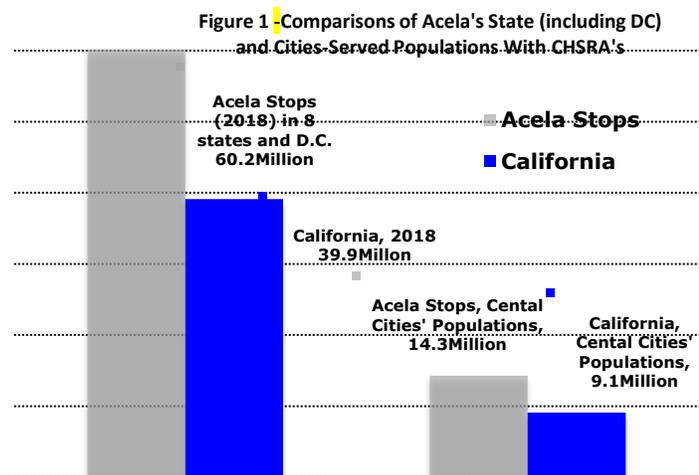
[9] See: pp. 15-16 of Response to Expression of Interest – RFEI HSR#15-02, September 14, 2015. Found at https://drive.google.com/open?id=0B9m407yyFerMbjhFQVpMdE1XR1U *The full quotation is "Comment: We have reviewed data from the International Union of Railways (Sept. 2014) which analyzed all 111 high 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.* Also see: Victoria Burnett, "Spain's High-Speed Rail Offers Guideposts For U.S." Statement by Iñaki Barrón de Angoiti, Director of High-Speed Rail, Union International des Chemins de Fer (UIC/IUR) in the NY Times, May 29, 2009 at www.nytimes.com/2009/05/30/business/energy- environment/30trains.html

(O&M) costs, which it must do to meet the rule of law,[10] it is valid to compare the two routes' (BOS-WDC and SF-LA) market metrics.

A1.1 COMPARING ACELA AND CHSRA'S POPULATIONS IN THEIR MARKET CATCHMENT AREAS – The Authority uses both long distance (>100miles) trips and some trips less than 50miles to claim that its ridership forecasts only take a tiny portion (±1-5%) of the auto, air, and rail travel market of California's 39.9Million population.

At first glance, 2018's Table 5.3 [11] ridership forecasts seem prudent. That is, 2029's 14Million high-speed rail riders constitute only 2% of California's long-distance travel market that the Authority could draw riders from. In 2040, ridership will have 'ramped up' to 40Million – only 4.8% of the potential travel market. But a careful check of those claims reveals how specious the HSR trains' percentage of travel markets are. The salient analytical question is: *"2% or 4.8% of what size potential market?"* Deriving the answer to that is simple – divide forecasted Long Distance ridership by the percent.[12] The Authority assumes the Silicon Valley-to-Central Valley (2029-2032) market's 14Million riders in 2029 to be from a travel market of 800Million, and its 2040 ridership forecasts of 40million riders represents 833Million trips by Californians! [13] Is that reasonable?

Starting by using US Census data and forecasts paints a very different picture. Acela's market area – the geographic base where it draws riders from – is the eleven cities of the eight states plus the District of Columbia in the US' Northeast Corridor (NEC). As Figure 1 shows, the combined populations of those geo-political areas served by Acela (60.2M) is more than 50% higher than California's 2018 population (39.9M).[14] Figure 1 also highlights the gap between the reality of populations that Acela 'draws' from (60.2Million) versus the fantasy of an 800Million trip California market that supposedly will provide many times Acela's riders.

Figure 1 - Comparisons of Acela's State (including DC) and Cities-Served Populations With CHSRA's

Acela Stops (2018) in 8 states and D.C. 60.2Million

California, 2018 39.9Millon

Acela Stops, Cental Cities' Populations, 14.3Million

California, Cental Cities' Populations, 9.1Million

Acela Stops

California

A1.1.1 DETAILS OF COMPARATIVE ACELA AND CHSRA-SERVED POPULATIONS – The population of Acela's market catchment area [15] – the geographic base where an HSR system logically draws riders from – is between Massachusetts and the District of Columbia. As Figure 2 shows, the combined populations of those eight states and District of Columbia that Acela draws from today is 60.2Million –

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[10] California law demands the high-speed train's revenues exceed it operating costs. 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."*

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

[12] Deriving the answer to that is simple – divide the 2029 ridership by the percent (for example divide VtoV's 14Million Long Distance riders by 2% = 700,000,000 or False Phase 1 2040's 40.0M riders/0.048 = 833,333,333).

[13] In its modeling the Authority assumes riders are only from inside California.

[14] State and city populations and population density data are found at: https://www.census.gov/quickfacts/fact/table/US/PST045217

[15] A market area is the surface over which a demand or supply offered at a specific location is expressed. Transportation is particularly important in market area analysis because it impacts on the location of the activities as well as their accessibility. The size of a market area is a function of its threshold and range. Market threshold is the minimum demand necessary to support an economic activity such as a service: threshold has a spatial dimension, and market size is a function of a threshold. Market range is the maximum distance each unit of demand (HSR riders) are willing to travel to reach HSR service. From Market Area Analysis, Dr. Jean-Paul Rodrigue, Dept. of Global Studies & Geography , Hofstra University, New York, USA. Found at: https://people.hofstra.edu/geotrans/eng/methods/ch7m2en.html

more than 50% greater than present-day California's 2018 population (39.9M) estimate. [16] Even today Acela's state-and District of Columbia catchment area is still more than a third (38%) greater than California's official population forecast of 43.6Million in the HSR train's first operating year 2029 and 28% greater than California's forecasted 46.8Million in 2040.[17]

Since the Authority used only California's population as its potential ridership 'catchment area' there is little chance the relative ratio of Acela and the CA HSR's 'ridership pools' are likely to swing in favor of the Authority.[18] The Authority has no reason to claim it has an inherent advantage when drawing from its statewide catchment area for ridership – today or tomorrow: the 'population-to-draw-from' advantage is clearly Acela's.

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[16] See: California Department of Finance Population Projections: 2010-2060 Data Tables, found at:
http://www.dof.ca.gov/Forecasting/Demographics/Projections/
[17] See: California Department of Finance Population Projections: 2010-2060 Data Tables, found at:
http://www.dof.ca.gov/Forecasting/Demographics/Projections/
[18] "California is projected to join the ranks of Japan and many European countries which have more deaths than births, while migration is expected to keep California's population growth rate positive. Compared to previous projections (2013 baseline series, published Dec. 2014), the statewide population forecast in 2060 is approximately 1 percent lower, due primarily to lower expected birth rates." See:
http://www.dof.ca.gov/Forecasting/Demographics/Projections/documents/P_PressRelease.pdf

Next, consider the populations of the central cities served by Acela versus those to be served by California's HSR train, shown in Figure A2 and Figure A3.

Figure A2 Eight States + The District of Columbia's Populations, Persons/Square Mile Densities and City Center Ridership Potential of Acela				
States & DC Populations [19]		Cities Population of Acela's Eleven Stops [20]	Density/sq. mile of Acela Cities	Data Source of Acela Stop's City Populations
MA	6.8M	Boston	0.67M	12,793 [21]	http://www.census.gov/quickfacts/table/PST045215/2507000,25,4260000
MA	6.8M	Westwood	–		Route 128 – part of Boston Metro area
RI	1.1M	Providence	0.18M	9,676	http://www.census.gov/quickfacts/table/PST045215/4459000,3474000,0952280,1077580,24,3451000
CN	3.6M	New Haven	0.13M	6,948	http://www.census.gov/quickfacts/table/PST045215/0952000,09009,09,2507000,25,4260000
CN	3.6M	New London	0.27M	4,919	http://www.census.gov/quickfacts/table/PST045215/09011
NY	19.4M	New York City	8.6M	27,452	http://www.census.gov/quickfacts/table/PST045215/3651000,09009,2507000,4260000
NJ	8.9M	Newark	0.28M	11,458	http://www.census.gov/quickfacts/table/PST045215/3451000,34,4260000,42,24510,24
NJ	8.9M	Trenton	0.84M	11,102	http://www.census.gov/quickfacts/table/PST045215/3474000,0952280,1077580,24,3451000
PA	12.8M	Philadelphia	1.5M	11,380	http://www.census.gov/quickfacts/table/PST045215/4260000,42,24510,24,3451000
DE	.95M	Wilmington	0.72M	6,498	http://www.census.gov/quickfacts/table/PST045215/1077580,4260000,42,24510,24,3451000
MD	6.0M	Baltimore	0.62M	7,672	http://www.census.gov/quickfacts/table/PST045215/24510,24,4260000,3451000
MD	6.0M	BWI	–		Baltimore Washington Airport
DC	0.7M	Union Station	0.67M	9,857	http://www.census.gov/quickfacts/table/PST045215/11001,24,4260000,42,24510
60.2M-Total Acela Served Population		14.3M-Total Populations Acela City Center Stops	10,887-Avg. Density/sq. mile	

The former chart shows the eleven central cities that Acela serves today have a combined population over 14Million, more than half again larger than today's twelve cities the Authority proposes to serve.

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[20] The Acela Express stops were found at https://www.amtrak.com/acela-express-train
[21] The populations and densities per square mile of the eleven cities along Acela's route were found at: http://www.census.gov/quickfacts/

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A2.0 DENSELY COUNTS – THE INTERNATIONAL EXPERIENCE: PARIS AND TOKYO'S MARKET AREAS AND URBAN DENSITIES VERSUS CALIFORNIA'S TWO LARGEST CITY PAIRS – It's no coincidence that the only two non-USA city pairs of supposedly profitable, existing HSR systems[22] are their respective nations' two largest and most densely populated cities. The Paris-Lyon TGV serves France's largest two cities[23] while Japan's pioneering Shinkansen's pair is Tokyo-Osaka.[24] While Paris' core of 2.2Million people[25] are half that of the City of Los Angeles, Paris has nearly three times San Francisco's residents. Similarly, Tokyo, whose urban core area is larger than the size of the entire Los Angeles County, has 38Million residents, nearly as large as the entire state of California.[26]

Cities' population density also counts. Along with higher density comes public transit systems (subways, busses, trolleys, etc.) that 'feed' high-speed rail riders to and from HSR stations. Paris' core population density of 55,600/square mile[27] is three times San Francisco's (17,179) and seven times Los Angeles' (8,092). Tokyo city's much larger area than San Francisco has a per square mile density of 15,600,[28] and while slightly less (10%) dense than San Francisco, is nearly twice as dense as the City of Los Angles.

A2.1 COMPARING THE POPULATION DENSITIES OF ACELA-SERVED AND CHSRA-TO-BE-SERVED CITIES – Figure A3, showing the total population of Acela and CHSRA-served central cities, (14.3Million versus California 9Million) is even more striking than the NE Corridor-California comparison. Acela's central cities' populations are nearly 60% greater than California's. Although California's HSR-to-be-served central cities like Fresno's population are growing, the ratio of the NE Corridor central city populations versus that of the California train's route is also unlikely to change in California's favor. The city size advantage is clearly Acela's.

Next, compare the population densities of the two sets of HSR served or to-be-served cities in Figure A3 and Figure A4. Cities like New York, Paris, or Tokyo draw high-speed rail passengers because they are densely populated and can (partially) support the 'feeder' transit systems to 'supply' high-speed rail passengers. This was clear from evidence presented to the US Congress in 2007[29] and is why Spain abandoned planned routes to smaller, lower density, cities.[30] Conclusion: Acela-served cities are far more densely populated than those CHSRA proposes to serve.

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[22] See: Victoria Burnett, "Spain's High-Speed Rail Offers Guideposts For U.S." Statement by Iñaki Barrón de Angoiti, Director of High-Speed Rail, Union International des Chemins de Fer (UIC/IUR) in the NY Times, May 29, 2009 at www.nytimes.com/2009/05/30/business/energy- environment/30trains.html Mr. Barrón's contact information at the UIC/IUR offices is 16 Rue Jean Rey. 75015 Paris; Tel: 011 33 1 44 492020; email address is barron@uic.org

[23] See: http://worldpopulationreview.com/world-cities/paris-population/ The population of Lyon is 2.2Million. See: http://about-france.com/tourism/main-towns-cities.htm

[24] Tokyo's population is 8.3Million, Osaka's 2.6Million. See: https://population.mongabay.com/population/Japan/

25 See: http://worldpopulationreview.com/world-cities/paris-population/

26 See: What is the population density of Tokyo? at https://www.quora.com/What-is-the-population-density-of-Tokyo

27 Paris is the 21st most densely populated city in the world. It's inner suburb (Department) Boulogne-Billancourt's population density is 47,000/sq. mile. See: https://en.wikipedia.org/wiki/List_of_cities_by_population_density

28 See: http://www.worldpopulationstatistics.com/tokyo-population-2013/

[29] Iñaki Barron de Angoiti, Director of High-Speed Rail at the International Union of Railways/UIC, presented chart to the US Congress On April 19 2007 showing high-speed rail routes of Europe – all starting and terminating in Europe's densely populated city centers. See: International High-Speed Rail Systems: a Hearing before the Subcommittee on Railroads, Pipelines and Hazardous Materials of the Committee on Transportation and Infrastructure, House of Representatives; April 19, 2007, at http://frwebgate.access.gpo.gov/cgibin/getdoc.cgi?dbname=110_house_hearings&docid=f:34799.Pdf

[30] See: Fernando Puente, Where Next for Spanish High-Speed Rail?, International Railway Journal, Monday, July 15, 2013 *"Meanwhile, construction has been suspended completely on the Valladolid - Burgos high-speed line, and substantially slowed down on the Basque Y, which will link Vitoria, Bilbao, and San Sebastian with the French border crossing at Irun/ Hendaye. Plans to link both lines and connect them to the Madrid - Barcelona line have been dropped. Likewise, proposals for a new line between Almeria and Murcia have also been shelved."* Found at: http://www.railjournal.com/index.php/high-speed/where-next-for-spanish-high-speed-rail.html

			Figure A3 California's Statewide [31] & City Center Populations And Densities		
	CA HSR Stops[32]	**CA HSR Cities' Pop.**	**Population Density/Sq. Mile**	**Source of Phase 1 CA HSR Stop's City Populations and Density/Sq. Mile**
1	**Anaheim**	0.35M	6,747	http://www.census.gov/quickfacts/table/PST045215/0602000,00
2	**Los Angeles**	4.0M	8,092	http://www.census.gov/quickfacts/table/PST045215/0644000,06
3	**Burbank**	0.11M	5,950	http://www.census.gov/quickfacts/table/PST045215/0608954,0602000,00
4	**Palmdale**	0.16M	1,442	http://www.census.gov/quickfacts/table/PST045215/0655156,0644000,06
5	**Bakersfield**	0.37M	2,444	http://www.census.gov/quickfacts/table/PST045215/0603526,0655156
6	**Visalia** [33]	0.13M	3,433	http://www.census.gov/quickfacts/table/PST045215/0682954,0608954,0602000,00
7	**Fresno**	0.52M	4,418	http://www.census.gov/quickfacts/table/PST045215/0627000,0603526,0655156
8	**Merced**	0.82M	3,386	http://www.census.gov/quickfacts/table/PST045215/0646898,0682954,0608954,0602000,00
9	**Gilroy**	0.52M	3,024	http://www.census.gov/quickfacts/table/PST045215/0629504,0646898,0682954,0608954,0602000,00
10	**San Jose**	1.0M	5,359	http://www.census.gov/quickfacts/table/PST045215/0668000,0627000,0603526,0655156
11	**Millbrae**	0.23M	6,631	http://www.census.gov/quickfacts/table/PST045215/0647486,0629504,0682954,00
12	**San Francisco**	0.86M	17,179	http://www.census.gov/quickfacts/table/PST045215/06075,0668000,0627000,0603526,0655156
	Central Cities' Pop Served By CA HSR – 9.07M		**Avg. Density – 5,675/sq. mile**	

Acela is financially successful in attracting paying passengers in part because the city centers it serves have an average density (10,887) per square mile nearly twice that (5,675) of the proposed California high-speed rail-served cities. Put another way, Acela's cities' densities are, on average nearly twice (1.92%) as dense as California HSR cities' would be. That's another very clear advantage over the Authority and another contributor to Acela's financial success. That conclusion holds true when looking at the three most dense of Acela route's cities versus the CA HSR route, as Figure A4 shows.

Figure A4 Comparisons of Acela and CA HSR Served City Centers' Most Densely Populated Cities (persons per square mile)			
	Most Dense City Center/sq. mile	Second Most Dense City Center/sq. mile	Third Most Dense City Center/sq. mile
	New York	**Boston**	**Newark**
Acela Route	27,452	12,793	11,458
Average density of 3 most densely populated Acela-served cities – 17,324			
	San Francisco	**Los Angeles**	**Anaheim**
CA HSR Route	17,179	8,092	6,747
Average density of 3 most densely populated CA HSR cities – 10,672			
Notes on Comparative Densities	*CA HSR city is 62% of Acela city's density*	*CA HSR city is 63% of Acela city's density*	*CA HSR city is 58% of Acela city's density*

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[31] California's population is 39.1Million- two thirds that of the 60.2Million in the eight states and District or Columbia served by Acela. See: http://www.census.gov/quickfacts/table/PST045215/06,2412150,3651000,09009,2507000,4260000

[32] From p. 3.2 [PDF 26] Figure 3.2, Cambridge Systematics, Ridership and Revenue Forecasting California High-Speed Rail 2016 Business Plan: Technical Supporting Document

[33] Shown as Kings/Tulare in Cambridge Systematics, Ridership and Revenue Forecasting California High-Speed Rail 2016 Business Plan: Technical Supporting Document, but Visalia in the 2014 Plan's Technical Supporting Document

Each of Acela's three most densely populated cities (NYC, Boston, Newark, NJ) are far more densely populated than the three most-dense California cities (San Francisco, Los Angeles and Anaheim). Combined, the three NEC cities offer Acela nearly 20Million (19,685Million) <u>more potential riders</u> with an average density of 17,234 persons/square mile – higher than California's highest, San Francisco (17,179/persons/square mile). Again, the market potential is and clearly will be Acela's.

A2.2 DETAILS OF THE CLAIM OF ACELA-SERVED CITY'S DENSITIES BEING HALF-OR-MORE AGAIN AS MUCH AS THOSE THE AUTHORITY PLANS TO SERVE – More than a century ago passenger railways built their termini in city centers. Europe and Japan's high-speed rail routes, like Paris-Lyon and Tokyo-Osaka, travel between one high-density city center and another high-density city center. City center dwellers find it easier to get to a central city's railway station than to an airport, as most airports were built many generations after railway stations.

Conversely, the Authority's trains must attract riders from the nine counties and 6,900 square miles of the SF Bay Area (MTC), 18,000 square mile of the five counties inside the San Joaquin Valley (SJV) and 38,000 square miles of the six counties inside the LA Basin (SCAG). [34] Given that all HSR stops, except the City-County of San Francisco are in low population density urban areas, getting to and from an HSR station is arguably equal or more difficult than to or from a regional airport such as Long Beach, San Jose or Santa Ana.

Figure A5 shows the average density per square mile of most-dense three Acela and Authority cities. The average density of the New York (27,452/sq. mile) is 65% larger than San Francisco. [35] Not only is New York City's population density three times that of the City of Los Angeles' (8,092/sq. mile) but both of Acela's first and second

Figure A5 - Comparative City Center Population Densities For Acela and CHSRA's Three Most Dense Cities

ranked cites' densities have higher densities than the <u>combination</u> of Authority's first and second dense-most cities: i.e. New York's 27,452/sq. mile is more densely populated than the SF and LA's combined (25,271/sq. mile).

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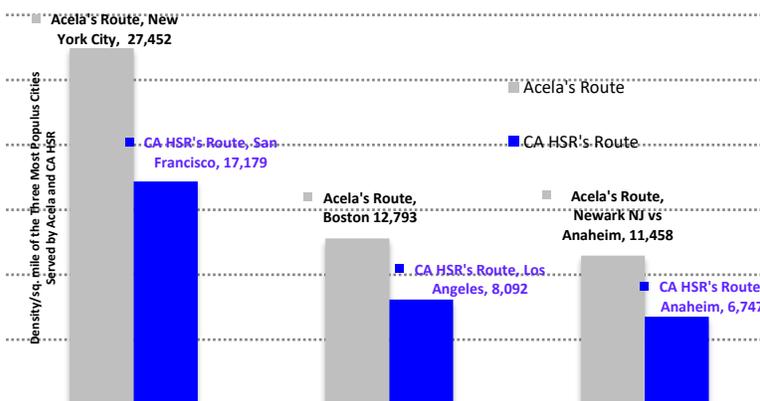
A2.3 CALIFORNIA'S HSR TRAIN WILL NOT CAPTURE BUSINESS TRAVELERS BECAUSE THE STATE'S BUSINESSES ARE NOT LOCATED IN DENSELY POPULATED DOWNTOWN – Capturing business travelers is important because it is the profitable portion of 'filled seats.' In 2012 the Authority's consultants said,

> ". . business travelers and commuters comprised more than 50 percent of the interregional travel market." [36]

Independent researchers have confirmed that finding and shown that at least half the existing HSR

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[34] For SF Bay Area's (MTC) square miles see: http://www.vitalsigns.mtc.ca.gov/population For the San Joaquin Valley see: http://www.counties.org/pod/square-mileage-county. For the 38,000 square miles of the Los Angeles metropolitan area (SCAG) see: https://en.wikipedia.org/wiki/Southern_California_Association_of_Governments

35 A State and city populations and population density data are found at: https://www.census.gov/quickfacts/fact/table/US/PST045217

[36] The 2012 Plan's technical memorandum says, "*Based on the 2,820 interregional trips captured in the* [2001 California statewide household activity/travel survey] *survey, business travelers and commuters comprised more than 50 percent of the interregional travel market*." See: California High-Speed Rail 2012 Business Plan Draft Technical Memorandum – Ridership and Revenue Forecasting, October 19, 2011, page 1-4 [PDF 14]

systems' main clientele is government or business employees traveling on business;[37] some considerably higher. [38] The Authors of the worldwide HSR experience confirm this – adding that HSR riders also belong ". . *to the upper-middle and upper income brackets . ."* [39]

As the figure to the right shows, nearly two-thirds (61%) of Acela's riders are traveling on business, whereas only a third of the conventional Amtrak passengers are traveling on business. [40]

Most business travel is reimbursed or deductible as an operating expense, making the relative costs of fares less important for business travelers than travel time and convenience. The single largest California HSR market is most likely the reimbursed business and/or government traveler.[41]

But California's high-speed train is unlikely to capture business riders. Why? In short, the time and cost economics of travel between California's main business and government centers, Los Angeles, San Francisco, San Diego and Sacramento defeat the rational for HSR business travel.

In a milestone' study comparing Spain's AVE Barcelona-Madrid route with the proposed SFTBT-LA Union/Anaheim route, the authors first stressed the similarities of the two HSR 'market catchment' areas.[42]

California and Spain have similar surface areas (423,970 and 505,645 Square Km), relatively similar population (38 and 47 million), and population densities (92 and 93 inhabitants per Square km), and the same distance (430 miles) between their main metropolitan areas: Los Angeles and San Francisco in California, and Barcelona and Madrid in Spain. Projected travel times in the two HSR corridors are also similar: 150 minutes for Barcelona-Madrid and 166 minutes for LA-San Francisco."

The authors also pointed out:

"*Among the aspects not adequately assessed in* [the Authority's] *demand forecasts is the role of*

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[37] *"Business trips usually take up a significant proportion of HSR trips (Chang & Lee, 2008; Levinson, 2004)"* quoted in Chuyuan Zhong, Germà Bel, and Mildred Warner: High-Speed Rail Accessibility: What Can California Learn From Spain? 2013.

[38] *In South Korea . . 70.8% of all HSR passengers travel for business reasons during a weekday"* See Chuyuan (Viktor) Zhong, Suitability Analysis of Proposed High-Speed Rail Stations in Los Angeles Metropolitan Area, PET #087. Or see: Lee and Chang, 2008, found at: http://www.tandfonline.com/doi/abs/10.1080/01441640701421495

[39] See The Economics and Politics of High-Speed Rail; Lessons From Experiences Abroad; Daniel Albalate and Germa Bel; Lexington Books, copyright 2014 (paperback); Hand delivered to California High-Speed Rail Headquarters, 770 L Street, Sacramento, CA on 29 March 2016 and time stamped at 9:07am. Page xiii says: *". . taxpayers are subsidizing journeys realized above all by users belonging to the upper-middle and upper income brackets, who usually travel for business reasons and whose ticket (the amount of which is far from covering the total cost of the service) is paid for by their employers."* Also "*In South Korea . . 70.8% of all HSR passengers travel for business reasons during a weekday."* See Chuyuan (Viktor) Zhong, Suitability Analysis of Proposed High-Speed Rail Stations in Los Angeles Metropolitan Area, PET #087. Or see: Lee and Chang, 2008, found at: http://www.tandfonline.com/doi/abs/10.1080/01441640701421495

[40] Nearly two-thirds (61%) of Acela's riders are traveling on business, versus 32% for Amtrak riders in the Northeast Corridor. See: PDF 4 of 2016 Amtrak Media Network, at http://amtrakmedianetwork.com/wp-content/uploads/2016/07/2016_AMN_7_8b_NP-2.pdf. They are also mostly male (55%) versus that same percent of Amtrak NEC riders being female. Eighty-five percent are employed (vs 77% of Amtrak NEC riders) and have about $50,000 more of annual household income than Amtrak NEC riders.

[41] Caution for HSR planners: business managers have become sensitive to travel costs: video conferencing is ubiquitous; and as the Authority's own consultant showed), the growth of air travel between the LA Basin and the SF Bay Area has slowed or stagnated; see: Bay Area to/from Southern California airline travelers (both ways) between 2000 and 2009 averaged about 10Million (10.28) from a 2006 low of 9.84Million to a high of 11.9Million. See: Table 1, p. 10 [PDF 116] Appendix B, Potential Airline Response to High-Speed Rail Service in California, prepared by Aviation System Consulting LLC, for Cambridge Systematics, Inc. Found in California High-Speed 2012 Business Plan, Ridership and Revenue Forecasting, final technical memorandum, April 12, 2012.

[42] See p. 470, of Zhong, Chuyuan; Bel, Germà; Warner, Mildred: High-speed rail accessibility: a comparative analysis of urban access in Los Angeles, San Francisco, Madrid, and Barcelona. EJTIR, Issue 14(4), 2014 pp. 468-488 ISSN: 1567-7141 tlo.tbm.tudelft.nl/ejtir or http://mildredwarner.org.s3.amazonaws.com/2012/09/20/Zhong_Bel_Warner_HighSpeedRail_201 2-b19b0817.pdf. "

urban structure, especially as regards accessibility of HSR." [43]

"HSR has proved to work best in corridors with populous and dense urban centres, such as Paris and Tokyo . . Polycentric cities with low population density will not reap the benefits of city centre connection that HSR offers. For polycentric cities, HSR presents a difficult trade-off: build several stations to attract suburban riders or limit stations to maintain the high-speed advantage."[44]

Then the authors 'drill down' to the differences between Spain and California cities' urban geographies. The Spanish HSR train survives because:

". . . employment concentration in the two Spanish cities is much higher. Data for 2009 in the metropolitan area of Barcelona show that the three districts in the central city surrounding the HSR station . . . concentrate more than 17% of total employment . . . In 2009, concentration of employment in the metro area of Madrid is still higher: the four districts in the central city surrounding the HSR station . . . concentrate more than 20% of total employment in the metro area . . ."[45]

That comparative study then points out that, conversely;

"Los Angeles is the prime example of a polycentric city . . . identified seven employment centres in the Los Angeles Metro area in 1970 and later . . . identified 36 employment centres in 1990 and 48 in 2000. The San Francisco Bay Area is only slightly less polycentric . . . 22 employment centres in the Bay Area in 1990." [46]

The authors conclude:

"Many business trips originate or terminate at office district destinations where employment concentrates. Hence a major employment center is also a major area of potential HSR riders." . . . *In Barcelona and Madrid, the employment centers coincide with the population centers in the downtown areas. . . However, in Los Angeles and the Bay Area, employment centers do not coincide with population centers."* [47]

Fallaciously the Authority assumes *"Because the HST stations are generally located in the city centers, they are assumed to be located closer to larger population and work centers than airports."* [48] Few business travelers will find HSR more Total Travel Time (or Door-to-Door time) convenient if they must make their way to one of twenty or forty employment centers.

Total Travel Times are also high priority for the roughly two-thirds of Californian's who don't live in a central city. The City-County of San Francisco and the City of San Jose together represent only a quarter of the 7.15Million residents of the SF Bay Area.[49] The 3.86Million residents of the City of Los Angeles represent only a fourth (22%) of the ±18Million population of Los Angeles' metropolitan area.[50] California's polycentric urban geography defeats the argument that HSR can efficiently serve

[43] See p. 469 of Zhong, Chuyuan; Bel, Germà; Warner, Mildred: High-speed rail accessibility: a comparative analysis of urban access in Los Angeles, San Francisco, Madrid, and Barcelona. EJTIR, Issue 14(4), 2014 pp. 468-488 ISSN: 1567-7141 tlo.tbm.tudelft.nl/ejtir

[44] See p. 471 of Zhong, Chuyuan; Bel, Germà; Warner, Mildred: High-speed rail accessibility: a comparative analysis of urban access in Los Angeles, San Francisco, Madrid, and Barcelona. EJTIR, Issue 14(4), 2014 pp. 468-488 ISSN: 1567-7141 tlo.tbm.tudelft.nl/ejtir

[45] See p. 472 of Zhong, Chuyuan; Bel, Germà; Warner, Mildred: High-speed rail accessibility: a comparative analysis of urban access in Los Angeles, San Francisco, Madrid, and Barcelona. EJTIR, Issue 14(4), 2014 pp. 468-488 ISSN: 1567-7141 tlo.tbm.tudelft.nl/ejtir

[46] See p. 472 of Zhong, Chuyuan; Bel, Germà; Warner, Mildred: High-speed rail accessibility: a comparative analysis of urban access in Los Angeles, San Francisco, Madrid, and Barcelona. EJTIR, Issue 14(4), 2014 pp. 468-488 ISSN: 1567-7141 tlo.tbm.tudelft.nl/ejtir

[47] See PDF 18 and PDF 20 of Chuyuan Zhong, Germà Bel, and Mildred Warner: High-Speed Rail Accessibility: What Can California Learn From Spain? 2013. Found at: http://mildredwarner.org.s3.amazonaws.com/2012/09/20/Zhong_Bel_Warner_HighSpeedRail_201 2-b19b0817.pdf

[48] See p. 3,2-31 [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 at: http://www.hsr.ca.gov/docs/programs/bay_area_eir/BayCValley08_EIR_finalHST_vol1.pdf.

[49] The SF Bay Area population comes from Bay Area Census, found at http://www.bayareacensus.ca.gov/bayarea.htm The population of San Francisco, 805,235 and the San Jose population of 1,000,000 come from http://worldpopulationreview.com/us-cities/san-francisco-population/ and http://worldpopulationreview.com/us-cities/san-jose-population/

[50] Found at http://worldpopulationreview.com/us-cities/los-angeles-population/

the vast majority of non-central city residents; and as the Author's two February 2018 reports show, Auto or Air's Total Travel Times will defeat almost every route offered by the Authority .[51]

This tale of two seemingly similar, but extremely different city pairs' context, is telling. In simple terms a HSR passenger going to Barcelona from Madrid (or vice versa) is likely to only be destined to one of three or four employment centers. In stark contrast, a HSR passenger going to the Los Angeles Basin or the SF Bay Area faces the question of how to get from the HSR station to between forty and twenty employment centers.

The California HSR train's business travelers would all too often be faced with renting an auto, which not only adds time to a business trip but also defeats the Authority's goal of decreasing greenhouse gases. It's a lose-lose proposition that few, if any business travelers will find more convenient than the regional airports solution. If the Authority can't attract business riders, air travel is stagnant, and it admits Auto travel is cheaper, where do the Authority's riders come from?

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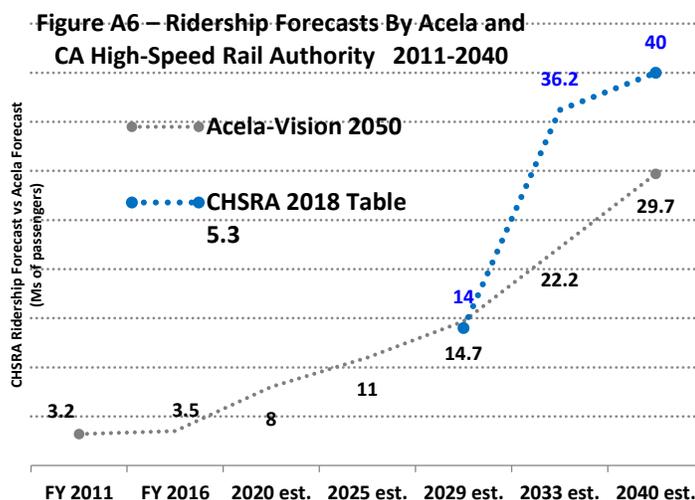**A3.0 What Might Acela and The CA HSR Systems' Ridership Look Like Over The Next Twenty-Two Years (2018-2040)? –** The Authority says that during its last SV-CV Period's operating year, 2032, its HSR train will carry 14.4Million passengers and that in 2033 HSR ridership will be 36.2Million.[52]

Reality shows a fairly steady ridership base for much of Acela's existence. After 18 years of service in the US' Northeast Corridor (NEC), in FY2015 Acela carried 'only' about 3.5Million passengers, [53] less than 10% of CHSRA's 'mature' forecast for the SV-CV Period. How can that be?

Acela's ridership has grown slowly, despite having some of the nation's best public transit 'feeder' systems to ease access and egress, central city populations with densities that soar above California's central cities except downtown San Francisco,[54] plus average longer distances between those city centers that, unlike in California, long ago made rail a habit-instilled travel option.

Acela's present-day ±3.5Million riders represent about one-in-twenty (5%) of the NE Corridor's ±60Million market catchment area's residents. It took two decades to build that ridership with some of the US' best underlying urban geography (large densely-populated cities in large population states) and public transit to support its growth.

Compare Amtrak's ridership forecasts for Acela's long-range plan – with a ridership base after nearly two decades of service – with that of the Authority. Figure A6 is based on Amtrak's Vision for the Northeast

Figure A6 – Ridership Forecasts By Acela and CA High-Speed Rail Authority   2011-2040

CHSRA Ridership Forecast vs Acela Forecast (Ms of passengers)

Acela-Vision 2050

CHSRA 2018 Table

5.3

3.2 · 3.5 · 8 · 11 · 14.7 · 22.2 · 29.7

14 · 36.2 · 40

FY 2011 | FY 2016 | 2020 est. | 2025 est. | 2029 est. | 2033 est. | 2040 est.

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[51] See the February 2018 reports by the same authors: A Bankrupt IOS North Will Destroy The HSR Brand, and If You Build It, The Will Not Come – The Sequel, found at www.sites.google.com/site/hsrcaliffr.

[52] See, Table 6.3, p. 6-6 [PDF 44] of Cambridge Systematics, Ridership and Revenue Forecasting California High-Speed Rail 2016 Business Plan: Technical Supporting Document.

[53] See, p. 2 of Amtrak FY15 Ridership and Revenue. In 2015 Acela carried 3,473,644 passengers, down 2% from FY14 (3,545,306). The publication noted: *"The slower growth in ridership is due, in part, to significant weather events and lower gas prices."* Found at: http://media.amtrak.com/wp-content/uploads/2015/10/FY15Ridership_Revenue_Fact_Sheet_11-5-15.pdf

[54] Manhattan's population density is 69,000/square mile (the five boroughs comprising New York City is 27,000/square mile), Boston's 13,000, Philadelphia's 11,000 San Francisco's a third less (17,000) than the City of New York. The City of Los Angeles is not even on Census data population density list of the nation's 132 highest population densities. See: https://en.wikipedia.org/wiki/List_of_United_States_cities_by_population_density

Corridor,[55] an optimistic growth scenario for Acela given that its ridership has barely budged upwards in nearly two decades. [56]

Figure A6 also shows the Authority claims – from zero riders in 2028 to 14Million a year later to 40Million in 2040 [57] – an almost vertical line. Note how the Authority's first year ridership forecast nearly equals Acela's in 2029. CHSRA's forecasts surpass Acela's a year later by 2040 are 35% more than Acela's Vision 2050.

Think what Acela has achieved: Authority-acknowledged profitable operations with ±3.5Million riders today from a larger and more densely populated region with some of the nation's best transit 'feeder' systems.

Without publicly available substantial evidence to support its ridership-revenue forecasts, the Authority expects Californians to believe that within four years of beginning its HSR service (2033), 36.2Million Californians will ride its trains and seven years later (2040) that will be 40Million. That 11-year 'achievement' (2029-2040) would be 11 times Acela's 2016 ridership (±3.5Million) and a third (34%) more than Acela's most optimistic forecast. Do the Authority ridership forecasts look reasonable when contrasted with Acela's history – or even Acela's optimistic Vision 2050 forecasts?

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[55] See Figure 28, p. 30 [PDF 37] of The Amtrak Vision for the Northeast Corridor – 2012 Update Report (July 2012), found at https://www.amtrak.com/ccurl/453/325/Amtrak-Vision-for-the-Northeast-Corridor.pdf.

[56] In FY2015, Acela carried 3.473Million passengers. See attachment to Amtrak press release found at http://media.amtrak.com/wp-content/uploads/2015/10/FY15Ridership_Revenue_Fact_Sheet_11-5-15.pdf In FY2014, Acela carried 3.545Million passengers. See attachment to Amtrak press release found at https://www.amtrak.com/ccurl/238/481/Amtrak-FY2014-Ridership-and-Revenue-ATK-14-096%20.pdf In FY2013, Acela carried 3.343Million passengers. See attachment to Amtrak press release found at https://www.amtrak.com/ccurl/730/658/FY13-Record-Ridership-ATK-13-122.pdf In FY2012 carried 3.395Million passengers: in FY2011 that was 3.379Million. See attachment to Amtrak press release found at https://www.amtrak.com/ccurl/636/294/Amtrak-Sets-New-Ridership-Record-FY2012-ATK-12-092.pdf In FY2010 carried 3.028Million passengers. See attachment to Amtrak press release: https://www.amtrak.com/ccurl/757/860/ATK-10-042%206%20Month%20Ridership%20FY10,0.pdf In FY2009 carried 3.019Million passengers: in FY2008 that was 3.398Million: in FY2007 that was 3.191Million riders. See attachment to Amtrak press release: https://www.amtrak.com/ccurl/971/945/ATK-09-074%20FY09%20Ridership%20and%20Revenue.pdf. FY2006 Acela ridership was calculated as 80% of FY2007 based on an article in Progressive Railroading (7/29/08) *"Ridership was especially high in the Northeast Corridor, where Acela Express trains carried 20 percent more passengers and Regional trains, 7 percent more riders compared with FY2006 totals."* See: http://progressiverailroading.com/rail_industry_trends/news/Amtrak-gains-more-revenue-riders-in-FY07--17445

[57] See Table 5.3, p. 5-6 [PDF 42], [of Cambridge Systematics, Ridership and Revenue Forecasting California High-Speed Rail 2018 Business Plan: Technical Supporting Document.