

# Richmond to South Hampton Roads High-Speed Rail Feasibility Study

## TASK 3 - RIDERSHIP AND REVENUE FORECASTING



Prepared for:  
Virginia Department of  
Rail and Public Transportation

Prepared by:



as a subconsultant to



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Virginia Department of Rail and Public Transportation

**RICHMOND TO SOUTH HAMPTON ROADS  
HIGH SPEED RAIL FEASIBILITY STUDY**

Ridership and Revenue Forecasting Report  
Executive Summary

Submitted by  
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As a subconsultant to  
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**Executive Summary**

The ridership and revenue forecasts for rail service from Richmond to South Hampton Roads were developed using information originally assembled for the Southeast High Speed Rail Study in 1996 and recently updated by AECOM for the North Carolina DOT and Amtrak. In addition, data from the 1996 Hampton Roads Crossing Study were obtained from VDOT to supplement the Southeast HSR study travel base.

The model used for this analysis is an adaptation of a spreadsheet model that has been used in many applications for Amtrak and Georgia and North Carolina DOTs to evaluate intercity rail alternatives. The spreadsheet models were developed based market research and physical data such as highway networks, socio-economic variables, and service characteristics of public modes.

The study team examined nine service alternatives for passenger rail service to Norfolk along the existing CSXT lines from the existing Richmond- Staples Mill station through Richmond’s Main Street station to Petersburg, then along the Norfolk Southern line from Petersburg to Norfolk. The alternatives vary with speed (79 mph to 110 mph) and frequency (one to six daily round trips). The exhibit below provides a summary of the alternatives operating characteristics between Newport News / Norfolk and the Richmond Main Street Station.

**Alternative Specification Summary**

Alternative	Maximum Allowed Speed*	Frequency		Travel Time	
		Newport News – Richmond	Norfolk-Richmond	Newport News – Richmond	Norfolk-Richmond
BASE	79 mph	2	0	1:30	
1	79 mph	2	1	1:30	1:43
2	90 mph	2	1	1:30	1:35
3	79 mph	2	2	1:30	1:43
4	90 mph	2	2	1:30	1:35
5	79 mph	2	4	1:30	1:43
5A	79 mph	4	4	1:30	1:43
6	90 mph	2	4	1:30	1:35
7	110 mph	2	4	1:30	1:26
8	110 mph	2	6	1:30	1:26

\* between Richmond and Norfolk only; speeds between Richmond and Newport News remain at a 79 mph maximum allowed speed in all alternatives

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Ridership and revenue forecasts were prepared for each of the nine alternatives for forecast years of 2010 and 2025. A summary of forecast results for 2025 are included in the table below. The trips reported in the table correspond to trips between Hampton Roads, Petersburg, Richmond, Washington DC, and the Northeast Corridor.

The forecast results show a consistent increase in performance measures as the speed and frequency of service increases. The low frequency alternatives have low incremental ridership gains because the new service does not provide a significant improvement over the existing Newport News service. As the speed and frequency of the South Hampton Roads service increases the incremental ridership and revenue increase significantly.

**Summary of Forecast Results for 2025**

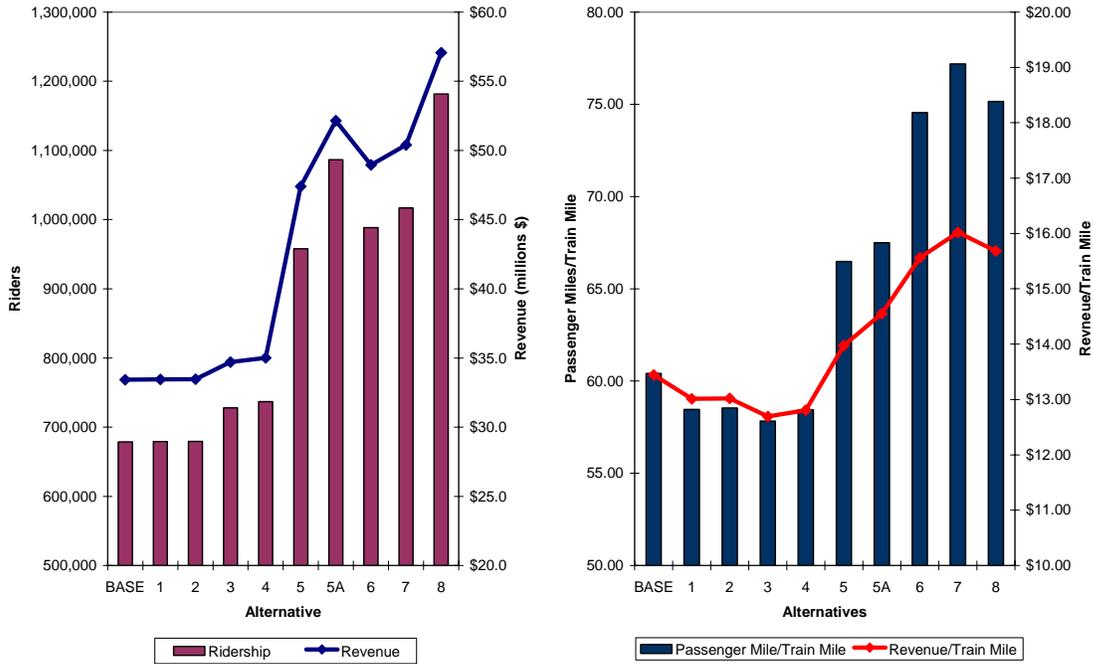
Alt	Total Riders	Total Revenue (millions \$)	Passenger Miles (millions)	Train Miles (millions)	Revenue/ Train Mile	Pass Mi/ Train Mile
Base	678,700	\$33.430	150.200	2.486	\$13.45	60.4
1	679,100	\$33.450	150.260	2.570	\$13.01	58.5
2	679,500	\$33.460	150.450	2.570	\$13.02	58.5
3	728,000	\$34.700	158.110	2.734	\$12.69	57.8
4	737,000	\$35.010	159.800	2.734	\$12.81	58.5
5	957,800	\$47.390	225.420	3.391	\$13.98	66.5
5A	1,086,600	\$52.150	241.940	3.584	\$14.55	67.5
6	988,400	\$48.960	234.530	3.146	\$15.56	74.5
7	1,017,000	\$50.400	242.860	3.146	\$16.02	77.2
8	1,181,500	\$57.060	273.420	3.638	\$15.68	75.2

It is important to note that the ridership and revenue increase at a faster rate than train miles for most of the higher frequency and speed alternatives. The following charts display forecasted riders and revenue and passenger miles and revenue per train mile. These charts illustrate the benefit of faster and more frequent service. Revenue per train mile increases from the base in all alternatives except for alternatives with low frequency. Passenger miles per train mile also generally increase after falling slightly in the low frequency alternatives.

The slightly lower performance of Alternatives 3 and 4, relative to Alternatives 1 and 2 as well as Alternative 8, relative to Alternative 7, reflects the diminishing return of additional frequencies as the timetable of trains expands. Because of the more than seven (7) hour running time between Norfolk and New York, it is not practical for all of the new Norfolk train frequencies operate north of Washington – they would depart or arrive at the end point station at a poor time of day and/or conflict with other Northeast Corridor

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 operations. This is the case with the additional frequency provided in Alternatives 3 and 4 and one of the two additional frequencies provided in Alternative 8.

### Forecast Results and Performance Measures for 2025



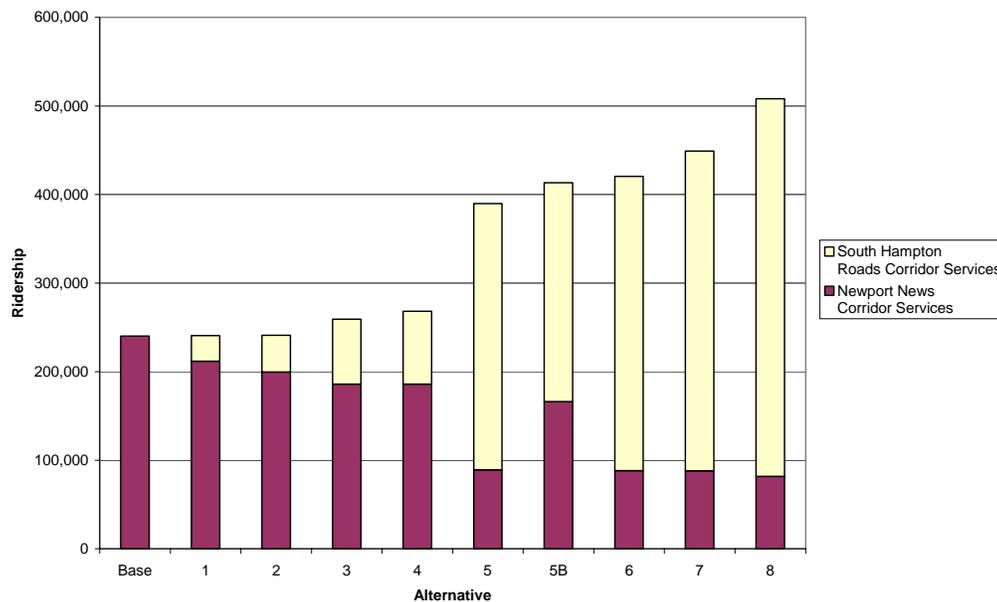
The next exhibits show ridership and revenue to/from the Hampton Roads area, served by the existing Newport News/Williamsburg corridor services and the new South Hampton Roads corridor service. As these exhibits show, there is an overall increase in ridership and revenue to/from the Hampton Roads area as the combined service frequencies and travel times improve across the service alternatives. Similarly, the exhibit shows the increasing diversion of ridership/revenue from the Newport News/Williamsburg corridor services, as passengers shift to the improved frequencies and travel times along the South Hampton Roads corridor service to/from Richmond and point north.

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**Hampton Roads Rail Ridership and Revenue for 2025**

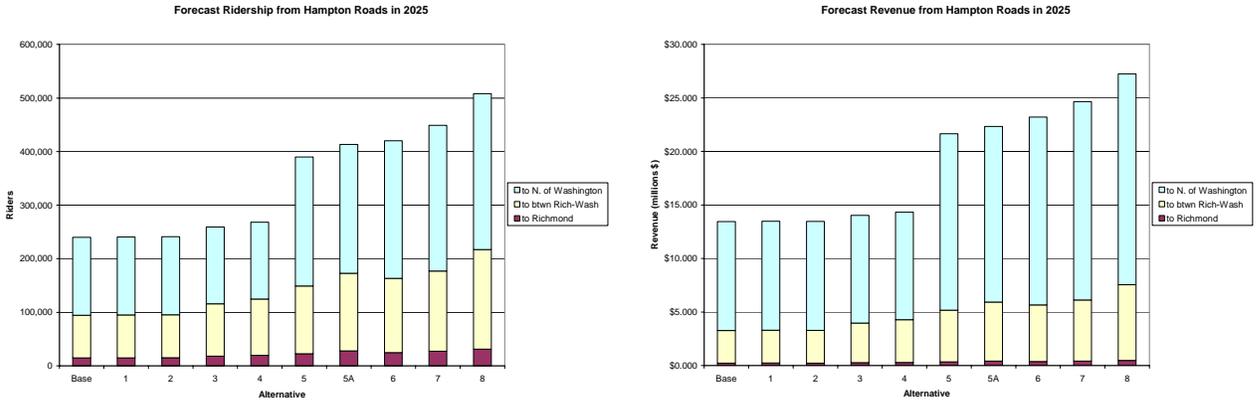
Alt	Newport News / Williamsburg Corridor Services		South Hampton Roads Corridor Services		Hampton Roads Total	
	Riders	Revenue (millions\$)	Riders	Revenue (millions\$)	Riders	Revenue (millions\$)
Base	240,200	\$13.460			240,200	\$13.460
1	211,800	\$12.460	28,800	\$1.020	240,600	\$13.480
2	199,500	\$11.970	41,500	\$1.510	241,000	\$13.480
3	185,900	\$11.380	73,300	\$2.650	259,200	\$14.030
4	185,900	\$11.380	82,300	\$2.960	268,200	\$14.340
5	89,000	\$4.870	300,800	\$16.780	389,800	\$21.650
5A	166,100	\$9.190	247,100	\$13.150	413,200	\$22.340
6	88,200	\$4.840	332,200	\$18.380	420,400	\$23.220
7	88,000	\$4.830	361,000	\$19.830	449,000	\$24.660
8	81,800	\$4.590	426,300	\$22.660	508,100	\$27.250

Forecast Ridership for Hampton Roads Corridors 2025



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Another important characteristic of the Hampton Roads area ridership and revenue forecasts is their north-end origin-destination. The exhibit below provides a graphical illustration of the relative significance of Hampton Roads ridership and revenue to/from Richmond, points north of Richmond to as far as Washington, and points north of Washington. As the exhibits show, very little Hampton Roads ridership and revenue is associated with travel to/from Richmond and, as in the base, most ridership and, in particular, revenue is associated with trips to/from points beyond Washington.



The next exhibit summarizes the total ridership and revenue forecasts for each of the alternatives including the above figures for the Hampton Roads area as well as impacts between Petersburg/Richmond and points north. As the exhibit shows, ridership and revenue also increase as new frequencies are introduced at Petersburg and, in some alternatives, Richmond.

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**Hampton Roads, Richmond, and Other Markets  
Rail Ridership and Revenue for 2025**

Alt	Hampton Roads		Richmond/Petersburg & markets to the north		Total	
	Riders	Revenue (millions\$)	Riders	Revenue (millions\$)	Riders	Revenue (millions\$)
Base	240,200	\$13.460	438,500	\$19.970	678,700	\$33.430
1	240,600	\$13.480	438,500	\$19.970	679,100	\$33.450
2	241,000	\$13.480	438,500	\$19.970	679,500	\$33.460
3	259,200	\$14.030	468,800	\$20.670	728,000	\$34.700
4	268,200	\$14.340	468,800	\$20.670	737,000	\$35.010
5	389,800	\$21.650	568,000	\$25.740	957,800	\$47.390
5A	413,200	\$22.340	673,400	\$29.810	1,086,600	\$52.150
6	420,400	\$23.220	568,000	\$25.740	988,400	\$48.960
7	449,000	\$24.660	568,000	\$25.740	1,017,000	\$50.400
8	508,100	\$27.250	673,400	\$29.810	1,181,500	\$57.060