DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL

J RIDERSHIP

D.C. TO RICHMOND SOUTHEAST HIGH SPEED RAIL

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J-1 RIDERSHIP FORECASTING TECHNICAL REPORT

DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL

Ridership Forecasting Technical Report

DRPT
Virginia Department of Rail and Public Transportation

U.S. Department of Transportation
Federal Railroad Administration

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1 INTRODUCTION

This Technical Report describes the methodology, alternatives, and results of the ridership forecasting process for the Washington, D.C. to Richmond (DC2RVA) segment of the Southeast High Speed Rail (SEHSR) Environmental Impact Statement. It is organized into five chapters and an appendix that present:

- A description of the ridership forecasting methodology and an assessment of its validation against existing, observed ridership patterns in the corridor. This methodology was tested by conducting a series of sensitivity tests that were compared to Amtrak's own experience with the ridership impacts of service changes. This test is designed to confirm that the model responds appropriately to frequency, speed, and reliability improvements.
- A brief description of each No Build and Build Alternative.
- Ridership forecasting results for the Year 2025.
- Ridership forecasting results for the Year 2045.
- An appendix that shows the rail schedule used to calibrate the model for existing conditions. This schedule also shows the scope of what is included in the modeling system—trains in and through the DC2RVA corridor, trains operating in the NEC from Washington, D.C. and north, and trains operating within North Carolina.

2 RIDERSHIP FORECASTING METHODOLOGY

This chapter describes the forecasting model developed to predict rail ridership for the Washington, D.C. to Richmond (DC2RVA) segment of the Southeast High Speed Rail (SEHSR) Project. This methodology is designed to be generally consistent with the assumptions and many of the methodologies used in similar planning efforts in adjoining corridors. In particular, the fundamental model structure and key demographic forecasts are based on work conducted for the Federal Railroad Administration as part of the NEC FUTURE project[1]. The geographic scope and some model parameters for the areas south of the DC2RVA corridor were obtained from the models used to forecast ridership for the Southeast High-Speed Rail (Raleigh to Richmond) Tier II Study[2].

The model was customized to the DC2RVA corridor based on corridor-specific ridership count data obtained from Amtrak, a survey of Amtrak customers traveling in the corridor, and a survey of all travelers to and from the corridor. The survey data was used to update the NEC FUTURE demand models for application to the DC2RVA market. The models were then calibrated to match the observed Amtrak ridership patterns.

An initial version of the DC2RVA model was reviewed by Amtrak to confirm that the model's sensitivity to travel time (speed), frequency, and on-time performance matched Amtrak experience with the effects of these factors on ridership. In several cases, the modeled sensitivities to rail service characteristics were adjusted to be more consistent with Amtrak's experience.

The remainder of this chapter describes the model developed and calibrated for the DC2RVA Project.

[1] NEC FUTURE is the Tier I Environmental Impact Statement for the Northeast Corridor. This study considered High-Speed and Regional Rail improvements for the corridor between Richmond, Virginia and Boston Massachusetts with a particular focus on the spine of the Northeast Corridor between Washington and Boston. All current DC2RVA trains and most future DC2RVA trains will be fully integrated with trains in the Northeast corridor and will operate north of Washington to New York.

[2] The Raleigh to Richmond EIS is important to the DC2RVA market since the North Carolina trains that are part of that project will operate north of Richmond to Washington, D.C. and New York. Many of the Raleigh to Richmond service improvements are dependent on capacity enhancements associated with the DC2RVA Project.

2.1 GEOGRAPHIC SCOPE OF ANALYSIS

The DC2RVA ridership forecasting models are designed to nest within the geographic analysis structures used for both the NEC FUTURE model and the SEHSR EIS model. For areas in the Northeast Corridor, north of the Washington, D.C. area, the model uses the same zone structure (and underlying assumptions) as the NEC FUTURE Model. For areas south and west of Richmond and Hampton Roads, the model uses counties (or county-equivalents) contained within the boundaries of the SEHSR forecasting model. In the primary DC2RVA corridor including Hampton Roads, Richmond, Fredericksburg, and Washington, D.C., the DC2RVA model uses aggregations of local MPO zones. Since station location will be a particular issue in Richmond, individual MPO zones are used in the core areas of the City of Richmond without any aggregation.

Figure 2-1 presents an overview of the zone system for the entire modeling area. Figure 2-2 presents the zones in the D.C. to Richmond corridor and Figure 2-3 presents the zone system in the Richmond area.

For purposes of calibration and detailed reporting, zones are aggregated to districts that correspond to the Consolidated Metropolitan Statistical Area (CMSA) definitions used in both the NEC FUTURE model and the SEHSR model. These CMSA districts are presented in Figure 2-4 (southern part of the modeling area) and Figure 2-5 (northern part of the modeling area). These CMSA districts are further collapsed into super districts for summary reporting. These super districts are defined as:

- New England: All CMSAs north of the New York CMSA
- NEC: All CMSAs between and including Baltimore and New York
- Washington: the Washington, D.C. CMSA
- Richmond: the Richmond CMSA
- Tidewater: The Virginia Beach and Williamsburg-Hampton CMSA
- Other VA: All other CMSAs in Virginia
- NC: All CMSAs in North Carolina

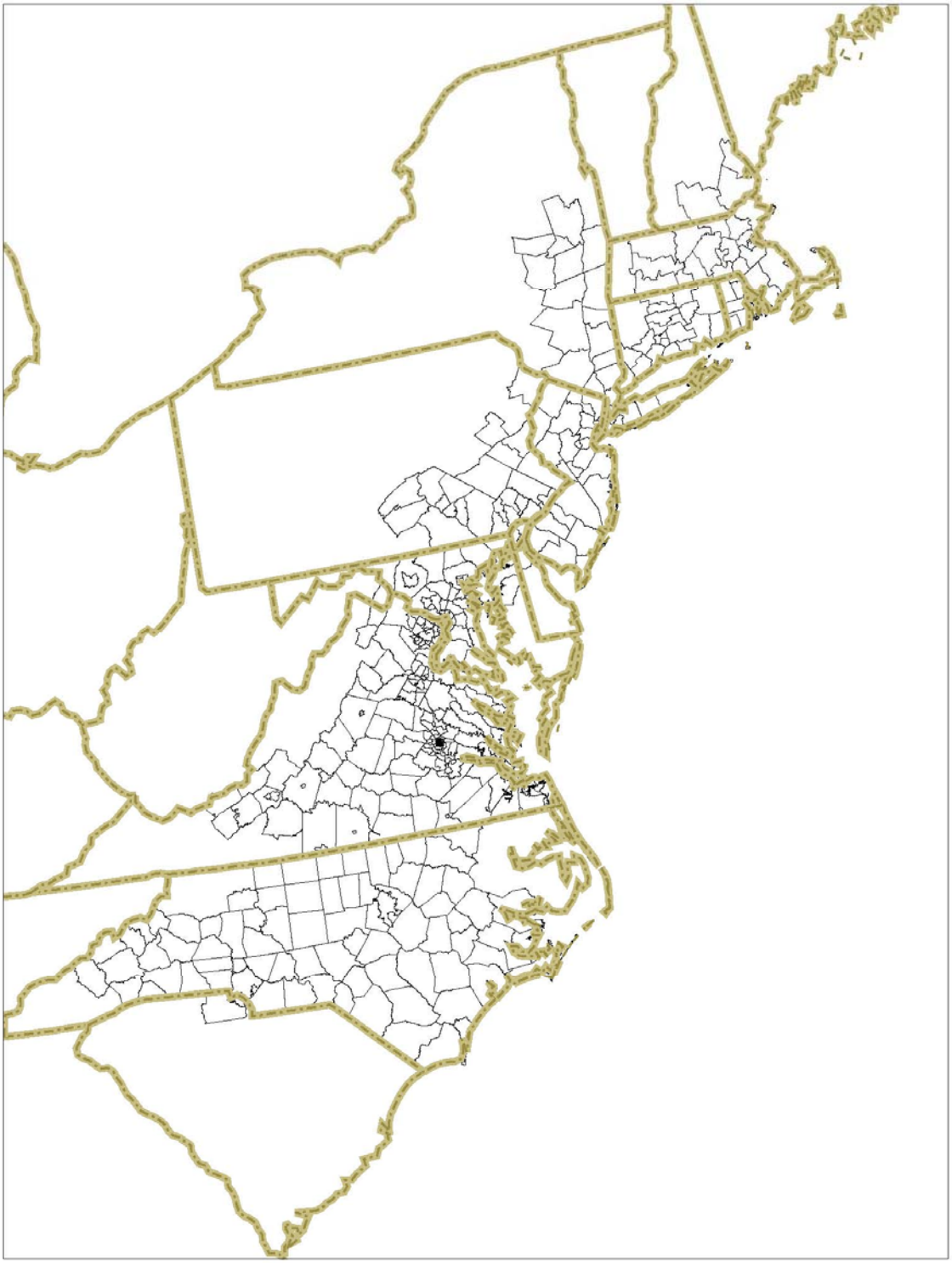


FIGURE 2-1: OVERVIEW OF ZONE SYSTEM FOR THE ENTIRE MODELING AREA

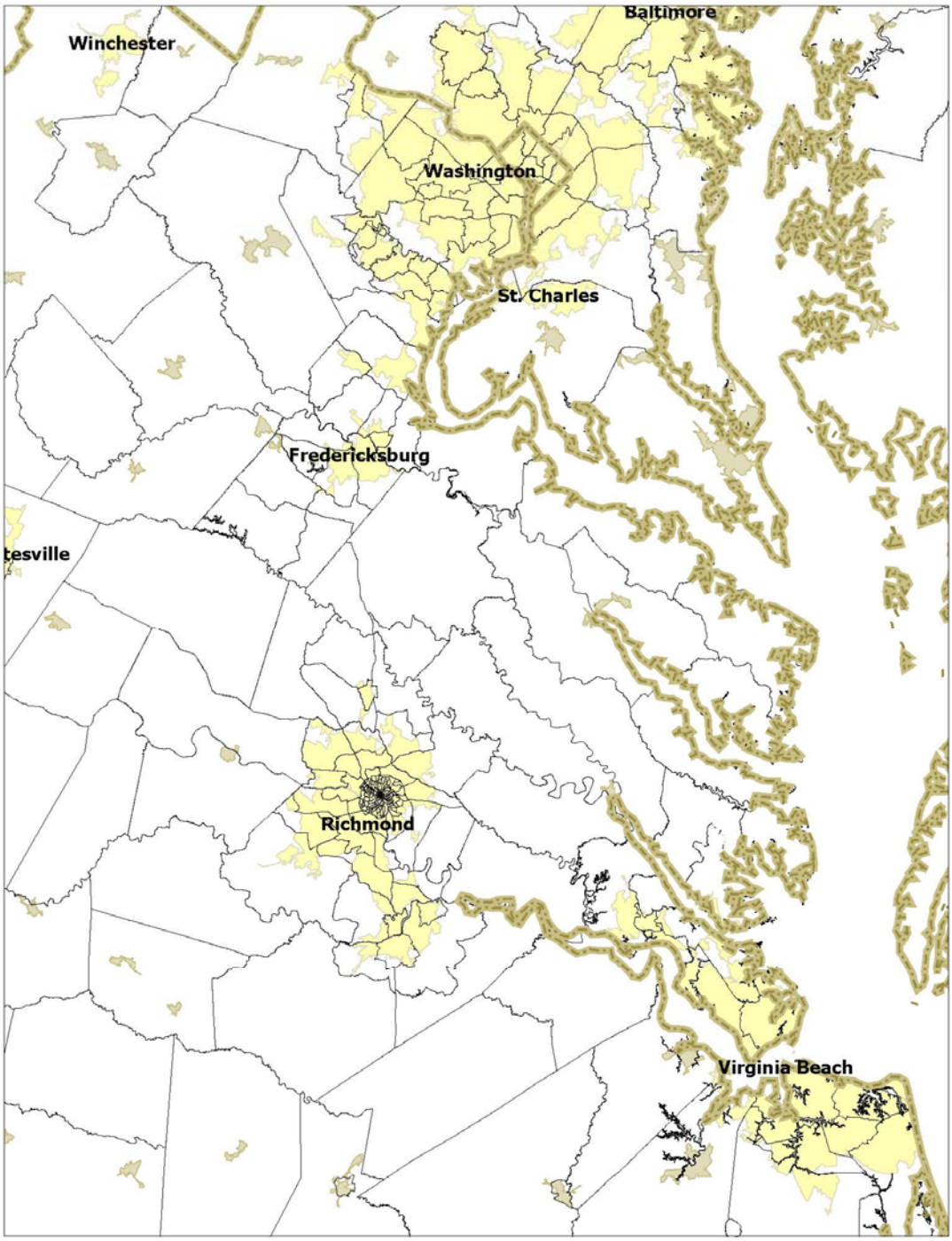


FIGURE 2-2: ZONE SYSTEM IN THE DC2RVA CORRIDOR

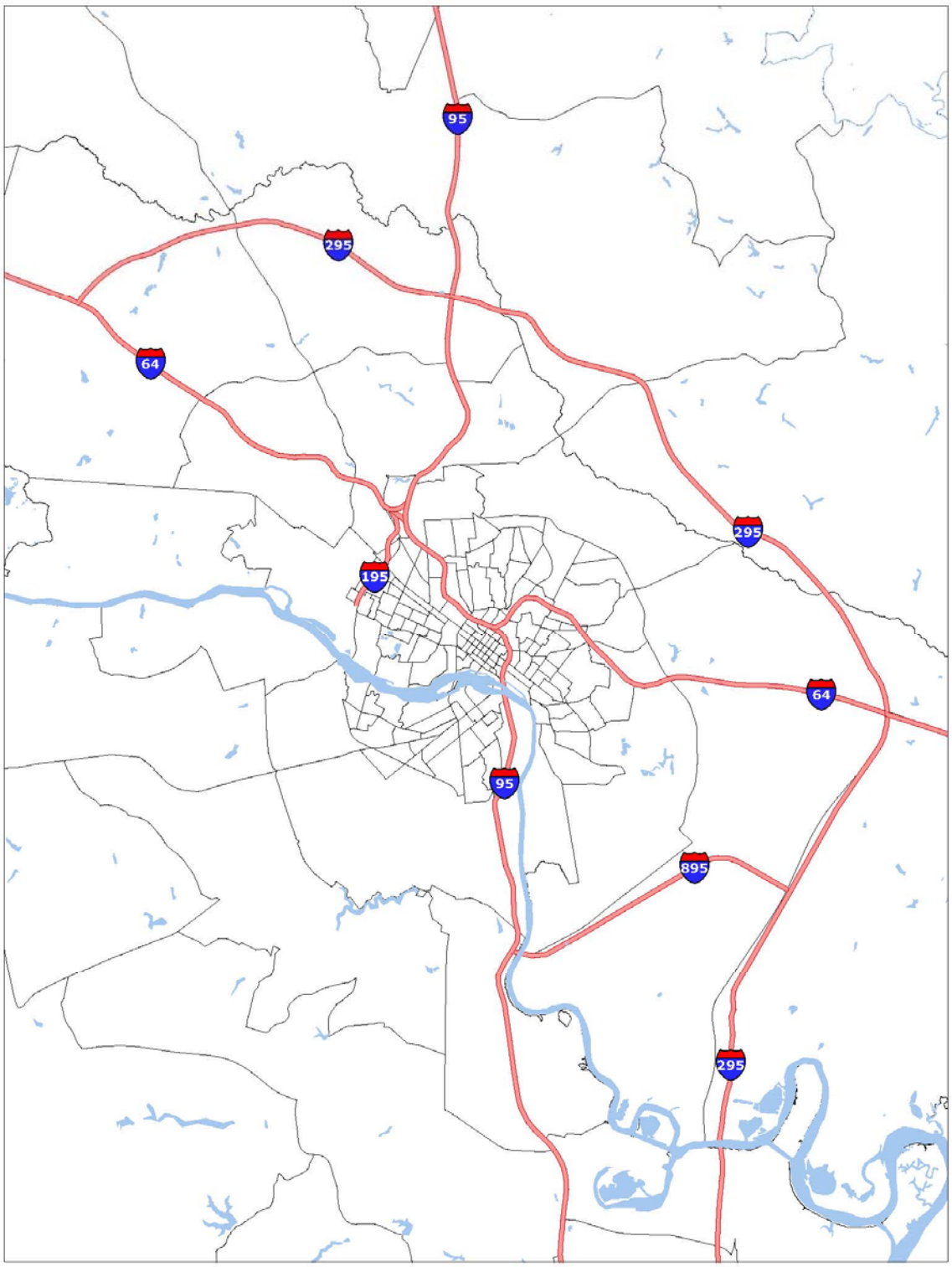


FIGURE 2-3: ZONE SYSTEM IN THE RICHMOND AREA

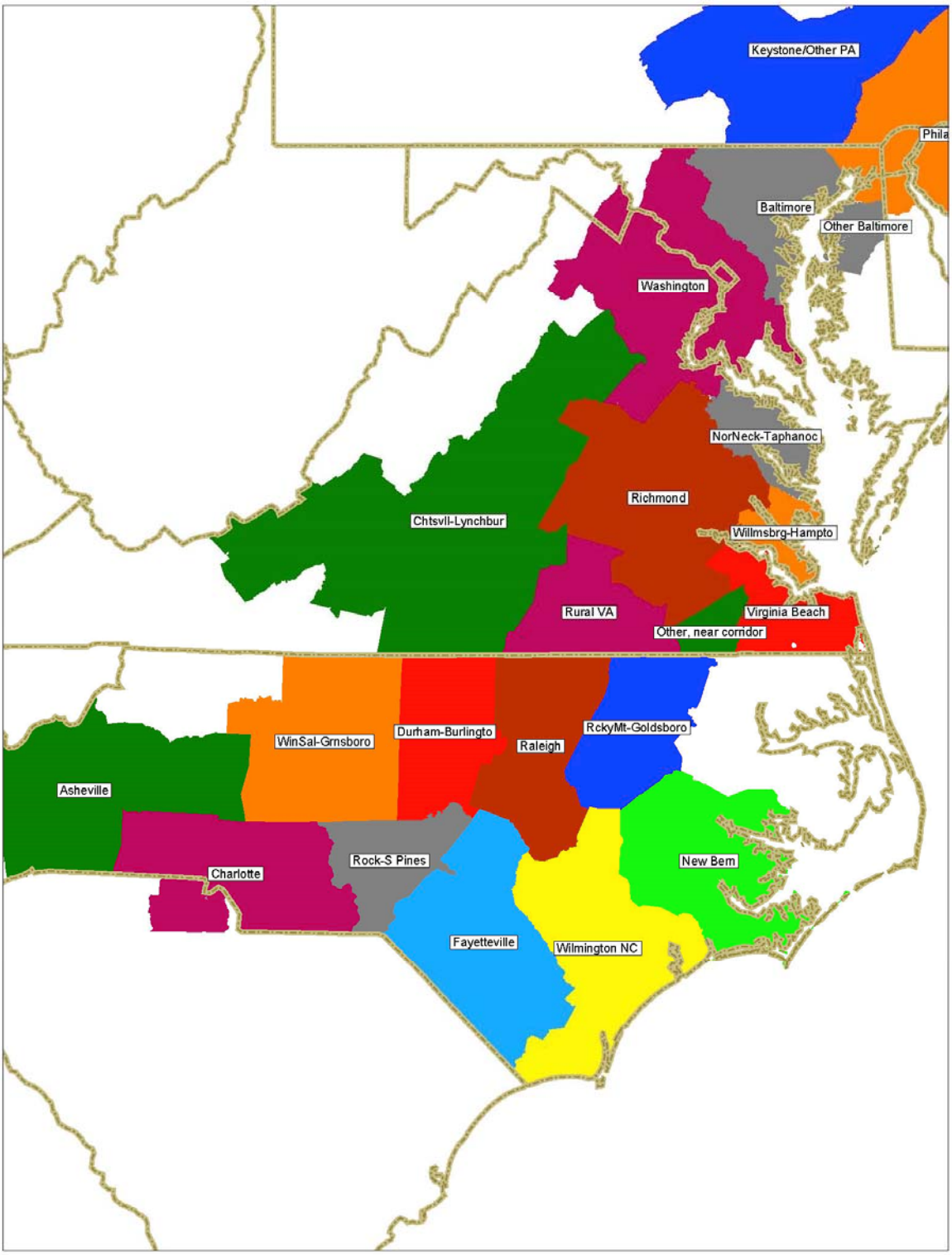


FIGURE 2-4: CMSA DISTRICT SYSTEM IN SOUTHERN PORTION OF MODELING AREA

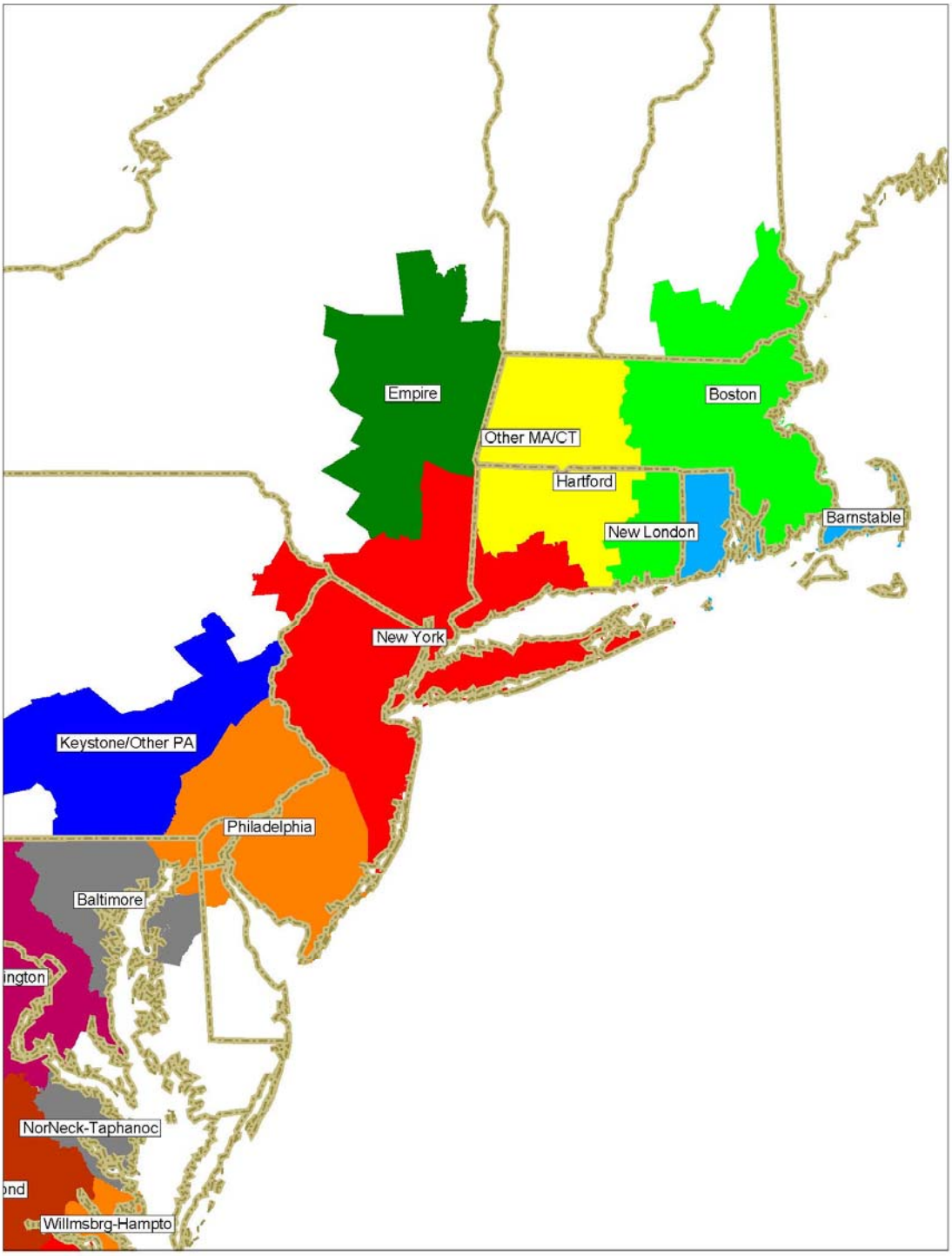


FIGURE 2-5: CMSA DISTRICT SYSTEM IN NORTHERN PORTION OF MODELING AREA

Note: Rhode Island is in the Providence CMSA District

2.2 DEMOGRAPHIC ASSUMPTIONS

Demographic assumptions include estimates of current and future population and employment in the modeling area for each Traffic Analysis Zone. Data were obtained from the following sources:

- Metropolitan Washington Council of Governments. Round 8.4 TAZ forecasts of population and employment for the period between 2010 and 2040 in five year increments. MWCOG projections of population and employment are used for all part of the MWCOG forecasting region except:
    - St Mary's County which is outside of the modeling region
    - Stafford, King George, and Spotsylvania Counties and the City of Fredericksburg which are included in the Fredericksburg Area Metropolitan Planning Organization database
- Fredericksburg Area Metropolitan Planning Organization (MWCOG). Model 3.0 TAZ forecasts of population and employment for the period between 2010 and 2040 in 10 year increments
- Richmond Regional Planning District Commission. (April 2015 Redacted Version)
- Hampton Roads Transportation Planning Organization (Model inputs from 2009 LRTP)
- NEC FUTURE model for all zones in the modeling area north of the areas included in the MWCOG modeling area
- Woods & Poole County-level forecasts of population and employment for areas south and west of Richmond and Hampton Roads. This is the same data series used in the Virginia Department of Transportation statewide models

These data sources were combined into a single region-wide GIS layer with estimates of population and employment by zone between 2015 and 2050 in 5-year increments. Interpolation was used in cases where an individual data source did not have a particular intermediate year. Straight line extension of the past 5 or 10 years was used in cases where an individual data source had 2040 as the furthest out-year.

Tables 2-1 and 2-2 present a summary of population and employment assumptions by CMSA district. Tables 2-3 and 2-4 present the same information summarized at the super district level.

TABLE 2-1: POPULATION BY CMSA AND YEAR

CMSA	2015	2025	2015-2025 Growth	2045	2015-2045 Growth
Boston	6,501,614	6,696,702	3%	6,952,920	7%
Hartford	1,858,109	1,906,345	3%	1,977,315	6%
Providence	1,057,273	1,083,970	3%	1,133,509	7%
New York	22,366,051	23,052,425	3%	24,786,243	11%
Philadelphia	6,620,767	6,818,080	3%	7,173,674	8%
Baltimore	2,813,364	2,942,123	5%	3,111,180	11%
Washington	5,922,365	6,651,279	12%	7,802,742	32%
Empire	1,224,503	1,249,730	2%	1,322,372	8%
Keystone/Other PA	2,858,013	3,085,780	8%	3,537,665	24%
Richmond	1,353,335	1,473,400	9%	2,047,711	51%
New London	396,061	407,500	3%	428,661	8%
Other MA/CT	391,749	394,270	1%	392,699	0%
Barnstable	243,412	253,492	4%	275,773	13%
Virginia Beach	1,142,581	1,214,606	6%	1,535,830	34%
Williamsburg-Hampton	541,233	556,587	3%	630,369	16%
No. Neck-Tappahannock	72,743	77,439	6%	84,295	16%
Rural VA	103,235	105,871	3%	106,975	4%
Charlottesville-Lynchburg	1,273,938	1,374,109	8%	1,550,077	22%
Rocky Mt-Goldsboro	309,309	324,519	5%	342,914	11%
Raleigh	4,443,141	5,501,237	24%	8,091,586	82%
New Bern	508,918	571,376	12%	699,671	37%
Wilmington NC	835,290	933,842	12%	1,133,185	36%
Fayetteville	778,889	855,835	10%	995,733	28%
Durham-Burlington	731,886	843,858	15%	1,082,650	48%
Winston Salem-Greensboro	1,559,587	1,726,152	11%	2,049,401	31%
Rockingham-Southern Pines	229,852	252,498	10%	294,245	28%
Charlotte	3,203,084	3,829,932	20%	5,294,235	65%
Asheville	1,170,089	1,291,236	10%	1,522,790	30%
Total	70,510,391	75,474,192	7%	86,356,419	22%

Table Source: Corridor Metropolitan Planning Organizations and NEC FUTURE Project, 2016.

TABLE 2-2: EMPLOYMENT BY CMSA AND YEAR

CMSA	2015	2025	2015-2025 Growth	2045	2015-2045 Growth
Boston	3,346,544	3,570,526	7%	3,799,536	14%
Hartford	910,304	955,870	5%	999,434	10%
Providence	476,734	506,425	6%	523,313	10%
New York	10,335,720	11,154,825	8%	12,093,013	17%
Philadelphia	3,083,899	3,366,985	9%	3,634,919	18%
Baltimore	1,508,825	1,643,062	9%	1,837,209	22%
Washington	3,458,191	3,980,523	15%	5,112,942	48%
Empire	579,857	632,170	9%	674,875	16%
Keystone/Other PA	1,319,563	1,462,630	11%	1,671,846	27%
Richmond	687,255	753,605	10%	989,683	44%
New London	175,960	187,500	7%	185,152	5%
Other MA/CT	155,239	159,720	3%	140,721	-9%
Barnstable	109,921	121,099	10%	136,169	24%
Virginia Beach	743,969	776,631	4%	937,902	26%
Williamsburg-Hampton	331,650	346,517	4%	411,891	24%
No. Neck-Tappahannock	32,602	36,451	12%	41,804	28%
Rural VA	46,731	49,924	7%	52,476	12%
Charlottesville-Lynchburg	715,387	809,176	13%	959,033	34%
Rocky Mt-Goldsboro	154,116	169,802	10%	189,514	23%
Raleigh	2,757,622	3,403,788	23%	4,852,004	76%
New Bern	270,656	308,133	14%	376,303	39%
Wilmington NC	432,497	487,845	13%	588,339	36%
Fayetteville	381,683	432,626	13%	523,766	37%
Durham-Burlington	483,771	580,642	20%	785,074	62%
Winston Salem-Greensboro	864,629	996,141	15%	1,237,814	43%
Rockingham-Southern Pines	111,395	127,004	14%	153,296	38%
Charlotte	2,113,146	2,559,290	21%	3,514,030	66%
Asheville	621,968	707,435	14%	861,806	39%
Total	36,209,833	40,286,346	11%	47,283,863	31%

Table Source: Corridor Metropolitan Planning Organizations and NEC FUTURE Project, 2016.

TABLE 2-3: POPULATION BY SUPER DISTRICT AND YEAR

Super District	2015	2025	2015-2025 Growth	2045	2015-2045 Growth
New England	11,672,721	11,992,008	3%	12,483,249	7%
NEC	34,658,196	35,898,408	4%	38,608,761	11%
Washington	5,922,365	6,651,279	12%	7,802,742	32%
Richmond	1,353,335	1,473,400	9%	2,047,711	51%
Tidewater	1,683,814	1,771,193	5%	2,166,199	29%
Other VA	1,449,916	1,557,419	7%	1,741,347	20%
NC	13,770,045	16,130,485	17%	21,506,410	56%
Total	70,510,391	75,474,192	7%	86,356,419	22%

Table Source: Corridor Metropolitan Planning Organizations and NEC FUTURE Project, 2016.

TABLE 2-4: EMPLOYMENT BY SUPER DISTRICT AND YEAR

Super District	2015	2025	2015-2025 Growth	2045	2015-2045 Growth
New England	5,754,559	6,133,311	7%	6,459,199	12%
NEC	16,248,006	17,627,502	8%	19,236,987	18%
Washington	3,458,191	3,980,523	15%	5,112,942	48%
Richmond	687,255	753,605	10%	989,683	44%
Tidewater	1,075,618	1,123,148	4%	1,349,793	25%
Other VA	794,720	895,551	13%	1,053,314	33%
NC	8,191,483	9,772,706	19%	13,081,946	60%
Total	36,209,833	40,286,346	11%	47,283,863	31%

Table Source: Corridor Metropolitan Planning Organizations and NEC FUTURE Project, 2016.

2.3 SUPPLY

An accurate representation of existing and future transportation supply is a critical element to the ridership forecasting process. This section describes the transportation system data sources and the procedures used to translate this information into estimates of zone-to-zone travel time. Modeled estimates of zone-to-zone travel times and other attributes were compared to independent information from on-line mapping or reservation web sites to confirm the their reasonableness.

2.3.1 Highway System

The highway network is based on the database developed for the NEC FUTURE model. This network is derived from the Oak Ridge National Highway Network combined with detailed information from local agencies in the New York metropolitan area. Similar databases were used to support both the NEC FUTURE project and the North Carolina portion of the SEHSR EIS.

The database includes interstate, principal arterial, and other highway facilities along the east coast of the United States from Maine to North Carolina as shown in Figure 2-6. A detailed view of the Virginia to New York portion of the corridor is shown in Figure 2-7.

Travel times were assigned to each link using procedures developed for the NEC FUTURE model. Speeds are computed (outside of the New York City area) based on the facility type, distance, and assumed speed limit for each link. In the New York region, travel times obtained from local planning agencies are posted directly to the network. These speed and time estimates were used with a GIS-based highway path-builder to estimate zone-to-zone travel times (also called "skims"). Tolls were also estimated using link-level tolls posted to the network as part of the NEC FUTURE project.

To confirm these times are appropriate for us in the DC2RVA Project, a sample of zone-to-zone travel times generated by the GIS procedures, described above, were checked against congested times estimated from on-line mapping/direction tools. This comparison is presented in Table 2-5. In general, the time estimates generated by the path-building procedures are similar to the on-line mapping results and are within the range of expected variation between modeled and observed times. The most notable exception is for times to New York City which, according to the on-line tools, are generally much shorter than the estimated skims. This additional time was retained in the DC2RVA analysis both to maintain consistency with NEC FUTURE forecasts and to represent the difficulty and uncertainty associated with using an automobile in New York City.

For this analysis, future highway travel times are assumed to be constant between the present and the forecast years. Interstate 95, the principal interstate facility serving the DC2RVA corridor can be highly congested in some sections and at some times-of-day or times-of-year. At other times, this roadway operates at, or above, the speed limit, for most of the journey. I-95 also offers High Occupancy Toll lanes which now cover many of the most congested segments of the roadway and offer a faster journey for HOV or toll-paying travelers. Extensions to this facility are currently being considered. Absent any definitive information from the Virginia Department of Transportation[3], the DC2RVA model assumes that the existing level-of-service on I-95 will be maintained into the future.

[3] At the time of this analysis, VDOT's statewide model was in the process of being updated. Until it can be used to evaluate potential changes to I-95 (including managed lanes), holding travel times constant was judged to be the most prudent option.

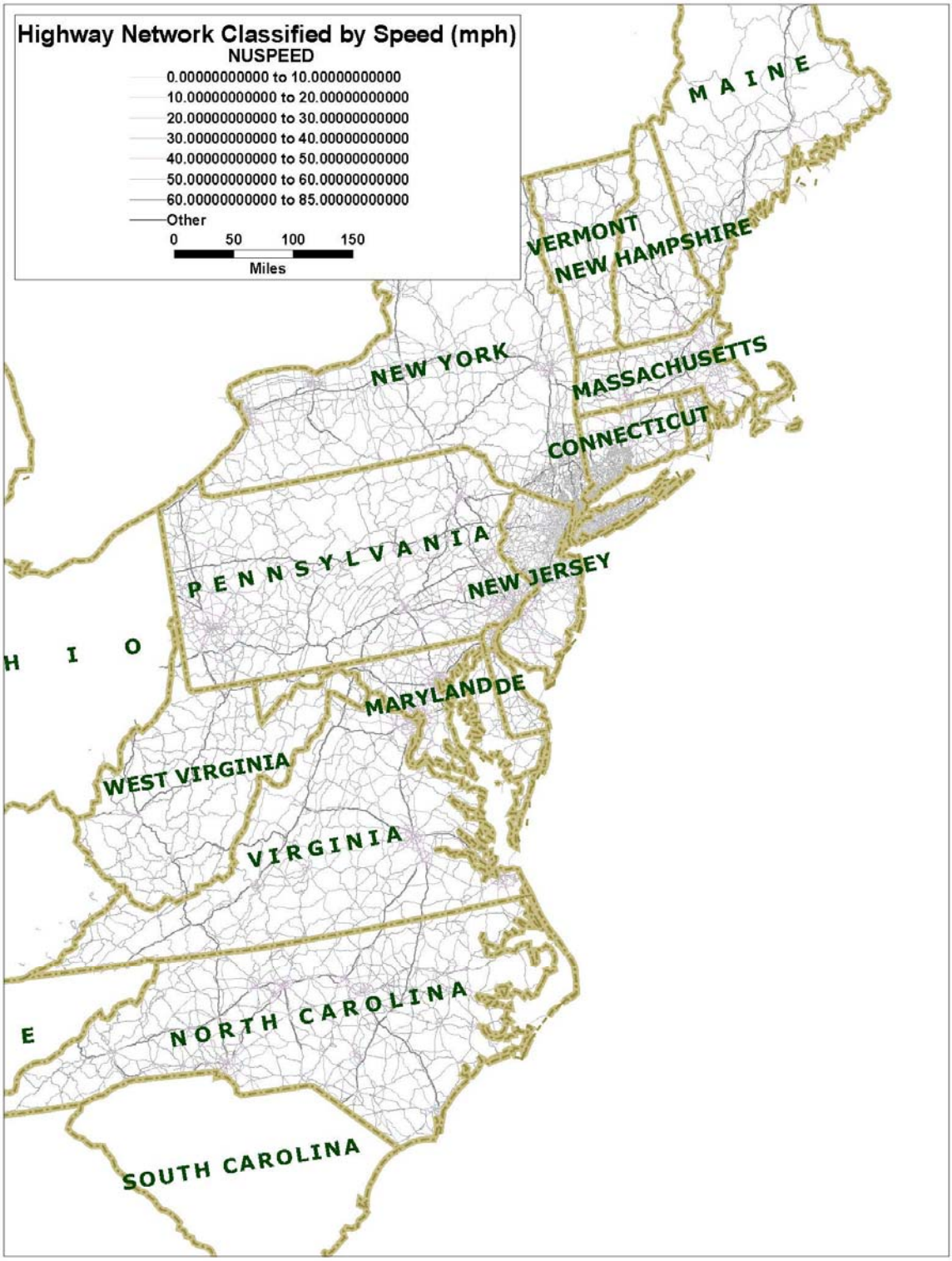


FIGURE 2-6: OVERVIEW OF COMPLETE HIGHWAY NETWORK

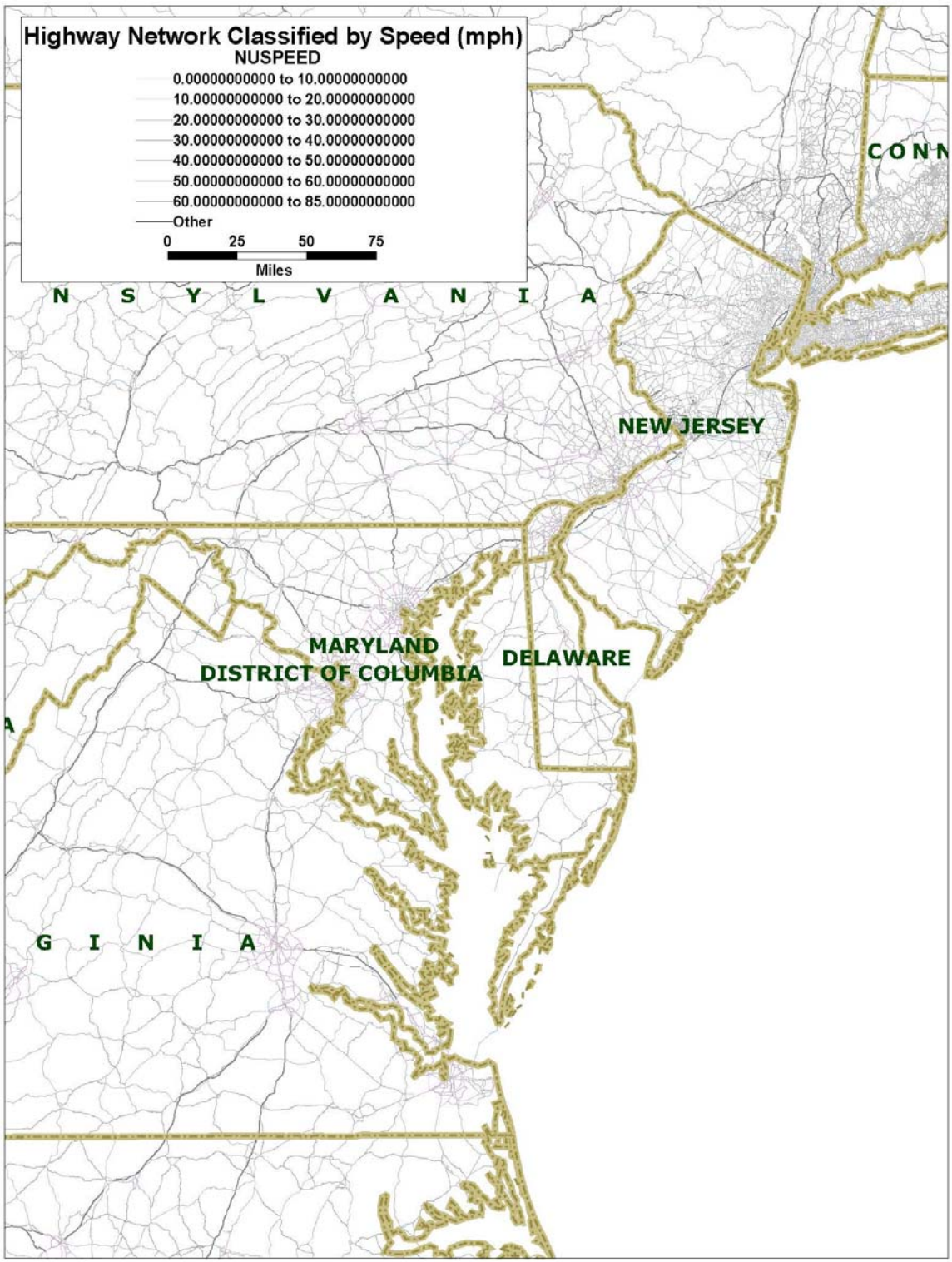


FIGURE 2-7: ILLUSTRATIVE HIGHWAY NETWORK DETAIL IN VIRGINIA TO NEW YORK PORTION OF CORRIDOR

TABLE 2-5: COMPARISON OF HIGHWAY TRAVEL TIME ESTIMATES FROM ON-LINE MAPPING AND DC2RVA NETWORK PROCESSING PROCEDURES (YEAR 2016, MINUTES)

From City and Zone			To City and Zone		
			Richmond	Washington, DC	New York City
City	Zone	Source	459	22	155
Norfolk	256	On-Line Directions	120	215	425
		Network	110	225	546
		Difference	-8%	5%	28%
Raleigh	161	On-Line Directions	155	280	485
		Network	194	318	502
		Difference	25%	14%	4%
Richmond	459	On-Line Directions		130	340
		Network		127	448
		Difference		-2%	32%
Fredericksburg	248	On-Line Directions	67.5	82.5	310
		Network	65	72	493
		Difference	-4%	-13%	59%

2.3.2 Aviation

The airline network was developed from the October 2014 T-100 data bank obtained from the Bureau of Transportation Statistics. This data source was also used for the NEC FUTURE and NC SEHSR EIS projects. This database provides information on the number of departures scheduled and operated by each carrier and the average travel time for each airport-to-airport interchange. This database was converted into General Transit Feed Specification (GTFS) format with one record for each airport-to-airport pair. A computerized path-builder (GTF Path) reads these GTFS files (and those developed for rail and bus networks) and generates estimates of zone-to-zone travel time and service frequency.

Air travel characteristics for key markets in the corridor are shown in Table 2-6 and are compared to results obtained from on-line reservation system results[4]. As this table shows, the T-100 database is very similar to the reservation results. Differences in frequency are caused by the use of different time periods for the analysis and by fact that the T-100 database represents the average frequency of trips actually operated (i.e., not canceled) over an entire month. By contrast, the reservation system shows the scheduled trips for a specific day and may include pad to account for airport delay in certain locations. Since the T-100 data bank represents the air system as actually operated, it was selected as the primary source of data for air service in the DC2RVA model with the on-line schedule serving as a check on the accuracy of that data.

Table 2-7 presents a summary of the zone-to-zone travel times estimated by GTF Path for selected zone-to-zone trips.

[4] On-line reservations queried in March 2016.

TABLE 2-6: COMPARISON OF GTFS AND ON-LINE SCHEDULE REPRESENTATION OF AIR SERVICE FOR SELECTED CORRIDOR AIRPORT PAIRS

	GTFS Schedule (October 2014)		On-Line Schedule (March 2016)	
Airport Pair	**Time[5] (minutes)**	**Frequency[6] (trips/day)**	**Time (minutes)**	**Frequency (trips/day)**
RIC-DCA	37	<1		0
RIC-IAD	50	3	53	3
RIC-BWI		0		0
RIC-PHL	60	7	59	7
RIC-EWR	75	4	78	5
RIC-LGA	79	8	69	9
RIC-JFK	78	3	85	3
RIC-BOS	89	6	99	7
RIC-RDU		0		0
RIC-CLT	74	8	77	8
ORF-DCA	54	4	61	4
ORF-IAD	59	5	70	4
ORF-BWI	62	3	60	4
ORF-PHL	69	6	59	7
ORF-EWR	80	2	87	5
ORF-LGA	83	5	75	9
ORF-JFK	84	2	87	1
ORF-BOS		0		0
ORF-RDU		0		0
ORF-CLT	78	8	84	8
DCA-RDU	69	6	68	7
DCA-CLT	85	9	88	10

[5] Based on T-100 Ramp-to-Ramp Time

[6] Based on T-100 Monthly Trips Actually Performed

TABLE 2-7: ZONE-TO-ZONE ESTIMATES OF AIR IN-VEHICLE TIME, ACCESS TIME, AND FREQUENCY (YEAR 2014, MINUTES)

From City and Zone			To City and Zone		
			Richmond	Washington, DC	New York City
City	**Zone**		**459**	**22**	**155**
Norfolk	256	In-Vehicle Time	37	54	83
		Access/Egress Time	12/21	12/12	12/29
		Frequency	1	4	6
Raleigh	161	In-Vehicle Time	122	75	92
		Access/Egress Time	30/21	30/12	30/29
		Frequency	17*	7	16
Richmond	459	In-Vehicle Time		37	79
		Access/Egress Time		21/12	21/29
		Frequency		1	8
Charlotte	167	In-Vehicle Time	64	78	107
		Access/Egress Time	25/21	25/12	25/29
		Frequency	8	10	17

2.3.3 Corridor Bus Services

Corridor bus services were prepared by hand-coding Greyhound and Megabus schedules in the Washington, D.C.-Richmond-Norfolk-Raleigh-Charlotte Corridor in GTFS format. The following Greyhound schedules were coded from March 2016:

- 123: Philadelphia-Baltimore-Washington-Richmond
- 124: New York-Richmond-Fayetteville
- 126: New York-Newark-Wilmington-Baltimore-Washington
- 143: Washington-Charlottesville
- 144: Richmond-Roanoke-Nashville
- 400: Jacksonville-Savannah-Fayetteville-Richmond
- 402: Richmond-Raleigh-Wilmington
- 420: New York/Philadelphia-Norfolk-Virginia Beach
- 422: Richmond-Williamsburg-Norfolk
- 423: Raleigh-Elizabeth City-Norfolk
- 424: Richmond-Charlotte-Atlanta

Megabus schedules were coded based on on-line schedules available in March 2016 connecting Richmond to Durham and Charlotte in the south and Washington, Baltimore (White Marsh) and Philadelphia.

For trips north of Washington, the representation of the bus system from the NEC FUTURE model was used.

GTFPath was used to process the Bus GTFS data and prepare zone-to-zone travel time and impedance matrices. A sample of the bus zone-to-zone impedance matrix is presented in Table 2-8.

TABLE 2-8: ZONE-TO-ZONE ESTIMATES OF BUS IN-VEHICLE TIME, ACCESS TIME, AND FREQUENCY (YEAR 2014, MINUTES)

To City and Zone			From City and Zone		
			Richmond	Washington, DC	New York City
City	Zone		459	22	155
Norfolk	256	In-Vehicle Time	90	275	565
		Access/Egress Time	23/8	23/4	17/10
		Frequency	5	2	3
Raleigh	161	In-Vehicle Time	190	290	
		Access/Egress Time	8/8	43/4	
		Frequency	4	3	
Richmond	459	In-Vehicle Time		125	405
		Access/Egress Time		8/4	8/10
		Frequency		13	10
Charlotte	167	In-Vehicle Time	375		
		Access/Egress Time	10/3		
		Frequency	2		

2.3.4 High-Speed Rail

The Acela timetable in GTFS format for September 2014 is the basis of all High Speed Rail services for existing and future conditions. Although this service is not operated in the Washington, D.C.-to-Richmond corridor in current year (or anticipated future scenarios), this service attracts many customers from Northern Virginia travelling to Philadelphia, New York, and other destinations in the Northeast Corridor. It is coded into the model to properly represent the choice that these trip-makers have to travel into Washington and take this service northward as opposed to using regional trains serving a closer Virginia station.

This GTFS schedule is processed using GTFPath to create zone-to-zone matrices of time and other impedances. Sample values are presented in Table 2-9.

TABLE 2-9: ZONE-TO-ZONE ESTIMATES OF HIGH SPEED RAIL IN-VEHICLE TIME, ACCESS TIME, AND FREQUENCY (YEAR 2014, MINUTES)

To City and Zone			City and Zone		
			Washington, DC	Philadelphia	New York City
City	Zone		22	57	155
Alexandria	173	In-Vehicle Time		88	165
		Access/Egress Time		18/20	18/11
		Frequency		16	16
Fredericksburg	248	In-Vehicle Time		88	165
		Access/Egress Time		72/20	72/11
		Frequency		16	16

2.3.5 Regional Rail

Regional rail schedules for the existing case and all future scenarios are developed by the DC2RVA service planning team. The scope of these schedules includes all regional trains operating in the Washington, D.C.-to-Richmond corridor, all intra-North Carolina trains, and all regional trains operating on the NEC between Washington and points north. The appendix presents the regional train schedule used for model calibration.

Similar to the other modes, GTF Path was used to generate estimates of zone-to-zone travel time and other impedances. To represent cases where travelers have a viable choice of station, two different paths were created. The first path is designed to represent the best overall choice for travelers who are willing to travel farther to a station to reach more frequent or faster train service. This path weights access and egress time at 2.5 times the value of in-vehicle (on train) travel time. The second path is intended to generate an alternative to the first path that connects to the nearest station; even if that station has very modest levels of service. The second path weights access and egress time at 15 times the value of in-vehicle time. The path-weight values were selected based on a series of path tests as follows:

- The value of 2.5 times in-vehicle time was the minimum value that caused paths to build reasonably. When this value was set to the weight generated by a statistical estimation of survey results (1.7), a path from Fredericksburg to Williamsburg would have an origin station of Richmond-Staples Mill. When 3 additional trains are added to Norfolk, the destination station becomes Norfolk. Neither outcome is a reasonable representation of how train passengers in this market would select boarding and alighting stations. When the weight is increased to 2.5, these paths board in Fredericksburg and alight in Williamsburg—the most logical station pair for this trip.
- The value of 15 times in-vehicle time is the amount that is necessary to reliably choose the closest station among all the existing and Build Alternatives. The most demanding situation concerned trips beginning in the City of Petersburg for alternatives where all trains stop at Richmond Main Street. Unless the weight was set to 15, some Petersburg origins would choose Richmond Main Street for some alternatives.

Table 2-10 presents computed estimates of travel time for selected key zone-to-zone combinations. This table shows both sets of regional rail paths. For places where multiple

potential boarding stations exist (e.g., Richmond and Norfolk), the fastest path and the closest-station path are different. In other places where only one station exists (e.g., Raleigh and Charlotte), the fastest path and the closest-station path are identical. Even in cases where the fastest-path and closest-station path are the same, both paths are retained for processing in later model steps.

TABLE 2-10: ZONE-TO-ZONE ESTIMATES OF REGIONAL RAIL IN-VEHICLE TIME, ACCESS TIME, AND FREQUENCY (YEAR 2014, MINUTES)

From City and Zone			To City and Zone- Path 1			To City and Zone – Path 2		
			Rich-mond	Wash., DC	New York City	Rich-mond	Wash., DC	New York City
City	**Zone**		**459**	**22**	**155**	**459**	**22**	**155**
Norfolk	256	Stations	NPN-RVM	NPN-WAS	NFK-NYP	NFK-RVR	NFK-WAS	NFK-NYP
		In-Vehicle Time	70	240	487	123	284	524
		Access/Egress Time	35/3	35/4	35/11	17/15	17/4	17/11
		Frequency	2	2	2	1	1	1
Raleigh	161	Stations	RGH-RVR	RGH-WAS	RGH-NYP	RGH-RVR	RGH-WAS	RGH-NYP
		In-Vehicle Time	202	353	605	202	353	605
		Access/Egress Time	7/15	7/4	7/11	7/15	7/4	7/11
		Frequency	2	2	2	2	2	2
Richmond	459	Stations		RVR-WAS	RVR-NYP		RVM-WAS	RVM-NYP
		In-Vehicle Time		135	365		170	413
		Access/Egress Time		15/4	15/11		3/4	3/11
		Frequency		9	9		2	2
Charlotte	167	Stations	CLT-RVR	CLT-WAS	CLT-NYP	CLT-RVR	CLT-WAS	CLT-NYP
		In-Vehicle Time	425	487	720	425	487	720
		Access/Egress Time	13/15	13/4	13/11	13/15	13/4	13/11
		Frequency	1	2	2	1	2	2

2.3 TRANSPORTATION LEVEL-OF-SERVICE MEASURES

After the completion of path-building, level-of-service statistics are computed for each origin zone-to-destination zone pair. Key statistics that are collected for each mode include:

- Access and egress time: Computed by the path builder using zone-to-station or zone-to-airport paths built using travel times from the highway network.
- In-vehicle time. For common carrier modes, this time is based on the scheduled time for the train(s), plane(s), or bus(es) used on the shortest paths for each zone-to-zone pair. For the auto mode, in-vehicle time is based on the zone-to-zone paths built with the highway network.
- Frequency. For common carrier modes, frequency is computed as the number of daily trains/buses/planes serving the station-to-station pair used for the trip.
- Adjusted frequency. Adjusted frequency is based on the formula used in the NEC FUTURE and SEHSR study:

$$Adjusted\ Frequency = ln\left(1 - \left(-0.08 \times e^{Frequency}\right)\right)$$

- Fare. Fare is computed separately for each common carrier mode and personal auto (including the access/egress component of common carrier trips):
  - Automobile. Business and commute trips are costed according to the fully allocated cost of operating an automobile at the time of the NEC FUTURE calibration. That value is $0.55 per mile. Non-Business Trips are costed at the incremental automobile rate of $0.15 per mile.
  - Rail fares are computed based on the mileage between rail stations according to the parameters developed for the NEC FUTURE project and shown in Table 2-11.

- Table 2-11: Mileage-Based Parameters for Estimating Rail Fares

• HSR Mileage Range	• HSR Cost/Mile		• Regional Rail Mileage Range	• Regional Rail Cost/Mile
• <75	• $0.92		• <75	• $0.447
• 75-250	• $0.63		• 75-200	• $0.405
• 250-350	• $0.14		• 200-300	• $0.216
• 350+	• $0.14		• 300+	• $0.216

  - Air fares are computed for each origin and destination airport based on average fare-paid information contained in the Airline Origin and Destination Survey

(DB1B) for 2012. For the DC2RVA study, NEC FUTURE fare table was extended to include key airports in the SEHSR corridor including Richmond (RIC), Norfolk (ORF), Raleigh-Durham (RDU), and Charlotte (CLT) using the 2012 average fares. These fares were checked against current (March 2016) fares by using on-line booking software to test fares to different locations for a trip one month in the future. This comparison is shown in Table 2-12. For Richmond, and to a lesser extent Norfolk, the 2012 fares are similar to current fares for a trip to be made in March 2016. The DB1B fares for the North Carolina airports are higher than the on-line booking fares. Given the variation that is possible with fares from day to day, the DB1B fares (which represent an average over an entire year) were retained for this analysis.

TABLE 2-12: COMPARISON OF DB1B FARES USED IN DC2RVA MODEL TO MARCH 2016 FARE QUOTES

From Airport		To Airport				
		DCA	BWI	PHL	EWR	LGA
RIC	DB1B	--	$292	$254	$313	$304
	Online range	$212	$218	$229 - $310	$270 - $335	$267 - $330
ORF	DB1B	$184	$149	$194	$244	$221
	Online range	$101	$112	$309 - $315	$285 - $420	$246 - $330
RDU	DB1B	$232	$142	$194	$236	$160
	Online range	$100	$100	$88	$117 - $128	$109
CLT	DB1B	$243	$134	$256	$230	$154
	Online range	$272 - $324	$105	$96	$78	$78

- Bus Fares were based on procedures developed for the NEC FUTURE project and extended to apply to DC2RVA Corridor. This fare relationship was tested by using on-line booking tools to compare modeled and actual fares. This comparison is presented in Table 2-13 and shows that the formula-based fares generally match the range of actual fares. As is the case for air fares, some city pairs have fares that are much lower than would be predicted by the distance. These discounted fares can be volatile and as a result the formula-based fares are used for this analysis.

TABLE 2-13: COMPARISON OF FORMULA-BASED BUS FARES USED IN DC2RVA MODEL TO MARCH 2016 FARE QUOTES

From City		To City			
		Richmond	Washington	Philadelphia	New York
Richmond	DC2RVA Estimate		$20	$32	$40
	Online range		$17 - $21	$18 - $21	$36-$40
Norfolk	DC2RVA Estimate	$19	$25	$33	$41
	Online range	$13 - $20	$17 - $30	$11 - $17	$30 - $35
Raleigh	DC2RVA Estimate	$24			
	Online range	$12			

2.4 ALL-MODE LONG DISTANCE TRAVEL DEMAND

The overall demand for long distance travel is based on the Federal Highway Administration National Long Distance Passenger Origin Destination Trip Table for 2008. This table is provided at the county (or county-equivalent) level-of-detail for travel demand occurring throughout the United States. As noted in its documentation, this table is designed to serve as a starting point for analysis of travel demand patterns and requires adaptation for any particular project.

The person trip table is stratified by the following modes and purposes:

- Bus
- Rail
- Air
- Auto (Business)
- Auto (Non-Business)

A summary of the Year 2008 Long Distance Trip Table is presented in Table 2-14.

These trip tables were scaled according to the projected growth in population and employment at each end of the trip using the procedures developed for the NEC FUTURE model. These procedures are:

$$FutureTrips = BaseYearTrips \times \left(\frac{\sqrt{Population_{Origin,Future} \times Population_{Destination,Future}}}{\sqrt{Population_{Origin,Exist} \times Population_{Destination,Exist}}} \right)^{x} \times \left(\frac{\sqrt{Employment_{Origin,Future} \times Employment_{Destination,Future}}}{\sqrt{Employment_{Origin,Exist} \times Employment_{Destination,Exist}}} \right)^{x}$$

The exponent, x, was calibrated by the NEC FUTURE team to the following values:

- Business travel: x = 0.7017
- Non-business travel: x=0.6919
- Commute travel: x=0.6144

This equation results in slightly higher growth in trips than either population or employment growth, alone, would suggest. For example, population growth of 16 percent and employment growth of 24 percent would yield a trip growth of 29%. This additional growth may reflect the fact that travel opportunities grow most strongly when both population and employment grow together.

Tables 2-15 to 2-20 present the resulting estimates of 2015, 2025, and 2045 trips tables in both absolute terms and as a percent of growth from 2008-to-2015 or 2015-to-2025 or 2045.

TABLE 2-14: YEAR 2008 ANNUAL LONG-DISTANCE PERSON TRIPS

From Super District	To Super District							
	New England	NEC	Washington	Richmond	Tidewater	Other VA	NC	Total
New England	20,376,713	27,617,282	1,918,213	343,325	369,068	448,327	1,214,375	52,287,303
NEC	30,025,124	63,111,002	14,506,858	2,687,990	2,470,020	3,452,296	4,615,277	120,868,568
Washington	1,979,981	14,307,486	265,218	2,961,105	2,194,458	2,833,422	2,495,976	27,037,647
Richmond	338,536	2,599,278	2,923,588	3,115	614,126	646,081	2,126,987	9,251,711
Tidewater	374,000	2,224,126	2,090,116	634,478	511	1,029,278	2,210,569	8,563,078
Other VA	448,634	3,398,591	2,840,918	660,489	1,032,194	886,812	4,586,623	13,854,260
NC	1,231,850	4,548,829	2,499,264	2,160,912	2,295,326	4,488,113	20,125,734	37,350,029
Total	54,774,837	117,806,594	27,044,176	9,451,415	8,975,703	13,784,330	37,375,541	269,212,596

TABLE 2-15: YEAR 2015 ANNUAL LONG-DISTANCE PERSON TRIPS

From Super District	To Super District							
	New England	NEC	Washington	Richmond	Tidewater	Other VA	NC	Total
New England	22,035,790	29,942,369	2,130,231	376,357	412,471	499,934	1,372,474	56,769,627
NEC	32,571,361	69,184,593	16,266,225	2,973,512	2,784,017	3,888,530	5,222,207	132,890,445
Washington	2,198,775	16,024,929	308,190	3,309,088	2,495,584	3,239,924	2,875,055	30,451,545
Richmond	371,315	2,876,295	3,270,446	3,475	720,575	738,291	2,422,637	10,403,034
Tidewater	418,481	2,515,300	2,381,507	745,334	517	1,172,698	2,585,773	9,819,610
Other VA	500,587	3,829,825	3,250,948	754,378	1,175,718	979,031	5,360,836	15,851,324
NC	1,392,713	5,146,015	2,879,847	2,458,309	2,680,468	5,238,949	23,404,162	43,200,463
Total	59,489,021	129,519,325	30,487,395	10,620,452	10,269,350	15,757,357	43,243,145	299,386,046

TABLE 2-16: GROWTH IN ANNUAL LONG-DISTANCE PERSON TRIPS BETWEEN 2008 AND 2015

From Super District	To Super District							
	New England	NEC	Washington	Richmond	Tidewater	Other VA	NC	Total
New England	8%	8%	11%	10%	12%	12%	13%	9%
NEC	8%	10%	12%	11%	13%	13%	13%	10%
Washington	11%	12%	16%	12%	14%	14%	15%	13%
Richmond	10%	11%	12%	12%	17%	14%	14%	12%
Tidewater	12%	13%	14%	17%	1%	14%	17%	15%
Other VA	12%	13%	14%	14%	14%	10%	17%	14%
NC	13%	13%	15%	14%	17%	17%	16%	16%
Total	9%	10%	13%	12%	14%	14%	16%	11%

TABLE 2-17: YEAR 2025 ANNUAL LONG-DISTANCE PERSON TRIPS

From Super District	To Super District							
	New England	NEC	Washington	Richmond	Tidewater	Other VA	NC	Total
New England	23,506,769	32,046,924	2,415,452	415,696	440,130	551,458	1,564,716	60,941,143
NEC	34,889,846	75,120,291	18,699,141	3,329,588	3,029,233	4,348,012	5,974,759	145,390,870
Washington	2,494,281	18,418,170	366,944	3,882,358	2,873,587	3,798,265	3,469,028	35,302,633
Richmond	410,411	3,221,987	3,839,688	3,977	810,521	846,635	2,844,661	11,977,881
Tidewater	446,646	2,731,225	2,740,480	837,415	538	1,301,619	2,940,400	10,998,323
Other VA	552,406	4,282,181	3,812,512	864,738	1,305,049	1,111,367	6,298,185	18,226,438
NC	1,588,405	5,885,952	3,473,562	2,882,414	3,056,768	6,148,922	28,031,320	51,067,343
Total	63,888,765	141,706,730	35,347,778	12,216,185	11,515,827	18,106,278	51,123,068	333,904,632

TABLE 2-18: GROWTH IN ANNUAL LONG-DISTANCE PERSON TRIPS BETWEEN 2015 AND 2025

From Super District	To Super District							
	New England	NEC	Washington	Richmond	Tidewater	Other VA	NC	Total
New England	7%	7%	13%	10%	7%	10%	14%	7%
NEC	7%	9%	15%	12%	9%	12%	14%	9%
Washington	13%	15%	19%	17%	15%	17%	21%	16%
Richmond	11%	12%	17%	14%	12%	15%	17%	15%
Tidewater	7%	9%	15%	12%	4%	11%	14%	12%
Other VA	10%	12%	17%	15%	11%	14%	17%	15%
NC	14%	14%	21%	17%	14%	17%	20%	18%
Total	7%	9%	16%	15%	12%	15%	18%	12%

TABLE 2-19: YEAR 2045 ANNUAL LONG-DISTANCE PERSON TRIPS

From Super District	To Super District							
	New England	NEC	Washington	Richmond	Tidewater	Other VA	NC	Total
New England	25,084,555	34,552,954	2,840,864	509,933	513,649	621,810	1,900,591	66,024,356
NEC	37,716,654	83,434,638	22,500,891	4,167,928	3,667,547	5,039,740	7,329,051	163,856,449
Washington	2,934,670	22,152,354	478,515	5,214,819	3,798,422	4,710,032	4,597,039	43,885,852
Richmond	504,591	4,037,572	5,169,044	5,227	1,136,013	1,119,804	3,916,255	15,888,507
Tidewater	521,713	3,299,350	3,621,276	1,171,742	658	1,628,754	3,911,373	14,154,866
Other VA	623,391	4,962,410	4,728,680	1,143,349	1,633,231	1,311,518	8,040,060	22,442,639
NC	1,930,801	7,213,429	4,598,730	3,957,581	4,085,607	7,832,712	37,442,940	67,061,799
Total	69,316,375	159,652,707	43,938,000	16,170,579	14,835,128	22,264,371	67,137,309	393,314,468

TABLE 2-20: GROWTH IN ANNUAL LONG-DISTANCE PERSON TRIPS BETWEEN 2015 AND 2045

From Super District	To Super District							
	New England	NEC	Washington	Richmond	Tidewater	Other VA	NC	Total
New England	14%	15%	33%	35%	25%	24%	38%	16%
NEC	16%	21%	38%	40%	32%	30%	40%	23%
Washington	33%	38%	55%	58%	52%	45%	60%	44%
Richmond	36%	40%	58%	50%	58%	52%	62%	53%
Tidewater	25%	31%	52%	57%	27%	39%	51%	44%
Other VA	25%	30%	45%	52%	39%	34%	50%	42%
NC	39%	40%	60%	61%	52%	50%	60%	55%
Total	17%	23%	44%	52%	44%	41%	55%	31%

2.5 MODE CHOICE MODEL

The mode choice model follows the basic structure of the NEC FUTURE model with several adjustments for application to the DC2RVA corridor. This model is structured as a nested logit choice model with the choice hierarchy shown in Figure 2-8. Key differences between the DC2RVA model and the NEC FUTURE model are as follows:

- The model is applied as a McFadden-type nested choice mode thus keeping generic variables consistent at the top choice level
- The model subdivides regional rail into two sub-choices that parallel the two potential paths described in the section on transportation supply. These choices represent the option to value access at a relatively low value (2.5 times in-vehicle time) or at a much higher level (15 times in-vehicle time). This choice was added to match the observed usage of Richmond Main Street and Staples Mill stations.

- The purpose-specific nesting structure of the NEC FUTURE model was replaced with a single nest structure that is used for all three trip purposes--business, non-business, and commute. To maintain consistency with the NEC FUTURE model while simplifying the program code, the missing nest choices in the NEC FUTURE model were represented with nest coefficients (θ_1, θ_2, θ_3, and θ_4) that were set to 1.0 which is mathematically equivalent to the NEC FUTURE structure.
- Coefficients were derived from a combination of four sources:
  - Stated-preference survey of current DC2RVA rail customers
  - Stated-preference survey of corridor residents who travel in the corridor
  - NEC FUTURE Model and its estimation of stated and revealed preferences
  - Initial model sensitivity to in-vehicle time, frequency and on-time performance compared to Amtrak experience of historic ridership response to service changes

The resulting model coefficients are presented in Table 2-21. In addition to the coefficients presented in this table, air trips under 150 miles are penalized to reduce the modeled estimate of very short air trips.

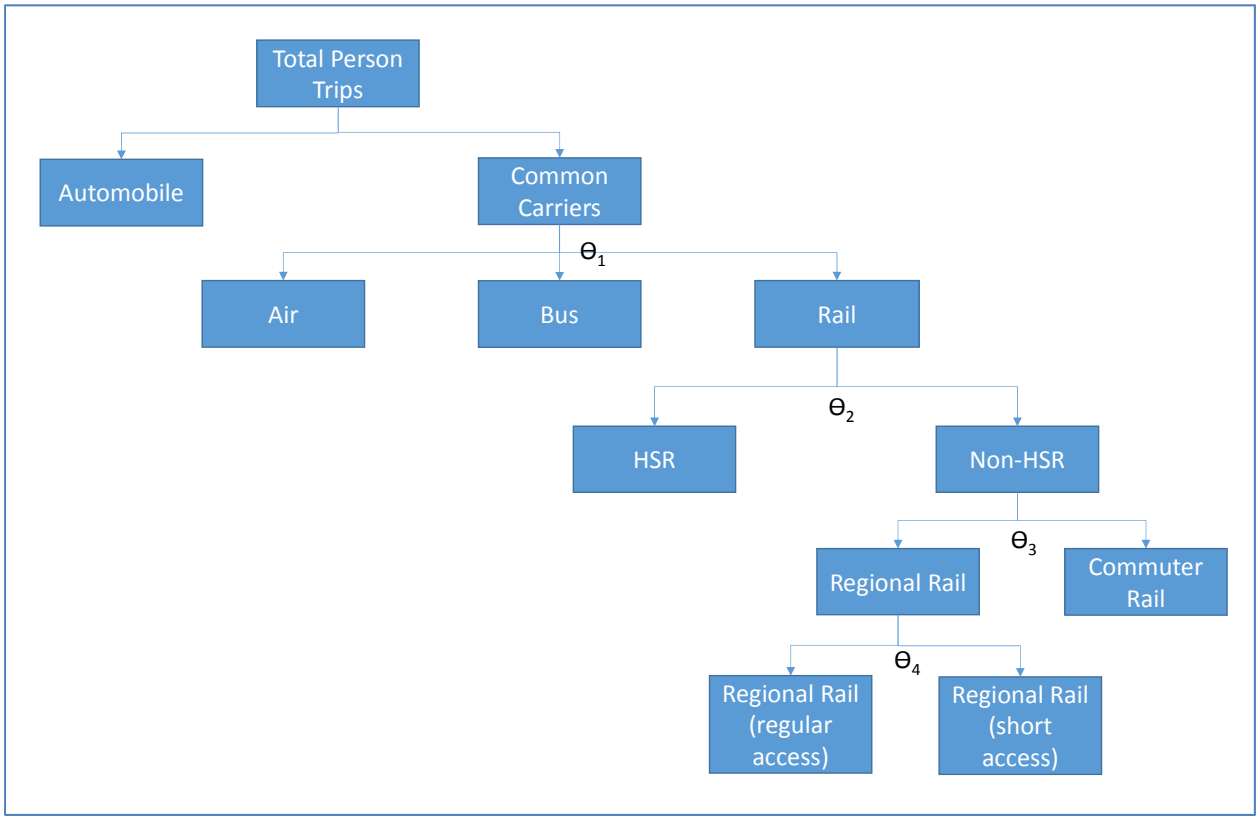


FIGURE 2-8: MODE CHOICE NESTING STRUCTURE FOR THE DC2RVA MODE

TABLE 2-21: MODE CHOICE MODEL PARAMETERS

Parameter	Applicable modes	Business	Non-Business	Commuter	Source
In-vehicle time (minutes)	All	-0.011	-0.0055	-0.0055	NEC FUTURE[7]
Access/egress time (minutes)	Common carrier modes	-0.02750	-0.01375	-0.01375	Midpoint of DC2RVA survey results for Business and Non-Business trips.[8]
Internal station time	Common carrier modes	-0.1902	-0.01823	-0.1823	DC2RVA survey[9]
Adjusted Frequency	Common carriers	0.8760	0.3240	0.3240	Between DC2RVA survey and NEC FUTURE to match observed Amtrak experience
Full Cost (premium modes, dollars)	Air, and HSR	-0.00203		-0.001896	DC2RVA survey
Full Cost (non-premium modes, dollars)	Auto, Bus, non-HSR rail	-0.00695		-0.001896	DC2RVA survey
Incremental Cost (dollars) <$50.00 $50.00-$99 $99.00-$149 >$149	Air and HSR		 -0.01896 -0.00649 -0.00391 -0.00281		DC2RVA survey
On time percentage[10]	Non-HSR rail to/from/within DC2RVA corridor	0.57	0.325		Half of DC2RVA survey result to match observed Amtrak experience

[7] In NEC FUTURE model, commute mode has an IVTT coefficient of -0.0057. Since this market was grouped with non-business in the DC2RVA survey and since the IVTT coefficients for non-business and commuter are nearly equal, these two markets were assigned the same parameters.

[8] The OVTT/IVTT ratio estimated in the DC2RVA survey was 1.7 for business trips and 3.3 for non-business trips. In the NEC FUTURE model, this ratio is 0.79 for business, 1.0 for non-business, 1.5 for commute, 1.5 for business path choice and 2.0 for non-business path choice. Given the apparent volatility of this weight, the path finding software was tested and it was found that 2.5 was the lowest weight that would generate reasonable paths. Mode choice weights were set to this value so that each element of the model performed consistently.

[9] Since this parameter has no effect on path-building, purpose-specific estimates of the OVTT-to-IVTT ratio were used (1.7 and 3.3 for business and non-business, respectively). This value is assigned to the assumed amount of time spent at passenger terminals—75 minutes for airports and 20 minutes for bus and rail stations. This time accounts for time spent for security, circulation time, and cushion time to allow the traveler to make the plane, train or bus in the event of unforeseen delays.

[10] OTP is currently 66% in corridor and expected to improve to 90% with the Project. The OTP improvement as a percent (24) is multiplied by $0.57 or $0.325 / OTP percent (Business and Non-Business, respectively) to estimate the equivalent value of the OTP improvement. This means that OTP improvement is equivalent to a discount of $13.68 or $7.80 off the regular ticket price. For any individual trip this “discount” is limited to half of the regular fare.

TABLE 2-21: MODE CHOICE MODEL PARAMETERS

Parameter	Applicable modes	Business	Non-Business	Commuter	Source
Short Path	Short Access Regional Rail	+0.275	+0.275	+0.275	Preference for being on the shorter of the two regional rail paths. Calibrated to match distribution of ridership at Richmond Staples Mill and Main Street Stations. Equivalent to 10 minutes of in-vehicle time for business travelers
Nest coefficients					
Θ_1		1.00000	1.00000	0.80300	NEC FUTURE[11]
Θ_2		0.65110	0.74170	1.00000	
Θ_3		0.96540	1.00000	1.00000	
Θ_4		1.00000	1.00000	1.00000	

2.6 MODEL CALIBRATION

The DC2RVA model was calibrated to match observed district-to-district trip flows by mode (air, bus, HSR, and regional rail), purpose (business, non-business, and commuter) at the CMSA district-to-district level. This was done with a series of utility adjustment constants at the district-to-district level. The source of the observed trip targets are as follows:

- Rail:
  - Trips beginning or ending in Virginia or North Carolina: Amtrak station-to-station counts assigned to CMSA districts according to station location and allocated to business or non-business purposes according to the corridor-wide regional rail shares in the NEC FUTURE count database.
  - Trips beginning and ending in the Northeast Corridor: NEC FUTURE count database
- Other modes: FHWA Long Distance Trip Tables

Since the FHWA person trip tables were not fully validated, the rail counts were treated as the primary calibration target and the FHWA trips served as a secondary target.

Following CMSA district-to-district calibration, estimated station boardings at individual stations were compared to counts. Early testing revealed that ridership at stations in or near the central cities of a region (i.e., Norfolk or Richmond) were underestimated while stations outside the central cities (Woodbridge, Quantico, Fredericksburg, Ashland, Williamsburg, and Petersburg) were typically overestimated. Some cities close to the core (Alexandria and Newport News) are slightly overestimated. To correct this problem, a series of station time adjustments were developed and applied to both path building and mode split. The values of these time

[11] Regular vs. short access for regional rail not part of NEC FUTURE model. Nest coefficient was set to 1.0. Since both paths always exist (as long as one path exists), this structure does not generate additional trips when a second path is found.

adjustments were set to match existing observed ridership and are shown in Table 2-22. The lack of a definitive pattern among these adjustments suggests that they should not be applied to new market areas without careful consideration of which adjustment may be most appropriate.

TABLE 2-22: STATION TIME ADJUSTMENTS (MINUTES)

Station	Time Adjustment	Notes
Washington, D.C.	0	
Alexandria	7	Reflects greater accessibility of Washington Union Station via Metro
Woodbridge	17	Non-core station in Washington CMSA
Quantico	23	Non-core station in Washington CMSA
Fredericksburg	32.5	Non-core station in Washington CMSA
Ashland	11	Non-core station in Richmond CMSA
Richmond (all stations)	0	
Petersburg	21	Non-core station in Richmond CMSA
Williamsburg	20	Non-core station in Virginia Beach CMSA
Newport News	2	Reflects greater accessibility of Norfolk
Norfolk	0	

As shown in Table 2-23, the resulting DC2RVA model does a reasonably good job representing total rail boardings in each origin-destination CMSA District-pair. This means that, at the district level of aggregation, the model properly represents the patterns of rail travel between different origins and destinations.

As shown in Table 2-24, the model also replicates the observed boardings at individual stations in the corridor to a reasonable level of fidelity. This feature will be important for testing the impacts of different station locations and service plans that change the relatively frequency of service to different stations.

TABLE 2-23: COMPARISON OF COUNTED AND MODELED ANNUAL RAIL TRIPS BY ORIGIN AND DESTINATION CMSA

Origin \ Destination>>>		Washington	Richmond	Virginia Beach	Newport News	Other	Total
North of DC	Count		89,563	9,347	43,731		142,640
	Model		89,446	9,390	42,638		141,473
Washington-Fredericksburg	Count	165,705	84,600	13,362	43,293		306,959
	Model	150,992	84,823	13,497	43,307		292,618
Richmond	Count	84,600	1,576	1,764	8,710	99,371	196,020
	Model	84,796	1,605	1,764	8,707	100,436	197,309
Newport News	Count	43,293	8,710	-	633	42,985	95,620
	Model	43,290	8,707	0	459	44,450	96,905
Norfolk-Va Beach	Count	13,362	1,764	-	-	9,298	24,424
	Model	13,362	1,764	0	0	11,385	26,511
Other Virginia	Count	-	-	-	-	-	-
	Model	388	34	112	139	1,438	2,110
North Carolina	Count	107,231	9,707	-	-	417,674	534,612
	Model	107,933	10,931	1,749	1,655	424,208	546,475
Total	Count	414,190	195,920	24,473	96,366	569,328	1,300,275
	Model	400,761	197,309	26,511	96,905	581,917	1,303,402

TABLE 2-25: COMPARISON OF COUNTED AND MODELED ANNUAL (2015) RAIL RIDERSHIP (BOARDINGS+ALIGHTINGS) BY CORRIDOR STATION

Station	Total Count	Counted Ridership Within Modeling Area	Model Estimate of Ridership
Petersburg	29,892	25,666	27,265
Norfolk	44,852	44,852	40,028
Newport News	115,440	115,440	123,798
Williamsburg	61,625	61,426	51,017
Richmond Main Street	45,062	45,062	46,849
Richmond Staples Mill	361,996	334,782	351,156
Ashland	28,141	28,142	28,013
Fredericksburg	117,423	117,424	127,535
Quantico	32,754	32,754	34,754
Woodbridge	24,212	24,212	23,836
Alexandria	186,841	171,170	174,238
Total	1,048,238	1,000,930	1,028,488

2.7 SENSITIVITY TESTING

The DC2RVA model was tested to confirm that it responded properly to increases in corridor demographics (related to future years) and changes to rail levels-of-service. These tests are described in the following sections.

2.7.1 Sensitivity to Future Demographics

The DC2RVA model was run with existing, Year 2025 and Year 2045 demographics. The results of this test are presented in Table 2-26 and are directly comparable to the increases in person travel described above. These travel increases are proportional (but slightly higher than) changes in the assumed population and employment for the corridor.

TABLE 2-26: FORECASTED CORRIDOR STATION RIDERSHIP (BOARDINGS+ALIGHTINGS) BY YEAR WITH EXISTING SERVICE PLAN

Station	2015	2025		2045	
	Model	Model	%Growth	Model	%Growth
Petersburg, VA	27,265	30,889	13%	36,573	34%
Norfolk, VA	40,028	44,643	12%	57,611	44%
Newport News, VA	123,798	136,527	10%	166,199	34%
Williamsburg, VA	51,017	57,907	14%	75,831	49%
Richmond Main	46,849	53,228	14%	69,680	49%
Richmond Staples Mill	351,156	401,639	14%	530,373	51%
Ashland, VA	28,013	32,782	17%	44,826	60%
Fredericksburg, VA	127,535	149,214	17%	194,726	53%
Quantico, VA	34,754	41,135	18%	53,985	55%
Woodbridge, VA	23,836	28,179	18%	35,273	48%
Alexandria, VA	174,238	204,464	17%	264,244	52%
Total	1,028,488	1,180,607	15%	1,529,321	49%

2.7.2 Sensitivity to Service Changes

Three tests of the DC2RVA model were conducted to confirm that the model is appropriately sensitive to changes in rail levels of service. ***Please note that these changes are designed solely for the purpose of testing model responsiveness to different types of service changes and are not forecast results. In particular, these sensitivity test scenarios are not representative of the actual Build Alternatives.***

These sensitivity test scenarios are defined as follows:

1. Relocate the Richmond Staples Mill Station to a location near to the former Broad Street Station. Add six minutes to the southbound station time and subtract six minutes from the northbound station time to account for the fact that this station is further from Washington and closer to points South and East.
2. Reduce Washington, D.C.-to-Richmond travel times by 10 minutes. Times between Washington and intermediate points will be reduced by 5 minutes to Fredericksburg and

7 minutes to Ashland. The time savings to Richmond will be reflected in all trips traveling between Washington (and points north) and Richmond (and points south) to reflect the fact that improvements to the Washington, D.C.-Richmond leg will benefit passengers in a broader market than just the DC2RVA corridor. For instance, a traveler beginning in New York and ending in North Carolina will also benefit from the 10 minute savings in time.

3. Frequency improvement. The test was constructed by adding 3 new Washington-Richmond-Norfolk trains with the same station stops and running times as the existing train.
4. On-time performance improvement. This test examines the effect of improving on-time percentage from 66 to 90 percent in the DC2RVA corridor.

Each model was applied for the 2015 forecast year. Results are presented in Table 2-27. Each of the tests appears to represent a realistic ridership response to service changes as described below.

- Relocate Richmond Staples Mill to vicinity of former Broad Street Station. This scenario tests the response of the model to relocating the main Richmond station to an area in the vicinity of the old Broad Street Station. When this change is made, total ridership in the modeling area increases by 32,000 annual trips. Total boardings at all Richmond stations increases from 199,000 annual passengers to 213,000, an increase of 14,000 or 7 percent. The number of boardings using Main Street Station drops from 23,000 to 9,000 annual customers indicating about 60 percent of all customers using Main Street Station today would find a station in the Broad Street area that was served by all trains passing through Richmond a better choice than Main Street Station serving just 2 trains per day. The fact that the total ridership grows suggests that the Broad Street Station is slightly better location for the main Richmond Station than the Staples Mill site if the travel time assumptions described above could be accomplished[12]. The station at Ashland is also affected by this change. As the Richmond Staples Mill station moves south, travelers from the northernmost suburbs of Richmond might prefer to use Ashland station, leading to an increase of about 1,000 annual riders.
- Improve Washington to Richmond travel speeds by 10 minutes. Improving travel times in the Washington, D.C.-to-Richmond corridor results in an increase of 56,000 annual riders. Looking at one specific market (Washington, D.C. to Richmond) this alternative increases ridership by 7.2 percent with a reduction in travel time of 7.7 percent—an elasticity of 0.94. This response is similar to Amtrak's experience with travel time improvements.
- Add three Washington-to-Norfolk trains. The addition of three Washington-to-Norfolk trains (in each direction) improves frequencies in the entire corridor but most notably at Norfolk where the current schedule offers only one daily arrival and departure. This change results in an increase of 71,000 annual corridor riders and an increase of 35,000 annual boardings at Norfolk. Since a similar number of riders also alight at Norfolk, the total passenger increase

[12] Note: This service sensitivity test scenario (and all scenarios described in this section) are designed to evaluate the sensitivity of the model. This scenario is not an actual Build Alternative and the times used here are not the result of any detailed rail operations analysis. Actual alternatives are defined in Chapter 3 and results are presented in Chapters 4 and 5.

to and from Norfolk is about 70,000 annual riders. Although Norfolk has increased ridership, some stations experienced a decrease in ridership. Most notably, Newport News boardings declined from 62,000 to 53,000 due to these diversions. Elasticity can be assessed by looking at individual markets. Washington, D.C. to Norfolk ridership increased by 195% with a 300% increase in service—an elasticity of 0.65. This value is similar to Amtrak's historic experience regarding the sensitivity of ridership to train frequency.

- Improve on-time performance. The sensitivity of the model was tested by assuming that the on-time percentage (OTP) for all markets to, from, or within the RC2RVA corridor was improved from 66 percent to 90 percent. When this is done, total modeled ridership increases by 116,000 daily customers. Ridership for just the stations in the DC2RVA (the market principally affected by the OTP improvement) increases from 496,000 to 530,000, an increase of 7 percent. This increase is consistent with Amtrak's experience with the effect of OTP on ridership.

2.8 OVERALL SUITABILITY FOR FORECASTING

The DC2RVA model is able to replicate existing Amtrak ridership patterns with a reasonable level of fidelity. Tests of model sensitivity confirm that this model has appropriate sensitivities to station location, travel time, frequency, and on-time performance. Where guidance from Amtrak was available, model sensitivities from the DC2RVA model were compared to Amtrak's experience regarding the change in ridership in response to service changes. In each case where comparisons were possible, the DC2RVA model matched Amtrak experience.

TABLE 2-27: FORECASTED YEAR 2015 ANNUAL BOARDINGS FOR SERVICE SENSITIVITY TEST SCENARIOS (NOTE: NOT ACTUAL BUILD ALTERNATIVES)

Station/Region	Exist	RVM relocation	Exist Save 10 min.	Improve Frequency	Improve OTP
New England	2,322,264	2,322,662	2,323,269	2,322,156	2,324,858
New York	2,607,595	2,610,399	2,614,352	2,607,764	2,620,097
New Jersey	1,021,097	1,022,042	1,022,918	1,021,232	1,024,875
Philadelphia	1,246,034	1,247,785	1,247,985	1,246,031	1,250,217
Delaware	618,418	618,965	619,585	618,407	621,789
Maryland	1,149,386	1,150,404	1,151,841	1,148,264	1,162,242
Washington	2,222,136	2,229,786	2,230,121	2,236,749	2,254,842
Crystal City	-	-	-	-	-
Alexandria	88,051	88,874	86,411	92,846	92,275
Burke/Manassas	13,836	13,834	13,845	13,868	15,362
Culpepper	9,334	9,331	9,335	9,299	10,127
Charlottesville	64,298	65,262	64,078	64,404	64,606
Lynchburg	35,408	35,415	35,446	35,677	35,416
Roanoke	-	-	-	-	-
Danville	6,112	6,113	6,116	6,121	6,209
Lorton	-	-	-	-	-
Woodbridge	11,918	12,046	12,101	15,668	12,981
Quantico	17,377	17,543	17,562	18,668	19,016
Fredericksburg	63,767	66,358	70,841	67,142	69,017
Ashland	14,006	14,959	13,768	14,847	14,925
Richmond Staples Mill	175,578	204,092	187,421	190,627	187,312
Richmond Main Street	23,424	8,854	24,434	20,111	25,198
Williamsburg	25,509	25,301	26,818	22,466	27,107
Newport News	61,899	61,849	65,231	53,392	65,736
Petersburg	13,632	11,492	14,184	15,487	14,384
Norfolk	20,014	20,087	21,444	55,725	21,163
Rocky Mount	104,830	104,603	109,401	106,966	108,206
Raleigh	58,531	58,441	59,797	58,967	59,521
Cary	17,788	17,788	17,956	17,926	17,981
Durham	54,137	54,198	54,715	54,887	54,593
Salisbury	107,682	107,800	108,123	108,765	108,961
Charlotte	83,864	83,969	84,483	84,287	84,470
Southern Pines	3,571	3,574	3,606	3,616	3,644
Total	12,261,495	12,293,825	12,317,188	12,332,364	12,377,132
Change in Total Trips		32,330	55,693	70,869	115,637

3 OVERVIEW OF ALTERNATIVES

3.1 NO BUILD DEFINITION

The No Build Amtrak service plan is similar to the existing schedule with the addition the following:

- One new daily intercity train from Lynchburg to Washington DC and continuing northward as an existing Northeast corridor train. A similar train is added in the southbound direction.
- Conversion of the Cardinal from 3 times per week to daily.
- Extension of two existing Northeast Corridor trains (in each direction) that currently begin and end in Richmond and will operate to and from Norfolk in the No Build. In addition, the model includes all Acela high-speed trains between Washington and Boston, other Northeast corridor trains that operate north of Washington, D.C., and intra-North Carolina trains that only operate south of Raleigh.

In addition, the model includes all Acela high-speed trains between Washington and Boston, other Northeast corridor trains that operate north of Washington, D.C., and intra-North Carolina trains that only operate south of Raleigh.

3.2 DEFINITION OF BUILD ALTERNATIVES

Seven different Build options were tested in this phase of the Project. All alternatives include similar increases in train frequencies and reduced travel times in the DC2RVA corridor. The principal difference among alternatives are the different configurations of service to one or more stations in the Richmond area. Because these station locations affect routings and travel times through the City of Richmond, station times for stations south of Richmond are different for each alternative. Station times north of Richmond are generally unchanged to maintain consistent transit schedules in the Northeast Corridor, north of Washington.

The alternative definitions are as follows:

3.2.1 Single Richmond Station Options

- Existing Staples Mill Road Station: All Amtrak trains with the exception of the Auto Train serve Staples Mill Road Station only. Trains traveling to/from Norfolk and the Carolinas continue using the A-Line down to Centralia. Trains traveling to/from Newport News continue to use the Peninsula Subdivision. The existing Main Street station is closed.

- New Boulevard Station: All Amtrak trains with the exception of the Auto Train serve a new Boulevard Station only. Trains traveling to/from Norfolk and the Carolinas continue using the A-Line down to Centralia. Trains traveling to/from Newport News continue to use the Peninsula Subdivision. The existing Main Street and Staples Mill Road stations are closed[13].
- New Broad Street Station: All Amtrak trains with the exception of the Auto Train serve a new Broad Street Station only. Trains traveling to/from Norfolk and the Carolinas continue using the A-Line down to Centralia. Trains traveling to/from Newport News continue to use the Peninsula Subdivision. The existing Main Street and Staples Mill Road stations are closed.
- Existing Main Street Station: All Amtrak trains with the exception of the Auto Train serve Main Street Station only. Trains traveling to/from Norfolk and the Carolinas use the S-Line from Main Street Station down to Centralia. Trains traveling to/from Newport News continue using the Peninsula Subdivision. The existing Staples Mill Road Station is closed.

3.2.2 Downtown/Suburban Station Combination Options

- Main Street & Staples Mill Road - Full Service: All Amtrak trains serve both stations. Trains traveling to/from Norfolk and the Carolinas use the S-Line from Main Street Station down to Centralia. Trains traveling to/from Newport News continue using the Peninsula Subdivision.
- Main Street & Staples Mill Road - Split Service: Trains traveling to/from Norfolk and the Carolinas serve Staples Mill Road Station only, traveling the A-Line from Staples Mill Road Station down to Centralia. Trains traveling to/from Newport News continue to service Main Street Station using the Peninsula Subdivision
- Main Street & Staples Mill Road - Shared Service: Trains traveling to/from Norfolk and the Carolinas use either the A-Line or the S-Line down to Centralia. Trains serving Main Street Station or Main Street Station and Staples Mill Road Station in combination use the S-Line. Trains serving only Staples Mill Road station use the A-Line. Trains traveling to/from Newport News continue using the Peninsula Subdivision.

[13] The alternative described in this section (and used for ridership modeling) is the Boulevard A-Line option. The full list of alternatives also includes a Boulevard S-Line option. Train schedules are similar and ridership results for the Boulevard alternative apply to both the A-Line and S-Line options.

4 YEAR 2025 RIDERSHIP FORECASTS

This section presents DC2RVA ridership projections for the 2025 Forecast Year.

4.1 OVERVIEW

Table 4-1 presents an overview of the DC2RVA ridership forecast results for 2025. Two statistics are presented:

- Annual rail ridership to, from, and through the DC2RVA corridor. This number includes all trips beginning or ending at any station in the corridor between Alexandria, Richmond, Newport News, Petersburg, and Norfolk. The number also includes all modeled rail travel between North Carolina and the Northeast Corridor who are also beneficiaries of the Project. This number does not include passengers on longer-distance trips (South Carolina, Georgia and Florida) since these markets are not part of the modeling region. An estimate of long-distance station boardings to and from corridor stations is presented later in this section.
- Annual rail ridership (boardings+alightings) at any of the stations located in Richmond, Virginia. This statistic demonstrates the effectiveness of each of the Richmond station options to serve the Richmond area.

The overview table shows that corridor ridership was approximately 1.4 million in 2015 and will grow to 1.7 million annual riders in the 2025 No Build Alternative. This change is due to a modest service improvement associated with the No Build Alternative and demographic growth between 2015 and 2025.

Each of the Build Alternatives attracts approximately 2.5 million annual corridor riders. This increase is a result of significant improvements to train frequency, travel time, and on-time performance. The different station options generate similar levels of overall ridership.

4.2 YEAR 2025 ANNUAL STATION RIDERSHIP

Table 4-2 presents annual station usage (sum of station boardings and alightings) for each station in the Project corridor for each alternative.

4.3 YEAR 2025 ANNUAL MARKET-LEVEL RIDERSHIP

Table 4-3 presents annual rail ridership occurring for different geographic markets in the modeling area. These markets are defined as follows:

- Intra-Project Corridor: trips occurring entirely within the Project corridor defined as including Alexandria, Richmond, Petersburg, Newport News, and Norfolk and all intermediate stations.
- Project Corridor-NEC: trips occurring between the Project corridor and Amtrak's Northeast Corridor between Washington and Boston (inclusive).
- Project Corridor-NC: trips occurring between the Project corridor and stations in North Carolina.
- NC-NEC: trips occurring between North Carolina and the Northeast Corridor.
- Other VA-Project Corridor: trips occurring between other parts of Virginia (i.e., along the route of the Crescent or Cardinal) and the Project corridor.
- Other VA-NEC: trips occurring between other parts of Virginia and the Northeast Corridor.
- Other VA-NC: trips occurring between other parts of Virginia and North Carolina.
- NEC-NEC: trips occurring between stations located along the Northeast Corridor.
- NC-NC: trips occurring between stations located in North Carolina.
- Other VA-Other VA: trips occurring between stations located in other parts of Virginia.

This table also includes two subtotals and one table total, defined as follows:

- Subtotal To/From/Through Corridor: This subtotal includes all trips classified as
    - Intra-Project Corridor
    - Project Corridor-NEC
    - Project Corridor-NC
    - NC-NEC
    - Other VA-Project Corridor
    - Other VA-NEC
-
- Subtotal Other Trips: Any trip not included in the previous subtotal.
- Total Modeled Trips: All trips in the table.

4.4 YEAR 2025 STATION RIDERSHIP BY TRAIN TYPE

This section presents annual station usage (sum of station boardings and alightings) for each station stratified by the type of trip. This information is used in the station planning process to determine the parking requirements. The following information is provided:

- Table 4-4 presents regional rail ridership for travel between corridor stations and a station located along the Northeast Corridor or in North Carolina. This category does not include trips within the corridor or between the corridor and Washington, D.C.
- Table 4-5 presents ridership for that subset of travel occurring within the corridor or between the corridor and Washington, D.C.
- Table 4-6 presents an estimate of passengers boarding long-distance trains which are the difference between total ridership at each station and the modeled ridership.

Table 4-1: Overview of Year 2015 and 2025 Annual Corridor Ridership by Alternative

Market	Year 2015 Existing Schedule 66% OTP	Year 2025 No Build 66% OTP	Year 2025 Staples Mill Only 90% OTP	Year 2025 Boulevard 90% OTP	Year 2025 Broad Street 90% OTP	Year 2025 Main Street 90% OTP	Year 2025 Staples Mill & Main Street Full 90% OTP	Year 2025 Staples Mill & Main Street Split 90% OTP	Year 2025 Staples Mill & Main Street Shared 90% OTP
Annual Rail Trips To/From/Through Corridor (millions)	1.388	1.725	2.579	2.509	2.474	2.521	2.553	2.519	2.556
Annual Boardings+Alightings at Richmond Stations (thousands)	398	458	715	700	678	726	788	696	770

Table 4-2: Year 2015 and 2025 Annual Ridership (Boardings+Alightings) by Station and Alternative

Station	Year 2015 Existing Schedule 66% OTP	Year 2025 No Build 66% OTP	Year 2025 Staples Mill Only 90% OTP	Year 2025 Boulevard 90% OTP	Year 2025 Broad Street 90% OTP	Year 2025 Main Street 90% OTP	Year 2025 Staples Mill & Main Street Full 90% OTP	Year 2025 Staples Mill & Main Street Split 90% OTP	Year 2025 Staples Mill & Main Street Shared 90% OTP
Petersburg, VA	27,265	37,502	62,964	53,934	55,000	36,801	38,733	54,708	42,278
Norfolk, VA	40,028	91,783	169,483	147,103	148,915	146,171	146,605	170,131	148,942
Newport News, VA	123,798	125,383	185,784	191,938	173,487	192,935	190,315	174,887	189,887
Williamsburg, VA	51,017	57,263	82,233	85,103	79,007	82,803	81,345	78,178	81,218
Richmond, VA Main	46,849	50,846	-	-	-	725,586	370,238	107,090	254,728
Richmond, VA Boulevard/Broad	-	-	-	700,152	677,667	-	-	-	-
Richmond, VA Staples Mill	351,156	407,119	714,795	-	-	-	417,774	588,610	514,975
Ashland, VA	28,013	32,694	47,368	50,437	54,002	55,771	44,165	45,701	44,388
Fredericksburg, VA	127,535	168,627	305,177	311,500	311,761	314,017	303,303	301,810	303,120
Quantico, VA	34,754	37,945	45,313	44,943	44,278	45,118	45,257	45,398	45,527
Woodbridge, VA	23,836	31,191	82,694	82,304	81,140	82,521	83,057	82,171	83,467
Alexandria, VA	174,238	208,496	233,602	227,706	224,571	228,278	230,840	230,896	233,030
Total	1,028,488	1,248,848	1,929,413	1,895,121	1,849,827	1,910,001	1,951,631	1,879,581	1,941,560

Table 4-3: Year 2015 and 2025 Annual Ridership by Market and Alternative

Market	Year 2015 Existing Schedule 66% OTP	Year 2025 No Build 66% OTP	Year 2025 Staples Mill Only 90% OTP	Year 2025 Boulevard 90% OTP	Year 2025 Broad Street 90% OTP	Year 2025 Main Street 90% OTP	Year 2025 Staples Mill & Main Street Full 90% OTP	Year 2025 Staples Mill & Main Street Split 90% OTP	Year 2025 Staples Mill & Main Street Shared 90% OTP
Intra-Project Corridor	121,605	148,349	212,663	211,148	203,320	215,260	220,486	212,041	219,212
Project Corridor-NEC	698,092	840,243	1,297,680	1,282,593	1,250,171	1,284,984	1,313,702	1,246,791	1,303,529
Project Corridor-NC	64,363	79,060	179,221	162,628	165,614	166,123	169,464	181,913	172,078
NC-NEC	262,862	298,926	545,512	508,502	511,013	503,735	505,517	534,918	517,204
OtherVA-Project Corridor	22,822	32,848	35,284	35,326	35,183	36,145	35,318	35,264	35,311
OtherVA-NEC	217,852	326,060	308,382	309,096	309,106	314,542	308,546	308,464	308,546
Subtotal To/From/Through Corridor	1,387,596	1,725,486	2,578,742	2,509,293	2,474,407	2,520,790	2,553,034	2,519,391	2,555,880
OtherVA-NC	6,912	7,554	8,063	8,077	8,029	8,084	7,957	7,939	8,033
NEC-NEC	10,598,458	12,202,645	12,197,982	12,197,982	12,197,982	12,197,251	12,197,982	12,199,376	12,197,982
NC-NC	263,335	394,358	451,695	452,634	452,992	452,262	452,523	448,949	452,252
OtherVA-OtherVA	5,194	15,003	12,290	12,298	12,299	12,309	12,292	12,289	12,292
Subtotal Other Trips	10,873,899	12,619,560	12,670,030	12,670,991	12,671,303	12,669,905	12,670,754	12,668,553	12,670,561
Total Modeled Trips	12,261,495	14,345,046	15,248,772	15,180,284	15,145,710	15,190,695	15,223,788	15,187,943	15,226,441

Table 4-4: Year 2015 and 2025 Annual Regional Train Ridership (Boardings+Alightings) by Station and Alternative

Station	Year 2015 Existing Schedule 66% OTP	Year 2025 No Build 66% OTP	Year 2025 Staples Mill Only 90% OTP	Year 2025 Boulevard 90% OTP	Year 2025 Broad Street 90% OTP	Year 2025 Main Street 90% OTP	Year 2025 Staples Mill & Main Street Full 90% OTP	Year 2025 Staples Mill & Main Street Split 90% OTP	Year 2025 Staples Mill & Main Street Shared 90% OTP
Petersburg, VA	17,010	23,036	40,873	35,365	35,763	24,569	26,222	35,548	29,019
Norfolk, VA	16,741	50,184	83,607	68,579	69,303	68,001	69,138	86,013	71,605
Newport News, VA	61,583	61,167	94,075	96,739	87,266	96,798	95,636	86,981	95,292
Williamsburg, VA	22,308	24,475	36,990	37,665	34,874	36,499	35,911	34,035	35,895
Richmond, VA Main	17,940	19,455	-	-	-	356,237	191,125	47,281	127,587
Richmond, VA Boulevard/Broad	-	-	-	342,188	331,607	-	-	-	-
Richmond, VA Staples Mill	178,794	203,447	351,158	-	-	-	196,292	293,972	249,340
Ashland, VA	20,259	22,707	30,875	33,826	37,817	38,151	30,894	31,334	30,920
Fredericksburg, VA	102,721	133,087	227,066	232,275	232,944	232,981	225,577	223,665	225,382
Quantico, VA	21,403	22,245	28,573	28,413	28,405	28,262	28,377	28,692	28,695
Woodbridge, VA	15,880	21,997	49,666	49,464	49,418	49,115	49,406	50,166	49,817
Alexandria, VA	81,809	100,356	109,069	105,500	105,699	106,663	105,029	108,042	107,858
Total	556,448	682,156	1,051,952	1,030,014	1,013,097	1,037,276	1,053,606	1,025,727	1,051,411

Table 4-5: Year 2015 and 2025 Annual Virginia/DC Train Ridership (Boardings+Alightings) by Station and Alternative

Station	Year 2015 Existing Schedule 66% OTP	Year 2025 No Build 66% OTP	Year 2025 Staples Mill Only 90% OTP	Year 2025 Boulevard 90% OTP	Year 2025 Broad Street 90% OTP	Year 2025 Main Street 90% OTP	Year 2025 Staples Mill & Main Street Full 90% OTP	Year 2025 Staples Mill & Main Street Split 90% OTP	Year 2025 Staples Mill & Main Street Shared 90% OTP
Petersburg, VA	10,254	14,465	22,091	18,569	19,236	12,231	12,511	19,160	13,260
Norfolk, VA	23,287	41,599	85,876	78,524	79,612	78,170	77,467	84,119	77,336
Newport News, VA	62,214	64,216	91,709	95,199	86,221	96,137	94,679	87,906	94,595
Williamsburg, VA	28,710	32,788	45,244	47,439	44,134	46,304	45,434	44,144	45,323
Richmond, VA Main	28,909	31,390	-	-	-	369,350	179,113	59,809	127,141
Richmond, VA Boulevard/Broad	-	-	-	357,964	346,060	-	-	-	-
Richmond, VA Staples Mill	172,362	203,672	363,637	-	-	-	221,482	294,638	265,635
Ashland, VA	7,754	9,987	16,494	16,611	16,184	17,620	13,271	14,367	13,468
Fredericksburg, VA	24,814	35,541	78,111	79,225	78,817	81,036	77,726	78,144	77,738
Quantico, VA	13,351	15,700	16,740	16,530	15,872	16,856	16,880	16,706	16,832
Woodbridge, VA	7,956	9,194	33,028	32,840	31,721	33,406	33,651	32,005	33,650
Alexandria, VA	92,429	108,140	124,532	122,206	118,872	121,615	125,811	122,854	125,172
Total	472,040	566,692	877,462	865,107	836,730	872,725	898,025	853,853	890,149

Table 4-6: Year 2015 and 2025 Annual Intercity Train Ridership (Boardings+Alightings) by Station and Alternative

Station	Year 2015 Existing Schedule 66% OTP	Year 2025 No Build 66% OTP	Year 2025 Staples Mill Only 90% OTP	Year 2025 Boulevard 90% OTP	Year 2025 Broad Street 90% OTP	Year 2025 Main Street 90% OTP	Year 2025 Staples Mill & Main Street Full 90% OTP	Year 2025 Staples Mill & Main Street Split 90% OTP	Year 2025 Staples Mill & Main Street Shared 90% OTP
Petersburg, VA	4,226	4,788	4,788	4,788	4,788	4,788	4,788	4,788	4,788
Norfolk, VA	-	-	-	-	-	-	-	-	-
Newport News, VA	-	-	-	-	-	-	-	-	-
Williamsburg, VA	199	226	226	226	226	226	226	226	226
Richmond, VA Main	-	-	-	-	-	31,126	-	-	-
Richmond, VA Boulevard/Broad	-	-	-	31,126	31,126	-	-	-	-
Richmond, VA Staples Mill	27,214	31,126	31,126	-	-	-	31,126	31,126	31,126
Ashland, VA	-	-	-	-	-	-	-	-	-
Fredericksburg, VA	-	-	-	-	-	-	-	-	-
Quantico, VA	-	-	-	-	-	-	-	-	-
Woodbridge, VA	-	-	-	-	-	-	-	-	-
Alexandria, VA	15,671	18,390	18,390	18,390	18,390	18,390	18,390	18,390	18,390
Total	47,310	54,530	54,530	54,530	54,530	54,530	54,530	54,530	54,530

4.5 YEAR 2025 OTHER RIDERSHIP-RELATED STATISTICS

This section presents detailed ridership-related statistics for each alternative. These statistics are presented in Tables 4-7 through 4-62 and are organized so that the first set of seven tables (4-7 to 4-13) describe outcomes associated with the No Build Alternative followed by the tables for each Build Alternative in the order defined in Chapter 3.

The information provided in these tables are:

- Annual trips by mode and geographic market. Modes are defined as highway, air, bus, high-speed rail (HSR, meaning Acela[14]), and regional rail. All existing and proposed future service in the DC2RVA corridor is categorized as regional rail. Geographic markets include:
    - NEC-NEC: internal to the Northeast Corridor (Washington, D.C. and north)
    - NEC-VA: home in the NEC, non-home trip-end in Virginia
    - NEC-NC: home in the NEC, non-home trip-end in North Carolina
    - VA-NEC: home in Virginia, non-home trip-end in the NEC
    - VA-VA: internal to Virginia
    - VA-NC: home Virginia, non-home trip-end in North Carolina
    - NC-NEC: home in North Carolina, non-home trip-end in the NEC
    - NC-VA: home in North Carolina, non-home trip-end in Virginia
    - NC-NC: internal to North Carolina
- Annual highway miles by mode and geographic market. The modes and geographic markets are the same as described above. This statistic presents the number of highway person-miles of travel accrued for each mode on an annual basis. For highway trips, this statistic includes the entire trip from origin to destination. For common carrier modes, this statistic includes just the access and egress portion of the trip. Since the DC2RVA model does not estimate mode-of-access, this statistic is computed with the assumption that all access/egress travel is made by automobile so that this statistic and the related environmental impacts are not underestimated.
- Average highway miles per trip by mode and geographic market. This statistic is calculated by dividing highway miles by the number of trips and is useful in assessing the reasonableness of each estimate.
- Annual common carrier passenger miles by mode and geographic market. The modes and geographic markets are the same as described above. This statistic presents the number of common carrier person-miles of travel accrued for each mode on an annual basis. For highway trips, this statistic is always equal to zero. For common carrier modes, this statistic includes just the travel between the origin station and the destination station.

[14] Since all trains in the DC2RVA corridor are coded as regional trains, relatively few trips outside of Northern Virginia elect to use the HSR option. Northern Virginia trips have the option of traveling to Washington, D.C. and boarding an Acela train at Union Station. Other travelers board a regional train in the DC2RVA corridor which provides a direct trip to the Northeast corridor at a much lower fare.

- Average common carrier passengers miles per trip by mode and geographic market. This statistic is calculated by dividing the common carrier passenger miles by the number of trips and is useful in assessing the reasonableness of each estimate.
- Annual rail revenue by mode and geographic market. The modes and geographic markets are the same as described above. This statistic presents the rail revenue (in constant 2015 year dollars) for the rail modes.
- Average rail revenue per trip by mode and geographic market. This statistic is calculated by dividing the rail revenue by the number of trips and is useful in assessing the reasonableness of each estimate.

Table 4-7: Year 2025 No Build Annual Trips by Mode and Geographic Market

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	170,203,956	5,821,936	38,896,441	2,634,988	10,144,794
NEC-VA	28,565,222	1,713,306	2,583,177	249,215	1,620,637
NEC-NC	4,911,855	2,739,164	1,067,047	-	121,615
VA-NEC	26,736,236	1,783,380	2,001,619	224,135	1,473,120
VA-VA	20,259,020	73,946	936,032	746	324,337
VA-NC	12,783,552	272,811	1,141,690	-	54,014
NC-NEC	5,143,923	3,280,503	223,757	-	146,681
NC-VA	13,395,487	294,562	481,665	-	69,446
NC-NC	25,578,461	30,953	2,031,504	-	390,402
Total	307,577,712	16,010,561	49,362,931	3,109,084	14,345,046

Table 4-8: Year 2025 No Build Annual Highway Miles (access/egress for common carrier modes)

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	26,468,969,270	256,109,805	1,944,745,593	94,584,279	404,226,838
NEC-VA	6,849,728,866	80,350,126	121,360,114	11,568,762	69,251,348
NEC-NC	2,528,119,587	144,708,934	54,738,592	-	4,537,704
VA-NEC	6,355,517,029	81,359,458	97,046,666	10,125,512	61,654,389
VA-VA	2,991,405,982	2,553,273	38,874,119	51,567	12,604,208
VA-NC	2,764,906,436	13,716,787	62,012,350	-	2,352,137
NC-NEC	2,577,132,272	428,025,713	13,732,491	-	5,102,896
NC-VA	2,911,252,393	14,830,159	32,008,980	-	2,985,763
NC-NC	3,955,827,569	2,114,566	122,611,345	-	15,373,532
Total	57,402,859,403	1,023,768,820	2,487,130,251	116,330,120	578,088,816

Table 4-9: Year 2025 No Build Average Highway Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	155.5	44.0	50.0	35.9	39.8
NEC-VA	239.8	46.9	47.0	46.4	42.7
NEC-NC	514.7	52.8	51.3	-	37.3
VA-NEC	237.7	45.6	48.5	45.2	41.9
VA-VA	147.7	34.5	41.5	69.2	38.9
VA-NC	216.3	50.3	54.3	-	43.5
NC-NEC	501.0	130.5	61.4	-	34.8
NC-VA	217.3	50.3	66.5	-	43.0
NC-NC	154.7	68.3	60.4	-	39.4
Total	186.6	63.9	50.4	37.4	40.3

Table 4-10: Year 2025 No Build Annual Common Carrier Passenger Miles

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	1,560,572,295	4,129,276,813	439,145,516	1,413,218,640
NEC-VA	-	584,583,273	465,769,860	46,437,271	320,583,192
NEC-NC	-	1,358,820,689	491,299,044	-	53,862,823
VA-NEC	-	615,861,060	424,903,515	40,572,765	294,672,914
VA-VA	-	25,864,068	93,261,150	21,620	39,359,038
VA-NC	-	74,677,308	208,871,302	-	14,442,403
NC-NEC	-	1,655,366,204	81,050,761	-	66,969,235
NC-VA	-	82,425,182	93,155,970	-	19,276,403
NC-NC	-	3,780,339	227,338,185	-	44,684,642
Total	-	5,961,950,417	6,214,926,599	526,177,172	2,267,069,290

Table 4-11: Year 2025 No Build Average Common Carrier Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	268.1	106.2	166.7	139.3
NEC-VA	-	341.2	180.3	186.3	197.8
NEC-NC	-	496.1	460.4	-	442.9
VA-NEC	-	345.3	212.3	181.0	200.0
VA-VA	-	349.8	99.6	29.0	121.4
VA-NC	-	273.7	182.9	-	267.4
NC-NEC	-	504.6	362.2	-	456.6
NC-VA	-	279.8	193.4	-	277.6
NC-NC	-	122.1	111.9	-	114.5
Total	-	372.4	125.9	169.2	158.0

Table 4-12: Year 2025 No Build Annual Rail Revenue

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 380,918,879	$ 620,316,793
NEC-VA				$ 38,487,585	$ 124,146,637
NEC-NC				$ -	$ 11,552,820
VA-NEC				$ 33,967,173	$ 111,903,064
VA-VA				$ 34,801	$ 12,922,128
VA-NC				$ -	$ 3,186,513
NC-NEC				$ -	$ 14,086,784
NC-VA				$ -	$ 4,167,435
NC-NC				$ -	$ 10,068,214
Total				$ 453,408,438	$ 912,350,388

Table 4-13: Year 2025 No Build Average Rail Revenue/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 144.56	$ 61.15
NEC-VA				$ 154.43	$ 76.60
NEC-NC				$ -	$ 94.99
VA-NEC				$ 151.55	$ 75.96
VA-VA				$ 46.68	$ 39.84
VA-NC				$ -	$ 58.99
NC-NEC				$ -	$ 96.04
NC-VA				$ -	$ 60.01
NC-NC				$ -	$ 25.79
Total				$ 145.83	$ 63.60

Table 4-14: Year 2025 Staples Mill Annual Trips by Mode and Geographic Market

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	170,203,914	5,821,936	38,896,441	2,634,986	10,144,838
NEC-VA	28,427,707	1,699,037	2,555,835	241,659	1,807,320
NEC-NC	4,868,124	2,691,205	1,051,020	-	229,332
VA-NEC	26,595,243	1,769,787	1,978,460	217,267	1,657,733
VA-VA	20,140,902	73,398	927,173	726	451,882
VA-NC	12,730,149	265,668	1,132,795	-	123,455
NC-NEC	5,099,383	3,227,329	218,135	-	250,017
NC-VA	13,339,453	288,298	477,304	-	136,104
NC-NC	25,528,959	30,815	2,023,456	-	448,090
Total	306,933,833	15,867,472	49,260,618	3,094,638	15,248,772

Table 4-15: Year 2025 Staples Mill Annual Highway Miles (access/egress for common carrier modes)

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	26,468,968,742	256,109,805	1,944,745,593	94,584,192	404,223,753
NEC-VA	6,818,099,315	79,694,820	120,141,955	11,082,086	75,146,417
NEC-NC	2,510,544,720	142,629,358	54,229,566	-	7,712,728
VA-NEC	6,323,875,866	80,735,014	96,118,017	9,688,000	66,775,590
VA-VA	2,975,514,681	2,537,322	38,546,730	50,085	17,120,937
VA-NC	2,751,038,364	13,424,720	61,700,277	-	4,715,548
NC-NEC	2,559,556,096	425,790,318	13,466,670	-	7,917,773
NC-VA	2,897,318,618	14,570,195	31,784,442	-	5,179,827
NC-NC	3,948,873,141	2,106,779	122,244,540	-	17,726,421
Total	57,253,789,544	1,017,598,330	2,482,977,790	115,404,362	606,518,996

Table 4-16: Year 2025 Staples Mill Average Highway Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	155.5	44.0	50.0	35.9	39.8
NEC-VA	239.8	46.9	47.0	45.9	41.6
NEC-NC	515.7	53.0	51.6	-	33.6
VA-NEC	237.8	45.6	48.6	44.6	40.3
VA-VA	147.7	34.6	41.6	69.0	37.9
VA-NC	216.1	50.5	54.5	-	38.2
NC-NEC	501.9	131.9	61.7	-	31.7
NC-VA	217.2	50.5	66.6	-	38.1
NC-NC	154.7	68.4	60.4	-	39.6
Total	186.5	64.1	50.4	37.3	39.8

Table 4-17: Year 2025 Staples Mill Annual Common Carrier Passenger Miles

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	1,560,572,295	4,129,276,813	439,145,452	1,413,218,994
NEC-VA	-	580,593,256	459,849,628	45,295,570	362,999,237
NEC-NC	-	1,339,277,180	484,389,474	-	106,731,876
VA-NEC	-	612,048,670	419,810,921	39,681,170	335,947,316
VA-VA	-	25,782,788	92,218,673	21,056	56,202,354
VA-NC	-	72,840,797	206,605,859	-	36,911,681
NC-NEC	-	1,633,831,886	79,348,250	-	115,950,274
NC-VA	-	80,786,238	92,084,036	-	39,045,160
NC-NC	-	3,763,078	226,384,260	-	51,334,812
Total	-	5,909,496,188	6,189,967,912	524,143,249	2,518,341,704

Table 4-18: Year 2025 Staples Mill Average Common Carrier Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	268.1	106.2	166.7	139.3
NEC-VA	-	341.7	179.9	187.4	200.8
NEC-NC	-	497.6	460.9	-	465.4
VA-NEC	-	345.8	212.2	182.6	202.7
VA-VA	-	351.3	99.5	29.0	124.4
VA-NC	-	274.2	182.4	-	299.0
NC-NEC	-	506.2	363.8	-	463.8
NC-VA	-	280.2	192.9	-	286.9
NC-NC	-	122.1	111.9	-	114.6
Total	-	372.4	125.7	169.4	165.2

Table 4-19: Year 2025 Staples Mill Annual Rail Revenue

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 380,918,777	$ 620,320,239
NEC-VA				$ 37,494,801	$ 138,326,075
NEC-NC				$ -	$ 22,354,367
VA-NEC				$ 33,159,824	$ 125,218,666
VA-VA				$ 33,893	$ 17,809,547
VA-NC				$ -	$ 7,814,801
NC-NEC				$ -	$ 25,246,949
NC-VA				$ -	$ 8,603,552
NC-NC				$ -	$ 11,522,662
Total				$ 451,607,295	$ 977,216,858

Table 4-20: Year 2025 Staples Mill Average Rail Revenue/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 144.56	$ 61.15
NEC-VA				$ 155.16	$ 76.54
NEC-NC				$ -	$ 97.48
VA-NEC				$ 152.62	$ 75.54
VA-VA				$ 46.68	$ 39.41
VA-NC				$ -	$ 63.30
NC-NEC				$ -	$ 100.98
NC-VA				$ -	$ 63.21
NC-NC				$ -	$ 25.72
Total				$ 145.93	$ 64.08

Table 4-21: Year 2025 Boulevard Annual Trips by Mode and Geographic Market

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	170,203,914	5,821,936	38,896,441	2,634,986	10,144,838
NEC-VA	28,431,405	1,699,298	2,556,082	241,659	1,803,113
NEC-NC	4,875,098	2,696,451	1,053,254	-	214,879
VA-NEC	26,600,629	1,770,238	1,978,911	217,267	1,651,445
VA-VA	20,145,872	73,505	927,584	726	446,394
VA-NC	12,737,512	266,504	1,134,023	-	114,028
NC-NEC	5,108,810	3,234,762	218,919	-	232,372
NC-VA	13,349,692	289,295	477,693	-	124,481
NC-NC	25,528,383	30,822	2,023,381	-	448,734
Total	306,981,315	15,882,810	49,266,288	3,094,638	15,180,284

Table 4-22: Year 2025 Boulevard Annual Highway Miles (access/egress for common carrier modes)

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	26,468,968,742	256,109,805	1,944,745,593	94,584,192	404,223,753
NEC-VA	6,819,000,381	79,704,856	120,142,471	11,082,086	74,698,370
NEC-NC	2,513,316,695	142,866,969	54,315,827	-	7,221,632
VA-NEC	6,325,145,499	80,750,257	96,120,808	9,688,000	66,212,651
VA-VA	2,976,346,862	2,540,437	38,558,050	50,085	16,715,552
VA-NC	2,752,929,106	13,459,915	61,737,964	-	4,279,410
NC-NEC	2,563,422,042	426,121,167	13,503,132	-	7,363,733
NC-VA	2,899,844,938	14,612,399	31,804,176	-	4,712,394
NC-NC	3,948,825,225	2,107,270	122,239,513	-	17,733,669
Total	57,267,799,488	1,018,273,076	2,483,167,534	115,404,362	603,161,165

Table 4-23: Year 2025 Boulevard Average Highway Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	155.5	44.0	50.0	35.9	39.8
NEC-VA	239.8	46.9	47.0	45.9	41.4
NEC-NC	515.5	53.0	51.6	-	33.6
VA-NEC	237.8	45.6	48.6	44.6	40.1
VA-VA	147.7	34.6	41.6	69.0	37.4
VA-NC	216.1	50.5	54.4	-	37.5
NC-NEC	501.8	131.7	61.7	-	31.7
NC-VA	217.2	50.5	66.6	-	37.9
NC-NC	154.7	68.4	60.4	-	39.5
Total	186.6	64.1	50.4	37.3	39.7

Table 4-24: Year 2025 Boulevard Annual Common Carrier Passenger Miles

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	1,560,572,295	4,129,276,813	439,145,452	1,413,218,994
NEC-VA	-	580,662,914	459,899,817	45,295,570	362,808,113
NEC-NC	-	1,341,417,762	485,341,603	-	100,073,175
VA-NEC	-	612,158,093	419,902,962	39,681,170	335,326,090
VA-VA	-	25,798,627	92,274,084	21,056	55,874,731
VA-NC	-	73,058,105	206,919,813	-	33,898,014
NC-NEC	-	1,636,894,724	79,602,910	-	107,759,433
NC-VA	-	81,059,066	92,191,398	-	35,584,420
NC-NC	-	3,763,909	226,373,953	-	51,408,537
Total	-	5,915,385,495	6,191,783,352	524,143,249	2,495,951,507

Table 4-25: Year 2025 Boulevard Average Common Carrier Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	268.1	106.2	166.7	139.3
NEC-VA	-	341.7	179.9	187.4	201.2
NEC-NC	-	497.5	460.8	-	465.7
VA-NEC	-	345.8	212.2	182.6	203.1
VA-VA	-	351.0	99.5	29.0	125.2
VA-NC	-	274.1	182.5	-	297.3
NC-NEC	-	506.0	363.6	-	463.7
NC-VA	-	280.2	193.0	-	285.9
NC-NC	-	122.1	111.9	-	114.6
Total	-	372.4	125.7	169.4	164.4

Table 4-26: Year 2025 Boulevard Annual Rail Revenue

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 380,918,777	$ 620,320,239
NEC-VA				$ 37,494,801	$ 139,490,193
NEC-NC				$ -	$ 20,979,232
VA-NEC				$ 33,159,824	$ 126,580,162
VA-VA				$ 33,893	$ 20,700,344
VA-NC				$ -	$ 8,578,973
NC-NEC				$ -	$ 23,433,212
NC-VA				$ -	$ 8,864,924
NC-NC				$ -	$ 11,537,432
Total				$ 451,607,295	$ 980,484,711

Table 4-27: Year 2025 Boulevard Average Rail Revenue/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 144.56	$ 61.15
NEC-VA				$ 155.16	$ 77.36
NEC-NC				$ -	$ 97.63
VA-NEC				$ 152.62	$ 76.65
VA-VA				$ 46.68	$ 46.37
VA-NC				$ -	$ 75.24
NC-NEC				$ -	$ 100.84
NC-VA				$ -	$ 71.22
NC-NC				$ -	$ 25.71
Total				$ 145.93	$ 64.59

Table 4-28: Year 2025 Broad Street Annual Trips by Mode and Geographic Market

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	170,203,914	5,821,936	38,896,441	2,634,986	10,144,838
NEC-VA	28,444,699	1,700,719	2,558,224	241,659	1,786,256
NEC-NC	4,875,689	2,696,902	1,053,437	-	213,653
VA-NEC	26,608,658	1,771,052	1,980,284	217,267	1,641,229
VA-VA	20,158,272	73,503	928,434	726	433,145
VA-NC	12,737,066	266,557	1,133,891	-	114,553
NC-NEC	5,106,966	3,233,253	218,773	-	235,872
NC-VA	13,347,507	289,069	477,510	-	127,073
NC-NC	25,528,056	30,821	2,023,352	-	449,091
Total	307,010,828	15,883,812	49,270,347	3,094,638	15,145,710

Table 4-29: Year 2025 Broad Street Annual Highway Miles (access/egress for common carrier modes)

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	26,468,968,742	256,109,805	1,944,745,593	94,584,192	404,223,753
NEC-VA	6,822,772,800	79,765,784	120,225,437	11,082,086	74,103,692
NEC-NC	2,513,550,817	142,887,311	54,322,622	-	7,179,798
VA-NEC	6,327,283,873	80,786,690	96,179,812	9,688,000	65,876,174
VA-VA	2,978,015,181	2,540,460	38,592,295	50,085	16,230,993
VA-NC	2,752,870,715	13,461,870	61,734,777	-	4,316,190
NC-NEC	2,562,618,153	426,053,787	13,496,088	-	7,469,373
NC-VA	2,899,304,137	14,602,738	31,795,507	-	4,806,045
NC-NC	3,948,774,281	2,107,230	122,237,739	-	17,746,294
Total	57,274,158,699	1,018,315,674	2,483,329,870	115,404,362	601,952,311

Table 4-30: Year 2025 Broad Street Average Highway Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	155.5	44.0	50.0	35.9	39.8
NEC-VA	239.9	46.9	47.0	45.9	41.5
NEC-NC	515.5	53.0	51.6	-	33.6
VA-NEC	237.8	45.6	48.6	44.6	40.1
VA-VA	147.7	34.6	41.6	69.0	37.5
VA-NC	216.1	50.5	54.4	-	37.7
NC-NEC	501.8	131.8	61.7	-	31.7
NC-VA	217.2	50.5	66.6	-	37.8
NC-NC	154.7	68.4	60.4	-	39.5
Total	186.6	64.1	50.4	37.3	39.7

Table 4-31: Year 2025 Broad Street Annual Common Carrier Passenger Miles

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	1,560,572,295	4,129,276,813	439,145,452	1,413,218,994
NEC-VA	-	581,108,164	460,464,906	45,295,570	357,875,896
NEC-NC	-	1,341,601,065	485,419,788	-	99,509,117
VA-NEC	-	612,414,328	420,258,754	39,681,170	332,541,783
VA-VA	-	25,798,433	92,378,280	21,056	54,140,440
VA-NC	-	73,071,927	206,904,049	-	33,966,438
NC-NEC	-	1,636,260,614	79,553,043	-	109,483,591
NC-VA	-	80,997,510	92,150,382	-	36,338,511
NC-NC	-	3,763,847	226,370,260	-	51,464,591
Total	-	5,915,588,184	6,192,776,273	524,143,249	2,488,539,361

Table 4-32: Year 2025 Broad Street Average Common Carrier Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	268.1	106.2	166.7	139.3
NEC-VA	-	341.7	180.0	187.4	200.3
NEC-NC	-	497.5	460.8	-	465.8
VA-NEC	-	345.8	212.2	182.6	202.6
VA-VA	-	351.0	99.5	29.0	125.0
VA-NC	-	274.1	182.5	-	296.5
NC-NEC	-	506.1	363.6	-	464.2
NC-VA	-	280.2	193.0	-	286.0
NC-NC	-	122.1	111.9	-	114.6
Total	-	372.4	125.7	169.4	164.3

Table 4-33: Year 2025 Broad Street Annual Rail Revenue

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 380,918,777	$ 620,320,239
NEC-VA				$ 37,494,801	$ 138,068,152
NEC-NC				$ -	$ 20,860,801
VA-NEC				$ 33,159,824	$ 125,718,924
VA-VA				$ 33,893	$ 20,063,025
VA-NC				$ -	$ 8,642,643
NC-NEC				$ -	$ 23,891,251
NC-VA				$ -	$ 9,129,586
NC-NC				$ -	$ 11,550,256
Total				$ 451,607,295	$ 978,244,876

Table 4-34: Year 2025 Broad Street Average Rail Revenue/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 144.56	$ 61.15
NEC-VA				$ 155.16	$ 77.29
NEC-NC				$ -	$ 97.64
VA-NEC				$ 152.62	$ 76.60
VA-VA				$ 46.68	$ 46.32
VA-NC				$ -	$ 75.45
NC-NEC				$ -	$ 101.29
NC-VA				$ -	$ 71.85
NC-NC				$ -	$ 25.72
Total				$ 145.93	$ 64.59

Table 4-35: Year 2025 Main Street Annual Trips by Mode and Geographic Market

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	170,204,148	5,821,936	38,896,484	2,635,001	10,144,546
NEC-VA	28,429,375	1,699,350	2,556,035	241,659	1,805,138
NEC-NC	4,875,776	2,696,898	1,053,528	-	213,479
VA-NEC	26,596,422	1,770,058	1,978,577	217,326	1,656,106
VA-VA	20,140,365	73,503	927,448	726	452,040
VA-NC	12,736,966	266,537	1,134,000	-	114,564
NC-NEC	5,110,909	3,234,608	218,995	-	230,352
NC-VA	13,348,234	289,214	477,614	-	126,098
NC-NC	25,528,851	30,822	2,023,275	-	448,371
Total	306,971,046	15,882,924	49,265,957	3,094,712	15,190,695

Table 4-36: Year 2025 Main Street Annual Highway Miles (access/egress for common carrier modes)

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	26,468,979,147	256,109,805	1,944,745,973	94,584,306	404,221,315
NEC-VA	6,818,124,020	79,699,652	120,111,122	11,082,086	74,789,931
NEC-NC	2,513,580,024	142,887,020	54,328,367	-	7,176,559
VA-NEC	6,323,732,375	80,736,137	96,076,119	9,691,522	66,472,136
VA-VA	2,975,473,633	2,540,332	38,532,951	50,085	17,024,301
VA-NC	2,752,851,591	13,461,385	61,744,197	-	4,301,112
NC-NEC	2,564,191,904	426,129,889	13,511,204	-	7,474,180
NC-VA	2,899,529,744	14,611,146	31,802,911	-	4,752,889
NC-NC	3,948,884,318	2,107,284	122,226,872	-	17,796,255
Total	57,265,346,755	1,018,282,650	2,483,079,716	115,407,999	604,008,678

Table 4-37: Year 2025 Main Street Average Highway Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	155.5	44.0	50.0	35.9	39.8
NEC-VA	239.8	46.9	47.0	45.9	41.4
NEC-NC	515.5	53.0	51.6	-	33.6
VA-NEC	237.8	45.6	48.6	44.6	40.1
VA-VA	147.7	34.6	41.5	69.0	37.7
VA-NC	216.1	50.5	54.4	-	37.5
NC-NEC	501.7	131.7	61.7	-	32.4
NC-VA	217.2	50.5	66.6	-	37.7
NC-NC	154.7	68.4	60.4	-	39.7
Total	186.5	64.1	50.4	37.3	39.8

Table 4-38: Year 2025 Main Street Annual Common Carrier Passenger Miles

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	1,560,572,295	4,129,278,610	439,146,052	1,413,207,041
NEC-VA	-	580,667,407	459,893,973	45,295,570	363,716,424
NEC-NC	-	1,341,598,508	485,457,452	-	99,450,205
VA-NEC	-	612,097,902	419,823,790	39,683,534	336,867,998
VA-VA	-	25,798,388	92,256,321	21,056	56,599,761
VA-NC	-	73,067,052	206,919,914	-	33,931,830
NC-NEC	-	1,636,920,062	79,650,206	-	106,903,201
NC-VA	-	81,037,070	92,175,052	-	36,072,433
NC-NC	-	3,763,935	226,372,275	-	51,458,417
Total	-	5,915,522,619	6,191,827,593	524,146,213	2,498,207,309

Table 4-39: Year 2025 Main Street Average Common Carrier Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	268.1	106.2	166.7	139.3
NEC-VA	-	341.7	179.9	187.4	201.5
NEC-NC	-	497.5	460.8	-	465.9
VA-NEC	-	345.8	212.2	182.6	203.4
VA-VA	-	351.0	99.5	29.0	125.2
VA-NC	-	274.1	182.5	-	296.2
NC-NEC	-	506.1	363.7	-	464.1
NC-VA	-	280.2	193.0	-	286.1
NC-NC	-	122.1	111.9	-	114.8
Total	-	372.4	125.7	169.4	164.5

Table 4-40: Year 2025 Main Street Annual Rail Revenue

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 380,919,628	$ 620,313,727
NEC-VA				$ 37,494,801	$ 138,230,971
NEC-NC				$ -	$ 20,849,761
VA-NEC				$ 33,163,181	$ 125,077,186
VA-VA				$ 33,893	$ 17,924,592
VA-NC				$ -	$ 8,701,118
NC-NEC				$ -	$ 23,018,425
NC-VA				$ -	$ 9,299,240
NC-NC				$ -	$ 11,520,180
Total				$ 451,611,503	$ 974,935,201

Table 4-41: Year 2025 Main Street Average Rail Revenue/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 144.56	$ 61.15
NEC-VA				$ 155.16	$ 76.58
NEC-NC				$ -	$ 97.67
VA-NEC				$ 152.60	$ 75.52
VA-VA				$ 46.68	$ 39.65
VA-NC				$ -	$ 75.95
NC-NEC				$ -	$ 99.93
NC-VA				$ -	$ 73.75
NC-NC				$ -	$ 25.69
Total				$ 145.93	$ 64.18

Table 4-42: Year 2025 Staples Mill and Main St Full Annual Trips by Mode and Geographic Market

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	170,203,914	5,821,936	38,896,441	2,634,986	10,144,838
NEC-VA	28,422,318	1,698,843	2,555,344	241,659	1,813,394
NEC-NC	4,877,124	2,697,847	1,053,992	-	210,718
VA-NEC	26,588,204	1,769,407	1,977,625	217,267	1,665,988
VA-VA	20,131,500	73,519	926,767	726	461,568
VA-NC	12,736,277	266,612	1,133,803	-	115,375
NC-NEC	5,108,264	3,233,692	218,853	-	234,054
NC-VA	13,345,437	289,080	477,446	-	129,197
NC-NC	25,528,457	30,822	2,023,384	-	448,657
Total	306,941,496	15,881,758	49,263,655	3,094,638	15,223,788

Table 4-43: Year 2025 Staples Mill and Main St Full Annual Highway Miles (access/egress for common carrier modes)

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	26,468,968,742	256,109,805	1,944,745,593	94,584,192	404,223,753
NEC-VA	6,816,563,989	79,674,112	120,100,209	11,082,086	75,269,052
NEC-NC	2,514,109,327	142,929,122	54,347,367	-	7,084,428
VA-NEC	6,321,998,563	80,706,177	96,059,886	9,688,000	66,926,202
VA-VA	2,974,547,079	2,540,780	38,512,413	50,085	17,637,499
VA-NC	2,752,668,032	13,463,828	61,728,267	-	4,413,764
NC-NEC	2,563,143,674	426,076,113	13,499,634	-	7,410,517
NC-VA	2,898,870,084	14,603,659	31,789,316	-	4,911,626
NC-NC	3,948,831,073	2,107,285	122,239,895	-	17,715,751
Total	57,259,700,562	1,018,210,882	2,483,022,580	115,404,362	605,592,592

Table 4-44: Year 2025 Staples Mill and Main St Full Average Highway Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	155.5	44.0	50.0	35.9	39.8
NEC-VA	239.8	46.9	47.0	45.9	41.5
NEC-NC	515.5	53.0	51.6	-	33.6
VA-NEC	237.8	45.6	48.6	44.6	40.2
VA-VA	147.8	34.6	41.6	69.0	38.2
VA-NC	216.1	50.5	54.4	-	38.3
NC-NEC	501.8	131.8	61.7	-	31.7
NC-VA	217.2	50.5	66.6	-	38.0
NC-NC	154.7	68.4	60.4	-	39.5
Total	186.5	64.1	50.4	37.3	39.8

Table 4-45: Year 2025 Staples Mill and Main St Full Annual Common Carrier Passenger Miles

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	1,560,572,295	4,129,276,813	439,145,452	1,413,218,994
NEC-VA	-	580,521,589	459,736,054	45,295,570	364,613,161
NEC-NC	-	1,341,982,961	485,656,687	-	98,209,253
VA-NEC	-	611,908,530	419,609,220	39,681,170	338,118,025
VA-VA	-	25,800,868	92,188,147	21,056	56,567,458
VA-NC	-	73,084,953	206,885,532	-	34,217,381
NC-NEC	-	1,636,462,412	79,584,254	-	108,721,168
NC-VA	-	80,999,737	92,139,646	-	37,198,751
NC-NC	-	3,763,942	226,374,809	-	51,406,822
Total	-	5,915,097,285	6,191,451,161	524,143,249	2,502,271,013

Table 4-46: Year 2025 Staples Mill and Main St Full Average Common Carrier Miles/Trip

Geographic Market	Hwy	Air	Bus	HSR	Regional
NEC-NEC	-	268.1	106.2	166.7	139.3
NEC-VA	-	341.7	179.9	187.4	201.1
NEC-NC	-	497.4	460.8	-	466.1
VA-NEC	-	345.8	212.2	182.6	203.0
VA-VA	-	350.9	99.5	29.0	122.6
VA-NC	-	274.1	182.5	-	296.6
NC-NEC	-	506.1	363.6	-	464.5
NC-VA	-	280.2	193.0	-	287.9
NC-NC	-	122.1	111.9	-	114.6
Total	-	372.4	125.7	169.4	164.4

Table 4-47: Year 2025 Staples Mill and Main St Full Annual Rail Revenue

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 380,918,777	$ 620,320,239
NEC-VA				$ 37,494,801	$ 138,872,397
NEC-NC				$ -	$ 20,611,932
VA-NEC				$ 33,159,824	$ 125,826,163
VA-VA				$ 33,893	$ 18,124,981
VA-NC				$ -	$ 8,188,875
NC-NEC				$ -	$ 23,745,424
NC-VA				$ -	$ 9,448,712
NC-NC				$ -	$ 11,537,616
Total				$ 451,607,295	$ 976,676,339

Table 4-48: Year 2025 Staples Mill and Main St Full Average Rail Revenue/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 144.56	$ 61.15
NEC-VA				$ 155.16	$ 76.58
NEC-NC				$ -	$ 97.82
VA-NEC				$ 152.62	$ 75.53
VA-VA				$ 46.68	$ 39.27
VA-NC				$ -	$ 70.98
NC-NEC				$ -	$ 101.45
NC-VA				$ -	$ 73.13
NC-NC				$ -	$ 25.72
Total				$ 145.93	$ 64.15

Table 4-49: Year 2025 Staples Mill and Main St Split Annual Trips by Mode and Geographic Market

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	170,203,914	5,821,936	38,896,441	2,634,986	10,144,838
NEC-VA	28,446,442	1,701,639	2,559,109	241,986	1,782,382
NEC-NC	4,871,334	2,696,952	1,052,550	-	218,846
VA-NEC	26,604,667	1,771,014	1,979,898	217,267	1,645,644
VA-VA	20,152,827	73,399	928,368	726	438,762
VA-NC	12,727,844	265,537	1,132,344	-	126,342
NC-NEC	5,099,383	3,227,329	218,135	-	250,017
NC-VA	13,339,466	288,299	477,304	-	136,091
NC-NC	25,531,416	30,830	2,024,052	-	445,022
Total	306,977,293	15,876,933	49,268,200	3,094,965	15,187,943

Table 4-50: Year 2025 Staples Mill and Main St Split Annual Highway Miles (access/egress for common carrier modes)

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	26,468,968,742	256,109,805	1,944,745,593	94,584,192	404,223,753
NEC-VA	6,822,870,042	79,791,984	120,241,051	11,099,949	74,460,563
NEC-NC	2,512,128,608	142,902,844	54,285,148	-	7,339,733
VA-NEC	6,325,893,443	80,774,082	96,142,865	9,688,000	66,448,322
VA-VA	2,976,991,420	2,537,348	38,572,947	50,085	16,795,119
VA-NC	2,750,432,954	13,419,077	61,677,279	-	4,808,808
NC-NEC	2,559,556,096	425,790,318	13,466,670	-	7,917,773
NC-VA	2,897,322,595	14,570,211	31,784,422	-	5,180,099
NC-NC	3,949,377,176	2,107,992	122,281,633	-	17,512,946
Total	57,263,541,076	1,018,003,661	2,483,197,608	115,422,226	604,687,116

Table 4-51: Year 2025 Staples Mill and Main St Split Average Highway Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	155.5	44.0	50.0	35.9	39.8
NEC-VA	239.8	46.9	47.0	45.9	41.8
NEC-NC	515.7	53.0	51.6	-	33.5
VA-NEC	237.8	45.6	48.6	44.6	40.4
VA-VA	147.7	34.6	41.5	69.0	38.3
VA-NC	216.1	50.5	54.5	-	38.1
NC-NEC	501.9	131.9	61.7	-	31.7
NC-VA	217.2	50.5	66.6	-	38.1
NC-NC	154.7	68.4	60.4	-	39.4
Total	186.5	64.1	50.4	37.3	39.8

Table 4-52: Year 2025 Staples Mill and Main St Split Annual Common Carrier Passenger Miles

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	1,560,572,295	4,129,276,813	439,145,452	1,413,218,994
NEC-VA	-	581,334,380	460,664,545	45,345,593	356,583,515
NEC-NC	-	1,341,742,798	485,164,912	-	100,843,602
VA-NEC	-	612,388,540	420,137,195	39,681,170	333,290,249
VA-VA	-	25,782,944	92,356,160	21,056	54,331,338
VA-NC	-	72,803,092	206,516,148	-	37,947,173
NC-NEC	-	1,633,831,886	79,348,250	-	115,950,274
NC-VA	-	80,786,364	92,083,951	-	39,036,479
NC-NC	-	3,764,977	226,464,348	-	51,009,220
Total	-	5,913,007,276	6,192,012,322	524,193,272	2,502,210,843

Table 4-53: Year 2025 Staples Mill and Main St Split Average Common Carrier Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	268.1	106.2	166.7	139.3
NEC-VA	-	341.6	180.0	187.4	200.1
NEC-NC	-	497.5	460.9	-	460.8
VA-NEC	-	345.8	212.2	182.6	202.5
VA-VA	-	351.3	99.5	29.0	123.8
VA-NC	-	274.2	182.4	-	300.4
NC-NEC	-	506.2	363.8	-	463.8
NC-VA	-	280.2	192.9	-	286.8
NC-NC	-	122.1	111.9	-	114.6
Total	-	372.4	125.7	169.4	164.7

Table 4-54: Year 2025 Staples Mill and Main St Split Annual Rail Revenue

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 380,918,777	$ 620,320,239
NEC-VA				$ 37,539,104	$ 136,350,092
NEC-NC				$ -	$ 21,234,356
VA-NEC				$ 33,159,824	$ 124,400,425
VA-VA				$ 33,893	$ 17,216,492
VA-NC				$ -	$ 8,048,078
NC-NEC				$ -	$ 25,246,949
NC-VA				$ -	$ 8,601,779
NC-NC				$ -	$ 11,467,434
Total				$ 451,651,598	$ 972,885,842

Table 4-55: Year 2025 Staples Mill and Main St Split Average Rail Revenue/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 144.56	$ 61.15
NEC-VA				$ 155.13	$ 76.50
NEC-NC				$ -	$ 97.03
VA-NEC				$ 152.62	$ 75.59
VA-VA				$ 46.68	$ 39.24
VA-NC				$ -	$ 63.70
NC-NEC				$ -	$ 100.98
NC-VA				$ -	$ 63.21
NC-NC				$ -	$ 25.77
Total				$ 145.93	$ 64.06

Table 4-56: Year 2025 Staples Mill and Main St Share Annual Trips by Mode and Geographic Market

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	170,203,914	5,821,936	38,896,441	2,634,986	10,144,838
NEC-VA	28,425,047	1,699,198	2,555,695	241,659	1,809,959
NEC-NC	4,873,191	2,697,183	1,052,916	-	216,392
VA-NEC	26,591,713	1,769,789	1,978,092	217,267	1,661,628
VA-VA	20,134,890	73,520	927,053	726	457,892
VA-NC	12,734,908	266,293	1,133,562	-	117,304
NC-NEC	5,104,238	3,232,961	218,640	-	239,025
NC-VA	13,343,608	288,903	477,453	-	131,196
NC-NC	25,528,848	30,815	2,023,451	-	448,206
Total	306,940,356	15,880,597	49,263,303	3,094,638	15,226,441

Table 4-57: Year 2025 Staples Mill and Main St Share Annual Highway Miles (access/egress for common carrier modes)

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	26,468,968,742	256,109,805	1,944,745,593	94,584,192	404,223,753
NEC-VA	6,817,270,267	79,687,006	120,110,705	11,082,086	75,348,282
NEC-NC	2,512,650,197	142,890,124	54,292,875	-	7,272,414
VA-NEC	6,322,832,055	80,720,410	96,074,682	9,688,000	66,951,628
VA-VA	2,974,958,623	2,540,809	38,523,413	50,085	17,591,880
VA-NC	2,752,316,936	13,450,943	61,717,162	-	4,497,787
NC-NEC	2,561,487,161	426,033,826	13,490,889	-	7,579,552
NC-VA	2,898,317,092	14,594,598	31,787,964	-	4,984,185
NC-NC	3,948,858,090	2,106,780	122,244,136	-	17,732,632
Total	57,257,659,163	1,018,134,300	2,482,987,419	115,404,362	606,182,113

Table 4-58: Year 2025 Staples Mill and Main St Share Average Highway Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	155.5	44.0	50.0	35.9	39.8
NEC-VA	239.8	46.9	47.0	45.9	41.6
NEC-NC	515.6	53.0	51.6	-	33.6
VA-NEC	237.8	45.6	48.6	44.6	40.3
VA-VA	147.8	34.6	41.6	69.0	38.4
VA-NC	216.1	50.5	54.4	-	38.3
NC-NEC	501.8	131.8	61.7	-	31.7
NC-VA	217.2	50.5	66.6	-	38.0
NC-NC	154.7	68.4	60.4	-	39.6
Total	186.5	64.1	50.4	37.3	39.8

Table 4-59: Year 2025 Staples Mill and Main St Share Annual Common Carrier Passenger Miles

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	1,560,572,295	4,129,276,813	439,145,452	1,413,218,994
NEC-VA	-	580,620,533	459,823,791	45,295,570	363,528,828
NEC-NC	-	1,341,706,132	485,231,508	-	100,231,852
VA-NEC	-	612,015,328	419,720,683	39,681,170	336,893,397
VA-VA	-	25,800,916	92,218,405	21,056	56,053,665
VA-NC	-	73,012,473	206,822,131	-	34,687,527
NC-NEC	-	1,636,073,241	79,495,672	-	110,761,861
NC-VA	-	80,952,436	92,130,032	-	37,454,254
NC-NC	-	3,763,079	226,383,771	-	51,336,575
Total	-	5,914,516,433	6,191,102,806	524,143,249	2,504,166,953

Table 4-60: Year 2025 Staples Mill and Main St Share Average Common Carrier Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	268.1	106.2	166.7	139.3
NEC-VA	-	341.7	179.9	187.4	200.8
NEC-NC	-	497.4	460.8	-	463.2
VA-NEC	-	345.8	212.2	182.6	202.7
VA-VA	-	350.9	99.5	29.0	122.4
VA-NC	-	274.2	182.5	-	295.7
NC-NEC	-	506.1	363.6	-	463.4
NC-VA	-	280.2	193.0	-	285.5
NC-NC	-	122.1	111.9	-	114.5
Total	-	372.4	125.7	169.4	164.5

Table 4-61: Year 2025 Staples Mill and Main St Share Annual Rail Revenue

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 380,918,777	$ 620,320,239
NEC-VA				$ 37,494,801	$ 138,610,943
NEC-NC				$ -	$ 21,018,484
VA-NEC				$ 33,159,824	$ 125,492,684
VA-VA				$ 33,893	$ 17,977,604
VA-NC				$ -	$ 7,905,351
NC-NEC				$ -	$ 24,139,667
NC-VA				$ -	$ 8,831,210
NC-NC				$ -	$ 11,524,917
Total				$ 451,607,295	$ 975,821,099

Table 4-62: Year 2025 Staples Mill and Main St Share Average Rail Revenue/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	$ -	$ -	$ -	$ 144.56	$ 61.15
NEC-VA	$ -	$ -	$ -	$ 155.16	$ 76.58
NEC-NC	$ -	$ -	$ -	$ -	$ 97.13
VA-NEC	$ -	$ -	$ -	$ 152.62	$ 75.52
VA-VA	$ -	$ -	$ -	$ 46.68	$ 39.26
VA-NC	$ -	$ -	$ -	$ -	$ 67.39
NC-NEC	$ -	$ -	$ -	$ -	$ 100.99
NC-VA	$ -	$ -	$ -	$ -	$ 67.31
NC-NC	$ -	$ -	$ -	$ -	$ 25.71
Total	$ -	$ -	$ -	$ 145.93	$ 64.09

5 YEAR 2045 RIDERSHIP FORECASTS

This section presents DC2RVA ridership projections for the 2045 Forecast Year.

5.1 OVERVIEW

Table 5-1 presents an overview of the DC2RVA ridership forecast results for 2045. Two statistics are presented:

- Annual rail ridership to, from, and through the DC2RVA corridor. This number includes all trips beginning or ending at any station in the corridor between Alexandria, Richmond, Newport News, Petersburg, and Norfolk. The number also includes all modeled rail travel between North Carolina and the Northeast Corridor who are also beneficiaries of the Project. This number does not include passengers on longer-distance trips (South Carolina, Georgia and Florida) since these markets are not part of the modeling region. An estimate of long-distance station boardings to and from corridor stations is presented later in this section.
- Annual rail ridership (boardings+alightings) at any of the stations located in Richmond, Virginia. This statistic demonstrates the effectiveness of each of the Richmond station options to serve the Richmond area.

The overview table shows that corridor ridership was approximately 1.4 million in 2015 and will grow to 2.2 million annual riders with the 2045 No Build. This change is due to a modest service improvement associated with the No Build Alternative and to demographic growth between 2015 and 2045.

Each of the Build Alternatives attracts approximately 3.2 million annual corridor riders. This increase is a result of significant improvements to train frequency, travel time, and on-time performance. The different station options generate similar levels of overall ridership.

5.2 YEAR 2045 ANNUAL STATION RIDERSHIP

Table 5-2 presents annual station usage (sum of station boardings and alightings) for each station in the Project corridor for each alternative.

5.3 YEAR 2045 ANNUAL MARKET-LEVEL RIDERSHIP

Table 5-3 presents annual rail ridership occurring for different geographic markets in the modeling area. These markets are defined as follows:

- Intra-Project Corridor: trips occurring entirely within the Project corridor defined as including Alexandria, Richmond, Petersburg, Newport News, and Norfolk and all intermediate stations.
- Project Corridor-NEC: trips occurring between the Project corridor and Amtrak's Northeast Corridor between Washington and Boston (inclusive).
- Project Corridor-NC: trips occurring between the Project corridor and stations in North Carolina.
- NC-NEC: trips occurring between North Carolina and the Northeast Corridor.
- Other VA-Project Corridor: trips occurring between other parts of Virginia (i.e., along the route of the Crescent or Cardinal) and the Project corridor.
- Other VA-NEC: trips occurring between other parts of Virginia and the Northeast Corridor.
- Other VA-NC: trips occurring between other parts of Virginia and North Carolina.
- NEC-NEC: trips occurring between stations located along the Northeast Corridor.
- NC-NC: trips occurring between stations located in North Carolina.
- Other VA-Other VA: trips occurring between stations located in other parts of Virginia.

This table also includes two subtotals and one table total, defined as follows:

- Subtotal To/From/Through Corridor: This subtotal includes all trips classified as
    - Intra-Project Corridor
    - Project Corridor-NEC
    - Project Corridor-NC
    - NC-NEC
    - OtherVA-Project Corridor
    - OtherVA-NEC
-
- Subtotal Other Trips: Any trip not included in the previous subtotal.
- Total Modeled Trips: All trips in the table.

5.4 YEAR 2045 STATION RIDERSHIP BY TRAIN TYPE

This section presents annual station usage (sum of station boardings and alightings) for each station stratified by the type of trip. This information is used in the station planning process to determine the parking requirements. The following information is provided:

- Table 5-4 presents regional rail ridership for travel between corridor stations and a station located along the Northeast Corridor or in North Carolina. This category does not include trips within the corridor or between the corridor and Washington, D.C.
- Table 5-5 presents ridership for that subset of travel occurring within the corridor or between the corridor and Washington, D.C.
- Table 5-6 presents an estimate of passengers boarding long-distance trains which are the difference between total ridership at each station and the modeled ridership.

Table 5-1: Overview of Year 2015 and 2045 Annual Corridor Ridership by Alternative

Market	Year 2015 Existing Schedule 66% OTP	Year 2045 No Build 66% OTP	Year 2045 Staples Mill Only 90% OTP	Year 2045 Boulevard 90% OTP	Year 2045 Broad Street 90% OTP	Year 2045 Main Street 90% OTP	Year 2045 Staples Mill & Main Street Full 90% OTP	Year 2045 Staples Mill & Main Street Split 90% OTP	Year 2045 Staples Mill & Main Street Shared 90% OTP
Annual Rail Trips To/From/Through Corridor (millions)	1.388	2.180	3.295	3.203	3.160	3.213	3.258	3.218	3.261
Annual Boardings+Alightings at Richmond Stations (thousands)	398	604	949	925	897	948	1,037	920	1,013

Table 5-2: Year 2015 and 2045 Annual Ridership (Boardings+Alightings) by Station and Alternative

Station	Year 2015 Existing Schedule 66% OTP	Year 2045 No Build 66% OTP	Year 2045 Staples Mill Only 90% OTP	Year 2045 Boulevard 90% OTP	Year 2045 Broad Street 90% OTP	Year 2045 Main Street 90% OTP	Year 2045 Staples Mill & Main Street Full 90% OTP	Year 2045 Staples Mill & Main Street Split 90% OTP	Year 2045 Staples Mill & Main Street Shared 90% OTP
Petersburg, VA	27,265	43,776	73,633	63,478	64,773	43,908	46,169	64,505	50,523
Norfolk, VA	40,028	118,780	221,057	191,802	194,221	190,838	191,518	222,352	194,552
Newport News, VA	123,798	151,317	223,256	230,585	208,462	232,075	228,843	210,103	228,320
Williamsburg, VA	51,017	74,980	107,445	111,203	103,321	108,871	106,853	102,755	106,669
Richmond, VA Main	46,849	66,732	-	-	-	948,482	474,840	136,534	326,531
Richmond, VA Boulevard/Broad	-	-	-	925,389	896,660	-	-	-	-
Richmond, VA Staples Mill	351,156	537,037	949,423	-	-	-	562,183	783,665	686,959
Ashland, VA	28,013	44,860	65,126	69,701	74,138	76,932	60,460	62,787	60,815
Fredericksburg, VA	127,535	220,621	398,177	408,343	408,435	411,690	395,219	393,903	394,860
Quantico, VA	34,754	50,182	59,676	59,140	58,255	59,293	59,538	59,787	59,943
Woodbridge, VA	23,836	38,843	104,261	103,657	102,144	103,712	104,602	103,549	105,166
Alexandria, VA	174,238	268,873	303,021	295,091	291,024	295,330	299,015	299,345	302,017
Total	1,028,488	1,616,001	2,505,074	2,458,388	2,401,432	2,471,131	2,529,241	2,439,285	2,516,354

Table 5-3: Year 2015 and 2045 Annual Ridership by Market and Alternative

Market	Year 2015 Existing Schedule 66% OTP	Year 2045 No Build 66% OTP	Year 2045 Staples Mill Only 90% OTP	Year 2045 Boulevard 90% OTP	Year 2045 Broad Street 90% OTP	Year 2045 Main Street 90% OTP	Year 2045 Staples Mill & Main Street Full 90% OTP	Year 2045 Staples Mill & Main Street Split 90% OTP	Year 2045 Staples Mill & Main Street Shared 90% OTP
Intra-Project Corridor	121,605	198,860	285,444	283,094	272,762	287,563	295,061	284,088	293,321
Project Corridor-NEC	698,092	1,069,490	1,652,325	1,632,439	1,592,060	1,630,454	1,669,947	1,586,159	1,657,156
Project Corridor-NC	64,363	107,456	246,886	224,300	228,639	229,037	233,845	250,480	237,189
NC-NEC	262,862	371,753	696,878	649,329	652,521	643,566	645,699	683,678	659,597
OtherVA-Project Corridor	22,822	41,335	44,695	44,754	44,567	45,862	44,742	44,644	44,735
OtherVA-NEC	217,852	390,904	368,571	369,462	369,495	376,743	368,754	368,676	368,754
Subtotal To/From/Through Corridor	1,387,596	2,179,798	3,294,799	3,203,378	3,160,045	3,213,225	3,258,049	3,217,725	3,260,751
OtherVA-NC	6,912	9,929	10,523	10,566	10,492	10,580	10,396	10,368	10,493
NEC-NEC	10,598,458	13,864,873	13,857,435	13,857,435	13,857,435	13,856,545	13,857,435	13,859,193	13,857,435
NC-NC	263,335	558,635	641,611	642,780	643,258	642,073	642,654	637,959	642,304
OtherVA-OtherVA	5,194	18,713	15,448	15,458	15,460	15,473	15,450	15,446	15,451
Subtotal Other Trips	10,873,899	14,452,150	14,525,017	14,526,239	14,526,645	14,524,672	14,525,936	14,522,966	14,525,682
Total Modeled Trips	12,261,495	16,631,948	17,819,816	17,729,617	17,686,690	17,737,897	17,783,985	17,740,691	17,786,433

Table 5-4: Year 2015 and 2045 Annual Regional Train Ridership (Boardings+Alightings) by Station and Alternative

Station	Year 2015 Existing Schedule 66% OTP	Year 2045 No Build 66% OTP	Year 2045 Staples Mill Only 90% OTP	Year 2045 Boulevard 90% OTP	Year 2045 Broad Street 90% OTP	Year 2045 Main Street 90% OTP	Year 2045 Staples Mill & Main Street Full 90% OTP	Year 2045 Staples Mill & Main Street Split 90% OTP	Year 2045 Staples Mill & Main Street Shared 90% OTP
Petersburg, VA	17,010	26,767	48,020	41,934	42,433	29,556	31,543	42,207	35,017
Norfolk, VA	16,741	62,649	105,765	86,219	87,208	85,504	87,098	109,033	90,310
Newport News, VA	61,583	70,202	107,369	110,446	99,589	110,870	109,534	99,303	109,117
Williamsburg, VA	22,308	30,346	45,804	46,673	43,209	45,583	44,777	42,414	44,755
Richmond, VA Main	17,940	24,687	-	-	-	452,885	240,101	57,796	159,841
Richmond, VA Boulevard/Broad	-	-	-	439,875	427,037	-	-	-	-
Richmond, VA Staples Mill	178,794	260,363	454,685	-	-	-	256,306	382,231	323,364
Ashland, VA	20,259	30,564	41,659	45,803	50,878	51,508	41,684	42,205	41,726
Fredericksburg, VA	102,721	172,774	294,348	302,410	303,168	303,427	292,154	290,043	291,763
Quantico, VA	21,403	28,961	36,942	36,719	36,710	36,513	36,669	37,116	37,133
Woodbridge, VA	15,880	26,672	60,588	60,316	60,260	59,858	60,242	61,240	60,808
Alexandria, VA	81,809	126,766	139,656	134,841	135,109	136,356	134,234	138,402	138,091
Total									

Table 5-5: Year 2015 and 2045 Annual Virginia/DC Train Ridership (Boardings+Alightings) by Station and Alternative

Station	Year 2015 Existing Schedule 66% OTP	Year 2045 No Build 66% OTP	Year 2045 Staples Mill Only 90% OTP	Year 2045 Boulevard 90% OTP	Year 2045 Broad Street 90% OTP	Year 2045 Main Street 90% OTP	Year 2045 Staples Mill & Main Street Full 90% OTP	Year 2045 Staples Mill & Main Street Split 90% OTP	Year 2045 Staples Mill & Main Street Shared 90% OTP
Petersburg, VA	10,254	17,009	25,613	21,544	22,340	14,352	14,627	22,299	15,506
Norfolk, VA	23,287	56,131	115,292	105,583	107,013	105,334	104,421	113,319	104,242
Newport News, VA	62,214	81,115	115,887	120,139	108,873	121,205	119,309	110,801	119,203
Williamsburg, VA	28,710	44,634	61,641	64,530	60,112	63,287	62,076	60,341	61,914
Richmond, VA Main	28,909	42,045	-	-	-	495,597	234,739	78,738	166,690
Richmond, VA Boulevard/Broad	-	-	-	485,514	469,624	-	-	-	-
Richmond, VA Staples Mill	172,362	276,675	494,737	-	-	-	305,876	401,434	363,594
Ashland, VA	7,754	14,296	23,467	23,898	23,259	25,424	18,776	20,582	19,089
Fredericksburg, VA	24,814	47,847	103,829	105,934	105,267	108,263	103,065	103,860	103,097
Quantico, VA	13,351	21,220	22,734	22,420	21,545	22,780	22,869	22,670	22,810
Woodbridge, VA	7,956	12,172	43,673	43,342	41,884	43,854	44,360	42,310	44,358
Alexandria, VA	92,429	142,107	163,365	160,250	155,915	158,974	164,780	160,942	163,926
Total	472,040	755,249	1,170,239	1,153,154	1,115,833	1,159,070	1,194,898	1,137,295	1,184,429

Table 5-6: Year 2015 and 2045 Annual Intercity Train Ridership (Boardings+Alightings) by Station and Alternative

Station	Year 2015 Existing Schedule 66% OTP	Year 2045 No Build 66% OTP	Year 2045 Staples Mill Only 90% OTP	Year 2045 Boulevard 90% OTP	Year 2045 Broad Street 90% OTP	Year 2045 Main Street 90% OTP	Year 2045 Staples Mill & Main Street Full 90% OTP	Year 2045 Staples Mill & Main Street Split 90% OTP	Year 2045 Staples Mill & Main Street Shared 90% OTP
Petersburg, VA	4,226	5,669	5,669	5,669	5,669	5,669	5,669	5,669	5,669
Norfolk, VA	-	-	-	-	-	-	-	-	-
Newport News, VA	-	-	-	-	-	-	-	-	-
Williamsburg, VA	199	296	296	296	296	296	296	296	296
Richmond, VA Main	-	-	-	-	-	41,103	-	-	-
Richmond, VA Boulevard/Broad	-	-	-	41,103	41,103	-	-	-	-
Richmond, VA Staples Mill	27,214	41,103	41,103	-	-	-	41,103	41,103	41,103
Ashland, VA	-	-	-	-	-	-	-	-	-
Fredericksburg, VA	-	-	-	-	-	-	-	-	-
Quantico, VA	-	-	-	-	-	-	-	-	-
Woodbridge, VA	-	-	-	-	-	-	-	-	-
Alexandria, VA	15,671	23,766	23,766	23,766	23,766	23,766	23,766	23,766	23,766
Total	47,310	70,834	70,834	70,834	70,834	70,834	70,834	70,834	70,834

5.5 YEAR 2045 OTHER RIDERSHIP-RELATED STATISTICS

This section presents detailed ridership-related statistics for each alternative. These statistics are presented in Tables 5-7 through 5-62 and are organized so that the first set of seven tables (5-7 to 5-13) describe outcomes associated with the No Build Alternative followed by the tables for each Build Alternative in the order defined in Chapter 3.

The information provided in these tables are:

- Annual trips by mode and geographic market. Modes are defined as highway, air, bus, high-speed rail (HSR, meaning Acela), and regional rail. All existing and proposed future service in the DC2RVA corridor is categorized as regional rail. Geographic markets include:
    - NEC-NEC: internal to the Northeast Corridor (Washington, D.C. and north)
    - NEC-VA: home in the NEC, non-home trip-end in Virginia
    - NEC-NC: home in the NEC, non-home trip-end in North Carolina
    - VA-NEC: home in Virginia, non-home trip-end in the NEC
    - VA-VA: internal to Virginia
    - VA-NC: home Virginia, non-home trip-end in North Carolina
    - NC-NEC: home in North Carolina, non-home trip-end in the NEC
    - NC-VA: home in North Carolina, non-home trip-end in Virginia
    - NC-NC: internal to North Carolina
- Annual highway miles by mode and geographic market. The modes and geographic markets are the same as described above. This statistic presents the number of highway person-miles of travel accrued for each mode on an annual basis. For highway trips, this statistic includes the entire trip from origin to destination. For common carrier modes, this statistic includes just the access and egress portion of the trip. Since the DC2RVA model does not estimate mode-of-access, this statistic is computed with the assumption that all access/egress travel is made by automobile so that this statistic and the related environmental impacts are not underestimated.
- Average highway miles per trip by mode and geographic market. This statistic is calculated by dividing highway miles by the number of trips and is useful in assessing the reasonableness of each estimate.
- Annual common carrier passenger miles by mode and geographic market. The modes and geographic markets are the same as described above. This statistic presents the number of common carrier person-miles of travel accrued for each mode on an annual basis. For highway trips, this statistic is always equal to zero. For common carrier modes, this statistic includes just the travel between the origin station and the destination station.
- Average common carrier passengers miles per trip by mode and geographic market. This statistic is calculated by dividing the common carrier passenger miles by the number of trips and is useful in assessing the reasonableness of each estimate.
- Annual rail revenue by mode and geographic market. The modes and geographic markets are the same as described above. This statistic presents the rail revenue (in constant 2015 year dollars) for the rail modes.

- Average rail revenue per trip by mode and geographic market. This statistic is calculated by dividing the rail revenue by the number of trips and is useful in assessing the reasonableness of each estimate.

Table 5-7: Year 2045 No Build Annual Trips by Mode and Geographic Market

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	186,946,056	6,506,060	42,684,110	2,922,468	11,383,878
NEC-VA	34,466,771	2,048,243	3,156,636	300,209	1,973,707
NEC-NC	6,002,363	3,464,088	1,317,540	-	150,018
VA-NEC	32,284,600	2,126,551	2,447,616	270,889	1,797,344
VA-VA	26,260,963	94,049	1,232,172	948	426,547
VA-NC	16,778,336	375,599	1,533,542	-	72,883
NC-NEC	6,281,403	4,133,688	286,870	-	180,769
NC-VA	17,576,521	404,793	661,858	-	92,957
NC-NC	34,059,294	41,903	2,787,898	-	553,845
Total	360,656,307	19,194,972	56,108,243	3,494,514	16,631,948

Table 5-8: Year 2045 No Build Annual Highway Miles (access/egress for common carrier modes)

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	29,129,687,269	284,822,714	2,129,660,302	104,423,386	453,577,961
NEC-VA	8,187,983,302	96,127,668	148,809,091	14,027,995	84,764,120
NEC-NC	3,065,349,563	180,768,921	66,616,899	-	5,522,166
VA-NEC	7,604,927,735	97,139,445	119,046,719	12,331,441	75,727,592
VA-VA	3,856,309,083	3,309,651	51,597,313	65,357	16,808,790
VA-NC	3,629,907,290	18,739,348	82,816,132	-	3,165,154
NC-NEC	3,123,030,236	523,964,335	17,395,791	-	6,217,219
NC-VA	3,823,412,040	20,222,386	43,793,566	-	3,987,845
NC-NC	5,262,949,198	2,823,721	165,307,466	-	21,360,155
Total	67,683,555,716	1,227,918,189	2,825,043,279	130,848,179	671,131,003

Table 5-9: Year 2045 No Build Average Highway Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	155.8	43.8	49.9	35.7	39.8
NEC-VA	237.6	46.9	47.1	46.7	42.9
NEC-NC	510.7	52.2	50.6	-	36.8
VA-NEC	235.6	45.7	48.6	45.5	42.1
VA-VA	146.8	35.2	41.9	69.0	39.4
VA-NC	216.3	49.9	54.0	-	43.4
NC-NEC	497.2	126.8	60.6	-	34.4
NC-VA	217.5	50.0	66.2	-	42.9
NC-NC	154.5	67.4	59.3	-	38.6
Total	187.7	64.0	50.3	37.4	40.4

Table 5-10: Year 2045 No Build Annual Common Carrier Passenger Miles

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	1,749,227,532	4,541,901,698	488,381,270	1,594,127,820
NEC-VA	-	696,271,309	564,036,702	55,638,212	387,435,587
NEC-NC	-	1,710,117,208	604,167,844	-	66,381,472
VA-NEC	-	731,656,541	515,415,931	48,781,854	356,319,721
VA-VA	-	32,368,540	122,449,942	27,485	51,442,832
VA-NC	-	102,567,478	282,945,122	-	19,599,061
NC-NEC	-	2,074,757,522	102,406,726	-	82,407,659
NC-VA	-	113,089,692	128,436,468	-	25,950,020
NC-NC	-	5,103,692	314,739,365	-	64,381,088
Total	-	7,215,159,514	7,176,499,798	592,828,821	2,648,045,260

Table 5-11: Year 2045 No Build Average Common Carrier Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	268.9	106.4	167.1	140.0
NEC-VA	-	339.9	178.7	185.3	196.3
NEC-NC	-	493.7	458.6	-	442.5
VA-NEC	-	344.1	210.6	180.1	198.2
VA-VA	-	344.2	99.4	29.0	120.6
VA-NC	-	273.1	184.5	-	268.9
NC-NEC	-	501.9	357.0	-	455.9
NC-VA	-	279.4	194.1	-	279.2
NC-NC	-	121.8	112.9	-	116.2
Total	-	375.9	127.9	169.6	159.2

Table 5-12: Year 2045 No Build Annual Rail Revenue

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 423,251,160	$ 699,080,464
NEC-VA				$ 46,183,968	$ 150,215,017
NEC-NC				$ -	$ 14,207,934
VA-NEC				$ 40,898,523	$ 135,499,005
VA-VA				$ 44,242	$ 16,902,132
VA-NC				$ -	$ 4,304,516
NC-NEC				$ -	$ 17,300,155
NC-VA				$ -	$ 5,602,171
NC-NC				$ -	$ 14,365,995
Total				$ 510,377,892	$ 1,057,477,389

Table 5-13: Year 2045 No Build Average Rail Revenue/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 144.83	$ 61.41
NEC-VA				$ 153.84	$ 76.11
NEC-NC				$ -	$ 94.71
VA-NEC				$ 150.98	$ 75.39
VA-VA				$ 46.68	$ 39.63
VA-NC				$ -	$ 59.06
NC-NEC				$ -	$ 95.70
NC-VA				$ -	$ 60.27
NC-NC				$ -	$ 25.94
Total				$ 146.05	$ 63.58

Table 5-14: Year 2045 Staples Mill Annual Trips by Mode and Geographic Market

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	186,946,004	6,506,060	42,684,110	2,922,465	11,383,932
NEC-VA	34,292,817	2,030,672	3,122,528	290,831	2,208,717
NEC-NC	5,945,359	3,401,520	1,296,546	-	290,584
VA-NEC	32,106,149	2,109,916	2,418,639	262,343	2,029,951
VA-VA	26,101,830	93,331	1,220,328	923	598,267
VA-NC	16,704,179	365,422	1,520,951	-	169,808
NC-NEC	6,223,284	4,064,308	279,209	-	315,929
NC-VA	17,499,265	395,868	655,636	-	185,360
NC-NC	33,987,927	41,689	2,776,057	-	637,267
Total	359,806,814	19,008,786	55,974,004	3,476,563	17,819,816

Table 5-15: Year 2045 Staples Mill Annual Highway Miles (access/egress for common carrier modes)

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	29,129,686,630	284,822,714	2,129,660,302	104,423,280	453,574,192
NEC-VA	8,148,429,699	95,313,177	147,273,584	13,417,935	92,259,928
NEC-NC	3,042,675,706	178,083,225	65,958,236	-	9,608,802
VA-NEC	7,565,502,552	96,369,211	117,871,198	11,780,862	82,263,105
VA-VA	3,834,946,242	3,288,201	51,151,335	63,459	23,002,525
VA-NC	3,610,678,093	18,325,685	82,373,627	-	6,458,192
NC-NEC	3,100,278,317	521,073,391	17,040,201	-	9,864,474
NC-VA	3,804,174,875	19,854,246	43,474,789	-	7,031,560
NC-NC	5,252,833,081	2,811,888	164,774,601	-	24,697,463
Total	67,489,205,195	1,219,941,739	2,819,577,873	129,685,536	708,760,241

Table 5-16: Year 2045 Staples Mill Average Highway Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	155.8	43.8	49.9	35.7	39.8
NEC-VA	237.6	46.9	47.2	46.1	41.8
NEC-NC	511.8	52.4	50.9	-	33.1
VA-NEC	235.6	45.7	48.7	44.9	40.5
VA-VA	146.9	35.2	41.9	68.8	38.4
VA-NC	216.2	50.1	54.2	-	38.0
NC-NEC	498.2	128.2	61.0	-	31.2
NC-VA	217.4	50.2	66.3	-	37.9
NC-NC	154.5	67.4	59.4	-	38.8
Total	187.6	64.2	50.4	37.3	39.8

Table 5-17: Year 2045 Staples Mill Annual Common Carrier Passenger Miles

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	1,749,227,532	4,541,901,698	488,381,193	1,594,128,252
NEC-VA	-	691,376,556	556,701,499	54,232,758	440,216,869
NEC-NC	-	1,684,753,555	595,204,247	-	134,850,444
VA-NEC	-	727,009,931	509,117,382	47,681,983	407,494,489
VA-VA	-	32,262,215	121,064,720	26,762	73,892,204
VA-NC	-	99,954,755	279,742,959	-	50,883,377
NC-NEC	-	2,046,809,440	100,111,356	-	146,089,467
NC-VA	-	110,755,537	126,911,150	-	53,458,644
NC-NC	-	5,076,889	313,316,941	-	74,194,753
Total	-	7,147,226,410	7,144,071,953	590,322,696	2,975,208,500

Table 5-18: Year 2045 Staples Mill Average Common Carrier Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	268.9	106.4	167.1	140.0
NEC-VA	-	340.5	178.3	186.5	199.3
NEC-NC	-	495.3	459.1	-	464.1
VA-NEC	-	344.6	210.5	181.8	200.7
VA-VA	-	345.7	99.2	29.0	123.5
VA-NC	-	273.5	183.9	-	299.7
NC-NEC	-	503.6	358.6	-	462.4
NC-VA	-	279.8	193.6	-	288.4
NC-NC	-	121.8	112.9	-	116.4
Total	-	376.0	127.6	169.8	167.0

Table 5-19: Year 2045 Staples Mill Annual Rail Revenue

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 423,251,035	$ 699,084,674
NEC-VA				$ 44,959,225	$ 167,908,485
NEC-NC				$ -	$ 28,232,342
VA-NEC				$ 39,900,105	$ 152,066,339
VA-VA				$ 43,077	$ 23,445,805
VA-NC				$ -	$ 10,741,067
NC-NEC				$ -	$ 31,740,140
NC-VA				$ -	$ 11,724,111
NC-NC				$ -	$ 16,492,660
Total				$ 508,153,443	$ 1,141,435,624

Table 5-20: Year 2045 Staples Mill Average Rail Revenue/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	$ -	$ -	$ -	$ 144.83	$ 61.41
NEC-VA	$ -	$ -	$ -	$ 154.59	$ 76.02
NEC-NC	$ -	$ -	$ -	$ -	$ 97.16
VA-NEC	$ -	$ -	$ -	$ 152.09	$ 74.91
VA-VA	$ -	$ -	$ -	$ 46.68	$ 39.19
VA-NC	$ -	$ -	$ -	$ -	$ 63.25
NC-NEC	$ -	$ -	$ -	$ -	$ 100.47
NC-VA	$ -	$ -	$ -	$ -	$ 63.25
NC-NC	$ -	$ -	$ -	$ -	$ 25.88
Total	$ -	$ -	$ -	$ 146.17	$ 64.05

Table 5-21: Year 2045 Boulevard Annual Trips by Mode and Geographic Market

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	186,946,004	6,506,060	42,684,110	2,922,465	11,383,932
NEC-VA	34,297,719	2,031,000	3,122,849	290,831	2,203,166
NEC-NC	5,954,123	3,408,345	1,299,391	-	272,150
VA-NEC	32,113,270	2,110,487	2,419,238	262,343	2,021,660
VA-VA	26,108,730	93,471	1,220,878	923	590,677
VA-NC	16,714,206	366,604	1,522,667	-	156,883
NC-NEC	6,235,033	4,073,930	280,262	-	293,505
NC-VA	17,513,087	397,278	656,192	-	169,572
NC-NC	33,987,211	41,697	2,775,959	-	638,072
Total	359,869,384	19,028,872	55,981,547	3,476,563	17,729,617

Table 5-22: Year 2045 Boulevard Annual Highway Miles (access/egress for common carrier modes)

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	29,129,686,630	284,822,714	2,129,660,302	104,423,280	453,574,192
NEC-VA	8,149,623,072	95,326,537	147,274,645	13,417,935	91,658,451
NEC-NC	3,046,132,453	178,389,195	66,065,408	-	8,992,264
VA-NEC	7,567,180,666	96,389,559	117,876,449	11,780,862	81,511,477
VA-VA	3,836,097,809	3,292,417	51,166,967	63,459	22,427,607
VA-NC	3,613,249,411	18,375,210	82,426,681	-	5,854,202
NC-NEC	3,105,054,698	521,496,806	17,088,637	-	9,170,466
NC-VA	3,807,590,183	19,913,571	43,503,314	-	6,390,937
NC-NC	5,252,774,215	2,812,502	164,768,032	-	24,702,893
Total	67,507,389,137	1,220,818,511	2,819,830,434	129,685,536	704,282,489

Table 5-23: Year 2045 Boulevard Average Highway Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	155.8	43.8	49.9	35.7	39.8
NEC-VA	237.6	46.9	47.2	46.1	41.6
NEC-NC	511.6	52.3	50.8	-	33.0
VA-NEC	235.6	45.7	48.7	44.9	40.3
VA-VA	146.9	35.2	41.9	68.8	38.0
VA-NC	216.2	50.1	54.1	-	37.3
NC-NEC	498.0	128.0	61.0	-	31.2
NC-VA	217.4	50.1	66.3	-	37.7
NC-NC	154.6	67.5	59.4	-	38.7
Total	187.6	64.2	50.4	37.3	39.7

Table 5-24: Year 2045 Boulevard Annual Common Carrier Passenger Miles

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	1,749,227,532	4,541,901,698	488,381,193	1,594,128,252
NEC-VA	-	691,464,005	556,766,613	54,232,758	439,911,785
NEC-NC	-	1,687,522,506	596,407,774	-	126,380,704
VA-NEC	-	727,150,130	509,240,313	47,681,983	406,609,447
VA-VA	-	32,282,991	121,138,903	26,762	73,454,116
VA-NC	-	100,261,613	280,179,521	-	46,747,676
NC-NEC	-	2,050,747,242	100,447,941	-	135,717,837
NC-VA	-	111,141,291	127,063,672	-	48,721,378
NC-NC	-	5,077,939	313,303,252	-	74,291,712
Total	-	7,154,875,251	7,146,449,686	590,322,696	2,945,962,908

Table 5-25: Year 2045 Boulevard Average Common Carrier Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	268.9	106.4	167.1	140.0
NEC-VA	-	340.5	178.3	186.5	199.7
NEC-NC	-	495.1	459.0	-	464.4
VA-NEC	-	344.5	210.5	181.8	201.1
VA-VA	-	345.4	99.2	29.0	124.4
VA-NC	-	273.5	184.0	-	298.0
NC-NEC	-	503.4	358.4	-	462.4
NC-VA	-	279.8	193.6	-	287.3
NC-NC	-	121.8	112.9	-	116.4
Total	-	376.0	127.7	169.8	166.2

Table 5-26: Year 2045 Boulevard Annual Rail Revenue

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 423,251,035	$ 699,084,674
NEC-VA				$ 44,959,225	$ 169,439,506
NEC-NC				$ -	$ 26,484,492
VA-NEC				$ 39,900,105	$ 153,849,804
VA-VA				$ 43,077	$ 27,374,139
VA-NC				$ -	$ 11,887,700
NC-NEC				$ -	$ 29,448,004
NC-VA				$ -	$ 12,178,197
NC-NC				$ -	$ 16,512,021
Total				$ 508,153,443	$ 1,146,258,538

Table 5-27: Year 2045 Boulevard Average Rail Revenue/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 144.83	$ 61.41
NEC-VA				$ 154.59	$ 76.91
NEC-NC				$ -	$ 97.32
VA-NEC				$ 152.09	$ 76.10
VA-VA				$ 46.68	$ 46.34
VA-NC				$ -	$ 75.77
NC-NEC				$ -	$ 100.33
NC-VA				$ -	$ 71.82
NC-NC				$ -	$ 25.88
Total				$ 146.17	$ 64.65

Table 5-28: Year 2045 Broad Street Annual Trips by Mode and Geographic Market

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	186,946,004	6,506,060	42,684,110	2,922,465	11,383,932
NEC-VA	34,314,092	2,032,686	3,125,446	290,831	2,182,511
NEC-NC	5,954,866	3,408,931	1,299,626	-	270,586
VA-NEC	32,123,269	2,111,458	2,420,919	262,343	2,009,011
VA-VA	26,125,102	93,469	1,222,000	923	573,184
VA-NC	16,713,504	366,676	1,522,462	-	157,718
NC-NEC	6,232,736	4,071,982	280,068	-	297,944
NC-VA	17,509,994	396,953	655,927	-	173,255
NC-NC	33,986,775	41,697	2,775,919	-	638,548
Total	359,906,343	19,029,910	55,986,477	3,476,563	17,686,690

Table 5-29: Year 2045 Broad Street Annual Highway Miles (access/egress for common carrier modes)

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	29,129,686,630	284,822,714	2,129,660,302	104,423,280	453,574,192
NEC-VA	8,154,189,829	95,399,267	147,376,570	13,417,935	90,920,806
NEC-NC	3,046,424,185	178,415,352	66,073,897	-	8,939,790
VA-NEC	7,569,787,570	96,433,087	117,949,194	11,780,862	81,089,734
VA-VA	3,838,285,167	3,292,427	51,213,074	63,459	21,780,894
VA-NC	3,613,148,189	18,377,826	82,421,641	-	5,908,168
NC-NEC	3,104,064,381	521,410,893	17,079,427	-	9,302,039
NC-VA	3,806,823,217	19,899,690	43,490,643	-	6,525,523
NC-NC	5,252,706,525	2,812,448	164,765,664	-	24,719,306
Total	67,515,115,695	1,220,863,705	2,820,030,411	129,685,536	702,760,453

Table 5-30: Year 2045 Broad Street Average Highway Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	155.8	43.8	49.9	35.7	39.8
NEC-VA	237.6	46.9	47.2	46.1	41.7
NEC-NC	511.6	52.3	50.8	-	33.0
VA-NEC	235.6	45.7	48.7	44.9	40.4
VA-VA	146.9	35.2	41.9	68.8	38.0
VA-NC	216.2	50.1	54.1	-	37.5
NC-NEC	498.0	128.0	61.0	-	31.2
NC-VA	217.4	50.1	66.3	-	37.7
NC-NC	154.6	67.5	59.4	-	38.7
Total	187.6	64.2	50.4	37.3	39.7

Table 5-31: Year 2045 Broad Street Annual Common Carrier Passenger Miles

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	1,749,227,532	4,541,901,698	488,381,193	1,594,128,252
NEC-VA	-	691,989,317	557,443,750	54,232,758	433,977,752
NEC-NC	-	1,687,759,343	596,506,998	-	125,663,376
VA-NEC	-	727,454,003	509,669,619	47,681,983	403,241,744
VA-VA	-	32,282,699	121,274,828	26,762	71,192,454
VA-NC	-	100,280,546	280,153,558	-	46,879,480
NC-NEC	-	2,049,934,379	100,382,884	-	137,893,873
NC-VA	-	111,052,530	127,004,249	-	49,794,116
NC-NC	-	5,077,856	313,298,293	-	74,366,806
Total	-	7,155,058,206	7,147,635,878	590,322,696	2,937,137,853

Table 5-32: Year 2045 Broad Street Average Common Carrier Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	268.9	106.4	167.1	140.0
NEC-VA	-	340.4	178.4	186.5	198.8
NEC-NC	-	495.1	459.0	-	464.4
VA-NEC	-	344.5	210.5	181.8	200.7
VA-VA	-	345.4	99.2	29.0	124.2
VA-NC	-	273.5	184.0	-	297.2
NC-NEC	-	503.4	358.4	-	462.8
NC-VA	-	279.8	193.6	-	287.4
NC-NC	-	121.8	112.9	-	116.5
Total	-	376.0	127.7	169.8	166.1

Table 5-33: Year 2045 Broad Street Annual Rail Revenue

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 423,251,035	$ 699,084,674
NEC-VA				$ 44,959,225	$ 167,710,335
NEC-NC				$ -	$ 26,333,924
VA-NEC				$ 39,900,105	$ 152,794,038
VA-VA				$ 43,077	$ 26,537,071
VA-NC				$ -	$ 11,994,638
NC-NEC				$ -	$ 30,020,390
NC-VA				$ -	$ 12,552,890
NC-NC				$ -	$ 16,529,146
Total				$ 508,153,443	$ 1,143,557,106

Table 5-34: Year 2045 Broad Street Average Rail Revenue/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 144.83	$ 61.41
NEC-VA				$ 154.59	$ 76.84
NEC-NC				$ -	$ 97.32
VA-NEC				$ 152.09	$ 76.05
VA-VA				$ 46.68	$ 46.30
VA-NC				$ -	$ 76.05
NC-NEC				$ -	$ 100.76
NC-VA				$ -	$ 72.45
NC-NC				$ -	$ 25.89
Total				$ 146.17	$ 64.66

Table 5-35: Year 2045 Main Street Annual Trips by Mode and Geographic Market

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	186,946,271	6,506,060	42,684,158	2,922,482	11,383,599
NEC-VA	34,296,904	2,031,138	3,122,911	290,831	2,203,781
NEC-NC	5,954,968	3,408,925	1,299,731	-	270,385
VA-NEC	32,109,663	2,110,338	2,418,940	262,420	2,025,638
VA-VA	26,103,100	93,468	1,220,779	923	596,407
VA-NC	16,713,358	366,645	1,522,640	-	157,717
NC-NEC	6,237,469	4,073,691	280,350	-	291,221
NC-VA	17,511,085	397,163	656,108	-	171,773
NC-NC	33,988,015	41,698	2,775,852	-	637,375
Total	359,860,835	19,029,126	55,981,468	3,476,657	17,737,897

Table 5-36: Year 2045 Main Street Annual Highway Miles (access/egress for common carrier modes)

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	29,129,698,511	284,822,714	2,129,660,731	104,423,411	453,571,408
NEC-VA	8,148,989,215	95,325,688	147,243,008	13,417,935	91,605,564
NEC-NC	3,046,457,729	178,414,973	66,080,522	-	8,936,087
VA-NEC	7,565,853,987	96,377,581	117,828,106	11,785,447	81,670,893
VA-VA	3,835,180,604	3,292,306	51,139,516	63,459	22,672,705
VA-NC	3,613,123,211	18,377,103	82,437,003	-	5,872,862
NC-NEC	3,105,937,322	521,504,236	17,098,182	-	9,306,528
NC-VA	3,807,158,939	19,911,735	43,503,614	-	6,429,733
NC-NC	5,252,873,461	2,812,519	164,754,628	-	24,768,491
Total	67,505,272,980	1,220,838,857	2,819,745,309	129,690,253	704,834,271

Table 5-37: Year 2045 Main Street Average Highway Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	155.8	43.8	49.9	35.7	39.8
NEC-VA	237.6	46.9	47.1	46.1	41.6
NEC-NC	511.6	52.3	50.8	-	33.0
VA-NEC	235.6	45.7	48.7	44.9	40.3
VA-VA	146.9	35.2	41.9	68.8	38.0
VA-NC	216.2	50.1	54.1	-	37.2
NC-NEC	497.9	128.0	61.0	-	32.0
NC-VA	217.4	50.1	66.3	-	37.4
NC-NC	154.6	67.5	59.4	-	38.9
Total	187.6	64.2	50.4	37.3	39.7

Table 5-38: Year 2045 Main Street Annual Common Carrier Passenger Miles

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	1,749,227,532	4,541,903,729	488,381,877	1,594,114,634
NEC-VA	-	691,491,846	556,785,504	54,232,758	440,661,118
NEC-NC	-	1,687,755,988	596,550,262	-	125,596,252
VA-NEC	-	727,098,146	509,168,248	47,685,054	408,174,407
VA-VA	-	32,282,717	121,124,402	26,762	74,275,495
VA-NC	-	100,272,893	280,179,797	-	46,823,929
NC-NEC	-	2,050,752,057	100,503,231	-	134,756,927
NC-VA	-	111,109,824	127,045,381	-	49,392,947
NC-NC	-	5,077,972	313,302,914	-	74,346,956
Total	-	7,155,068,975	7,146,563,467	590,326,451	2,948,142,663

Table 5-39: Year 2045 Main Street Average Common Carrier Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	268.9	106.4	167.1	140.0
NEC-VA	-	340.4	178.3	186.5	200.0
NEC-NC	-	495.1	459.0	-	464.5
VA-NEC	-	344.5	210.5	181.7	201.5
VA-VA	-	345.4	99.2	29.0	124.5
VA-NC	-	273.5	184.0	-	296.9
NC-NEC	-	503.4	358.5	-	462.7
NC-VA	-	279.8	193.6	-	287.5
NC-NC	-	121.8	112.9	-	116.6
Total	-	376.0	127.7	169.8	166.2

Table 5-40: Year 2045 Main Street Annual Rail Revenue

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 423,252,007	$ 699,077,255
NEC-VA				$ 44,959,225	$ 167,598,765
NEC-NC				$ -	$ 26,321,658
VA-NEC				$ 39,904,466	$ 151,703,443
VA-VA				$ 43,077	$ 23,551,674
VA-NC				$ -	$ 12,057,973
NC-NEC				$ -	$ 28,965,748
NC-VA				$ -	$ 12,761,453
NC-NC				$ -	$ 16,486,099
Total				$ 508,158,775	$ 1,138,524,069

Table 5-41: Year 2045 Main Street Average Rail Revenue/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 144.83	$ 61.41
NEC-VA				$ 154.59	$ 76.05
NEC-NC				$ -	$ 97.35
VA-NEC				$ 152.06	$ 74.89
VA-VA				$ 46.68	$ 39.49
VA-NC				$ -	$ 76.45
NC-NEC				$ -	$ 99.46
NC-VA				$ -	$ 74.29
NC-NC				$ -	$ 25.87
Total				$ 146.16	$ 64.19

Table 5-42: Year 2045 Staples Mill and Main St Full Annual Trips by Mode and Geographic Market

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	186,946,004	6,506,060	42,684,110	2,922,465	11,383,932
NEC-VA	34,287,001	2,030,473	3,121,988	290,831	2,215,272
NEC-NC	5,956,629	3,410,148	1,300,311	-	266,920
VA-NEC	32,098,325	2,109,497	2,417,686	262,343	2,039,148
VA-VA	26,090,468	93,490	1,219,834	923	609,964
VA-NC	16,712,289	366,752	1,522,337	-	158,982
NC-NEC	6,234,258	4,072,533	280,169	-	295,771
NC-VA	17,507,302	396,965	655,850	-	176,012
NC-NC	33,987,294	41,698	2,775,962	-	637,985
Total	359,819,570	19,027,617	55,978,248	3,476,563	17,783,985

Table 5-43: Year 2045 Staples Mill and Main St Full Annual Highway Miles (access/egress for common carrier modes)

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	29,129,686,630	284,822,714	2,129,660,302	104,423,280	453,574,192
NEC-VA	8,146,786,170	95,290,992	147,226,342	13,417,935	92,305,685
NEC-NC	3,047,104,204	178,468,551	66,103,648	-	8,822,651
VA-NEC	7,563,453,062	96,337,634	117,804,374	11,780,862	82,341,169
VA-VA	3,833,829,142	3,292,891	51,109,144	63,459	23,592,640
VA-NC	3,612,847,008	18,380,429	82,412,740	-	6,039,268
NC-NEC	3,104,676,348	521,438,467	17,083,945	-	9,232,146
NC-VA	3,806,262,998	19,900,856	43,482,852	-	6,659,479
NC-NC	5,252,780,169	2,812,519	164,768,456	-	24,681,318
Total	67,497,425,732	1,220,745,053	2,819,651,803	129,685,536	707,248,548

Table 5-44: Year 2045 Staples Mill and Main St Full Average Highway Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	155.8	43.8	49.9	35.7	39.8
NEC-VA	237.6	46.9	47.2	46.1	41.7
NEC-NC	511.5	52.3	50.8	-	33.1
VA-NEC	235.6	45.7	48.7	44.9	40.4
VA-VA	146.9	35.2	41.9	68.8	38.7
VA-NC	216.2	50.1	54.1	-	38.0
NC-NEC	498.0	128.0	61.0	-	31.2
NC-VA	217.4	50.1	66.3	-	37.8
NC-NC	154.6	67.5	59.4	-	38.7
Total	187.6	64.2	50.4	37.3	39.8

Table 5-45: Year 2045 Staples Mill and Main St Full Annual Common Carrier Passenger Miles

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	1,749,227,532	4,541,901,698	488,381,193	1,594,128,252
NEC-VA	-	691,300,511	556,577,622	54,232,758	442,023,750
NEC-NC	-	1,688,248,335	596,797,788	-	124,042,512
VA-NEC	-	726,853,486	508,889,078	47,681,983	409,961,604
VA-VA	-	32,285,935	121,029,946	26,762	74,271,723
VA-NC	-	100,298,256	280,128,025	-	47,246,623
NC-NEC	-	2,050,184,315	100,421,293	-	136,981,053
NC-VA	-	111,054,996	126,991,495	-	50,910,867
NC-NC	-	5,077,979	313,304,310	-	74,289,810
Total	-	7,154,531,344	7,146,041,255	590,322,696	2,953,856,195

Table 5-46: Year 2045 Staples Mill and Main St Full Average Common Carrier Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	268.9	106.4	167.1	140.0
NEC-VA	-	340.5	178.3	186.5	199.5
NEC-NC	-	495.1	459.0	-	464.7
VA-NEC	-	344.6	210.5	181.8	201.0
VA-VA	-	345.3	99.2	29.0	121.8
VA-NC	-	273.5	184.0	-	297.2
NC-NEC	-	503.4	358.4	-	463.1
NC-VA	-	279.8	193.6	-	289.2
NC-NC	-	121.8	112.9	-	116.4
Total	-	376.0	127.7	169.8	166.1

Table 5-47: Year 2045 Staples Mill and Main St Full Annual Rail Revenue

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 423,251,035	$ 699,084,674
NEC-VA				$ 44,959,225	$ 168,496,969
NEC-NC				$ -	$ 26,026,242
VA-NEC				$ 39,900,105	$ 152,733,676
VA-VA				$ 43,077	$ 23,833,119
VA-NC				$ -	$ 11,324,992
NC-NEC				$ -	$ 29,847,117
NC-VA				$ -	$ 12,899,042
NC-NC				$ -	$ 16,512,372
Total				$ 508,153,443	$ 1,140,758,202

Table 5-48: Year 2045 Staples Mill and Main St Full Average Rail Revenue/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 144.83	$ 61.41
NEC-VA				$ 154.59	$ 76.06
NEC-NC				$ -	$ 97.51
VA-NEC				$ 152.09	$ 74.90
VA-VA				$ 46.68	$ 39.07
VA-NC				$ -	$ 71.23
NC-NEC				$ -	$ 100.91
NC-VA				$ -	$ 73.29
NC-NC				$ -	$ 25.88
Total				$ 146.17	$ 64.15

Table 5-49: Year 2045 Staples Mill and Main St Split Annual Trips by Mode and Geographic Market

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	186,946,004	6,506,060	42,684,110	2,922,465	11,383,932
NEC-VA	34,316,739	2,033,915	3,126,618	291,239	2,177,055
NEC-NC	5,949,285	3,408,765	1,298,459	-	277,501
VA-NEC	32,118,612	2,111,462	2,420,487	262,343	2,014,095
VA-VA	26,118,516	93,332	1,221,929	923	579,978
VA-NC	16,701,123	365,241	1,520,359	-	173,638
NC-NEC	6,223,284	4,064,308	279,209	-	315,929
NC-VA	17,499,283	395,869	655,636	-	185,342
NC-NC	33,991,165	41,708	2,776,843	-	633,223
Total	359,864,011	19,020,660	55,983,650	3,476,970	17,740,691

Table 5-50: Year 2045 Staples Mill and Main St Split Annual Highway Miles (access/egress for common carrier modes)

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	29,129,686,630	284,822,714	2,129,660,302	104,423,280	453,574,192
NEC-VA	8,154,436,925	95,434,631	147,399,869	13,440,395	91,343,152
NEC-NC	3,044,604,667	178,425,853	66,027,383	-	9,147,871
VA-NEC	7,568,139,873	96,418,623	117,905,363	11,780,862	81,789,140
VA-VA	3,837,009,404	3,288,236	51,188,465	63,459	22,498,120
VA-NC	3,609,871,940	18,317,859	82,344,314	-	6,578,372
NC-NEC	3,100,278,317	521,073,391	17,040,201	-	9,864,474
NC-VA	3,804,180,401	19,854,271	43,474,776	-	7,031,842
NC-NC	5,253,496,552	2,813,472	164,823,073	-	24,418,999
Total	67,501,704,710	1,220,449,050	2,819,863,746	129,707,996	706,246,163

Table 5-51: Year 2045 Staples Mill and Main St Split Average Highway Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	155.8	43.8	49.9	35.7	39.8
NEC-VA	237.6	46.9	47.1	46.1	42.0
NEC-NC	511.8	52.3	50.9	-	33.0
VA-NEC	235.6	45.7	48.7	44.9	40.6
VA-VA	146.9	35.2	41.9	68.8	38.8
VA-NC	216.1	50.2	54.2	-	37.9
NC-NEC	498.2	128.2	61.0	-	31.2
NC-VA	217.4	50.2	66.3	-	37.9
NC-NC	154.6	67.5	59.4	-	38.6
Total	187.6	64.2	50.4	37.3	39.8

Table 5-52: Year 2045 Staples Mill and Main St Split Annual Common Carrier Passenger Miles

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	1,749,227,532	4,541,901,698	488,381,193	1,594,128,252
NEC-VA	-	692,297,291	557,710,485	54,295,034	432,240,824
NEC-NC	-	1,687,862,465	596,173,203	-	127,509,913
VA-NEC	-	727,439,129	509,530,089	47,681,983	404,110,595
VA-VA	-	32,262,415	121,248,354	26,762	71,362,480
VA-NC	-	99,902,528	279,623,170	-	52,280,533
NC-NEC	-	2,046,809,440	100,111,356	-	146,089,467
NC-VA	-	110,755,712	126,911,066	-	53,446,845
NC-NC	-	5,079,383	313,423,253	-	73,758,203
Total	-	7,151,635,896	7,146,632,675	590,384,971	2,954,927,112

Table 5-53: Year 2045 Staples Mill and Main St Split Average Common Carrier Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	268.9	106.4	167.1	140.0
NEC-VA	-	340.4	178.4	186.4	198.5
NEC-NC	-	495.2	459.1	-	459.5
VA-NEC	-	344.5	210.5	181.8	200.6
VA-VA	-	345.7	99.2	29.0	123.0
VA-NC	-	273.5	183.9	-	301.1
NC-NEC	-	503.6	358.6	-	462.4
NC-VA	-	279.8	193.6	-	288.4
NC-NC	-	121.8	112.9	-	116.5
Total	-	376.0	127.7	169.8	166.6

Table 5-54: Year 2045 Staples Mill and Main St Split Annual Rail Revenue

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 423,251,035	$ 699,084,674
NEC-VA				$ 45,014,391	$ 165,415,989
NEC-NC				$ -	$ 26,843,216
VA-NEC				$ 39,900,105	$ 151,003,852
VA-VA				$ 43,077	$ 22,636,024
VA-NC				$ -	$ 11,056,229
NC-NEC				$ -	$ 31,740,140
NC-VA				$ -	$ 11,721,706
NC-NC				$ -	$ 16,418,481
Total				$ 508,208,609	$ 1,135,920,311

Table 5-55: Year 2045 Staples Mill and Main St Split Average Rail Revenue/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 144.83	$ 61.41
NEC-VA				$ 154.56	$ 75.98
NEC-NC				$ -	$ 96.73
VA-NEC				$ 152.09	$ 74.97
VA-VA				$ 46.68	$ 39.03
VA-NC				$ -	$ 63.67
NC-NEC				$ -	$ 100.47
NC-VA				$ -	$ 63.24
NC-NC				$ -	$ 25.93
Total				$ 146.16	$ 64.03

Table 5-56: Year 2045 Staples Mill and Main St Share Annual Trips by Mode and Geographic Market

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	186,946,004	6,506,060	42,684,110	2,922,465	11,383,932
NEC-VA	34,290,371	2,030,910	3,122,423	290,831	2,211,030
NEC-NC	5,951,888	3,409,320	1,299,019	-	273,782
VA-NEC	32,102,663	2,109,968	2,418,267	262,343	2,033,759
VA-VA	26,095,013	93,490	1,220,217	923	605,035
VA-NC	16,710,638	366,294	1,522,036	-	161,392
NC-NEC	6,229,614	4,071,671	279,909	-	301,537
NC-VA	17,504,987	396,730	655,864	-	178,547
NC-NC	33,987,781	41,689	2,776,050	-	637,420
Total	359,818,959	19,026,133	55,977,895	3,476,563	17,786,433

Table 5-57: Year 2045 Staples Mill and Main St Share Annual Highway Miles (access/egress for common carrier modes)

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	29,129,686,630	284,822,714	2,129,660,302	104,423,280	453,574,192
NEC-VA	8,147,643,760	95,306,572	147,239,184	13,417,935	92,409,663
NEC-NC	3,045,374,313	178,420,530	66,040,035	-	9,044,907
VA-NEC	7,564,466,210	96,354,836	117,822,579	11,780,862	82,375,251
VA-VA	3,834,379,451	3,292,931	51,123,954	63,459	23,529,754
VA-NC	3,612,413,996	18,362,141	82,398,870	-	6,153,927
NC-NEC	3,102,776,336	521,388,799	17,073,147	-	9,426,323
NC-VA	3,805,556,963	19,888,817	43,480,859	-	6,754,273
NC-NC	5,252,813,344	2,811,889	164,774,078	-	24,705,624
Total	67,495,111,003	1,220,649,229	2,819,613,007	129,685,536	707,973,915

Table 5-58: Year 2045 Staples Mill and Main St Share Average Highway Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	155.8	43.8	49.9	35.7	39.8
NEC-VA	237.6	46.9	47.2	46.1	41.8
NEC-NC	511.7	52.3	50.8	-	33.0
VA-NEC	235.6	45.7	48.7	44.9	40.5
VA-VA	146.9	35.2	41.9	68.8	38.9
VA-NC	216.2	50.1	54.1	-	38.1
NC-NEC	498.1	128.1	61.0	-	31.3
NC-VA	217.4	50.1	66.3	-	37.8
NC-NC	154.6	67.4	59.4	-	38.8
Total	187.6	64.2	50.4	37.3	39.8

Table 5-59: Year 2045 Staples Mill and Main St Share Annual Common Carrier Passenger Miles

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	1,749,227,532	4,541,901,698	488,381,193	1,594,128,252
NEC-VA	-	691,422,293	556,684,961	54,232,758	440,697,531
NEC-NC	-	1,687,917,010	596,297,577	-	126,443,792
VA-NEC	-	726,985,041	509,026,325	47,681,983	408,462,768
VA-VA	-	32,286,002	121,070,252	26,762	73,590,580
VA-NC	-	100,194,923	280,045,514	-	47,832,689
NC-NEC	-	2,049,727,117	100,314,592	-	139,340,582
NC-VA	-	110,992,252	126,980,082	-	51,224,612
NC-NC	-	5,076,890	313,316,307	-	74,197,241
Total	-	7,153,829,062	7,145,637,306	590,322,696	2,955,918,047

Table 5-60: Year 2045 Staples Mill and Main St Share Average Common Carrier Miles/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC	-	268.9	106.4	167.1	140.0
NEC-VA	-	340.4	178.3	186.5	199.3
NEC-NC	-	495.1	459.0	-	461.8
VA-NEC	-	344.5	210.5	181.8	200.8
VA-VA	-	345.3	99.2	29.0	121.6
VA-NC	-	273.5	184.0	-	296.4
NC-NEC	-	503.4	358.4	-	462.1
NC-VA	-	279.8	193.6	-	286.9
NC-NC	-	121.8	112.9	-	116.4
Total	-	376.0	127.7	169.8	166.2

Table 5-61: Year 2045 Staples Mill and Main St Share Annual Rail Revenue

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 423,251,035	$ 699,084,674
NEC-VA				$ 44,959,225	$ 168,178,985
NEC-NC				$ -	$ 26,501,014
VA-NEC				$ 39,900,105	$ 152,325,083
VA-VA				$ 43,077	$ 23,633,928
VA-NC				$ -	$ 10,906,329
NC-NEC				$ -	$ 30,300,677
NC-VA				$ -	$ 12,052,885
NC-NC				$ -	$ 16,495,668
Total				$ 508,153,443	$ 1,139,479,242

Table 5-62: Year 2045 Staples Mill and Main St Share Average Rail Revenue/Trip

Geographic Market	Highway	Air	Bus	HSR	Regional
NEC-NEC				$ 144.83	$ 61.41
NEC-VA				$ 154.59	$ 76.06
NEC-NC				$ -	$ 96.80
VA-NEC				$ 152.09	$ 74.90
VA-VA				$ 46.68	$ 39.06
VA-NC				$ -	$ 67.58
NC-NEC				$ -	$ 100.49
NC-VA				$ -	$ 67.51
NC-NC				$ -	$ 25.88
Total				$ 146.17	$ 64.06

A APPENDIX—EXISTING RAIL SCHEDULE

This appendix presents the existing-year rail schedule used in the development and application of the DC2RVA ridership forecasting model. Note that the analysis at this stage of the process uses daily train frequency together with station stop location and travel time to describe the level-of-service. Specific times-of-day for individual trains are not part of this process. As the analysis proceeds into the Service Development Plan, specific arrival and departure times will be used for each train.

Existing Regional Rail Southbound Schedule (1 of 4)

Southbound			REG 67	REG 65	REG 151	REG 111	LD 89	REG 181	LD 51	NC REG 73	NC REG 75	NC REG 79
Stations			BOS-NPN	BOS-NPN	NYP-WAS	NYP-WAS	NYP-SAV	NYP-WAS	NYP-CHI	RGH-CLT	RGH-CLT	NYP-CLT
FREQUENCY			Su-R	FSa	M-F	M-F	Daily	M-F	Daily	M-F	M-F	Daily
Boston, MA (South)	*BOS*	Dp	21:30:00	21:30:00								
Boston,MA (Back Bay)	*BBY*	Dp	21:36:00	21:36:00								
Route 128, MA	*RTE*	Dp	21:50:00	21:50:00								
Providence, RI	*PVD*	Dp	22:22:00	22:22:00								
Kingston, RI	*KIN*	Dp	22:48:00	22:48:00								
Westerly, RI	*WLY*	Dp	23:05:00	23:05:00								
Mystic, CT	*MYS*	Dp	23:17:00	23:17:00								
New London, CT	*NLC*	Dp	23:31:00	23:31:00								
Old Saybrook, CT	*OSB*	Dp	23:53:00	23:53:00								
Springfield, MA	*SPG*	Dp										
Windsor Locks, CT	*WNL*	Dp										
Windsor, CT	*WND*	Dp										
Hartford, CT	*HFD*	Dp										
Berlin, CT	*BER*	Dp										
Meriden, CT	*MDN*	Dp										
Wallingford, CT	*WFD*	Dp										
New Haven, CT	*NHV*	Ar										
New Haven, CT	*NHV*	Ar	0:30:00	12:30:00								
New Haven, CT	*NHV*	Dp	0:35:00	0:35:00								
Bridgeport, CT	*BRP*	Dp										
Stamford, CT	*STM*	Dp	1:21:00	1:21:00								
New Rochelle, NY	*NRO*	Dp										
New York, NY	*NYP*	Ar	2:15:00	2:15:00								
New York, NY	*NYP*	Dp	3:00:00	3:00:00	4:40:00	5:30:00	6:05:00	6:10:00	6:45:00			7:05:00
Newark, NJ	*NWK*	Dp	3:20:00	3:20:00	R04:57:00	R05:46:00	R06:22:00	R06:27:00	R07:05:00			R07:24:00
Newark Airport, NJ	*EWR*	Dp										
Metropark, NJ	*MET*	Dp	3:36:00	3:36:00	5:12:00	5:58:00		6:41:00				
New Brunswick, NJ	*NBK*	Dp						6:50:00				
Princeton Jct, NJ	*PJC*	Dp				6:16:00		7:05:00				
Trenton, NJ	*TRE*	Dp	4:03:00	4:03:00	5:35:00	6:26:00	R07:02:00	7:15:00	R07:42:00			8:03:00
Philadelphia, PA	*PHL*	Ar	4:35:00	4:35:00	6:02:00	6:53:00	R07:28:00	7:42:00	R08:08:00			8:30:00
Philadelphia, PA	*PHL*	Dp	4:40:00	4:40:00	6:05:00	6:55:00	R07:32:00	7:45:00	R08:15:00			8:35:00
Wilmington, DE	*WIL*	Dp	5:05:00	5:03:00	6:25:00	7:15:00	R07:56:00	8:07:00	R08:44:00			8:58:00
Newark, DE	*NRK*	Dp										
Aberdeen, MD	*ABE*	Dp			6:57:00			8:34:00				
Baltimore, MD	*BAL*	Dp	6:10:00	5:51:00	7:32:00	8:00:00	R08:50:00	8:59:00	R09:30:00			9:45:00
BWI Airport, MD	*BWI*	Dp	6:23:00	6:06:00	7:45:00	8:15:00		9:11:00				
New Carrolton, MD	*NCR*	Dp	6:45:00	6:22:00	D08:04:00	D08:30:00		D9:29:00				
Washington, DC	WAS	Ar	6:58:00	6:36:00	8:20:00	8:50:00	R09:25:00	9:50:00	R10:10:00			10:25:00
Washington, DC	**WAS**	Dp	**7:30:00**	**7:00:00**			**R09:55:00**		**R11:05:00**			**10:53:00**
L'Enfant, DC	XLN	Dp										
Alexandria, VA	ALX	Dp	7:48:00	7:18:00			10:13:00		R11:24:00			11:10:00
Burke Center, VA	BCV	Dp										
Manassas, VA	MSS	Dp							11:57:00			
Culpeper, VA	CLP	Dp							12:30:00			
Charlottesville, VA	CVS	Dp							13:48:00			
Lynchburg, VA	LYH	Ar										
Roanoke, VA	RNK	Ar										
Danville, VA	DAN	Dp										
Lorton, VA	LOR	Dp										
Woodbridge, VA	WDB	Dp										
Quantico, VA	QAN	Dp	8:14:00	7:44:00								11:36:00
Fredericksburg, VA	FBG	Dp	8:36:00	8:05:00								11:56:00
Ashland, VA	ASD	Dp	9:18:00	8:47:00								
Richmond Staples Mill, VA	RVR	Ar	9:39:00	9:03:00			12:02:00					12:59:00
Richmond Staples Mill, VA	RVR	Dp	9:44:00	9:08:00			12:14:00					13:08:00
Richmond Main Street, VA	RVM	Dp	10:10:00	9:34:00								
Williamsburg, VA	*WBG*	Dp	11:14:00	L10:38:00								
Newport News, VA	*NPN*	Ar	11:45:00	11:15:00								
Petersburg, VA	*PTB*	Dp					12:49:00					13:41:00
Norfolk, VA	*NFK*	Ar										
Rocky Mount, NC	*RMT*	Dp					14:24:00					15:11:00
Wilson, NC	*WLN*	Dp					14:42:00					15:30:00
Selma-Smithfield, NC	*SSM*	Dp					15:09:00					16:03:00
Fayetteville, NC	*FAY*	Dp					16:00:00					
La Crosse, VA	*XLC*	Dp										
Henderson, NC	*XHN*	Dp										
Raleigh, NC	*RGH*	Ar										16:42:00
Raleigh, NC	*RGH*	Dp								6:45:00	11:45:00	16:50:00
Cary, NC	*CYN*	Dp								6:57:00	11:57:00	17:03:00
Durham, NC	*DNC*	Dp								7:17:00	12:17:00	17:24:00
Hillsborough, NC	*XHG*	Dp								x	x	x
Burlington, NC	*BNC*	Dp								7:53:00	12:53:00	18:01:00
Greensboro, NC	*GRO*	Dp								8:18:00	13:18:00	18:32:00
High Point, NC	*HPT*	Dp								8:34:00	13:34:00	18:48:00
Lexington, NC	*XLX*	Dp								x	x	x
Salisbury, NC	*SAL*	Dp								9:08:00	14:08:00	19:24:00
Kannapolis, NC	*KAN*	Dp								9:24:00	14:24:00	19:41:00
Harrisburg, NC	*XHB*	Dp								x	x	x
Charlotte, NC	*CLT*	Ar								9:55:00	14:55:00	20:12:00
Southern Pines, NC	*SOP*	Dp										
Hamlet, NC	*HAM*	Dp										

Existing Regional Rail Southbound Schedule (2 of 4)

Southbound			REG 183	REG 185	REG 141	REG 95	SHUTTLE 495	LD 91	AT 53	REG 125	REG 171	REG 133
Stations			NYP-WAS	NYP-WAS	SPG-WAS	BOS-NPN	SPG-NHV	NYP-MIA	LOR-SFA	NYP-NFK	BOS-LYH	NYP-WAS
FREQUENCY			M-F	M-F	M-F	M-F	M-F	Daily	Daily	M-F	M-F	F
Boston, MA (South)	*BOS*	Dp				6:10:00					8:15:00	
Boston,MA (Back Bay)	*BBY*	Dp				R06:15:00					R08:21:00	
Route 128, MA	*RTE*	Dp				R06:25:00					R08:31:00	
Providence, RI	*PVD*	Dp				6:50:00					8:55:00	
Kingston, RI	*KIN*	Dp				7:11:00					9:15:00	
Westerly, RI	*WLY*	Dp				7:25:00						
Mystic, CT	*MYS*	Dp										
New London, CT	*NLC*	Dp				7:45:00					9:48:00	
Old Saybrook, CT	*OSB*	Dp				8:04:00						
Springfield, MA	*SPG*	Dp			5:55:00		7:10:00					
Windsor Locks, CT	*WNL*	Dp			6:15:00		7:28:00					
Windsor, CT	*WND*	Dp			6:20:00		7:33:00					
Hartford, CT	*HFD*	Dp			6:35:00		7:45:00					
Berlin, CT	*BER*	Dp			6:49:00		7:58:00					
Meriden, CT	*MDN*	Dp			6:59:00		8:08:00					
Wallingford, CT	*WFD*	Dp			7:07:00		8:15:00					
New Haven, CT	*NHV*	Ar					8:35:00					
New Haven, CT	*NHV*	Ar			7:24:00	8:41:00					10:38:00	
New Haven, CT	*NHV*	Dp			7:37:00	8:43:00					10:40:00	
Bridgeport, CT	*BRP*	Dp			7:59:00						11:02:00	
Stamford, CT	*STM*	Dp			8:27:00	9:30:00					11:29:00	
New Rochelle, NY	*NRO*	Dp			8:48:00							
New York, NY	*NYP*	Ar			9:21:00	10:21:00					12:20:00	
New York, NY	*NYP*	Dp	7:17:00	8:10:00	9:35:00	10:35:00		11:02:00		11:35:00	12:35:00	13:09:00
Newark, NJ	*NWK*	Dp	R07:34:00	8:27:00	9:52:00	10:53:00		R11:22:00		11:52:00	12:52:00	R13:25:00
Newark Airport, NJ	*EWR*	Dp		8:32:00	9:56:00						12:57:00	
Metropark, NJ	*MET*	Dp	7:48:00	8:45:00	10:09:00	11:07:00				12:05:00	13:10:00	
New Brunswick, NJ	*NBK*	Dp										
Princeton Jct, NJ	*PJC*	Dp										
Trenton, NJ	*TRE*	Dp	8:11:00	9:08:00	10:32:00	11:30:00		R12:00:00		12:30:00	13:32:00	13:58:00
Philadelphia, PA	*PHL*	Ar	8:39:00	9:35:00	11:00:00	11:57:00		R12:30:00		12:57:00	14:00:00	14:26:00
Philadelphia, PA	*PHL*	Dp	8:42:00	9:37:00	11:11:00	12:02:00		R12:35:00		13:00:00	14:10:00	14:29:00
Wilmington, DE	*WIL*	Dp	9:03:00	9:58:00	11:32:00	12:24:00		R13:02:00		13:21:00	14:32:00	14:50:00
Newark, DE	*NRK*	Dp										15:01:00
Aberdeen, MD	*ABE*	Dp									14:59:00	
Baltimore, MD	*BAL*	Dp	9:50:00	10:45:00	12:18:00	13:17:00		R13:55:00		14:14:00	15:30:00	15:40:00
BWI Airport, MD	*BWI*	Dp	10:04:00	10:58:00	12:31:00	13:30:00				14:28:00	15:45:00	15:55:00
New Carrolton, MD	*NCR*	Dp	R10:18:00	D11:12:00	D12:44:00	13:45:00				14:42:00	15:59:00	D16:08:00
Washington, DC	WAS	Ar	10:40:00	11:35:00	13:05:00	14:00:00		R14:35:00		15:05:00	16:18:00	16:30:00
Washington, DC	**WAS**	Dp				**14:30:00**		**R15:05:00**		**15:55:00**	**16:50:00**	
L'Enfant, DC	XLN	Dp								R16:01:00	R16:56:00	
Alexandria, VA	ALX	Dp				14:48:00		15:23:00		16:14:00	17:11:00	
Burke Center, VA	BCV	Dp									17:30:00	
Manassas, VA	MSS	Dp									17:49:00	
Culpeper, VA	CLP	Dp									18:24:00	
Charlottesville, VA	CVS	Dp									19:23:00	
Lynchburg, VA	LYH	Ar									20:36:00	
Roanoke, VA	RNK	Ar										
Danville, VA	DAN	Dp										
Lorton, VA	LOR	Dp							16:00:00			
Woodbridge, VA	WDB	Dp				15:05:00				16:32:00		
Quantico, VA	QAN	Dp				15:16:00				16:45:00		
Fredericksburg, VA	FBG	Dp				15:40:00				17:12:00		
Ashland, VA	ASD	Dp				16:22:00				17:54:00		
Richmond Staples Mill, VA	RVR	Ar				16:43:00		17:07:00		18:17:00		
Richmond Staples Mill, VA	RVR	Dp				16:48:00		17:17:00		18:24:00		
Richmond Main Street, VA	RVM	Dp				17:15:00						
Williamsburg, VA	*WBG*	Dp				18:21:00						
Newport News, VA	*NPN*	Ar				18:52:00						
Petersburg, VA	*PTB*	Dp						17:51:00		18:58:00		
Norfolk, VA	*NFK*	Ar								20:38:00		
Rocky Mount, NC	*RMT*	Dp						19:21:00				
Wilson, NC	*WLN*	Dp										
Selma-Smithfield, NC	*SSM*	Dp										
Fayetteville, NC	*FAY*	Dp										
La Crosse, VA	*XLC*	Dp										
Henderson, NC	*XHN*	Dp										
Raleigh, NC	*RGH*	Ar						20:48:00				
Raleigh, NC	*RGH*	Dp						21:01:00				
Cary, NC	*CYN*	Dp						21:23:00				
Durham, NC	*DNC*	Dp										
Hillsborough, NC	*XHG*	Dp										
Burlington, NC	*BNC*	Dp										
Greensboro, NC	*GRO*	Dp										
High Point, NC	*HPT*	Dp										
Lexington, NC	*XLX*	Dp										
Salisbury, NC	*SAL*	Dp										
Kannapolis, NC	*KAN*	Dp										
Harrisburg, NC	*XHB*	Dp										
Charlotte, NC	*CLT*	Ar										
Southern Pines, NC	*SOP*	Dp						22:36:00				
Hamlet, NC	*HAM*	Dp						23:13:00				

Existing Regional Rail Southbound Schedule (3 of 4)

Southbound			REG 133	REG 93	SHUTTLE 493	REG 83	LD 19	REG 85	REG 173	LD 97	REG 127	REG 129
Stations			NYP-WAS	BOS-RVR	SPG-NHV	BOS-NPN	NYP-NOL	NYP-RVR	BOS-WAS	NYP-MIA	NYP-WAS	NYP-WAS
FREQUENCY			F	M-R	M-F	F	Daily	M-F	M-F	Daily	M-F	M-F
Boston, MA (South)	*BOS*	Dp		9:30:00		9:30:00			11:15:00			
Boston,MA (Back Bay)	*BBY*	Dp		R09:36:00		R09:36:00			R11:21:00			
Route 128, MA	*RTE*	Dp		R09:46:00		R09:46:00			R11:32:00			
Providence, RI	*PVD*	Dp		10:11:00		10:11:00			11:56:00			
Kingston, RI	*KIN*	Dp		10:32:00		10:32:00			12:16:00			
Westerly, RI	*WLY*	Dp		10:46:00		10:46:00						
Mystic, CT	*MYS*	Dp		10:56:00		10:56:00						
New London, CT	*NLC*	Dp		11:12:00		11:12:00			12:48:00			
Old Saybrook, CT	*OSB*	Dp		11:31:00		11:31:00						
Springfield, MA	*SPG*	Dp			10:30:00							
Windsor Locks, CT	*WNL*	Dp			10:48:00							
Windsor, CT	*WND*	Dp			10:53:00							
Hartford, CT	*HFD*	Dp			11:03:00							
Berlin, CT	*BER*	Dp			11:14:00							
Meriden, CT	*MDN*	Dp			11:22:00							
Wallingford, CT	*WFD*	Dp			11:29:00							
New Haven, CT	*NHV*	Ar			11:50:00							
New Haven, CT	*NHV*	Ar		12:04:00		12:04:00			13:38:00			
New Haven, CT	*NHV*	Dp		12:09:00		12:09:00			13:40:00			
Bridgeport, CT	*BRP*	Dp		12:31:00		12:31:00			14:02:00			
Stamford, CT	*STM*	Dp		12:58:00		12:58:00			14:29:00			
New Rochelle, NY	*NRO*	Dp		13:19:00		13:19:00			14:50:00			
New York, NY	*NYP*	Ar		13:48:00		13:48:00			15:20:00			
New York, NY	*NYP*	Dp	13:09:00	14:02:00		14:02:00	14:15:00	15:05:00	15:35:00	15:15:00	16:05:00	16:42:00
Newark, NJ	*NWK*	Dp	R13:25:00	14:19:00		14:19:00	R14:37:00	15:22:00	15:53:00	R15:38:00	R16:22:00	16:58:00
Newark Airport, NJ	*EWR*	Dp									16:28:00	
Metropark, NJ	*MET*	Dp		14:34:00		14:34:00		15:36:00			16:38:00	17:13:00
New Brunswick, NJ	*NBK*	Dp										
Princeton Jct, NJ	*PJC*	Dp										
Trenton, NJ	*TRE*	Dp	13:58:00	14:57:00		14:57:00	R15:18:00	16:00:00		R16:18:00	17:02:00	17:37:00
Philadelphia, PA	*PHL*	Ar	14:26:00	15:24:00		15:24:00	R15:48:00	16:27:00	16:52:00	R16:48:00	17:30:00	18:04:00
Philadelphia, PA	*PHL*	Dp	14:29:00	15:27:00		15:32:00	R15:55:00	16:30:00	16:55:00	R16:58:00	17:33:00	18:10:00
Wilmington, DE	*WIL*	Dp	14:50:00	15:48:00		15:53:00	R16:19:00	16:52:00	17:17:00	R17:22:00	17:53:00	18:30:00
Newark, DE	*NRK*	Dp	15:01:00									
Aberdeen, MD	*ABE*	Dp						17:19:00				18:58:00
Baltimore, MD	*BAL*	Dp	15:40:00	16:33:00		16:38:00	R17:12:00	17:42:00	18:02:00	R18:14:00	18:40:00	19:22:00
BWI Airport, MD	*BWI*	Dp	15:55:00	16:46:00		16:51:00		17:56:00	18:15:00		18:53:00	19:35:00
New Carrolton, MD	*NCR*	Dp	D16:08:00	17:00:00		17:05:00		18:10:00	D18:28:00		D19:07:00	D19:48:00
Washington, DC	WAS	Ar	16:30:00	17:15:00		17:20:00	R17:54:00	18:25:00	18:51:00	R18:55:00	19:30:00	20:10:00
Washington, DC	**WAS**	Dp		**17:50:00**		**17:50:00**	**R18:30:00**	**19:05:00**		**R19:30:00**		
L'Enfant, DC	XLN	Dp		R17:56:00		R17:56:00						
Alexandria, VA	ALX	Dp		18:09:00		18:09:00	18:49:00	19:22:00		19:49:00		
Burke Center, VA	BCV	Dp										
Manassas, VA	MSS	Dp					19:22:00					
Culpeper, VA	CLP	Dp					19:55:00					
Charlottesville, VA	CVS	Dp					20:52:00					
Lynchburg, VA	LYH	Ar					22:00:00					
Roanoke, VA	RNK	Ar										
Danville, VA	DAN	Dp					23:14:00					
Lorton, VA	LOR	Dp										
Woodbridge, VA	WDB	Dp						19:40:00				
Quantico, VA	QAN	Dp		18:36:00		18:36:00		19:52:00				
Fredericksburg, VA	FBG	Dp		19:01:00		19:01:00		20:17:00				
Ashland, VA	ASD	Dp		19:45:00		19:45:00		20:59:00				
Richmond Staples Mill, VA	RVR	Ar		20:06:00		20:11:00		21:16:00		21:34:00		
Richmond Staples Mill, VA	RVR	Dp				20:16:00				21:44:00		
Richmond Main Street, VA	RVM	Dp				20:44:00						
Williamsburg, VA	*WBG*	Dp				21:41:00						
Newport News, VA	*NPN*	Ar				22:15:00						
Petersburg, VA	*PTB*	Dp								22:18:00		
Norfolk, VA	*NFK*	Ar										
Rocky Mount, NC	*RMT*	Dp								23:50:00		
Wilson, NC	*WLN*	Dp										
Selma-Smithfield, NC	*SSM*	Dp										
Fayetteville, NC	*FAY*	Dp								1:22:00		
La Crosse, VA	*XLC*	Dp										
Henderson, NC	*XHN*	Dp										
Raleigh, NC	*RGH*	Ar										
Raleigh, NC	*RGH*	Dp										
Cary, NC	*CYN*	Dp										
Durham, NC	*DNC*	Dp										
Hillsborough, NC	*XHG*	Dp										
Burlington, NC	*BNC*	Dp										
Greensboro, NC	*GRO*	Dp					0:22:00					
High Point, NC	*HPT*	Dp					0:39:00					
Lexington, NC	*XLX*	Dp					x					
Salisbury, NC	*SAL*	Dp					1:17:00					
Kannapolis, NC	*KAN*	Dp										
Harrisburg, NC	*XHB*	Dp					x					
Charlotte, NC	*CLT*	Ar					2:20:00					
Southern Pines, NC	*SOP*	Dp										
Hamlet, NC	*HAM*	Dp										

Existing Regional Rail Southbound Schedule (4 of 4)

Southbound			REG 193	REG 137	VT. IC 55	REG 175	SHUTTLE 475	REG 187	REG 177	REG 179	SHUTTLE 479
Stations			NYP-WAS	BOS-WAS	SAB-WAS	BOS-WAS	SPG-NHV	NYP-WAS	BOS-WAS	BOS-NYP	SPG-HNV
FREQUENCY			M-F	M-F	M-F	M-F	M-F	M-F	M-F	M-F	M-F
Boston, MA (South)	*BOS*	Dp		13:40:00		15:20:00			17:35:00	18:45:00	
Boston,MA (Back Bay)	*BBY*	Dp		R13:46:00		R15:26:00			R17:40:00	R19:51:00	
Route 128, MA	*RTE*	Dp		R13:57:00		R15:37:00			R17:50:00	R19:01:00	
Providence, RI	*PVD*	Dp		14:21:00		16:01:00			18:14:00	19:25:00	
Kingston, RI	*KIN*	Dp		14:42:00		16:22:00			18:38:00	19:45:00	
Westerly, RI	*WLY*	Dp							18:52:00		
Mystic, CT	*MYS*	Dp				16:44:00			19:01:00		
New London, CT	*NLC*	Dp		15:14:00		16:57:00			19:15:00	20:17:00	
Old Saybrook, CT	*OSB*	Dp		15:32:00		17:15:00			19:36:00		
Springfield, MA	*SPG*	Dp			14:50:00		16:05:00				19:25:00
Windsor Locks, CT	*WNL*	Dp			15:12:00		16:23:00				19:43:00
Windsor, CT	*WND*	Dp					16:28:00				19:48:00
Hartford, CT	*HFD*	Dp			15:32:00		16:42:00				20:01:00
Berlin, CT	*BER*	Dp			15:45:00		16:54:00				20:13:00
Meriden, CT	*MDN*	Dp			15:56:00		17:04:00				20:22:00
Wallingford, CT	*WFD*	Dp			16:05:00		17:11:00				20:31:00
New Haven, CT	*NHV*	Ar					17:35:00				20:50:00
New Haven, CT	*NHV*	Ar		16:07:00	16:25:00	17:43:00			20:11:00	21:08:00	
New Haven, CT	*NHV*	Dp		16:09:00	16:39:00	17:45:00			20:13:00	21:10:00	
Bridgeport, CT	*BRP*	Dp		16:31:00	17:01:00				20:35:00	21:32:00	
Stamford, CT	*STM*	Dp		16:58:00	17:28:00	18:33:00			21:03:00	21:59:00	
New Rochelle, NY	*NRO*	Dp		17:19:00					21:24:00		
New York, NY	*NYP*	Ar		18:00:00	18:25:00	19:26:00			21:51:00	22:50:00	
New York, NY	*NYP*	Dp	17:39:00	18:25:00	18:45:00	19:40:00		21:10:00	22:05:00		
Newark, NJ	*NWK*	Dp	17:56:00	18:42:00	19:03:00	19:58:00		21:27:00	22:22:00		
Newark Airport, NJ	*EWR*	Dp		18:47:00		20:03:00					
Metropark, NJ	*MET*	Dp		19:01:00		20:16:00		21:42:00	22:38:00		
New Brunswick, NJ	*NBK*	Dp									
Princeton Jct, NJ	*PJC*	Dp									
Trenton, NJ	*TRE*	Dp		19:24:00	19:38:00	20:38:00		22:04:00	23:01:00		
Philadelphia, PA	*PHL*	Ar	19:00:00	19:52:00	20:07:00	21:10:00		22:32:00	23:28:00		
Philadelphia, PA	*PHL*	Dp	19:10:00	19:55:00	20:10:00	21:12:00		22:35:00	23:30:00		
Wilmington, DE	*WIL*	Dp	19:30:00	20:15:00	20:32:00	21:32:00		22:55:00	23:51:00		
Newark, DE	*NRK*	Dp	19:40:00								
Aberdeen, MD	*ABE*	Dp	20:00:00								
Baltimore, MD	*BAL*	Dp	20:23:00	21:00:00	21:20:00	22:20:00		23:41:00	0:40:00		
BWI Airport, MD	*BWI*	Dp	20:36:00	21:13:00		22:34:00		23:54:00	0:53:00		
New Carrolton, MD	*NCR*	Dp	D20:49:00	D21:26:00	D21:43:00	D22:48:00		D00:07:00	D01:06:00		
Washington, DC	WAS	Ar	21:13:00	21:50:00	22:05:00	23:10:00		0:30:00	1:30:00		
Washington, DC	WAS	Dp									
L'Enfant, DC	XLN	Dp									
Alexandria, VA	ALX	Dp									
Burke Center, VA	BCV	Dp									
Manassas, VA	MSS	Dp									
Culpeper, VA	CLP	Dp									
Charlottesville, VA	CVS	Dp									
Lynchburg, VA	LYH	Ar									
Roanoke, VA	RNK	Ar									
Danville, VA	DAN	Dp									
Lorton, VA	LOR	Dp									
Woodbridge, VA	WDB	Dp									
Quantico, VA	QAN	Dp									
Fredericksburg, VA	FBG	Dp									
Ashland, VA	ASD	Dp									
Richmond Staples Mill, VA	RVR	Ar									
Richmond Staples Mill, VA	RVR	Dp									
Richmond Main Street, VA	RVM	Dp									
Williamsburg, VA	*WBG*	Dp									
Newport News, VA	*NPN*	Ar									
Petersburg, VA	*PTB*	Dp									
Norfolk, VA	*NFK*	Ar									
Rocky Mount, NC	*RMT*	Dp									
Wilson, NC	*WLN*	Dp									
Selma-Smithfield, NC	*SSM*	Dp									
Fayetteville, NC	*FAY*	Dp									
La Crosse, VA	*XLC*	Dp									
Henderson, NC	*XHN*	Dp									
Raleigh, NC	*RGH*	Ar									
Raleigh, NC	*RGH*	Dp									
Cary, NC	*CYN*	Dp									
Durham, NC	*DNC*	Dp									
Hillsborough, NC	*XHG*	Dp									
Burlington, NC	*BNC*	Dp									
Greensboro, NC	*GRO*	Dp									
High Point, NC	*HPT*	Dp									
Lexington, NC	*XLX*	Dp									
Salisbury, NC	*SAL*	Dp									
Kannapolis, NC	*KAN*	Dp									
Harrisburg, NC	*XHB*	Dp									
Charlotte, NC	*CLT*	Ar									
Southern Pines, NC	*SOP*	Dp									
Hamlet, NC	*HAM*	Dp									

Existing Regional Rail Northbound Schedule (1 of 4)

Northbound			REG 190	SHUTTLE 490	REG 110	REG 170	SHUTTLE 470	REG 180	REG 130	REG 172	LD 98	VT. IC 56
Stations			WAS-BOS	NHV-SPG	WAS-NYP	WAS-BOS	NHV-SPG	WAS-NYP	WAS-NYP	WAS-BOS	MIA-NYP	WAS-SAB
FREQUENCY			M-F	M-F	M-F	M-F	M-F	M-F	M-F	M-F	Daily	M-F
Hamlet, NC	*HAM*	Dp										
Southern Pines, NC	*SOP*	Dp										
Charlotte, NC	*CLT*	Dp										
Harrisburg, NC	*XHB*	Dp										
Kannapolis, NC	*KAN*	Dp										
Salisbury, NC	*SAL*	Dp										
Lexington, NC	*XLX*	Dp										
High Point, NC	*HPT*	Dp										
Greensboro, NC	*GRO*	Dp										
Burlington, NC	*BNC*	Dp										
Hillsborough, NC	*XHG*	Dp										
Durham, NC	*DNC*	Dp										
Cary, NC	*CYN*	Dp										
Raleigh, NC	*RGH*	Ar										
Raleigh, NC	*RGH*	Dp										
Henderson, NC	*XHN*	Dp										
La Crosse, VA	*XLC*	Dp										
Fayetteville, NC	*FAY*	Dp									0:42:00	
Selma-Smithfield, NC	*SSM*	Dp										
Wilson, NC	*WLN*	Dp										
Rocky Mount, NC	RMT	Dp									2:14:00	
Norfolk, VA	NFK	Dp										
Petersburg, VA	PTB	Dp									3:38:00	
Newport News, VA	*NPN*	Dp										
Williamsburg, VA	*WBG*	Dp										
Richmond Main Street, VA	RVM	Dp										
Richmond Staples Mill, VA	RVR	Ar									4:27:00	
Richmond Staples Mill, VA	RVR	Dp									4:37:00	
Ashland, VA	ASD	Dp										
Fredericksburg, VA	FBG	Dp										
Quantico, VA	QAN	Dp										
Woodbridge, VA	WDB	Dp										
Lorton, VA	LOR	Ar										
Danville, VA	DAN	Dp										
Roanoke, VA	RNK	Dp										
Lynchburg, VA	LYH	Dp										
Charlottesville, VA	CVS	Dp										
Culpeper, VA	CLP	Dp										
Manassas, VA	MSS	Dp										
Burke Center, VA	BCV	Dp										
Alexandria, VA	ALX	Dp									D06:36:0	
L'Enfant, DC	XLN	Dp										
Washington, DC	WAS	Ar									D07:07:0	
Washington, DC	WAS	Dp	3:15:00		4:00:00	4:52:00		5:30:00	6:30:00	7:25:00	D07:32:0	8:10:00
New Carrolton, MD	*NCR*	Dp			R04:10:0	R05:03:0		R05:42:0	R06:42:0	R07:38:0		R08:20:0
BWI Airport, MD	*BWI*	Dp	3:40:00		4:25:00	5:20:00		5:57:00	6:57:00	7:53:00		8:35:00
Baltimore, MD	*BAL*	Dp	3:55:00		4:41:00	5:35:00		6:13:00	7:14:00	8:09:00	D08:12:0	8:52:00
Aberdeen, MD	*ABE*	Dp	4:18:00					6:35:00	7:37:00			
Newark, DE	*NRK*	Dp										
Wilmington, DE	*WIL*	Dp	4:46:00		5:27:00	6:21:00		7:02:00	8:04:00	8:55:00	D09:05:0	9:36:00
Philadelphia, PA	*PHL*	Ar	5:10:00		5:50:00	6:45:00		7:26:00	8:28:00	9:19:00	D09:30:0	9:58:00
Philadelphia, PA	*PHL*	Dp	5:15:00		5:53:00	6:48:00		7:28:00	8:30:00	9:21:00	D09:35:0	10:01:00
Trenton, NJ	*TRE*	Dp	5:45:00		6:27:00	7:16:00			9:00:00	9:48:00	D10:03:0	10:28:00
Princeton Jct, NJ	*PJC*	Dp										
New Brunswick, NJ	*NBK*	Dp										
Metropark, NJ	*MET*	Dp							9:27:00	10:10:00		
Newark Airport, NJ	*EWR*	Dp	6:16:00						9:37:00	10:20:00		
Newark, NJ	*NWK*	Dp	6:22:00		7:02:00	7:57:00		8:25:00	9:42:00	10:26:00	D10:40:0	11:03:00
New York, NY	*NYP*	Ar	6:40:00		7:22:00	8:15:00		8:44:00	10:00:00	10:44:00	D11:00:0	11:21:00
New York, NY	*NYP*	Dp	6:55:00			8:30:00				11:00:00		11:33:00
New Rochelle, NY	*NRO*	Dp				8:56:00				11:27:00		
Stamford, CT	*STM*	Dp	7:47:00			9:19:00				11:48:00		12:18:00
Bridgeport, CT	*BRP*	Dp				9:47:00				12:16:00		12:46:00
New Haven, CT	*NHV*	Ar	8:35:00			10:11:00				12:42:00		13:11:00
New Haven, CT	*NHV*	Dp	8:37:00			10:13:00				12:44:00		13:25:00
New Haven, CT	*NHV*	Dp		8:40:00			10:30:00					
Wallingford, CT	*WFD*	Dp		8:55:00			10:43:00					13:40:00
Meriden, CT	*MDN*	Dp		9:05:00			10:50:00					13:49:00
Berlin, CT	*BER*	Dp		9:16:00			10:59:00					13:59:00
Hartford, CT	*HFD*	Dp		9:29:00			11:15:00					14:13:00
Windsor, CT	*WND*	Dp		L09:38:00			L11:23:00					
Windsor Locks, CT	*WNL*	Dp		L09:44:00			L11:30:00					14:29:00
Springfield, MA	*SPG*	Ar		10:10:00			11:55:00					15:00:00
Old Saybrook, CT	*OSB*	Dp	9:06:00							13:12:00		
New London, CT	*NLC*	Dp	9:26:00			11:00:00				13:32:00		
Mystic, CT	*MYS*	Dp				11:12:00						
Westerly, RI	*WLY*	Dp				11:22:00						
Kingston, RI	*KIN*	Dp	9:57:00			11:37:00				14:04:00		
Providence, RI	*PVD*	Dp	10:17:00			11:55:00				14:23:00		
Route 128, MA	*RTE*	Dp	D10:48:0			D12:28:0				D14:58:0		
Boston, MA (Back Bay)	*BBY*	Dp	D10:59:0			D12:39:0				D15:09:0		
Boston, MA (South)	*BOS*	Ar	11:05:00			12:45:00				15:15:00		

Existing Regional Rail Northbound Schedule (2 of 4)

Northbound			REG 86	REG 184	LD 20	REG 174	AT 52	REG 84	REG 176	SHUTTLE 476	REG 186	REG 94
Stations			RVR-BOS	WAS-NYP	NOL-NYP	NFK-BOS	SFA-LOR	RVR-NYP	LYH-BOS	NHV-SPG	WAS-NYP	NPN-BOS
FREQUENCY			M-F	M-F	Daily	M-F	Daily	M-F	M-F	M-F	M-F	M-F
Hamlet, NC	*HAM*	Dp										
Southern Pines, NC	*SOP*	Dp										
Charlotte, NC	*CLT*	Dp			1:46:00							
Harrisburg, NC	*XHB*	Dp			x							
Kannapolis, NC	*KAN*	Dp										
Salisbury, NC	*SAL*	Dp			2:32:00							
Lexington, NC	*XLX*	Dp			x							
High Point, NC	*HPT*	Dp			3:16:00							
Greensboro, NC	*GRO*	Dp			3:44:00							
Burlington, NC	*BNC*	Dp										
Hillsborough, NC	*XHG*	Dp										
Durham, NC	*DNC*	Dp										
Cary, NC	*CYN*	Dp										
Raleigh, NC	*RGH*	Ar										
Raleigh, NC	*RGH*	Dp										
Henderson, NC	*XHN*	Dp										
La Crosse, VA	*XLC*	Dp										
Fayetteville, NC	*FAY*	Dp										
Selma-Smithfield, NC	*SSM*	Dp										
Wilson, NC	*WLN*	Dp										
Rocky Mount, NC	RMT	Dp										
Norfolk, VA	NFK	Dp				5:00:00						
Petersburg, VA	PTB	Dp				6:27:00						
Newport News, VA	*NPN*	Dp										9:15:00
Williamsburg, VA	*WBG*	Dp										9:37:00
Richmond Main Street, VA	RVM	Dp										10:29:00
Richmond Staples Mill, VA	RVR	Ar				7:03:00						11:04:00
Richmond Staples Mill, VA	RVR	Dp	6:00:00			7:10:00		8:00:00				11:09:00
Ashland, VA	ASD	Dp	6:13:00			7:23:00		8:14:00				11:22:00
Fredericksburg, VA	FBG	Dp	6:56:00			8:10:00		8:58:00				12:08:00
Quantico, VA	QAN	Dp	7:16:00			8:32:00		9:18:00				12:28:00
Woodbridge, VA	WDB	Dp	7:28:00			8:46:00						
Lorton, VA	LOR	Ar					8:59:00					
Danville, VA	DAN	Dp			4:43:00							
Roanoke, VA	RNK	Dp										
Lynchburg, VA	LYH	Dp			5:56:00				7:38:00			
Charlottesville, VA	CVS	Dp			7:09:00				8:52:00			
Culpeper, VA	CLP	Dp			8:01:00				9:44:00			
Manassas, VA	MSS	Dp			8:35:00				10:19:00			
Burke Center, VA	BCV	Dp							10:36:00			
Alexandria, VA	ALX	Dp	7:52:00		9:32:00	9:15:00		9:51:00	11:05:00			13:07:00
L'Enfant, DC	XLN	Dp	D8:03:00			D09:30:0			D11:14:0			
Washington, DC	WAS	Ar	8:15:00		9:53:00	9:44:00		10:15:00	11:20:00			13:35:00
Washington, DC	WAS	Dp	8:40:00	9:20:00	10:18:00	10:20:00		11:02:00	12:02:00		13:02:00	14:02:00
New Carrolton, MD	*NCR*	Dp	8:52:00	R09:32:0		10:32:00		11:14:00	12:14:00		R13:14:0	14:14:00
BWI Airport, MD	*BWI*	Dp	9:07:00	9:48:00		10:47:00		11:29:00	12:29:00		13:29:00	14:30:00
Baltimore, MD	*BAL*	Dp	9:23:00	10:04:00	10:55:00	11:04:00		11:44:00	12:45:00		13:45:00	14:46:00
Aberdeen, MD	*ABE*	Dp										
Newark, DE	*NRK*	Dp									14:21:00	
Wilmington, DE	*WIL*	Dp	10:09:00	10:50:00	11:44:00	11:49:00		12:28:00	13:31:00		14:33:00	15:33:00
Philadelphia, PA	*PHL*	Ar	10:33:00	11:14:00	12:08:00	12:13:00		12:51:00	13:55:00		14:56:00	15:56:00
Philadelphia, PA	*PHL*	Dp	10:39:00	11:17:00	12:15:00	12:17:00		12:54:00	13:58:00		15:01:00	16:01:00
Trenton, NJ	*TRE*	Dp	11:08:00	11:45:00	12:41:00	12:46:00		13:23:00	14:24:00		15:30:00	16:28:00
Princeton Jct, NJ	*PJC*	Dp										
New Brunswick, NJ	*NBK*	Dp										
Metropark, NJ	*MET*	Dp	11:31:00	12:08:00		13:09:00		13:43:00	14:47:00		15:52:00	
Newark Airport, NJ	*EWR*	Dp				13:20:00					16:05:00	16:59:00
Newark, NJ	*NWK*	Dp	11:47:00	12:22:00	13:25:00	13:26:00		13:59:00	15:01:00		16:12:00	17:05:00
New York, NY	*NYP*	Ar	12:05:00	12:40:00	13:46:00	13:44:00		14:20:00	15:19:00		16:30:00	17:22:00
New York, NY	*NYP*	Dp	12:30:00			14:00:00			15:30:00			17:42:00
New Rochelle, NY	*NRO*	Dp				14:27:00			15:57:00			
Stamford, CT	*STM*	Dp	13:18:00			14:48:00			16:18:00			18:31:00
Bridgeport, CT	*BRP*	Dp				15:16:00			16:46:00			
New Haven, CT	*NHV*	Ar	14:08:00			15:42:00			17:12:00			19:21:00
New Haven, CT	*NHV*	Dp	14:10:00			15:44:00			17:34:00			19:32:00
New Haven, CT	*NHV*	Dp								17:20:00		
Wallingford, CT	*WFD*	Dp								17:35:00		
Meriden, CT	*MDN*	Dp								17:43:00		
Berlin, CT	*BER*	Dp								17:55:00		
Hartford, CT	*HFD*	Dp								18:10:00		
Windsor, CT	*WND*	Dp								L18:20:00		
Windsor Locks, CT	*WNL*	Dp								L18:26:00		
Springfield, MA	*SPG*	Ar								18:50:00		
Old Saybrook, CT	*OSB*	Dp				16:15:00			18:04:00			20:06:00
New London, CT	*NLC*	Dp	14:52:00			16:35:00			18:24:00			20:24:00
Mystic, CT	*MYS*	Dp										
Westerly, RI	*WLY*	Dp				16:56:00			18:44:00			
Kingston, RI	*KIN*	Dp	15:26:00			17:12:00			18:57:00			20:57:00
Providence, RI	*PVD*	Dp	15:47:00			17:30:00			19:19:00			21:16:00
Route 128, MA	*RTE*	Dp	D16:17:0			D18:09:0			D19:54:0			D21:50:0
Boston, MA (Back Bay)	*BBY*	Dp	D16:28:0			D18:25:0			D20:06:0			D22:02:0
Boston, MA (South)	*BOS*	Ar	16:35:00			18:30:00			20:12:00			22:10:00

Existing Regional Rail Northbound Schedule (3 of 4)

Northbound			SHUTTLE 494	REG 148	LD 92	REG 134	REG 178	REG 196	REG 136	NC REG 80	NC REG 74	NC REG 76
Stations			NHV-SPG	WAS-SPG	MIA-NYP	WAS-NYP	WAS-BOS	WAS-NYP	WAS-SPG	CLT-NYP	CLT-RGH	CLT-RGH
FREQUENCY			M-F	M-F	Daily	RF	M-F	M-R	F	M-F	M-F	M-F
Hamlet, NC	*HAM*	Dp			6:14:00							
Southern Pines, NC	*SOP*	Dp			6:52:00							
Charlotte, NC	*CLT*	Dp								7:00:00	12:00:00	17:15:00
Harrisburg, NC	*XHB*	Dp								x	x	x
Kannapolis, NC	*KAN*	Dp								7:25:00	12:25:00	17:40:00
Salisbury, NC	*SAL*	Dp								7:43:00	12:41:00	17:56:00
Lexington, NC	*XLX*	Dp								x	x	x
High Point, NC	*HPT*	Dp								8:17:00	13:14:00	18:29:00
Greensboro, NC	*GRO*	Dp								8:39:00	13:34:00	18:49:00
Burlington, NC	*BNC*	Dp								9:01:00	13:55:00	19:10:00
Hillsborough, NC	*XHG*	Dp								x	x	x
Durham, NC	*DNC*	Dp								9:42:00	14:33:00	19:48:00
Cary, NC	*CYN*	Dp			8:08:00					10:02:00	14:53:00	20:08:00
Raleigh, NC	*RGH*	Ar			8:34:00					10:17:00	15:11:00	20:26:00
Raleigh, NC	*RGH*	Dp			8:45:00					10:25:00		
Henderson, NC	*XHN*	Dp										
La Crosse, VA	*XLC*	Dp										
Fayetteville, NC	*FAY*	Dp										
Selma-Smithfield, NC	*SSM*	Dp								11:00:00		
Wilson, NC	*WLN*	Dp								11:30:00		
Rocky Mount, NC	*RMT*	Dp			10:03:00					11:52:00		
Norfolk, VA	*NFK*	Dp										
Petersburg, VA	*PTB*	Dp			11:28:00					13:17:00		
Newport News, VA	*NPN*	Dp										
Williamsburg, VA	*WBG*	Dp										
Richmond Main Street, VA	RVM	Dp										
Richmond Staples Mill, VA	RVR	Ar			12:07:00					14:05:00		
Richmond Staples Mill, VA	RVR	Dp			12:16:00					14:12:00		
Ashland, VA	ASD	Dp										
Fredericksburg, VA	FBG	Dp								15:06:00		
Quantico, VA	QAN	Dp								15:28:00		
Woodbridge, VA	WDB	Dp										
Lorton, VA	LOR	Ar										
Danville, VA	DAN	Dp										
Roanoke, VA	RNK	Dp										
Lynchburg, VA	LYH	Dp										
Charlottesville, VA	CVS	Dp										
Culpeper, VA	CLP	Dp										
Manassas, VA	MSS	Dp										
Burke Center, VA	BCV	Dp										
Alexandria, VA	ALX	Dp			D14:04:0					16:02:00		
L'Enfant, DC	XLN	Dp										
Washington, DC	WAS	Ar			D14:38:0					D16:29:0		
Washington, DC	WAS	Dp		15:02:00	D15:10:0	15:30:00	16:02:00	17:05:00	17:05:00	D17:15:0		
New Carrolton, MD	*NCR*	Dp		R15:14:0			R16:14:0	R17:17:0	R17:17:0			
BWI Airport, MD	*BWI*	Dp		15:29:00		15:54:00	16:29:00	17:32:00	17:32:00			
Baltimore, MD	*BAL*	Dp		15:45:00	D15:47:0	16:09:00	16:45:00	17:48:00	17:48:00	D17:51:0		
Aberdeen, MD	*ABE*	Dp		16:08:00								
Newark, DE	*NRK*	Dp				16:45:00						
Wilmington, DE	*WIL*	Dp		16:35:00	D16:40:0	16:58:00	17:31:00	18:36:00	18:36:00	D18:43:0		
Philadelphia, PA	*PHL*	Ar		16:59:00	D17:05:0	17:22:00	17:55:00	19:00:00	19:00:00	D19:07:0		
Philadelphia, PA	*PHL*	Dp		17:02:00	D17:10:0	17:33:00	17:58:00	19:02:00	19:02:00	D19:11:0		
Trenton, NJ	*TRE*	Dp		17:29:00	D17:40:0		18:26:00	19:30:00	19:30:00	D19:42:0		
Princeton Jct, NJ	*PJC*	Dp						19:39:00	19:39:00			
New Brunswick, NJ	*NBK*	Dp						19:54:00	19:54:00			
Metropark, NJ	*MET*	Dp		17:51:00				20:05:00	20:05:00			
Newark Airport, NJ	*EWR*	Dp		18:02:00			18:57:00	20:17:00	20:17:00			
Newark, NJ	*NWK*	Dp		18:10:00	D18:23:0	D18:37:0	19:03:00	D20:22:0	D20:22:0	D20:24:0		
New York, NY	*NYP*	Ar		18:30:00	18:50:00	18:56:00	19:21:00	20:41:00	20:41:00	20:47:00		
New York, NY	*NYP*	Dp		18:45:00			19:50:00		20:57:00			
New Rochelle, NY	*NRO*	Dp		19:15:00			20:25:00		21:29:00			
Stamford, CT	*STM*	Dp		19:35:00			20:45:00		21:49:00			
Bridgeport, CT	*BRP*	Dp		20:03:00			21:13:00		22:17:00			
New Haven, CT	*NHV*	Ar		20:29:00			21:40:00		22:44:00			
New Haven, CT	*NHV*	Dp		20:44:00			21:42:00		22:59:00			
New Haven, CT	*NHV*	Dp	19:30:00									
Wallingford, CT	*WFD*	Dp	19:44:00	20:59:00					23:13:00			
Meriden, CT	*MDN*	Dp	19:52:00	21:07:00					23:23:00			
Berlin, CT	*BER*	Dp	20:02:00	21:17:00					23:33:00			
Hartford, CT	*HFD*	Dp	20:16:00	21:31:00					23:47:00			
Windsor, CT	*WND*	Dp	L20:25:00	L21:41:00					23:56:00			
Windsor Locks, CT	*WNL*	Dp	L20:30:00	L21:49:00					0:02:00			
Springfield, MA	*SPG*	Ar	20:55:00	22:20:00					0:30:00			
Old Saybrook, CT	*OSB*	Dp					22:13:00					
New London, CT	*NLC*	Dp					22:35:00					
Mystic, CT	*MYS*	Dp					22:48:00					
Westerly, RI	*WLY*	Dp					22:59:00					
Kingston, RI	*KIN*	Dp					23:16:00					
Providence, RI	*PVD*	Dp					23:37:00					
Route 128, MA	*RTE*	Dp					D00:12:0					
Boston, MA (Back Bay)	*BBY*	Dp					D00:24:0					
Boston, MA (South)	*BOS*	Ar					0:30:00					

Existing Regional Rail Northbound Schedule (4 of 4)

Northbound			REG 138	LD 50	REG 188	LD 90	REG 198	REG 66
Stations			WAS-NYP	CHI-NYP	WAS-NYP	SAV-NYP	WAS-NYP	NPN-BOS
FREQUENCY			M-F	Daily	M-F	Daily	M-F	M-F
Hamlet, NC	*HAM*	Dp						
Southern Pines, NC	*SOP*	Dp						
Charlotte, NC	*CLT*	Dp						
Harrisburg, NC	*XHB*	Dp						
Kannapolis, NC	*KAN*	Dp						
Salisbury, NC	*SAL*	Dp						
Lexington, NC	*XLX*	Dp						
High Point, NC	*HPT*	Dp						
Greensboro, NC	*GRO*	Dp						
Burlington, NC	*BNC*	Dp						
Hillsborough, NC	*XHG*	Dp						
Durham, NC	*DNC*	Dp						
Cary, NC	*CYN*	Dp						
Raleigh, NC	*RGH*	Ar						
Raleigh, NC	*RGH*	Dp						
Henderson, NC	*XHN*	Dp						
La Crosse, VA	*XLC*	Dp						
Fayetteville, NC	*FAY*	Dp				13:05:00		
Selma-Smithfield, NC	*SSM*	Dp				13:52:00		
Wilson, NC	*WLN*	Dp				14:24:00		
Rocky Mount, NC	RMT	Dp				14:52:00		
Norfolk, VA	NFK	Dp						
Petersburg, VA	PTB	Dp				16:20:00		
Newport News, VA	*NPN*	Dp						17:20:00
Williamsburg, VA	*WBG*	Dp						17:41:00
Richmond Main Street, VA	RVM	Dp						18:30:00
Richmond Staples Mill, VA	RVR	Ar				17:04:00		18:55:00
Richmond Staples Mill, VA	RVR	Dp				17:14:00		19:00:00
Ashland, VA	ASD	Dp						19:13:00
Fredericksburg, VA	FBG	Dp						19:57:00
Quantico, VA	QAN	Dp						20:22:00
Woodbridge, VA	WDB	Dp						
Lorton, VA	LOR	Ar						
Danville, VA	DAN	Dp						
Roanoke, VA	RNK	Dp						
Lynchburg, VA	LYH	Dp						
Charlottesville, VA	CVS	Dp		15:19:00				
Culpeper, VA	CLP	Dp		16:35:00				
Manassas, VA	MSS	Dp		17:10:00				
Burke Center, VA	BCV	Dp						
Alexandria, VA	ALX	Dp		D17:59:0		19:07:00		20:55:00
L'Enfant, DC	XLN	Dp						
Washington, DC	WAS	Ar		D18:19:0		D19:42:0		21:20:00
Washington, DC	WAS	Dp	18:05:00	D18:42:0	19:10:00	D20:05:0	21:05:00	22:10:00
New Carrolton, MD	*NCR*	Dp	R18:17:0		R19:22:0		R21:17:0	22:22:00
BWI Airport, MD	*BWI*	Dp	18:33:00		19:37:00		21:32:00	22:40:00
Baltimore, MD	*BAL*	Dp	18:50:00	D19:16:0	19:54:00	D20:38:0	21:48:00	22:56:00
Aberdeen, MD	*ABE*	Dp			20:16:00		22:09:00	
Newark, DE	*NRK*	Dp						
Wilmington, DE	*WIL*	Dp	19:36:00	D20:05:0	20:43:00	D21:29:0	22:37:00	23:46:00
Philadelphia, PA	*PHL*	Ar	20:00:00	D20:26:0	21:07:00	D21:55:0	23:01:00	0:09:00
Philadelphia, PA	*PHL*	Dp	20:02:00	D20:32:0	21:10:00	D22:05:0	23:04:00	0:14:00
Trenton, NJ	*TRE*	Dp	20:29:00	D21:02:0	21:37:00	D22:35:0	23:33:00	0:48:00
Princeton Jct, NJ	*PJC*	Dp	20:38:00					
New Brunswick, NJ	*NBK*	Dp						
Metropark, NJ	*MET*	Dp	20:56:00		D21:59:0		D23:53:0	1:15:00
Newark Airport, NJ	*EWR*	Dp	21:07:00					
Newark, NJ	*NWK*	Dp	21:12:00	D21:38:0	D22:14:0	D23:15:0	D00:10:0	1:32:00
New York, NY	*NYP*	Ar	21:30:00	D21:58:0	22:34:00	23:36:00	0:30:00	1:50:00
New York, NY	*NYP*	Dp						2:40:00
New Rochelle, NY	*NRO*	Dp						
Stamford, CT	*STM*	Dp						3:25:00
Bridgeport, CT	*BRP*	Dp						
New Haven, CT	*NHV*	Ar						4:20:00
New Haven, CT	*NHV*	Dp						4:40:00
New Haven, CT	*NHV*	Dp						
Wallingford, CT	*WFD*	Dp						
Meriden, CT	*MDN*	Dp						
Berlin, CT	*BER*	Dp						
Hartford, CT	*HFD*	Dp						
Windsor, CT	*WND*	Dp						
Windsor Locks, CT	*WNL*	Dp						
Springfield, MA	*SPG*	Ar						
Old Saybrook, CT	*OSB*	Dp						5:13:00
New London, CT	*NLC*	Dp						5:34:00
Mystic, CT	*MYS*	Dp						5:48:00
Westerly, RI	*WLY*	Dp						6:00:00
Kingston, RI	*KIN*	Dp						6:17:00
Providence, RI	*PVD*	Dp						6:56:00
Route 128, MA	*RTE*	Dp						D07:34:0
Boston, MA (Back Bay)	*BBY*	Dp						D07:53:0
Boston, MA (South)	*BOS*	Ar						7:58:00

J-2 SURVEY TECHNICAL REPORT

DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL

Survey Technical Report

DRPT
Virginia Department of Rail and Public Transportation

U.S. Department of Transportation
Federal Railroad Administration

TABLE OF CONTENTS

1 INTRODUCTION

RSG, on behalf of the Virginia Department of Rail and Public Transportation (VDRPT) and the Federal Railroad Administration (FRA), recently conducted a survey of rail, bus, air, and automobile passengers traveling between Richmond, Virginia and points north. The central purpose of the survey was to better understand the behavior of travelers along the Washington, D.C. to Richmond Southeast High Speed Rail (DC2RVA) corridor.

Some data from the survey will be used to inform a ridership model, which will in turn be used to estimate ridership on any future high-speed rail connection between Richmond and Washington, D.C. RSG will present those estimates, and the details of the ridership model, in a separate report.

To capture riders on all modes simultaneously, we conducted an online survey through Research Now. Research Now is an online sample provider that maintains a diverse panel of potential respondents. Respondents were screened to include only those who had made a trip along the DC2RVA corridor in the past year.

To get a more detailed picture of rail and bus travelers along the corridor, we also conducted a field survey of travelers on Amtrak and Megabus. This approach ensured a representative sample of existing rail and bus riders on the corridor. The current Amtrak-riding population is particularly important, as current riders are likely candidates to transition to a new rail option.

2 SURVEY METHODOLOGY

The field survey was administered using tablet computers furnished by the study team. For the online survey, respondents used their own computer or device. A virtually identical survey instrument was used regardless of mode or data collection method (field or online). Built-in branching logic ensured that passengers only got questions that made sense for their trip; for example, Amtrak passengers selected from a list of Amtrak stations for their boarding location, while Megabus passengers selected from a list of bus stops.

The questionnaire, which can be seen in the Appendix of this report, covered a range of topics, described in brief below.

2.1 ORIGIN/DESTINATION INFORMATION

Respondents were asked to provide their origin and destination locations through a map or search bar. These locations were coded to latitude/longitude coordinates in real time through a Google maps-based application. Respondents were also asked to select their boarding and alighting locations from a list of possible stops or stations.

2.2 TRIP INFORMATION

Respondents were asked several questions about their specific trip, including departure time, expected door-to-door travel time, trip purpose, party size, and their use of a car while away from home.

2.3 TRAVELER INFORMATION

Respondents provided their home ZIP code and basic demographic information. Additionally, they reported their frequency taking similar trips by mode, their reasons for varying their travel mode (when applicable), and whether or not they have regular access to a vehicle.

2.4 CHOICE-BASED CONJOINT FOR RELIABILITY

To help us estimate the value of on-time performance, respondents were asked to choose between two hypothetical trains which varied in cost and on-time performance. Each respondent completed two such experiments. Figure 2-1 shows an example of one experiment.

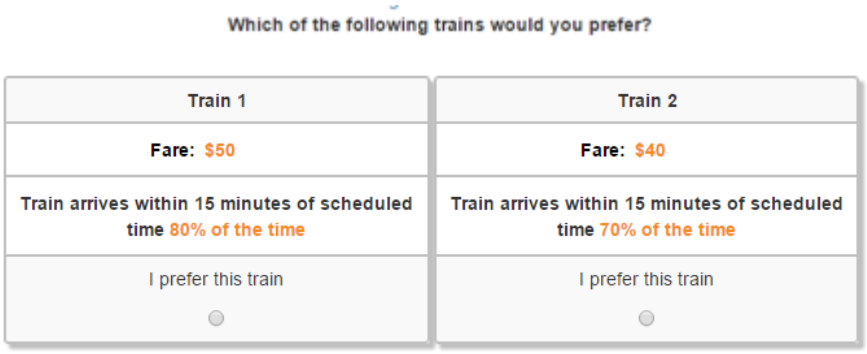


FIGURE 2-1: EXAMPLE RELIABILITY EXPERIMENT

2.4 CHOICE-BASED CONJOINT FOR TRAVEL MODEL

The last section of the questionnaire was a series of experiments asking respondents to select one of three travel modes. Values for travel time, access and egress mode, fare, and frequency (number of daily trains, buses, or flights) were based on the individual respondent's real world options; for example, the access time may have been based on the distance between the respondent's home and the nearest airport. All of these values, shown in orange in Figure 2-2, were varied across experiments. This allows us to model the importance of each attribute separately.

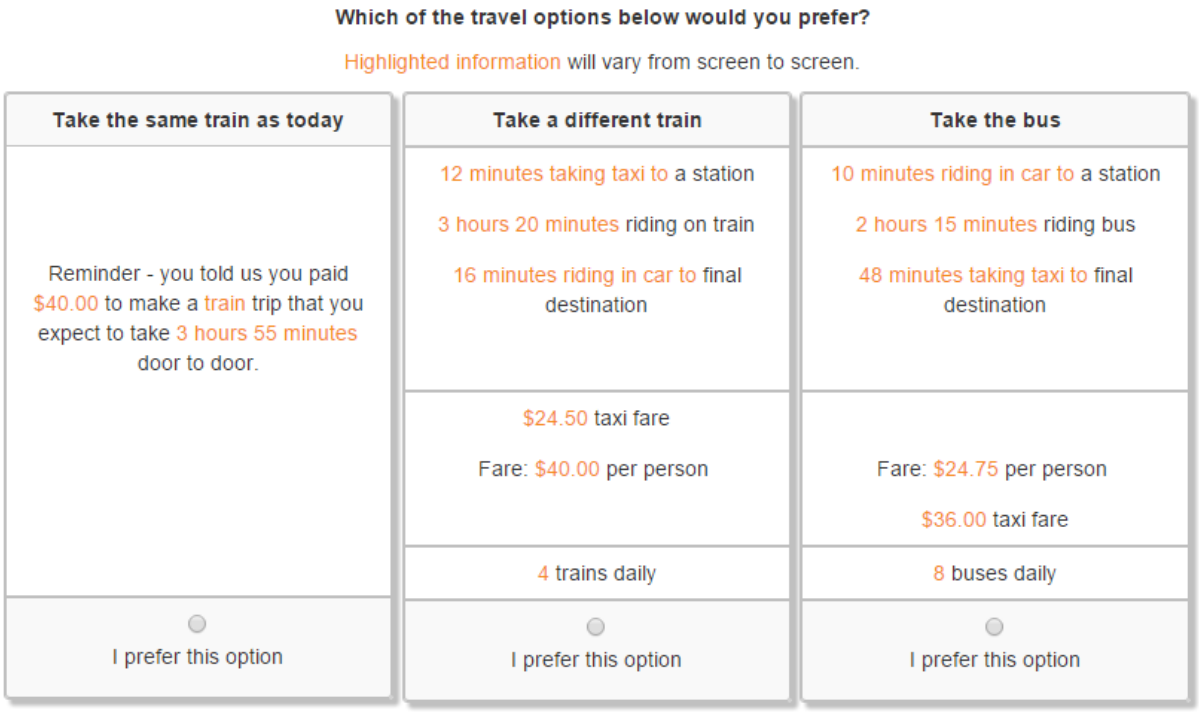


FIGURE 2-2: EXAMPLE MODE CHOICE EXPERIMENT

2.5 WEIGHTING

For some analyses, the online survey data are weighted by trip frequency. The purpose of the weighting is to make the sample better resemble an in-field sample. While respondents who travel frequently may only make up a small percentage of all travelers, they may make up a much larger percentage of all trips (and vice versa). For analyses relating to demographics or mode split, the weighted data provide better estimates.

3 SURVEY ADMINISTRATION

This section describes the administration of each component of the DC2RVA survey.

3.1 OVERVIEW OF SURVEY ADMINISTRATION

The team collected 2,998 complete questionnaires in two rounds of surveying. The first round took place aboard Amtrak trains traveling between Richmond and Washington. The second round took place entirely online. Records with nonsensical travel information (for example, where the reported origin and destination were in the same place) were eliminated. Table 3-1 shows the number of complete surveys by mode and data collection method.

TABLE 3-1: COMPLETE SURVEYS BY MODE AND DATA COLLECTION METHOD

Mode	Online	Field	Total
Airplane	110	0	**110**
Bus	36	161	**197**
Car	1753	0	**1753**
Train	104	834	**938**
Total	**2003**	**995**	**2998**

3.2 ON-LINE DATA COLLECTION

The bulk of the data collection took place online, through an online sample provider called Research Now®. Online sample providers recruit participants to research panels. Research Now does not recruit panelists for any particular survey topic, which minimizes the risk of self-selection bias. Respondents complete the questionnaire on their own computer or device using a survey instrument prepared by RSG.

We targeted respondents based on geography. First, only respondents living in ZIP codes roughly corresponding to the highlighted regions in Figure 3-1 and Figure 3-2 were invited to participate. Subsequently, respondents were asked a whether they had made a trip to somewhere in the opposite region in the past 12 months (again, based on the shaded regions in the figures below). As a shorthand, any respondent that traversed the I-95 corridor between Alexandria, VA and Fredericksburg, VA in the past year was included. This recruitment method enabled us to survey all types of travelers along the corridor, including the largest group, drivers.

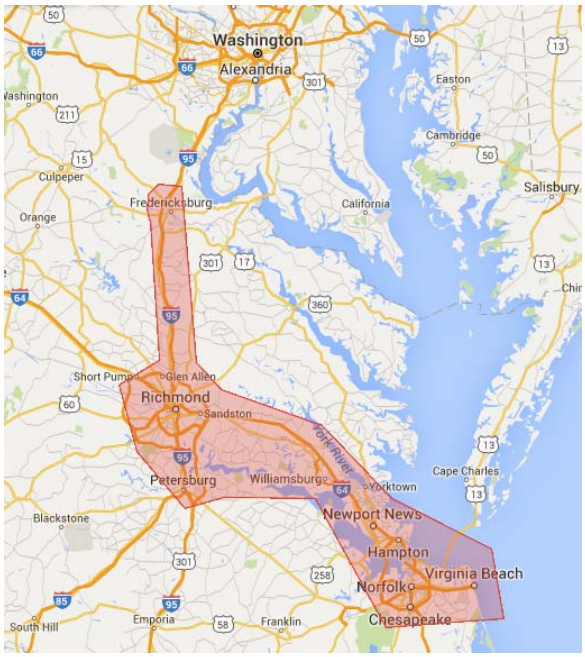


FIGURE 3-1: SOUTHERN SURVEY REGION

FIGURE 3-2: NORTHERN SURVEY REGION

On both Megabus and Amtrak, surveys were administered through tablet computers. When respondents were unable or unwilling to use the tablets themselves, staff administered the survey

as an interview and recorded answers through the same survey instrument. This ensured that the respondents who were not comfortable using a mobile device were included in the sample. In rare cases, when a potential respondent specifically requested to take the survey on their own device, staff provided a postcard with a link to the survey.

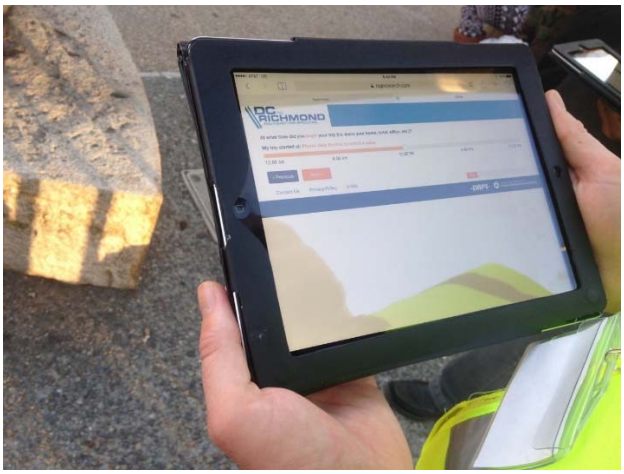


FIGURE 3-3: SURVEY ON A TABLET COMPUTER

Amtrak surveying took place over five days, from Tuesday, October 13th through Saturday, October 17th, 2015. A total of 22 trains were surveyed, with 2-3 staff working on each train. In order to generate the most representative sample possible, trains were sampled throughout all times of day and across all Amtrak lines.

Megabus surveying took place over a full week, from Sunday, October 18th, through Saturday, October 24th, 2015. Every Megabus departure during that week was surveyed, totaling 35 sampled buses. Staff were not able to count all boarding passengers, but we estimate that the response rate was in excess of 50 percent.

3.3 AIRPORT PILOT

A pilot study to determine the feasibility of sampling air passengers in situ took place on Thursday, October 22nd, 2015, at Richmond International Airport. Two staff members spent roughly two hours at intercepting arriving passengers at the foot of the escalator connecting the terminal level to ground level. This approach proved difficult, both because passengers from eligible origin airports could not be distinguished and because the steady flow of pedestrian traffic made it an unnatural place to stop. For most of this time, the staff opted to distribute postcards rather than attempt to administer the survey on a tablet. Relatively few passengers (less than 10 percent) accepted postcards, and none went on to complete the survey.

The rest of the time was spent near the baggage claim, where arriving passengers could be more easily targeted by origin. This approach was only slightly more effective, generating three complete surveys over about four hours. For the most part, passengers were able to collect their bags almost immediately after arriving at the baggage claim and were unwilling to stay in the airport to complete the survey.

After the pilot, we determined a full-scale survey effort in the airport to be infeasible without gaining admission to the inside-security areas of the airport. Ultimately, the study team decided to pursue responses from air passengers through the online survey alone.

4 TRAVELER PROFILE

This section presents key results from the DC2RVA on-line survey that describe the characteristics of all (regardless of mode) survey participants who traveled between the north and south survey regions.

4.1 MODE SHARE

The vast majority of survey respondents traveled by car. At 75 percent of all trips, the car was used three times as often as train, bus, and airplane combined (Figure 4-1). Respondents living in the southern region traveled more often by VRE, while those in the northern region traveled more often by Amtrak (Figure 4-2). This appears reasonable given the option for residents of the southern region to drive north to VRE trains destined for Washington, D.C. Travelers heading south are more likely to take Amtrak to a station where they can then walk or ride in a taxi to their destination.

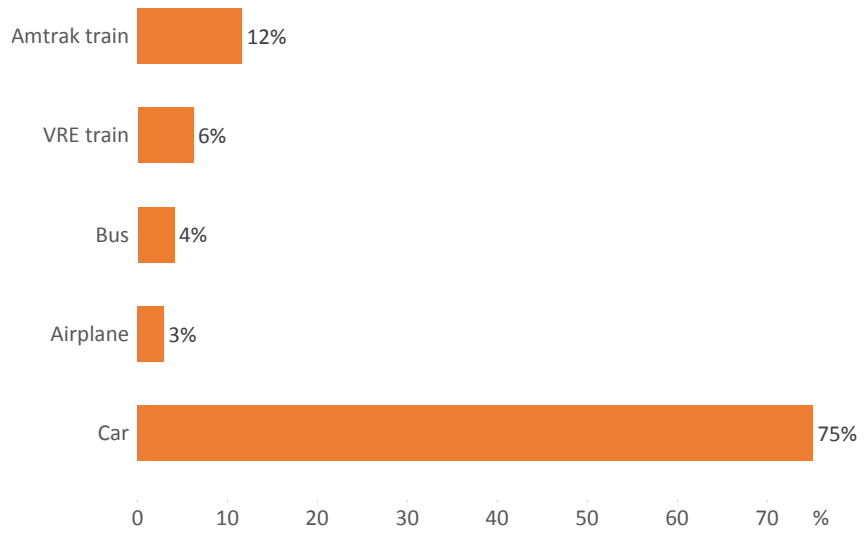


FIGURE 4-1: OVERALL CORRIDOR TRAVELER MODE SHARES

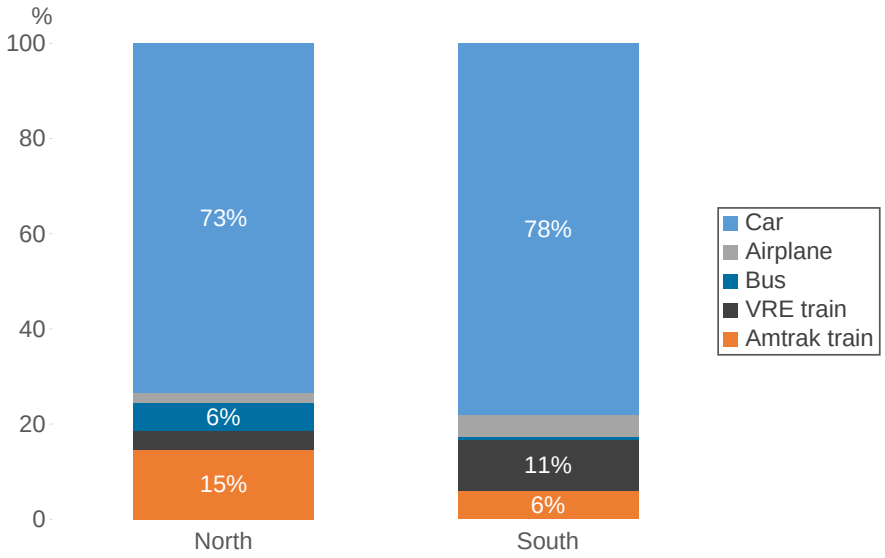


FIGURE 4-2: CORRIDOR TRAVELER MODE SHARES BY SURVEY REGION

4.2 TRAVELER DEMOGRAPHICS

The sample was made up of roughly equal numbers of male and female respondents (Figure 4-3). Travelers 25-34 years old (33 percent) and 35-44 years old (21 percent) made up over half of all survey respondents (Figure 4-4).

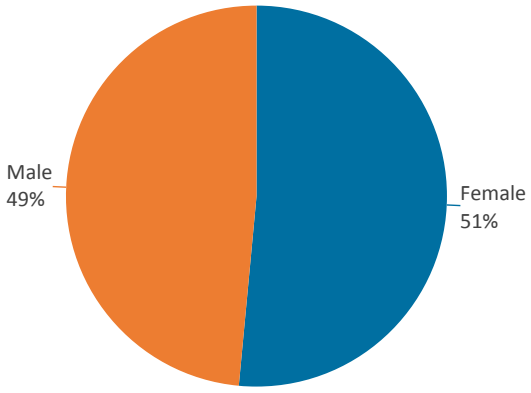


FIGURE 4-3: DISTRIBUTION OF CORRIDOR TRAVELERS BY GENDER

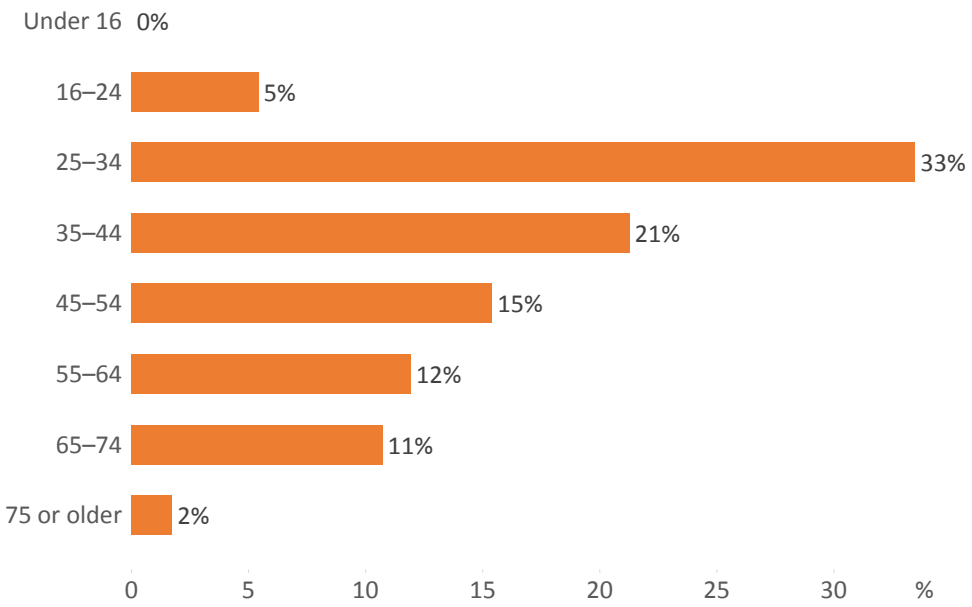


FIGURE 4-4: DISTRIBUTION OF CORRIDOR TRAVELERS BY AGE

Over a third of respondents came from households with annual incomes in the $50,000-$99,999 range (Figure 4-5). Notably, 75 percent of bus-travelers had household income lower than $50,000 while more than 75 percent of travelers on all other modes had household income of $50,000 or greater (Figure 4-6). Household incomes were also found to be higher amongst travelers living in the southern region than those in the northern region (Figure 4-7), with the highest median incomes in the Fredericksburg and Richmond metro areas (Figure 4-8).

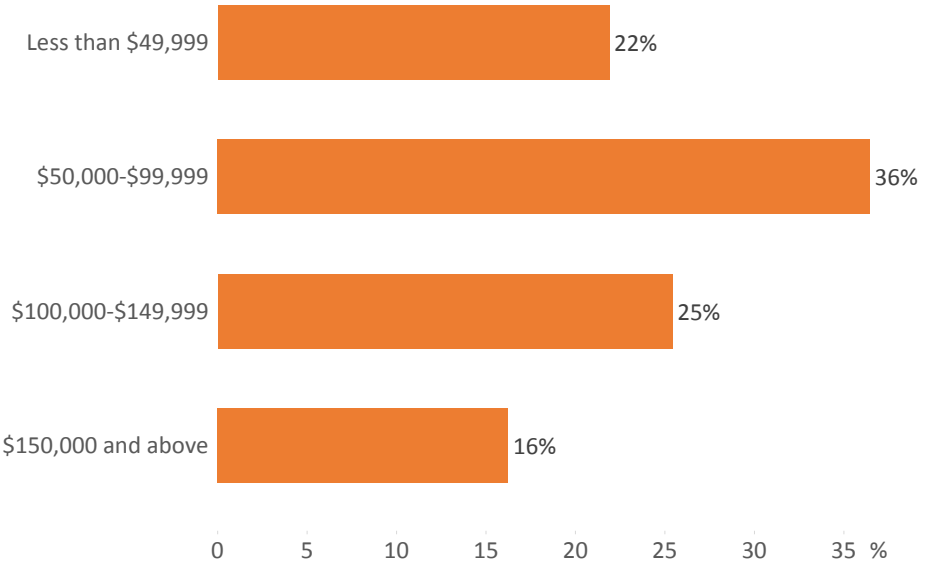


FIGURE 4-5: DISTRIBUTION OF CORRIDOR TRAVELERS BY HOUSEHOLD INCOME

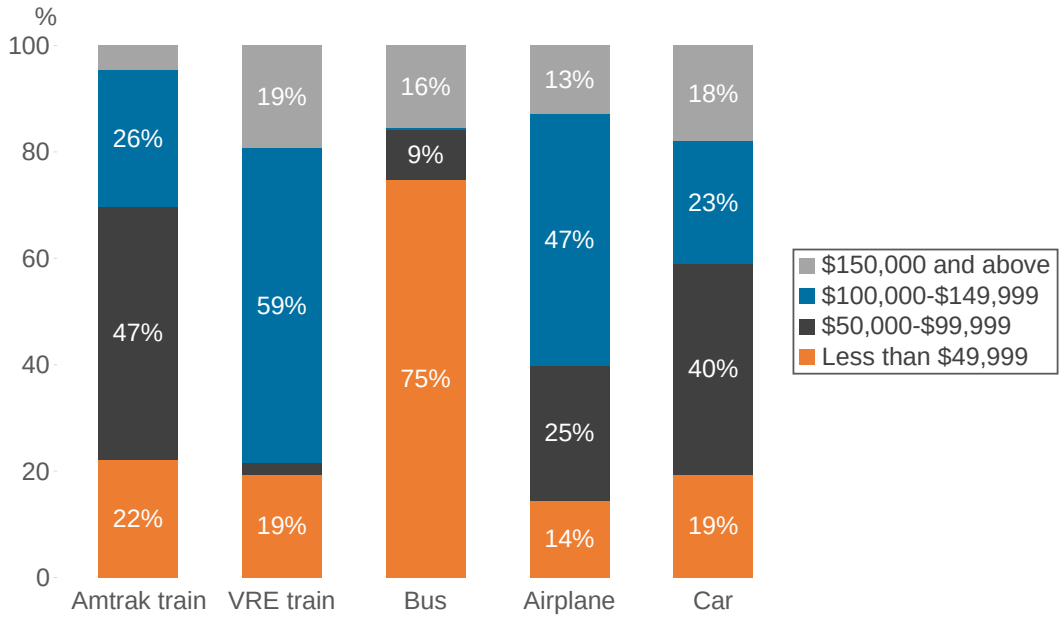


FIGURE 4-6: DISTRIBUTION OF CORRIDOR TRAVELERS BY HOUSEHOLD INCOME AND MODE

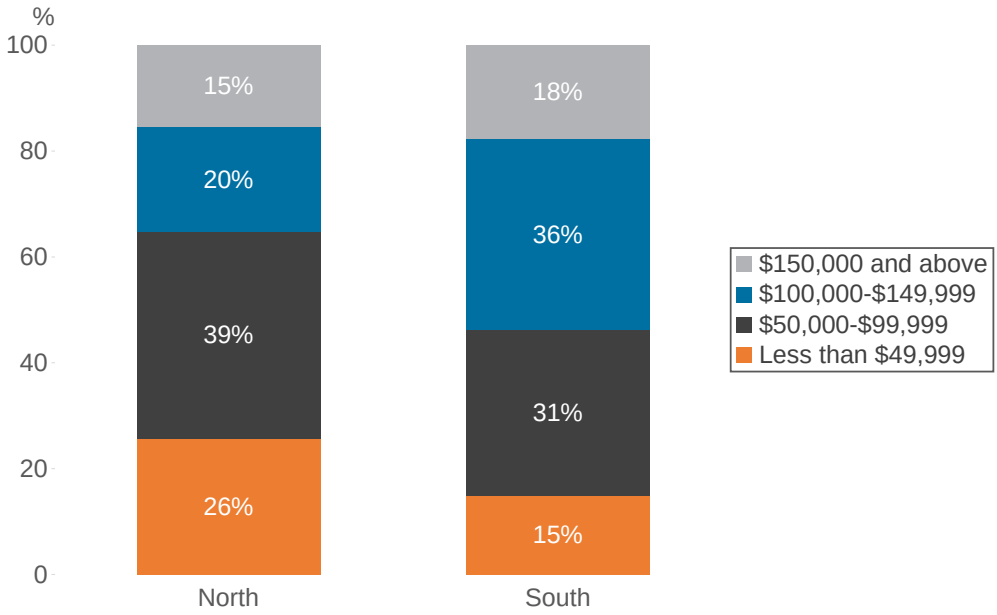


FIGURE 4-7: DISTRIBUTION OF CORRIDOR TRAVELERS BY HOUSEHOLD INCOME AND SURVEY REGION

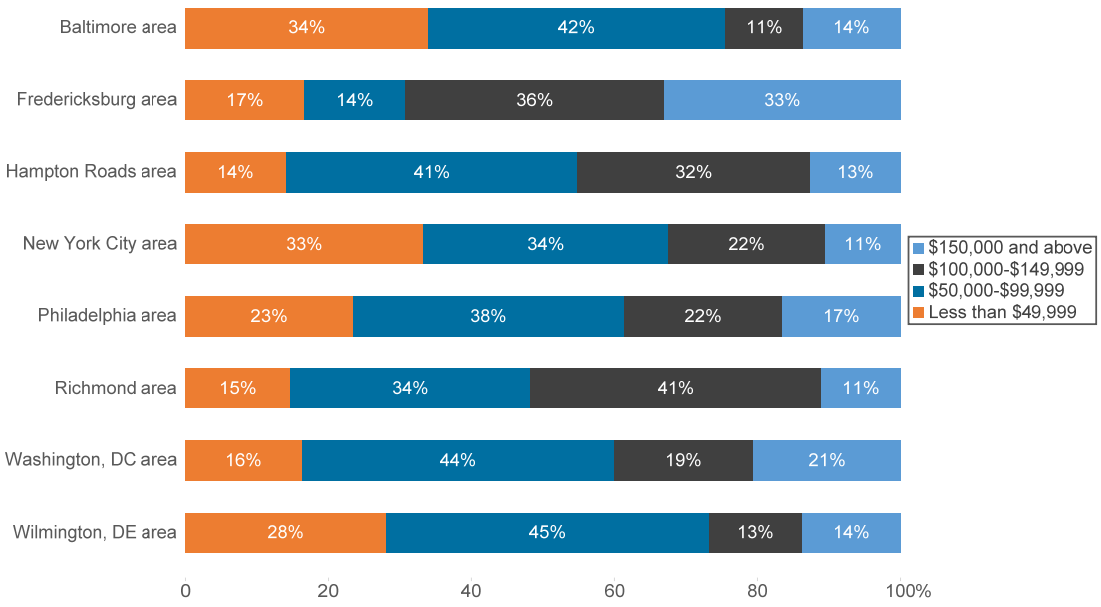


FIGURE 4-8: DISTRIBUTION OF CORRIDOR TRAVELERS BY HOUSEHOLD INCOME AND METRO AREA

4.3 ORIGIN-DESTINATION ANALYSIS

Over 70 percent of all southbound survey trips within the study corridor originate in the New York City or Washington, D.C. metro areas. Of all southbound survey trips (i.e. trips made by people living in the New York, Philadelphia, Wilmington, Baltimore, or Washington areas), nearly half are destined for the Richmond metro area Table 4-1). Of all northbound survey trips within the study corridor (i.e. trips made by people living in the Richmond, Fredericksburg, or Hampton Roads areas), nearly half originate from the Hampton Roads metro area. The great majority of northbound trips, 62 percent, end in Washington, D.C. (Table 4-2).

TABLE 4-1: SOUTHBOUND SURVEY TRIP DISTRIBUTION BY METRO AREA

DESTINATION	Fredericksburg	Richmond	Hampton Roads	Total
HOME				
New York City	5%	16%	14%	34%
Philadelphia	5%	7%	4%	16%
Wilmington, DE	1%	1%	1%	3%
Baltimore	1%	5%	4%	10%
Washington, D.C.	12%	17%	8%	37%
Total	**23%**	**45%**	**32%**	**100%**

TABLE 4-2: NORTHBOUND SURVEY TRIP DISTRIBUTION BY METRO AREA

DESTINATION	New York City	Philadelphia	Wilmington, DE	Baltimore	Washington D.C.	Total
HOME						
Fredericksburg	1%	1%	0%	0%	20%	22%
Richmond	5%	4%	0%	4%	19%	33%
Hampton Roads	12%	4%	0%	5%	23%	45%
Total	**19%**	**8%**	**1%**	**10%**	**62%**	**100%**

5 TRIP PROFILE FOR OVERALL TRAVEL MARKET

This section presents results from the on-line survey describing the nature of overall (all mode) travel market.

Nearly half of all non-auto trips (44 percent) began with the traveler driving to their primary mode of transportation (Figure 5-1). While only 7 percent of travelers accessed their primary mode of transportation via public transportation (i.e., upon leaving home on their outbound leg), 24 percent of travelers finished their trip on public transportation (Figure 5-2).

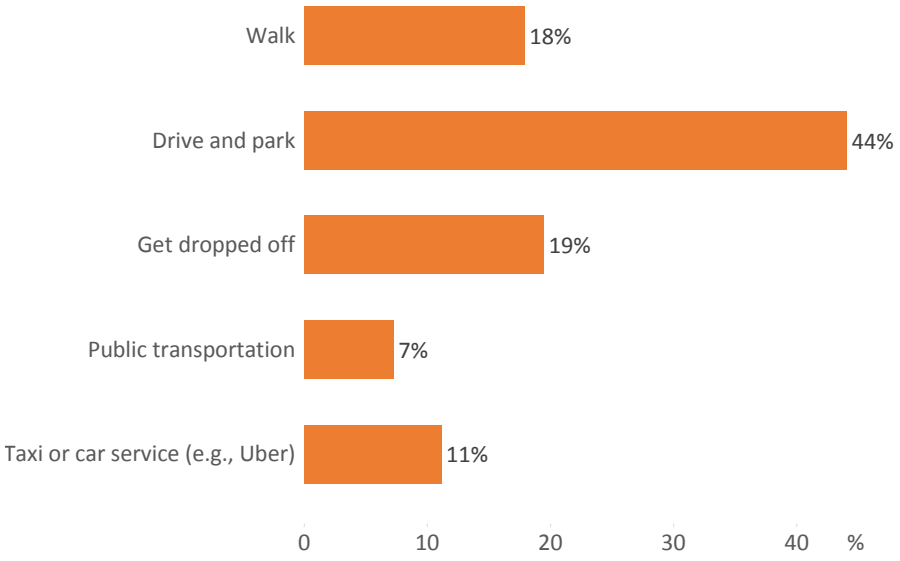


FIGURE 5-1: DISTRIBUTION OF NON-AUTO CORRIDOR TRIPS BY ACCESS (HOME-END) MODES

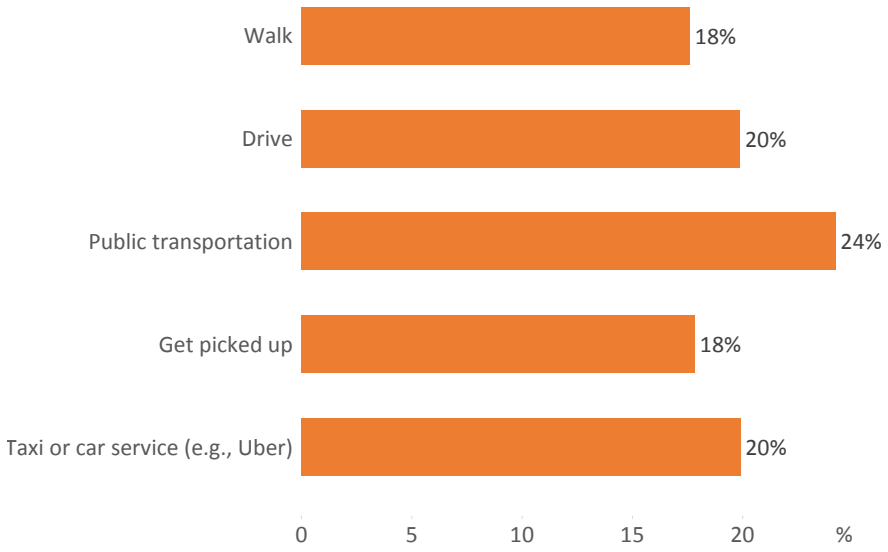


FIGURE 5-2: DISTRIBUTION OF NON-AUTO CORRIDOR TRIPS BY EGRESS (NON-HOME-END) MODES

Figure 5-3 shows that respondents more often traveled in the study corridor for leisure/vacation or family events (48 percent combined) than for commuting or business purposes (40 percent combined). Notably, 74 percent of bus trips were for leisure/vacation or family events while only 32 percent of Amtrak train trips were for those purposes (Figure 5-4).

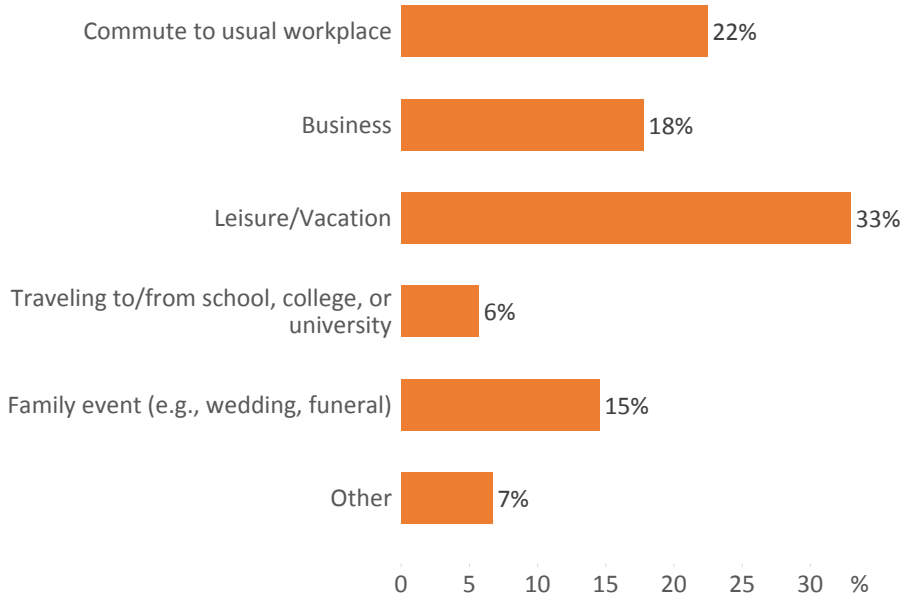


FIGURE 5-3: DISTRIBUTION OF CORRIDOR TRIPS BY TRAVEL PURPOSE

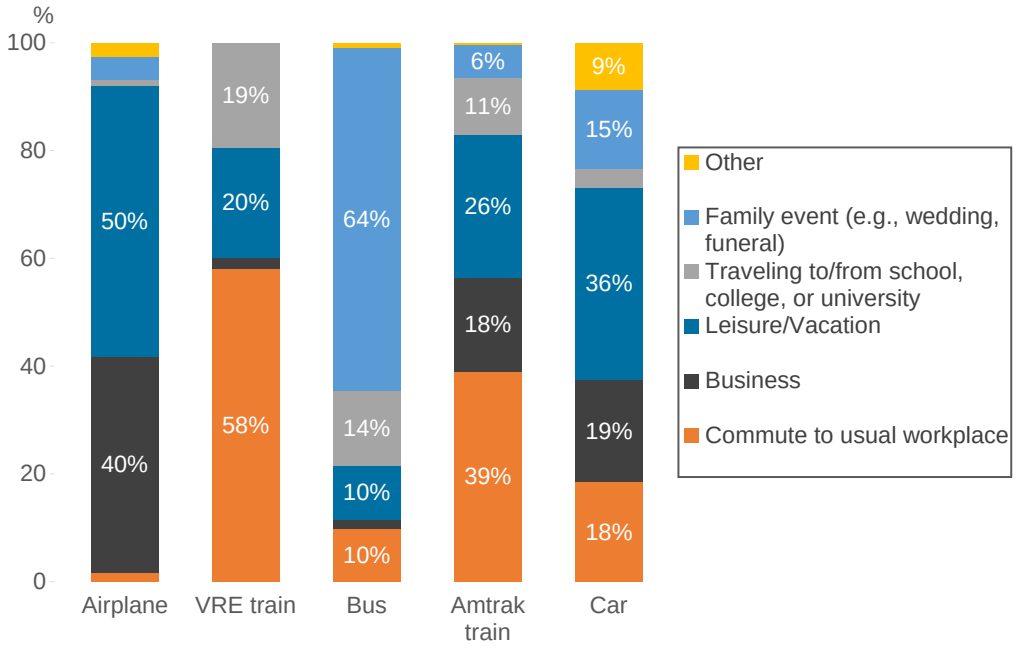


FIGURE 5-4: DISTRIBUTION OF CORRIDOR TRIPS BY TRAVEL PURPOSE AND MODE

Almost 70 percent of all trips were made alone or with one other person (Figure 5-5). Forty percent of travelers make their trip once a week or more (Figure 5-6).

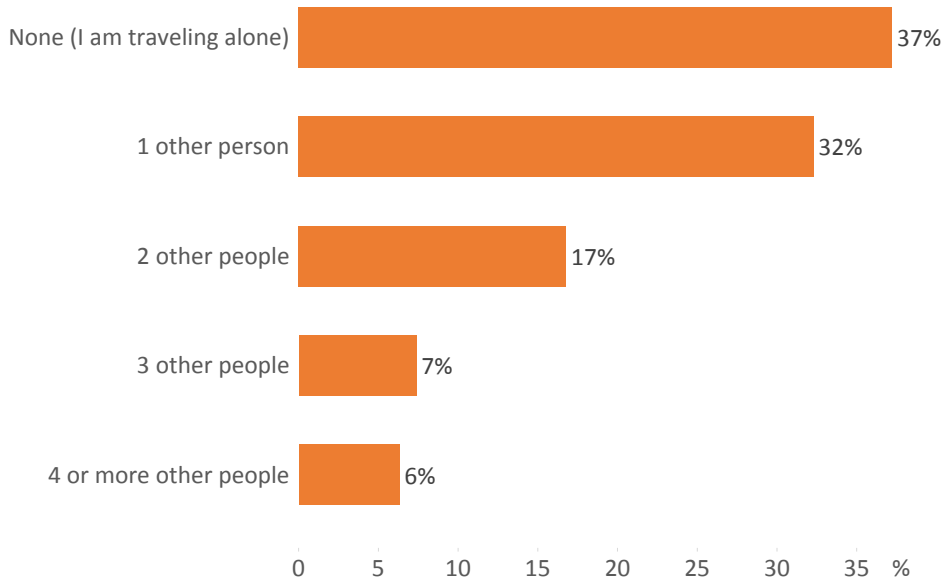


FIGURE 5-5: DISTRIBUTION OF CORRIDOR TRIPS BY PARTY SIZE

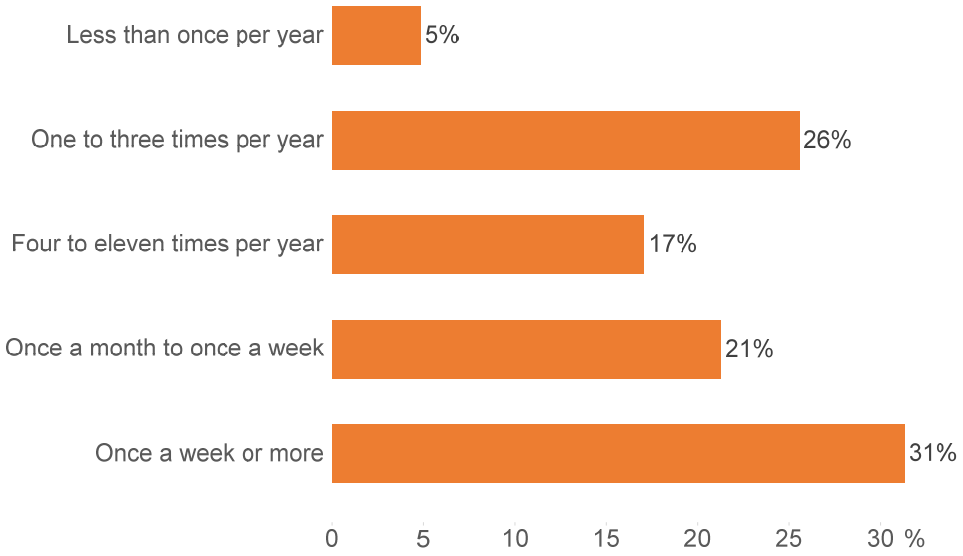


FIGURE 5-6: DISTRIBUTION CORRIDOR TRIPS BY TRIP FREQUENCY

6 DETAILED PROFILE OF RAIL AND BUS USERS

This section presents results from the survey conducted aboard Amtrak trains and at the Richmond Megabus stop, and describes the nature of the intercity rail and bus travel markets.

6.1 TRIP PURPOSE

The distribution of trip purposes varies between current corridor rail and bus users. Bus passengers are much more likely to be attending a family event (such as a wedding) or traveling to or from school or college (Figure 6-1). Amtrak users are more likely to be commuters or business travelers, though the most likely trip purpose for Amtrak users is leisure/vacation.

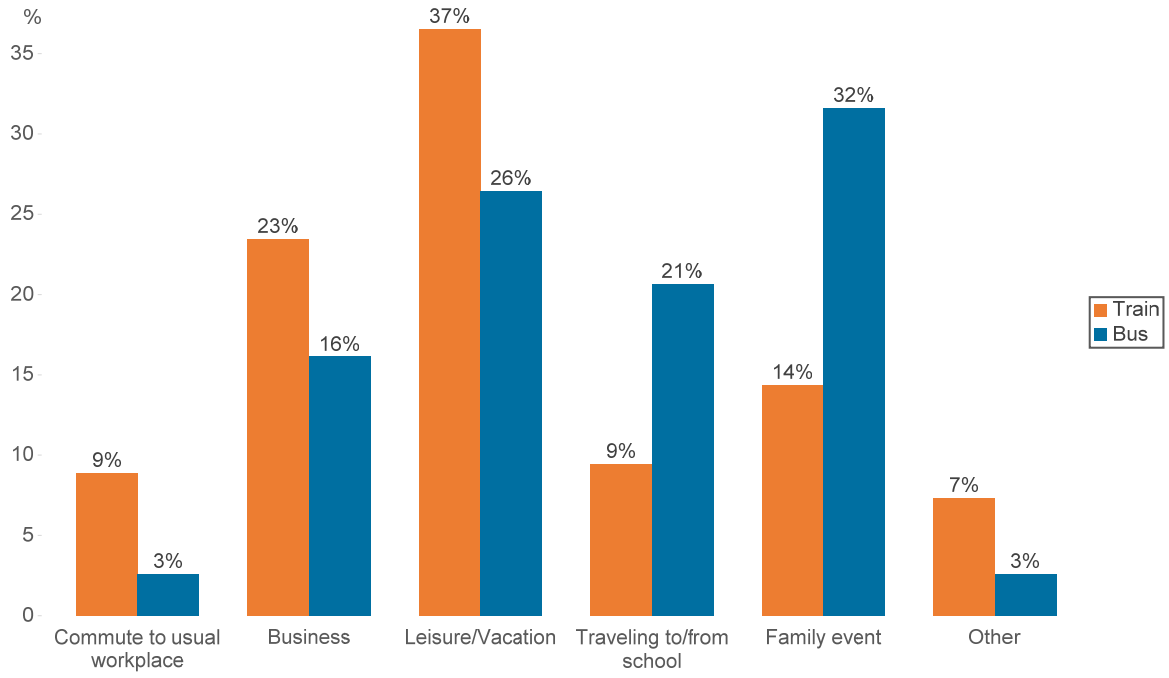


FIGURE 6-1: DISTRIBUTION CORRIDOR TRIPS BY TRIP FREQUENCY

6.2 TRANSFERS

Nearly 9 percent of the survey respondents were making a trip that required a transfer.

6.3 RAIL BOARDING STATION

Among surveyed passengers traveling along the DC2RVA corridor, Richmond Staples Mill Road was the most used train station, followed by Union Station in Washington D.C. and Penn Station in New York (Figure 6-2). Nearly 8 percent were travelling from an area south of the study corridor (which terminates in Petersburg).

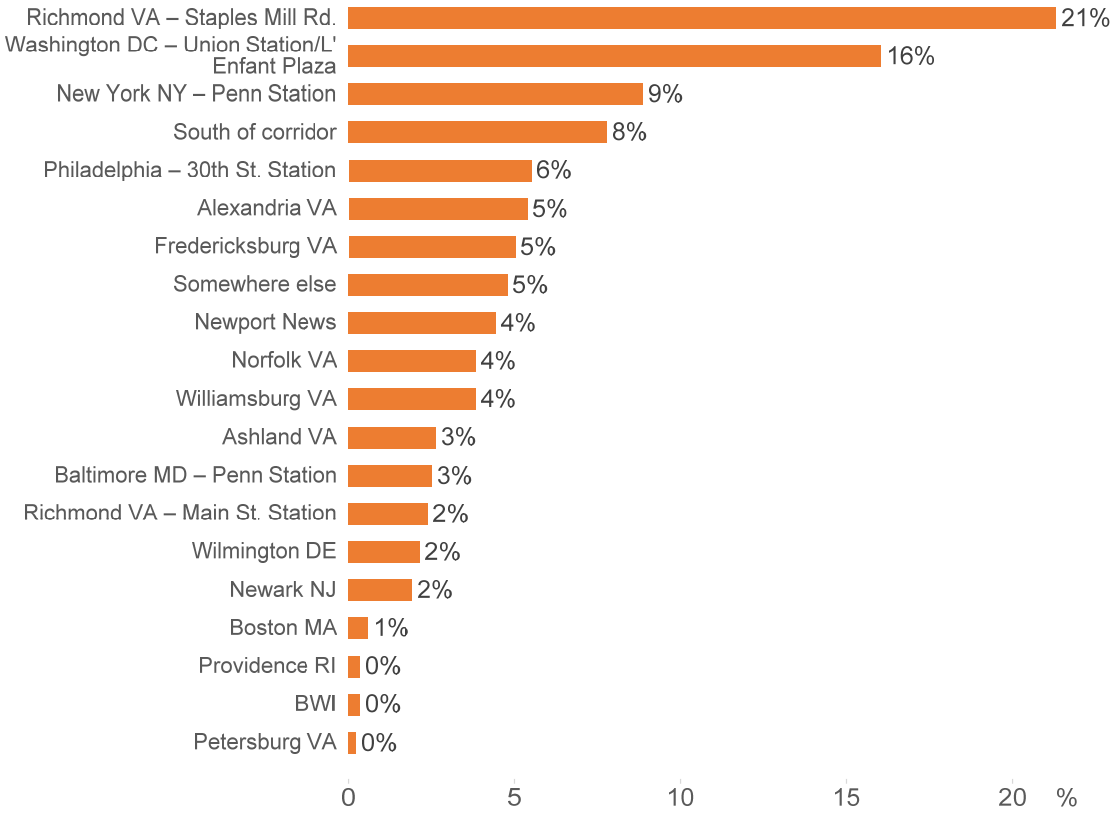


FIGURE 6-2: SURVEYED RIDERSHIP BY STATION

6.4 USAGE CHARACTERISTICS AT EACH RICHMOND AMTRAK STATION

There are two Amtrak stations in the Richmond area, including a suburban station (Staples Mill Road Station) and a downtown station (Main Street Station). The two stations serve slightly different populations, and passengers access the stations in different ways.

Figure 6-3 shows combined access/egress mode information for passengers from each station. Passengers boarding or alighting at Staples Mill Road Station were much more likely than passengers using Main Street Station to have driven themselves or been dropped off or picked up to or from the station. Passengers using Main Street Station are more likely to have taken a taxi and far more likely to have walked.

Figure 6-4 and Figure 6-5 show trip purpose for boarding and alighting passengers at the two Richmond stations. Passengers departing from Main Street station are more likely to be traveling for business while those arriving at the station are more likely to be traveling for leisure/vacation or family events. This disparity shows that the downtown station is more often used for the non-home end of trips while the suburban station is more often used for home end trips.

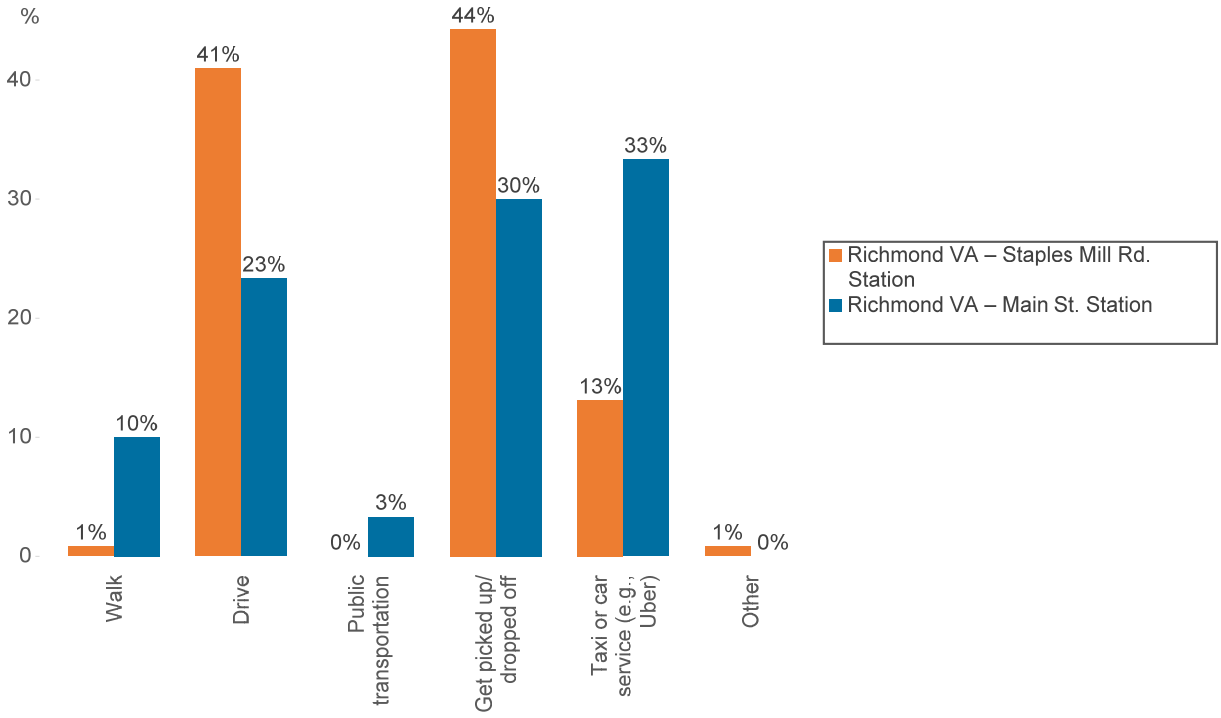


FIGURE 6-3: ACCESS/EGRESS MODE BY RICHMOND RAIL STATION

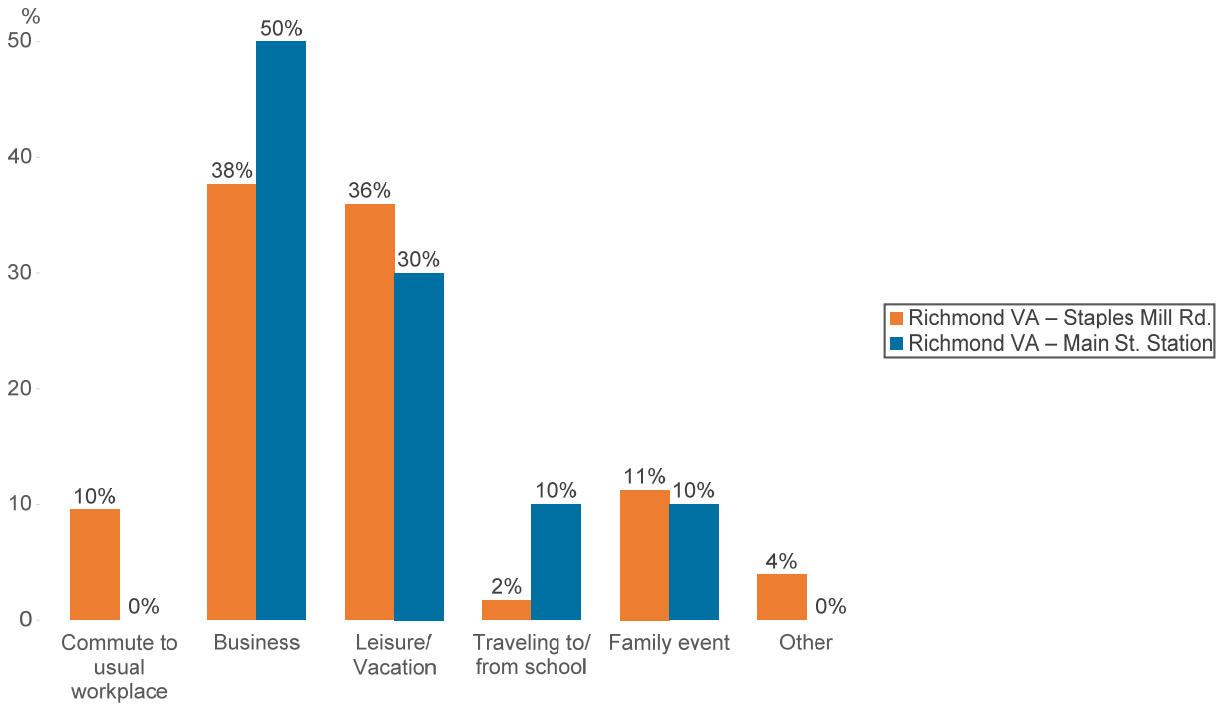


FIGURE 6-4: BOARDING PASSENGER TRIP PURPOSE BY RICHMOND RAIL STATION

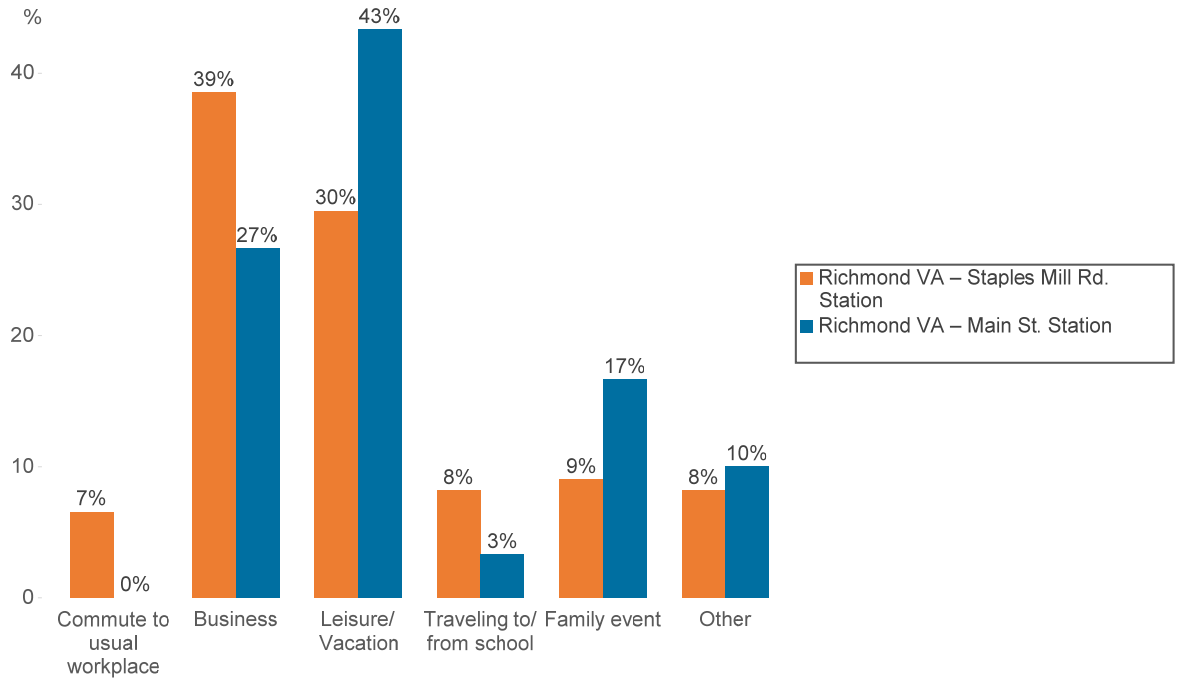


FIGURE 6-5: ALIGHTING PASSENGER TRIPS PURPOSE BY RICHMOND RAIL STATION

6.5 ORIGIN AND DESTINATION LOCATION OF RAIL AND BUS TRIPS IN THE RICHMOND AREA

Figure 6-6 and Figure 7-7 show the origin and destination locations within Richmond for bus and Amtrak users traveling to or from the Northeast. Residents of the Richmond area are represented by orange dots, and non-residents by blue dots. As one might expect, non-residents are more likely to have downtown origins and destinations. Residents are more like to begin or end their trips over a broader region.

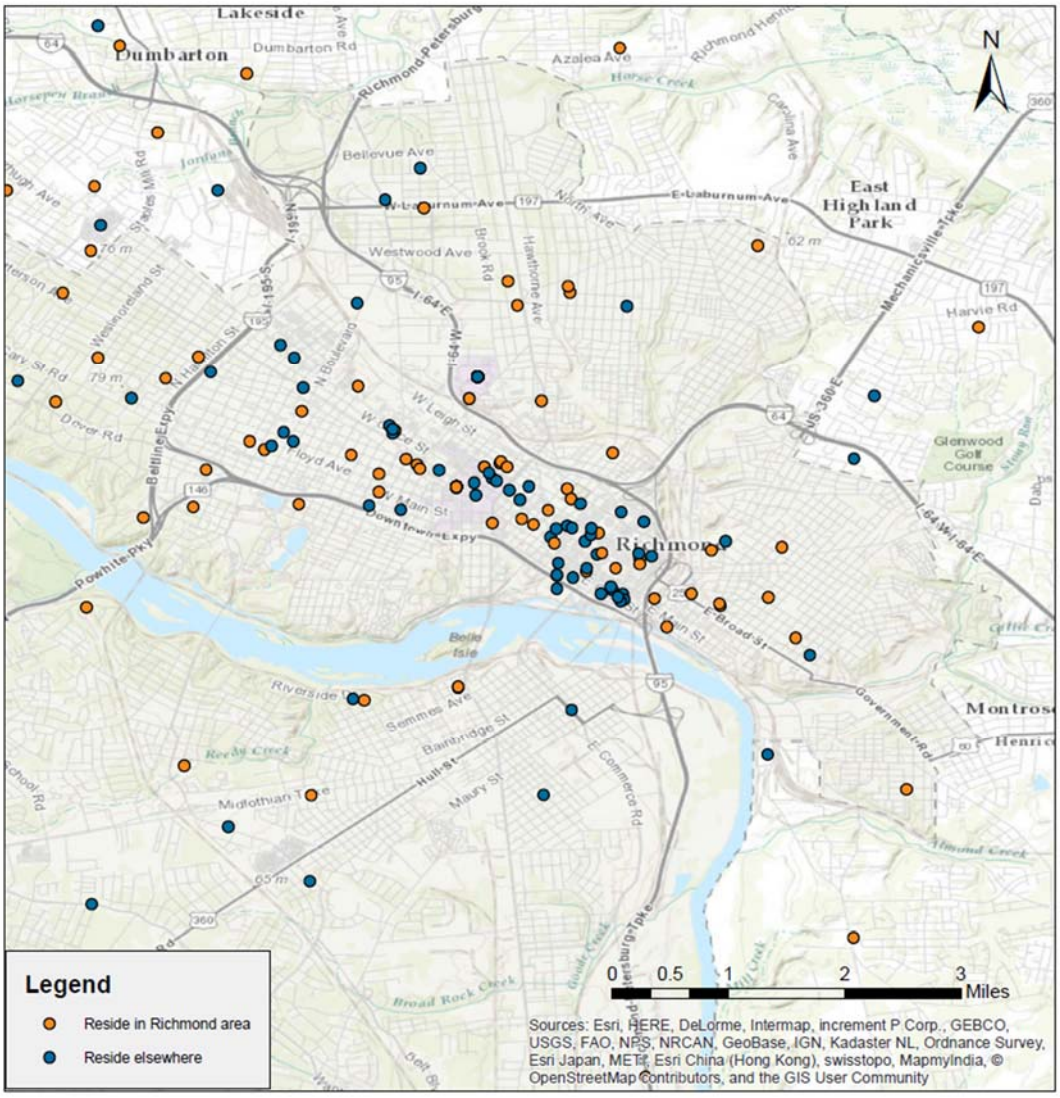


FIGURE 6-6: TRIP ORIGINS IN THE RICHMOND AREA

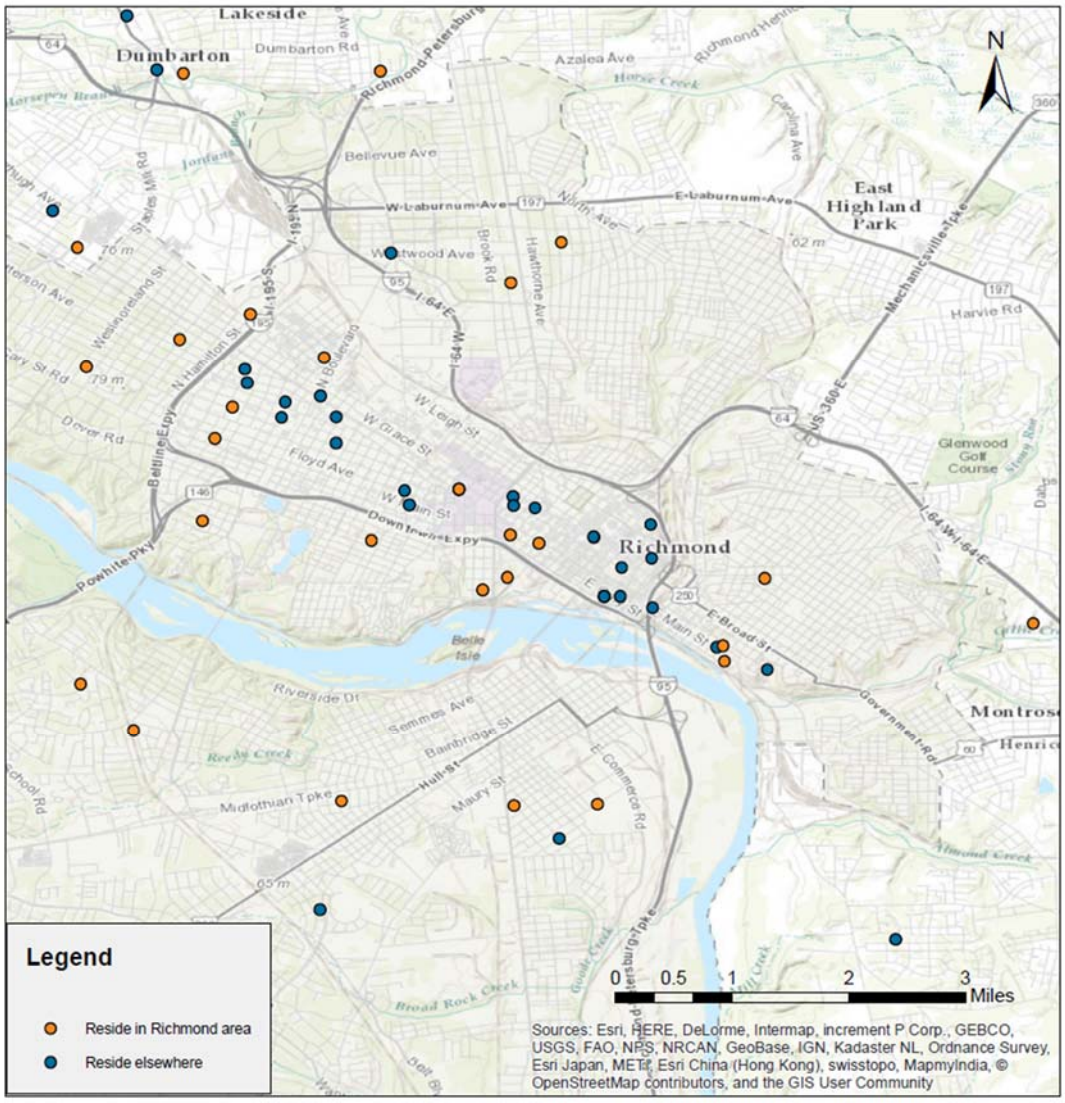


FIGURE 6-6: TRIP DESTINATIONS IN THE RICHMOND AREA

6.6 STATION USE BY HOME- AND NON-HOME-TRIP END

In order to determine which Amtrak station was the respondent's "home" station, we compared the home ZIP code (provided by the respondent) to the location of the respondent's origin and destination. If the origin or destination fell within the ZIP code, or within 35 miles of the centroid of that ZIP code, it was assigned as the respondent's home location. About 76 percent of the records had an identifiable home location; others were likely making trips between two non-home locations.

The results of this analysis show that downtown stations, like Main Street Station in Richmond, are much more likely to serve the non-home end of a trip. Suburban stations like Staples Mill Road Station in Richmond, are more likely to serve people traveling between their home in Richmond and points north (Table 6-1).

TABLE 6-1: DISTRIBUTION OF HOME- AND NON-HOME TRIP ENDS BY STATION

Station	Home end (boarding or alighting at home)	Non-home end (boarding or alighting away from home)	Home end %	Non-home end %
Boston MA	4	2	67%	33%
Providence RI	1	3	25%	75%
New York NY – Penn Station	33	87	28%	73%
Newark NJ	12	13	48%	52%
Philadelphia – 30th St. Station	28	42	40%	60%
Wilmington DE	11	10	52%	48%
Baltimore MD – Penn Station	6	27	18%	82%
BWI	2	3	40%	60%
Washington D.C. – Union Station or L'Enfant Plaza	59	188	24%	76%
Alexandria VA	16	47	25%	75%
Fredericksburg VA	53	6	90%	10%
Ashland VA	22	8	73%	27%
Williamsburg VA	29	26	53%	47%
Richmond VA – Staples Mill Rd. Station	190	47	80%	20%
Richmond VA – Main St. Station	15	20	43%	57%
Petersburg VA	1	2	33%	67%
Norfolk VA	21	13	62%	38%
Newport News	33	25	57%	43%
South of corridor	70	50	58%	42%

7 TRAVELER SENSITIVITY TO TRIP ATTRIBUTES

Data collected from the reliability and mode choice experiments described in Section 2.0 were used to estimate an initial set of passenger sensitivities to changes in fare, travel time, and other service attributes. It is important to note that the final ridership model will likely not adhere strictly to these sensitivities. Rather, they will serve as a starting point for model calibration that will then compare these results to revealed preferences (based on actual Amtrak experience). As needed, model parameters will be adjusted to match actual (revealed) sensitivities.

The model specifications adhere to the framework of the NEC FUTURE model (version dated April of 2015). Data from respondents commuting to their typical workplaces was excluded, as there were few commuters in the sample and the NEC FUTURE Model has separate coefficients for commuters.

The coefficients in Table 7-1 and Table 7-2 have, in most cases, been expressed in terms of marginal rates of substitution for line haul travel time. This makes them easy to interpret; for example, business travelers would trade an additional 28 minutes of travel time for increasing the frequency of available daily trips from four to five. In the case of on-time performance, the coefficients for which come from a separate model, the marginal rates of substitution are reported in dollars.

Where applicable, the comparable sensitivities from the NEC FUTURE model are also provided in the tables.

TABLE 7-1: SENSITIVITIES FOR BUSINESS TRAVELERS

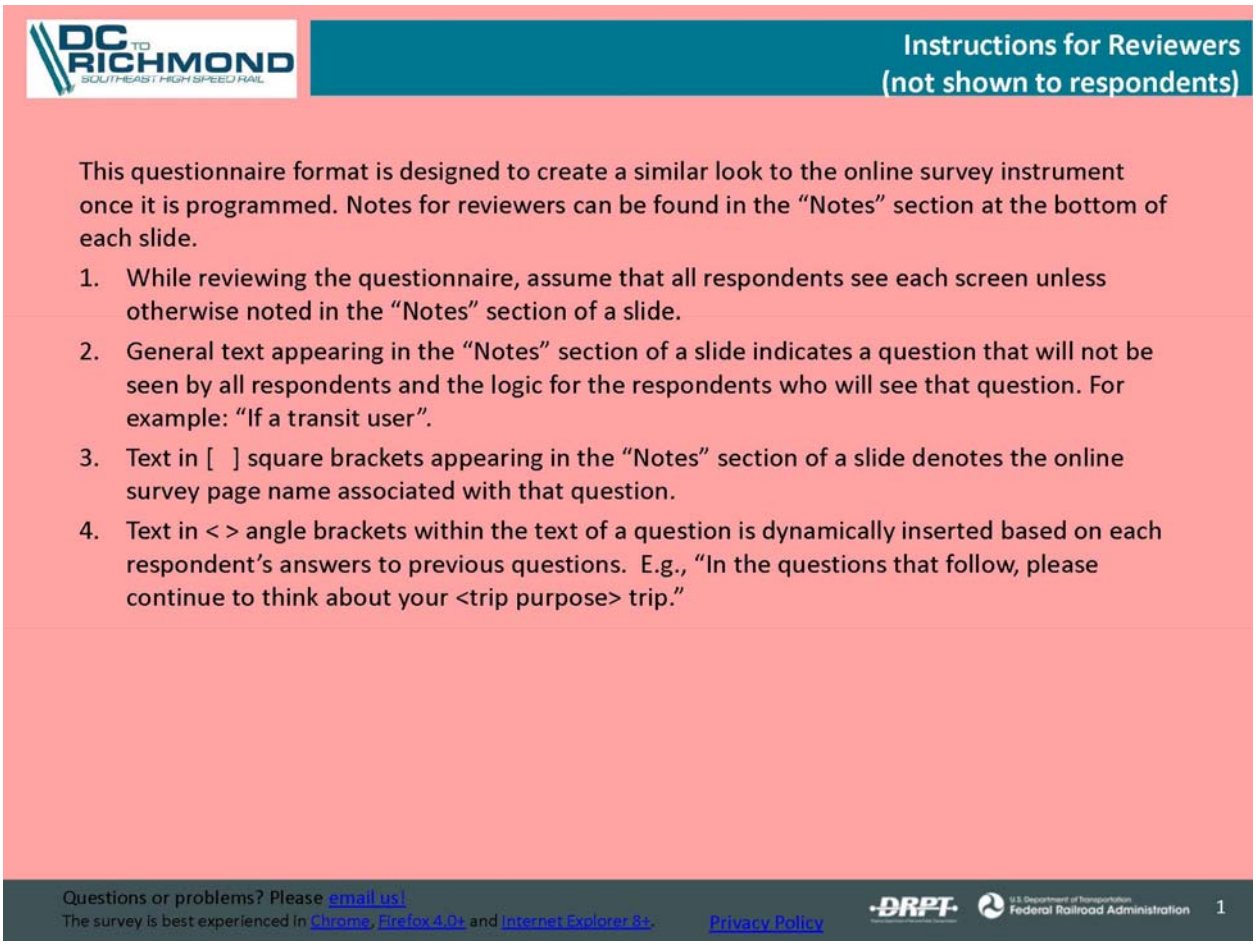
Attribute	Units	NEC FUTURE	DC2RVA
Cost (Premium Modes)	Minutes of Line Haul Travel Time / Dollar of Total Trip Cost	0.664	1.005
Cost (Non-Premium Modes)	Minutes of Line Haul Travel Time / Dollar of Total Trip Cost	1.455	3.441
Access/Egress Time	Minutes of Line Haul Travel Time / Minute of Access/Egress Time	0.791	1.729
Frequency	Minutes of Line Haul Travel Time / Additional Daily Train	27.963	28.039
On-time performance (1%)	Dollars / Percentage Point Increase in On-time Performance	N/A	$1.14

TABLE 7-2: SENSITIVITIES FOR NON-BUSINESS TRAVELERS

Attribute	Units	NEC FUTURE	DC2RVA
Cost (Cost <$50)	Minutes of Line Haul Travel Time / Dollar	10.727	5.464
Cost (Cost $50-$99)	Minutes of Line Haul Travel Time / Dollar	5.273	1.869
Cost (Cost $100-$149)	Minutes of Line Haul Travel Time / Dollar	2.545	1.128
Cost (Cost >=$150)	Minutes of Line Haul Travel Time / Dollar	1.818	0.807
Access/Egress Time	Minutes of Line Haul Travel Time / Minute of Access/Egress time	0.982	3.314
Frequency	Minutes of Line Haul Travel Time / Additional Daily Train	0.056	10.943
On-time performance (1%)	Dollars / Percentage Point Increase in On-time Performance	N/A	$0.64

A APPENDIX

This appendix presents the questionnaire used for the DC2RVA survey.


DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Instructions for Reviewers
(not shown to respondents)
This questionnaire format is designed to create a similar look to the online survey instrument once it is programmed. Notes for reviewers can be found in the "Notes" section at the bottom of each slide.
1. While reviewing the questionnaire, assume that all respondents see each screen unless otherwise noted in the "Notes" section of a slide.
2. General text appearing in the "Notes" section of a slide indicates a question that will not be seen by all respondents and the logic for the respondents who will see that question. For example: "If a transit user".
3. Text in [ ] square brackets appearing in the "Notes" section of a slide denotes the online survey page name associated with that question.
4. Text in < > angle brackets within the text of a question is dynamically inserted based on each respondent's answers to previous questions. E.g., "In the questions that follow, please continue to think about your <trip purpose> trip."
Questions or problems? Please email us!
The survey is best experienced in Chrome, Firefox 4.0+ and Internet Explorer 8+.
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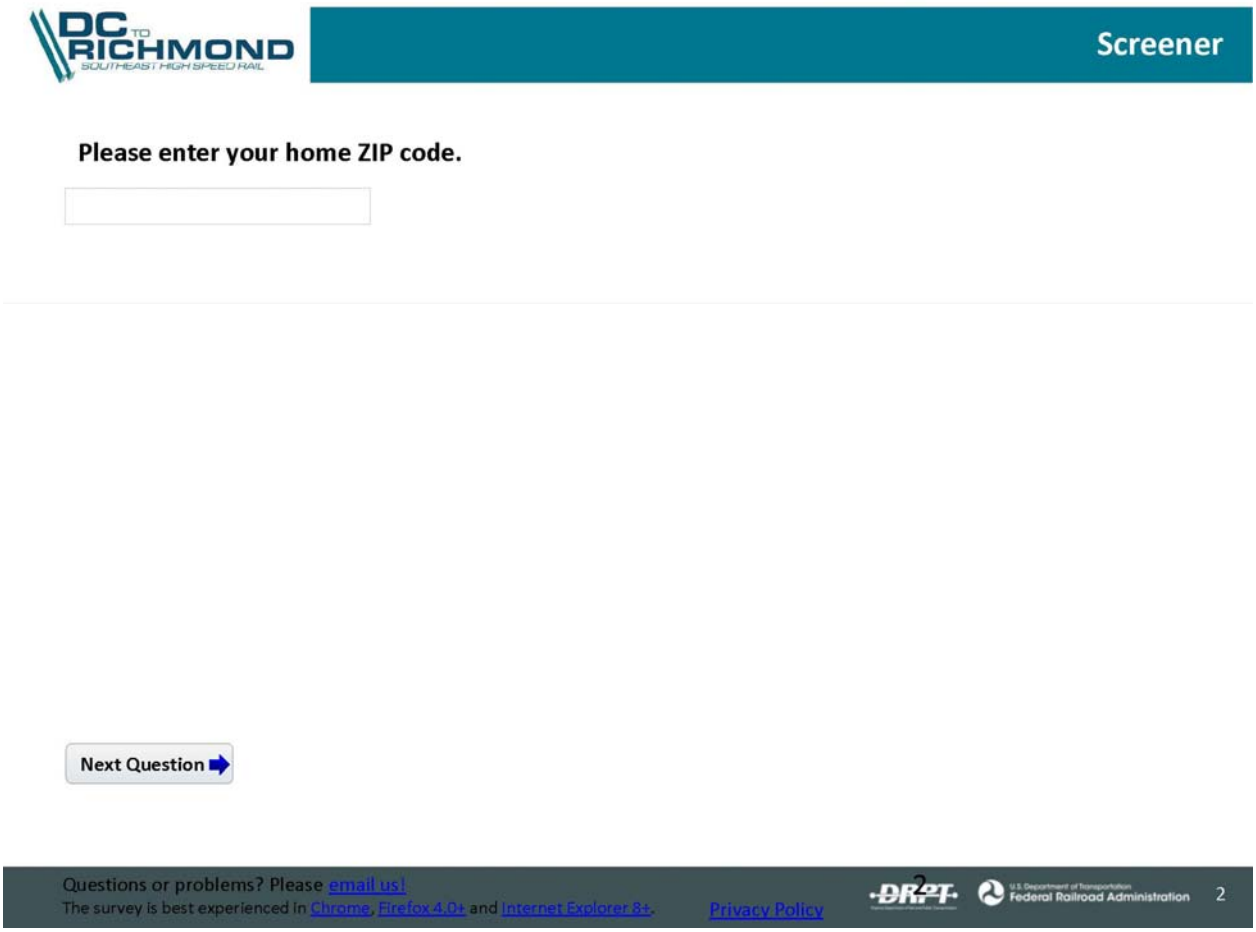
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Screener
Please enter your home ZIP code.
Next Question
Questions or problems? Please email us!
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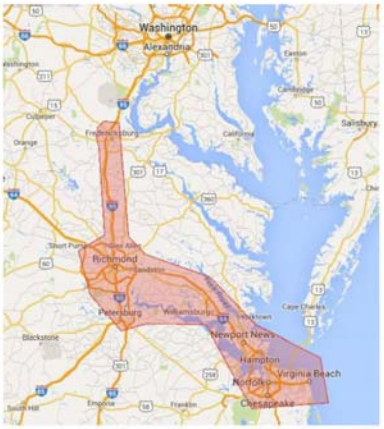
DC TO RICHMOND SOUTHEAST HIGH SPEED RAIL

Screener

In the past 12 months, have you made one or more round trips between your home and the highlighted region on the map? Select all that apply.

- ☐ No
- ☐ Yes, by car
- ☐ Yes, by bus
- ☐ Yes, by rail
- ☐ Yes, by airplane

[show to northern respondents]



[show to southern respondents]

Next Question

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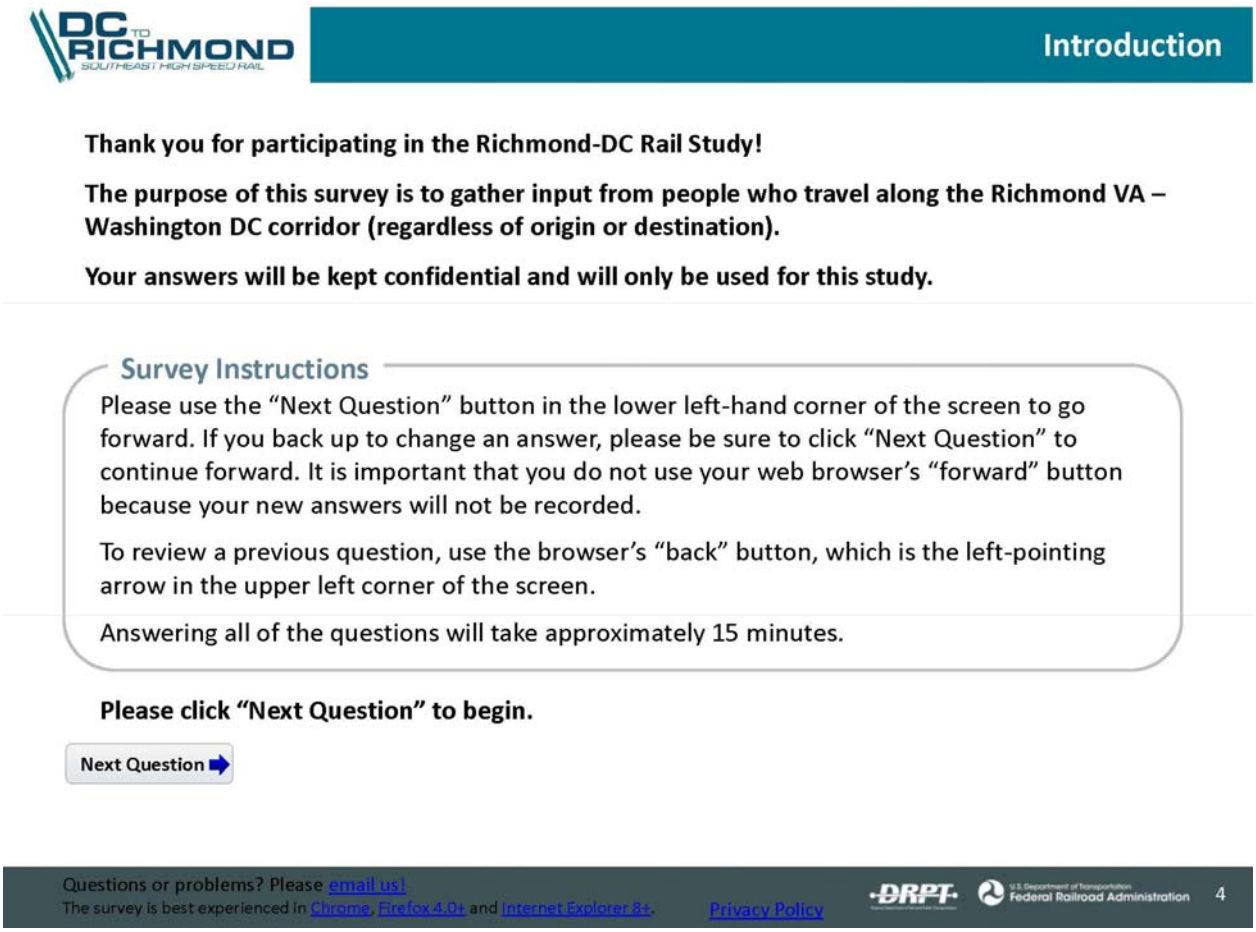
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Introduction
Thank you for participating in the Richmond-DC Rail Study!
The purpose of this survey is to gather input from people who travel along the Richmond VA – Washington DC corridor (regardless of origin or destination).
Your answers will be kept confidential and will only be used for this study.
Survey Instructions
Please use the "Next Question" button in the lower left-hand corner of the screen to go forward. If you back up to change an answer, please be sure to click "Next Question" to continue forward. It is important that you do not use your web browser's "forward" button because your new answers will not be recorded.
To review a previous question, use the browser's "back" button, which is the left-pointing arrow in the upper left corner of the screen.
Answering all of the questions will take approximately 15 minutes.
Please click "Next Question" to begin.
Next Question
Questions or problems? Please email us!
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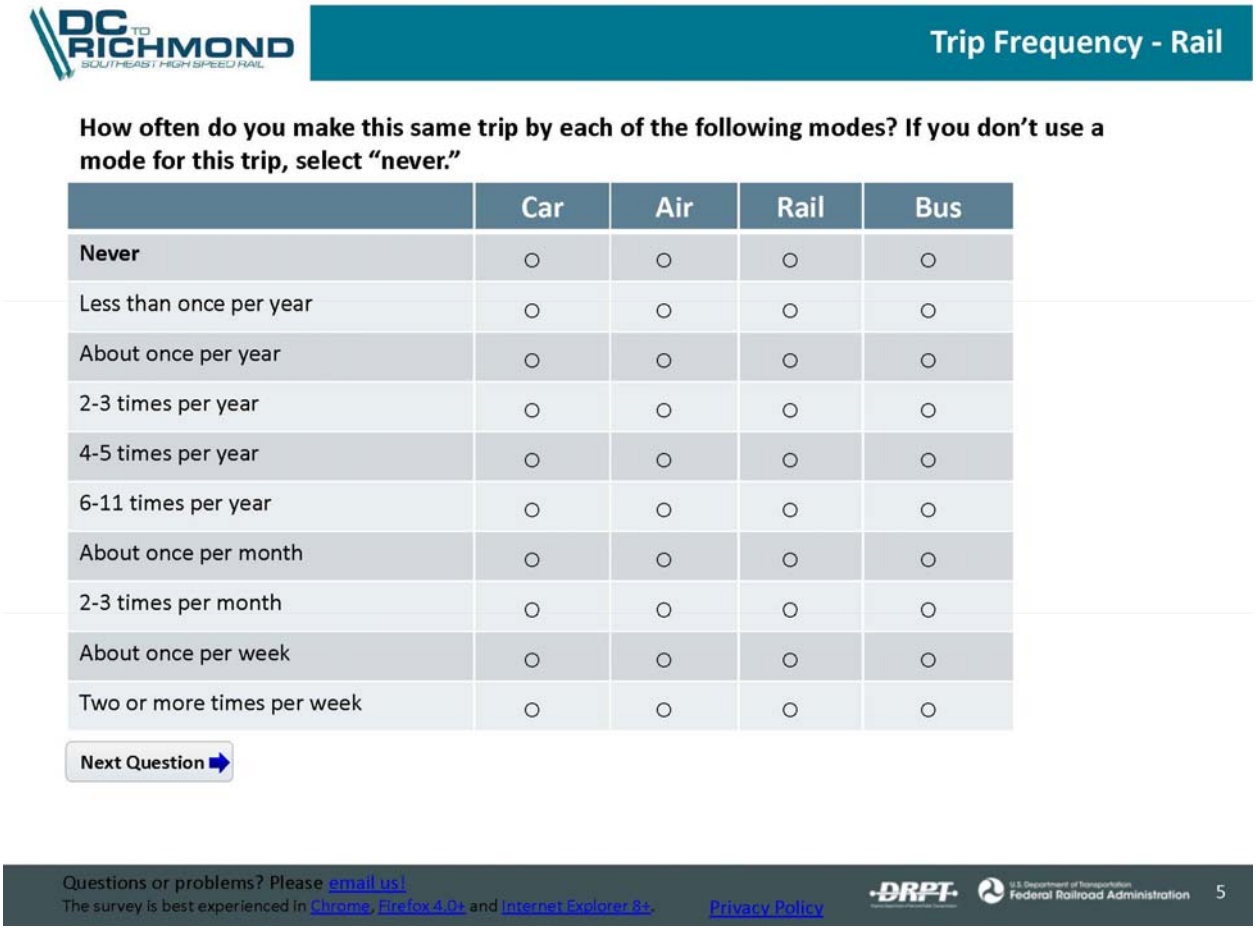
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Trip Frequency - Rail
How often do you make this same trip by each of the following modes? If you don't use a mode for this trip, select "never."
Car
Air
Rail
Bus
Never
Less than once per year
About once per year
2-3 times per year
4-5 times per year
6-11 times per year
About once per month
2-3 times per month
About once per week
Two or more times per week
Next Question
Questions or problems? Please email us!
The survey is best experienced in Chrome, Firefox 4.0+ and Internet Explorer 8+.
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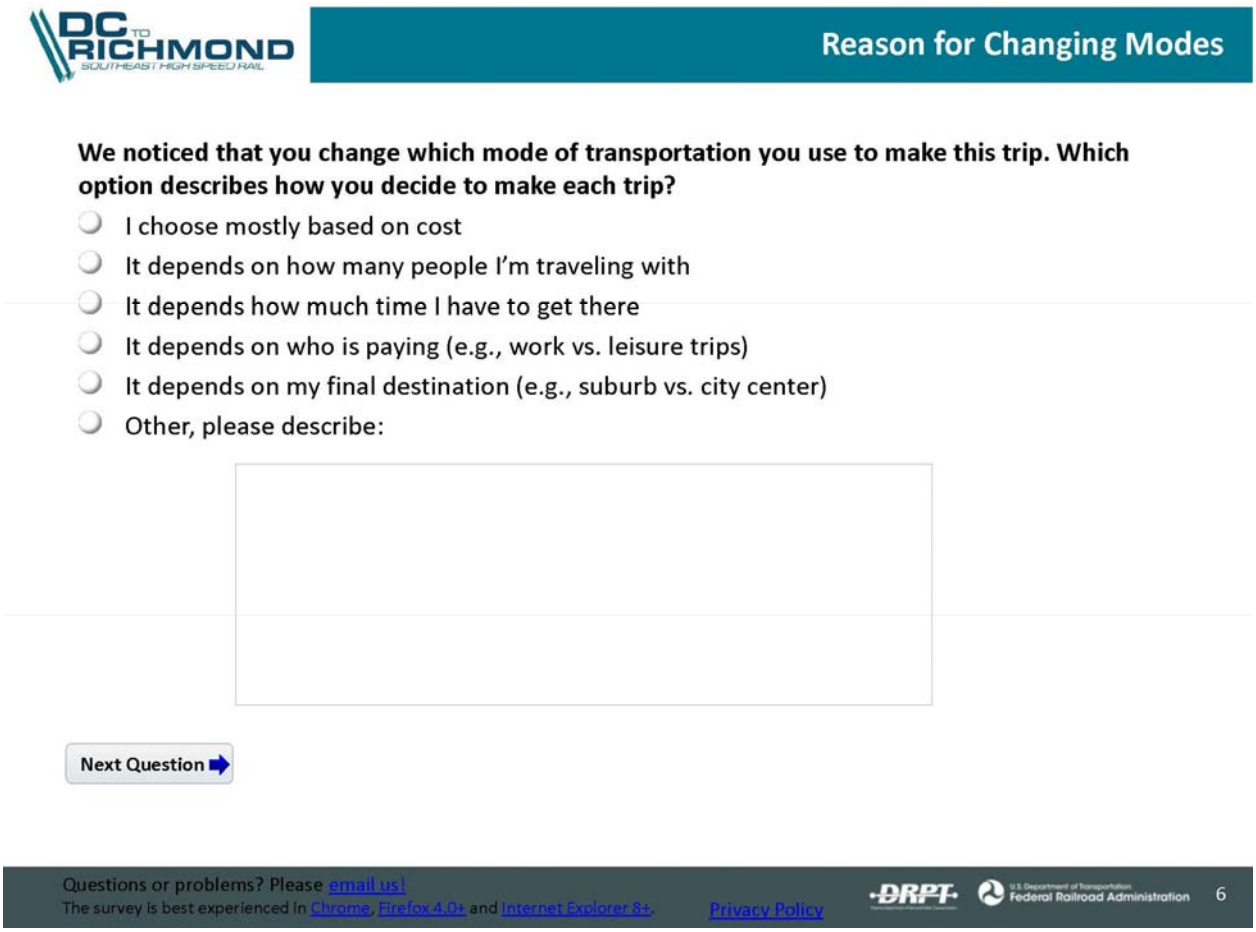
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Reason for Changing Modes
We noticed that you change which mode of transportation you use to make this trip. Which option describes how you decide to make each trip?
I choose mostly based on cost
It depends on how many people I'm traveling with
It depends how much time I have to get there
It depends on who is paying (e.g., work vs. leisure trips)
It depends on my final destination (e.g., suburb vs. city center)
Other, please describe:
Next Question
Questions or problems? Please email us!
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DC TO RICHMOND SOUTHEAST HIGH SPEED RAIL

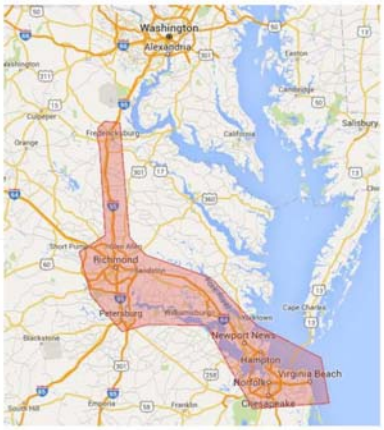
Access

For the next several questions, please think about your most recent trip between your home and the highlighted area on the map.

What mode of transportation did you use for that most recent trip?

- Amtrak train
- VRE train
- Bus
- Airplane
- Car

[show to northern respondents]



[show to southern respondents]

Next Question

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DC TO RICHMOND SOUTHEAST HIGH SPEED RAIL

Destination city

On your most recent trip to the shaded region, which area best describes your destination?

[if from northern region]

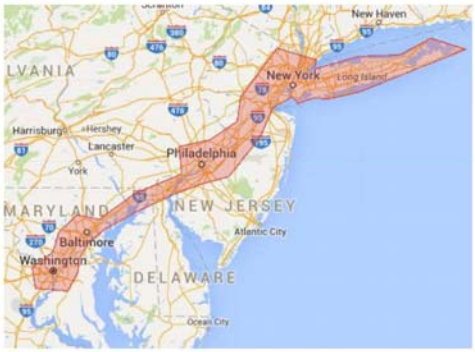
- Fredericksburg area
- Richmond area
- Hampton Roads area (incl. Newport News, Hampton, Virginia Beach, and Norfolk)

[show to northern respondents]

[if from southern region]

- New York City area
- Philadelphia area
- Wilmington, DE area
- Baltimore area
- Washington, DC area

[show to southern respondents]



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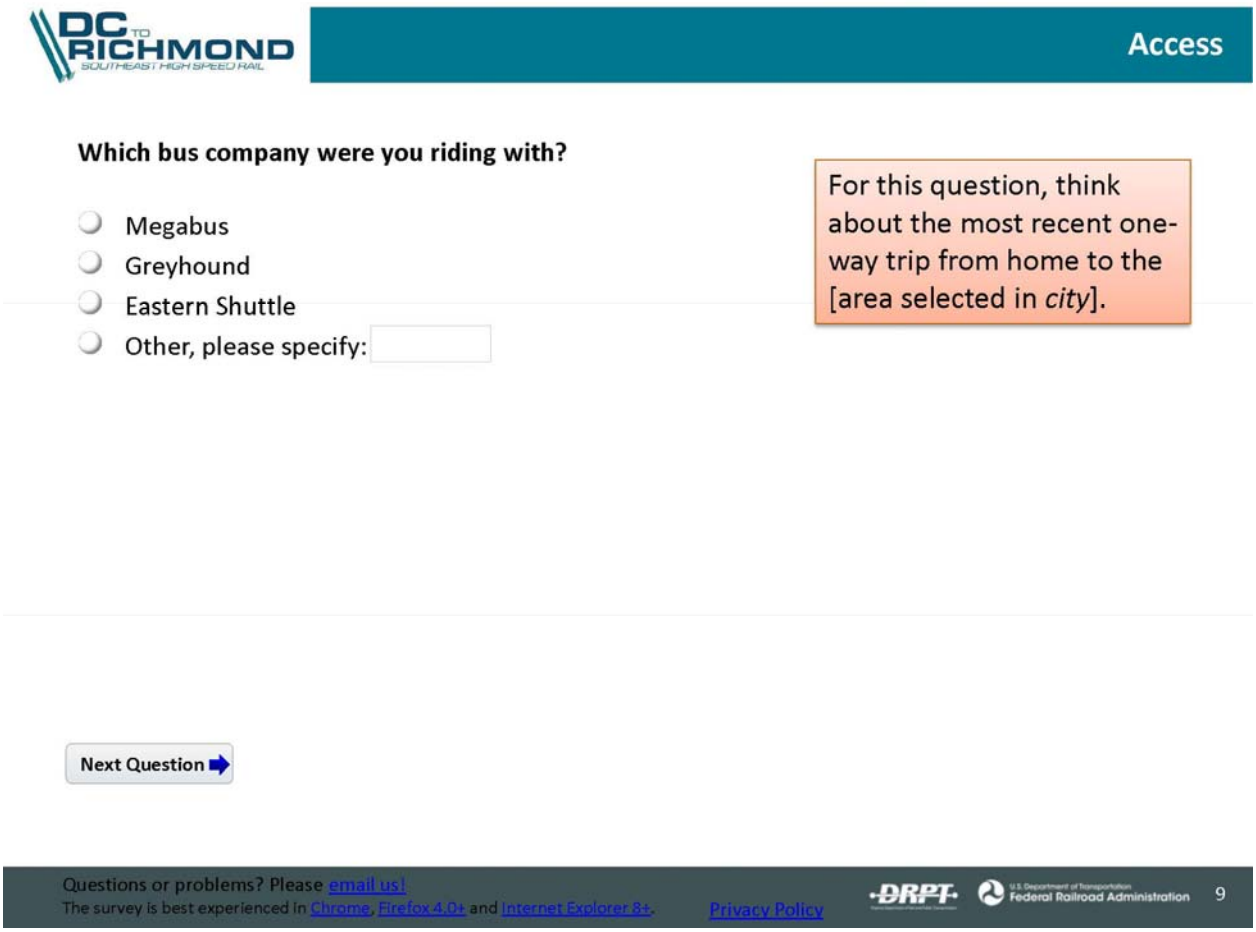
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Access
Which bus company were you riding with?
Megabus
Greyhound
Eastern Shuttle
Other, please specify:
For this question, think about the most recent one-way trip from home to the [area selected in *city*].
Next Question
Questions or problems? Please email us!
The survey is best experienced in Chrome, Firefox 4.0+ and Internet Explorer 8+.
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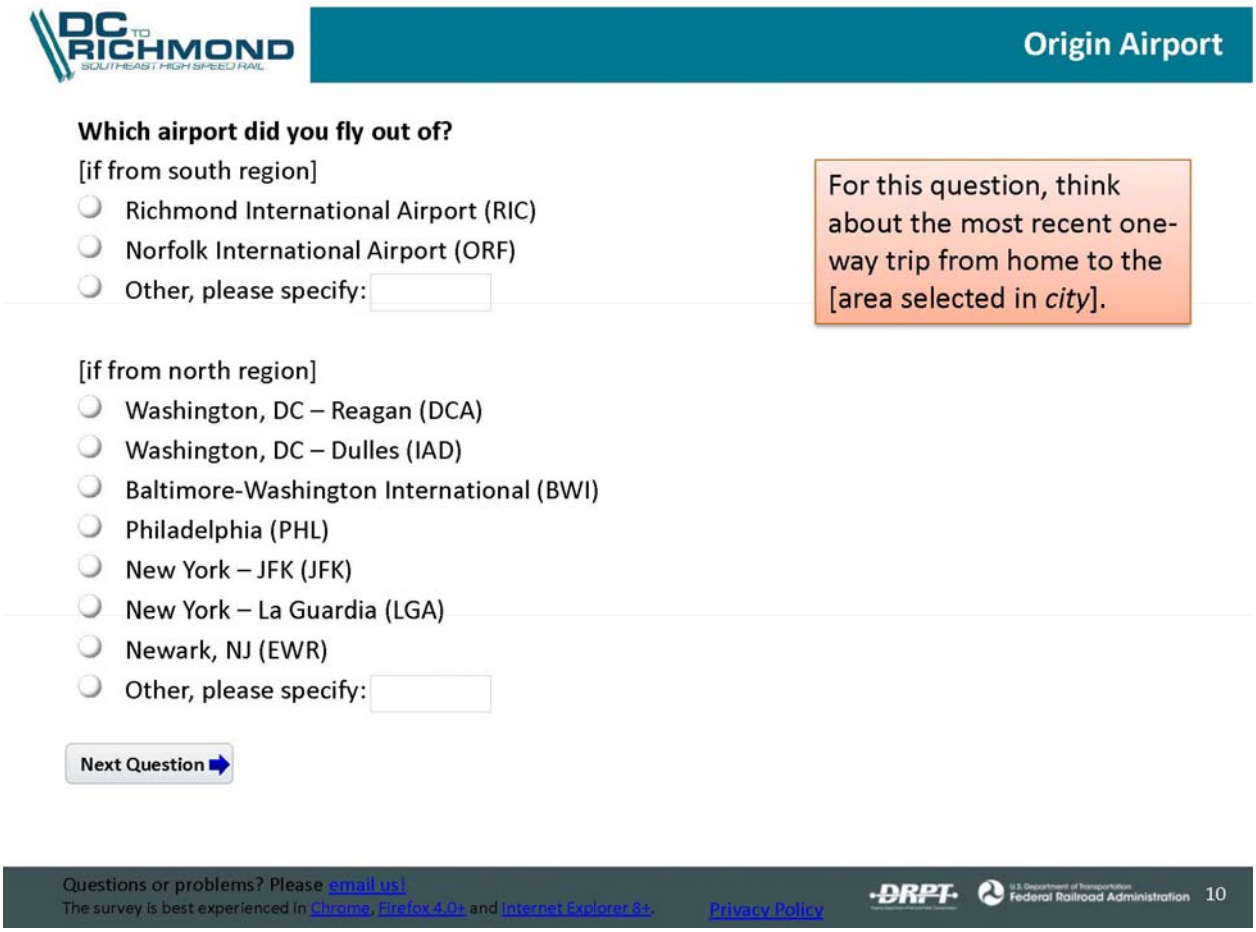
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Origin Airport
Which airport did you fly out of?
[if from south region]
Richmond International Airport (RIC)
Norfolk International Airport (ORF)
Other, please specify:
For this question, think about the most recent one-way trip from home to the [area selected in city].
[if from north region]
Washington, DC – Reagan (DCA)
Washington, DC – Dulles (IAD)
Baltimore-Washington International (BWI)
Philadelphia (PHL)
New York – JFK (JFK)
New York – La Guardia (LGA)
Newark, NJ (EWR)
Other, please specify:
Next Question
Questions or problems? Please email us!
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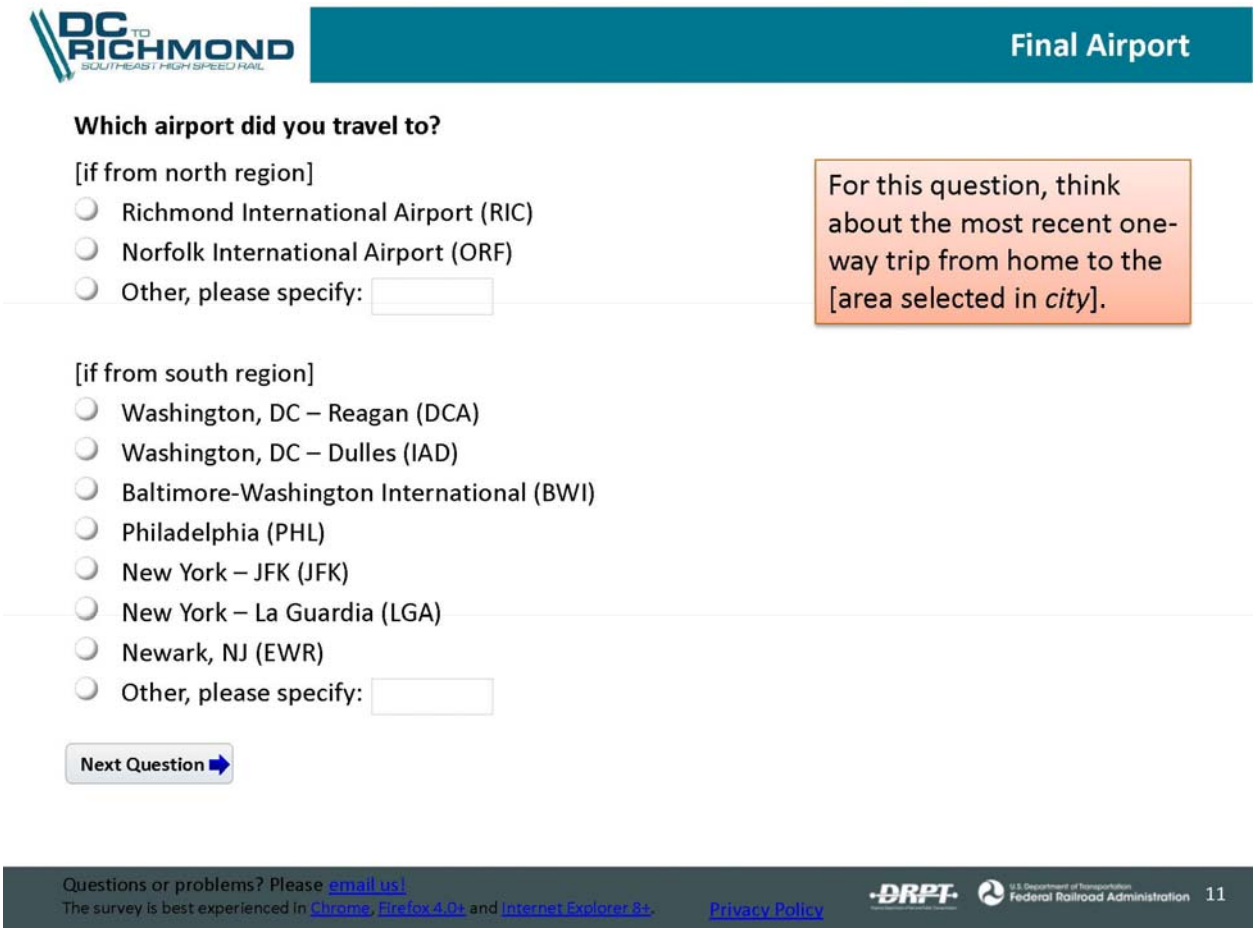
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Final Airport
Which airport did you travel to?
[if from north region]
Richmond International Airport (RIC)
Norfolk International Airport (ORF)
Other, please specify:
For this question, think about the most recent one-way trip from home to the [area selected in city].
[if from south region]
Washington, DC – Reagan (DCA)
Washington, DC – Dulles (IAD)
Baltimore-Washington International (BWI)
Philadelphia (PHL)
New York – JFK (JFK)
New York – La Guardia (LGA)
Newark, NJ (EWR)
Other, please specify:
Next Question
Questions or problems? Please email us!
The survey is best experienced in Chrome, Firefox 4.0+ and Internet Explorer 8+.
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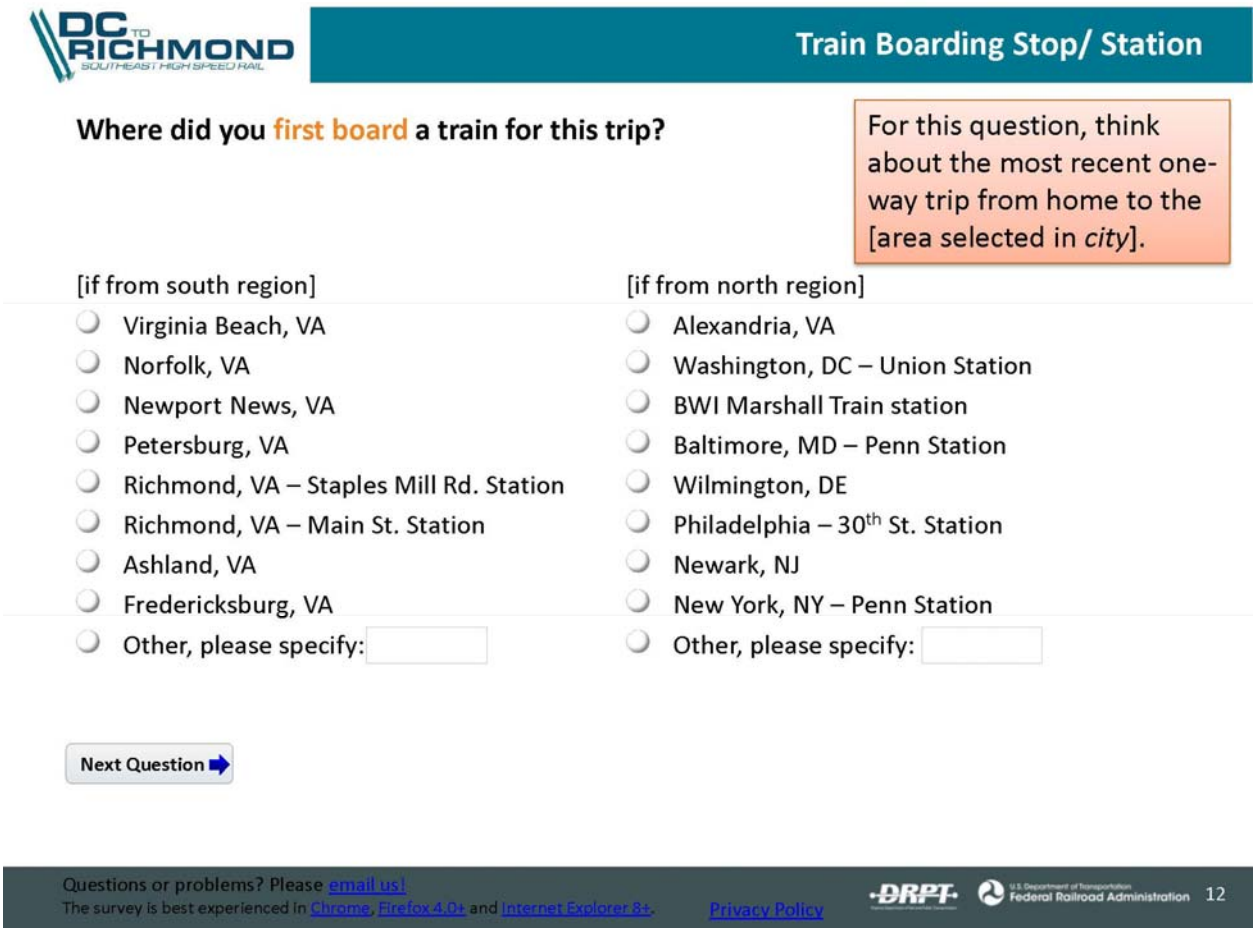
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Train Boarding Stop/ Station
Where did you first board a train for this trip?
For this question, think about the most recent one-way trip from home to the [area selected in city].
[if from south region]
Virginia Beach, VA
Norfolk, VA
Newport News, VA
Petersburg, VA
Richmond, VA – Staples Mill Rd. Station
Richmond, VA – Main St. Station
Ashland, VA
Fredericksburg, VA
Other, please specify:
[if from north region]
Alexandria, VA
Washington, DC – Union Station
BWI Marshall Train station
Baltimore, MD – Penn Station
Wilmington, DE
Philadelphia – 30th St. Station
Newark, NJ
New York, NY – Penn Station
Other, please specify:
Next Question
Questions or problems? Please email us!
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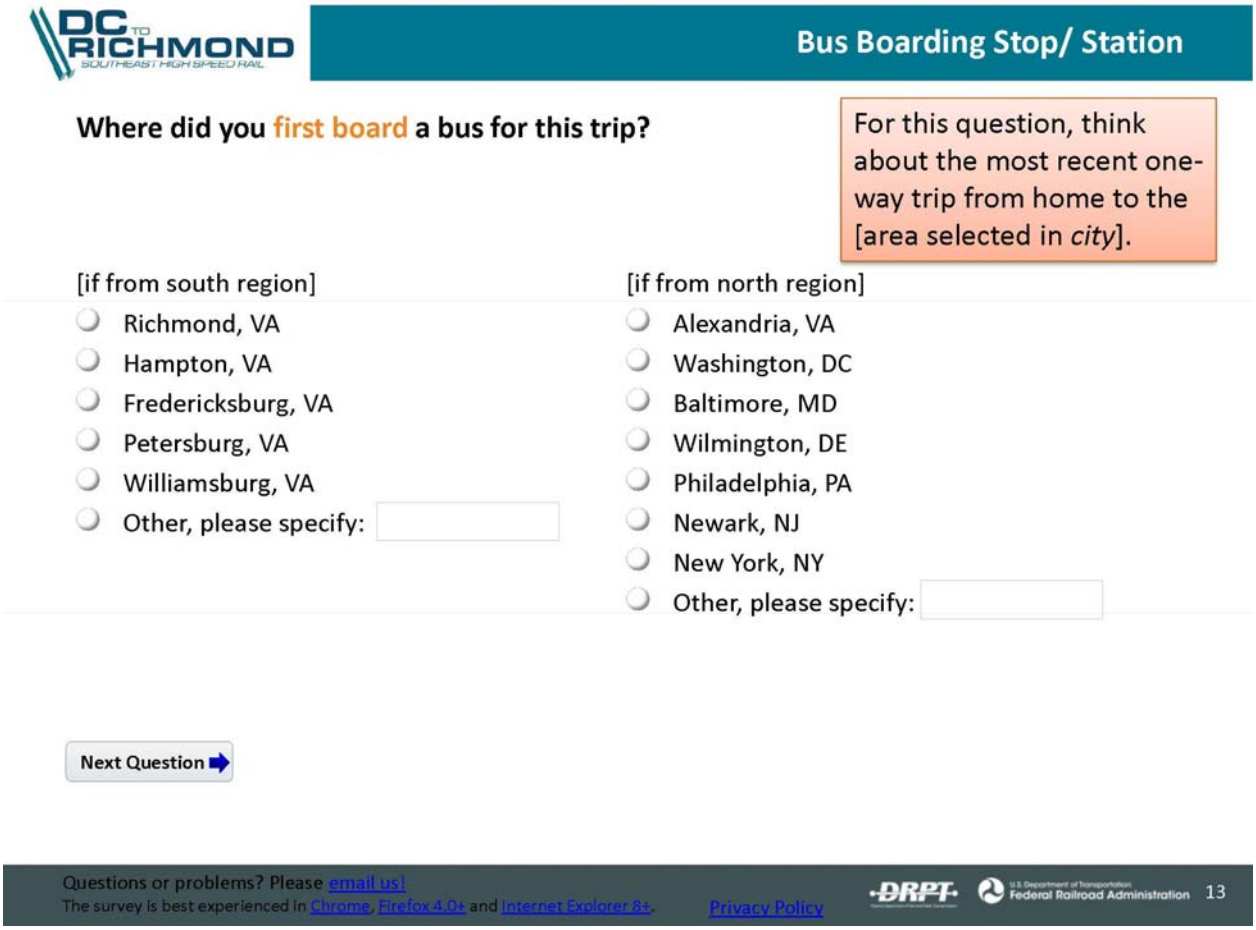
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Bus Boarding Stop/ Station
Where did you first board a bus for this trip?
For this question, think about the most recent one-way trip from home to the [area selected in *city*].
[if from south region]
Richmond, VA
Hampton, VA
Fredericksburg, VA
Petersburg, VA
Williamsburg, VA
Other, please specify:
[if from north region]
Alexandria, VA
Washington, DC
Baltimore, MD
Wilmington, DE
Philadelphia, PA
Newark, NJ
New York, NY
Other, please specify:
Next Question
Questions or problems? Please email us!
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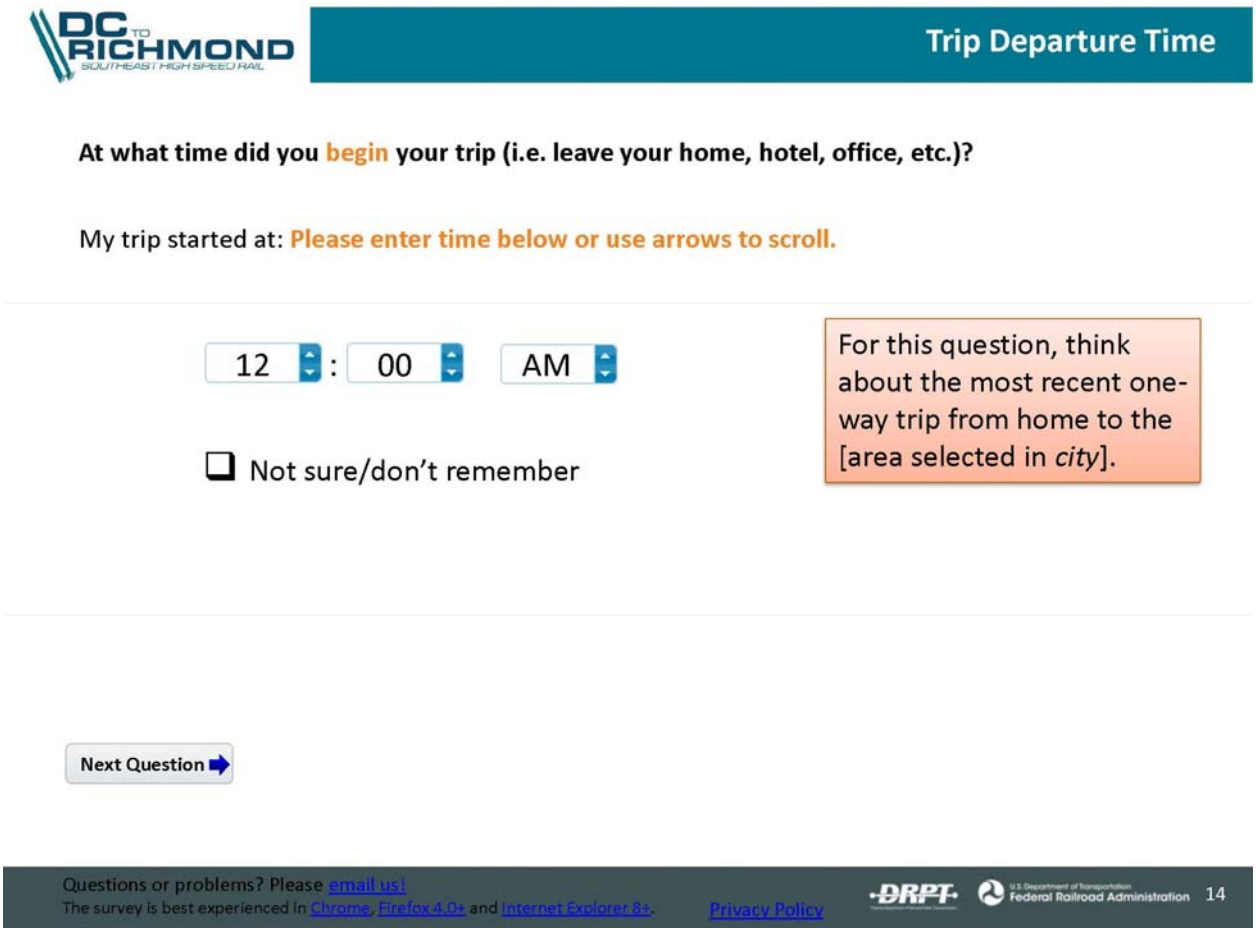
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Trip Departure Time
At what time did you begin your trip (i.e. leave your home, hotel, office, etc.)?
My trip started at: Please enter time below or use arrows to scroll.
12 : 00 AM
Not sure/don't remember
For this question, think about the most recent one-way trip from home to the [area selected in city].
Next Question
Questions or problems? Please email us!
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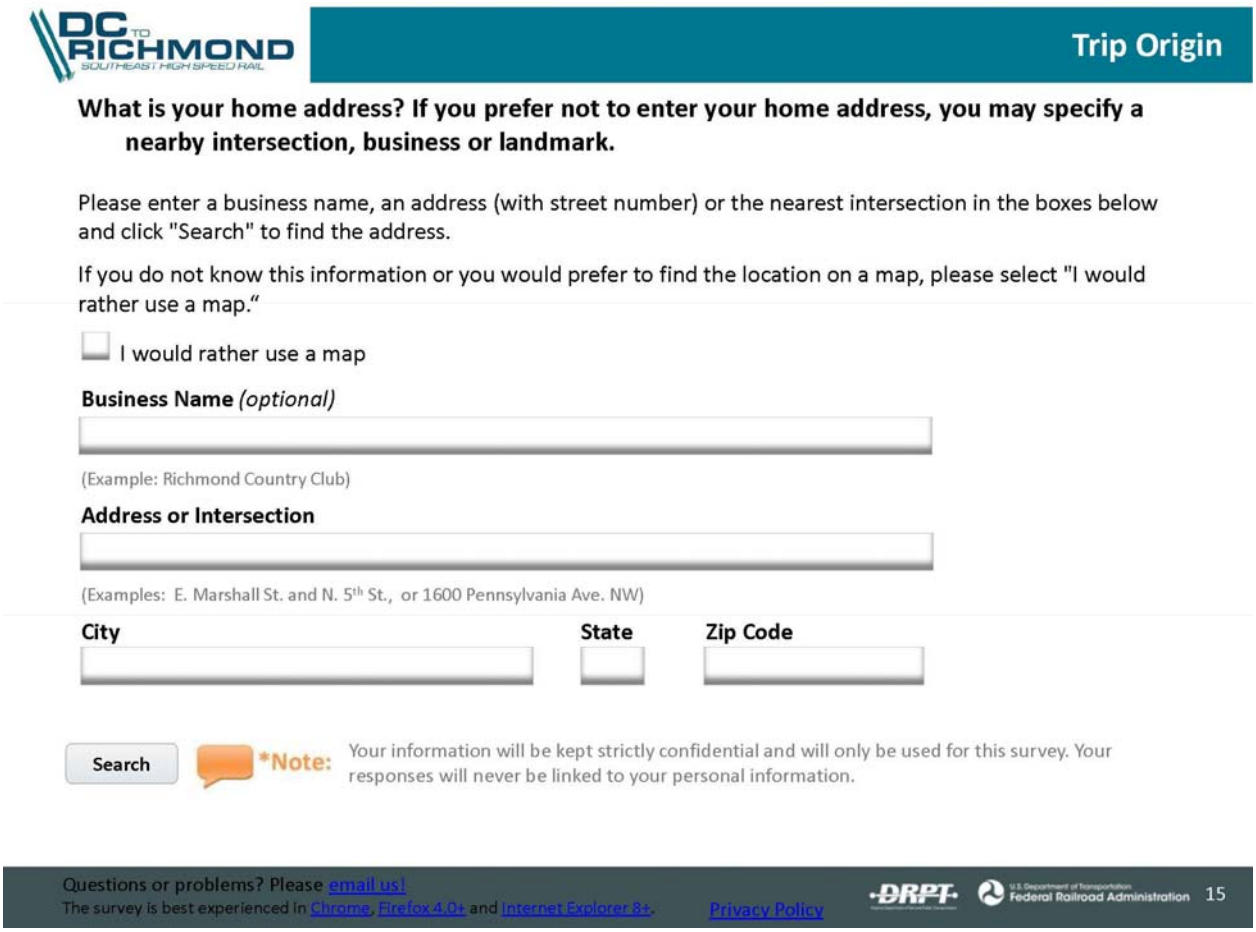
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Trip Origin
What is your home address? If you prefer not to enter your home address, you may specify a nearby intersection, business or landmark.
Please enter a business name, an address (with street number) or the nearest intersection in the boxes below and click "Search" to find the address.
If you do not know this information or you would prefer to find the location on a map, please select "I would rather use a map."
I would rather use a map
Business Name (optional)
(Example: Richmond Country Club)
Address or Intersection
(Examples: E. Marshall St. and N. 5th St., or 1600 Pennsylvania Ave. NW)
City
State
Zip Code
Search
*Note:
Your information will be kept strictly confidential and will only be used for this survey. Your responses will never be linked to your personal information.
Questions or problems? Please email us!
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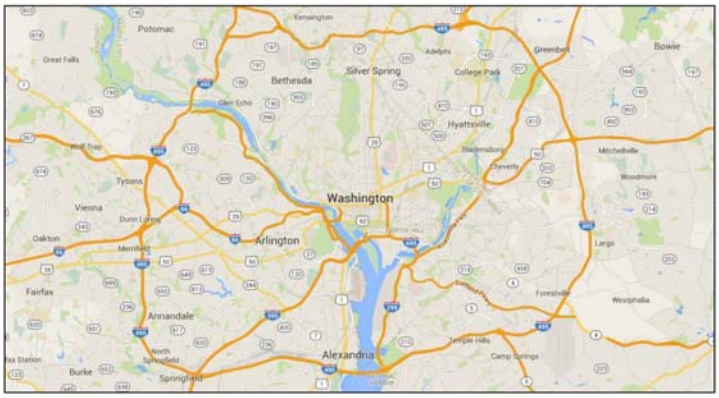
DC TO RICHMOND SOUTHEAST HIGH SPEED RAIL

Trip Origin Map

☑ I would rather use a map

To use the map:

1. Click on the map to zoom in on your location
2. Keep zooming until a marker appears
3. Continue to drag the map and click on the location until the marker is in the right place (the street number does not have to be exact)
4. Click "Next Question" to proceed



Next Question

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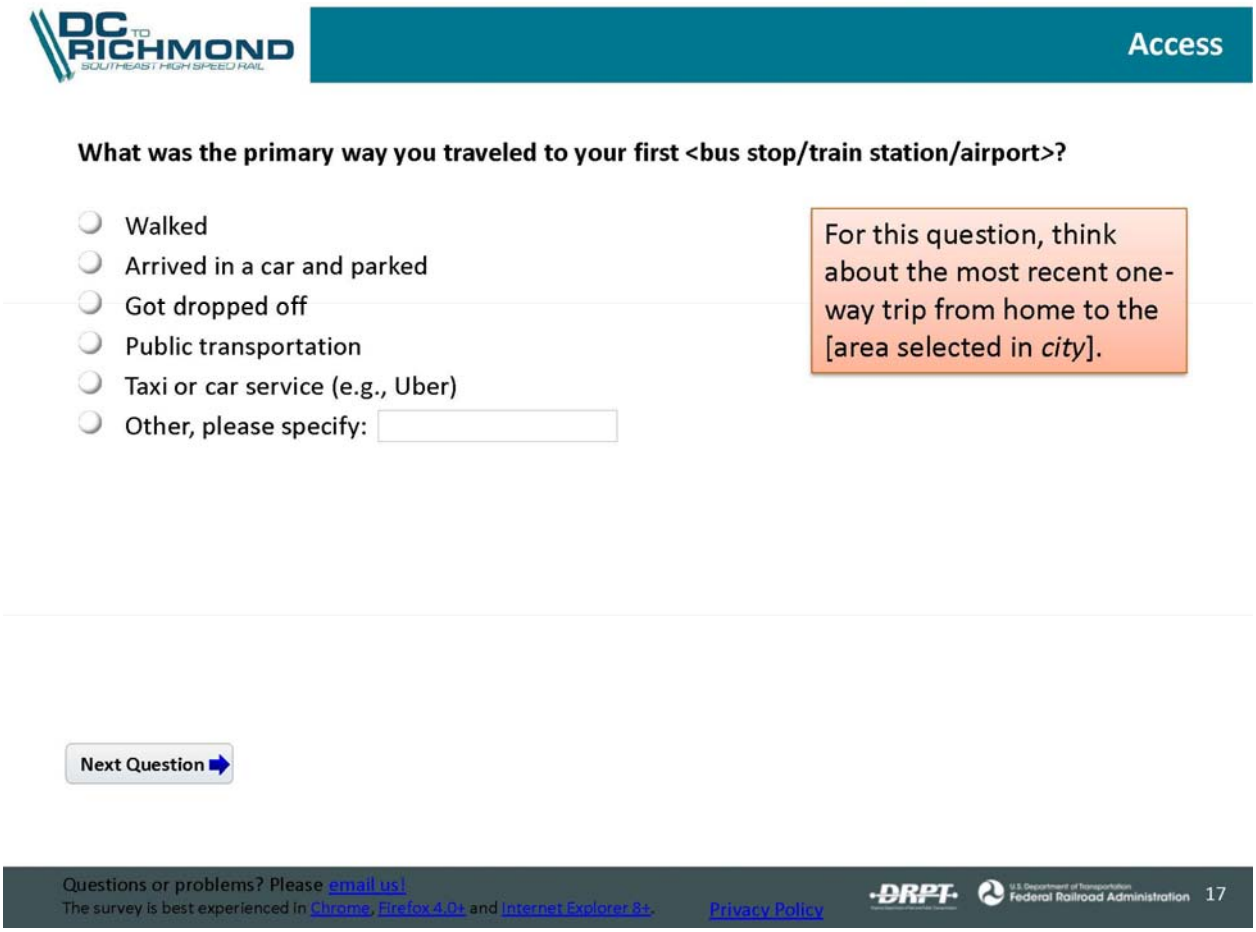
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Access
What was the primary way you traveled to your first <bus stop/train station/airport>?
Walked
Arrived in a car and parked
Got dropped off
Public transportation
Taxi or car service (e.g., Uber)
Other, please specify:
For this question, think about the most recent one-way trip from home to the [area selected in city].
Next Question
Questions or problems? Please email us!
The survey is best experienced in Chrome, Firefox 4.0+ and Internet Explorer 8+.
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Federal Railroad Administration
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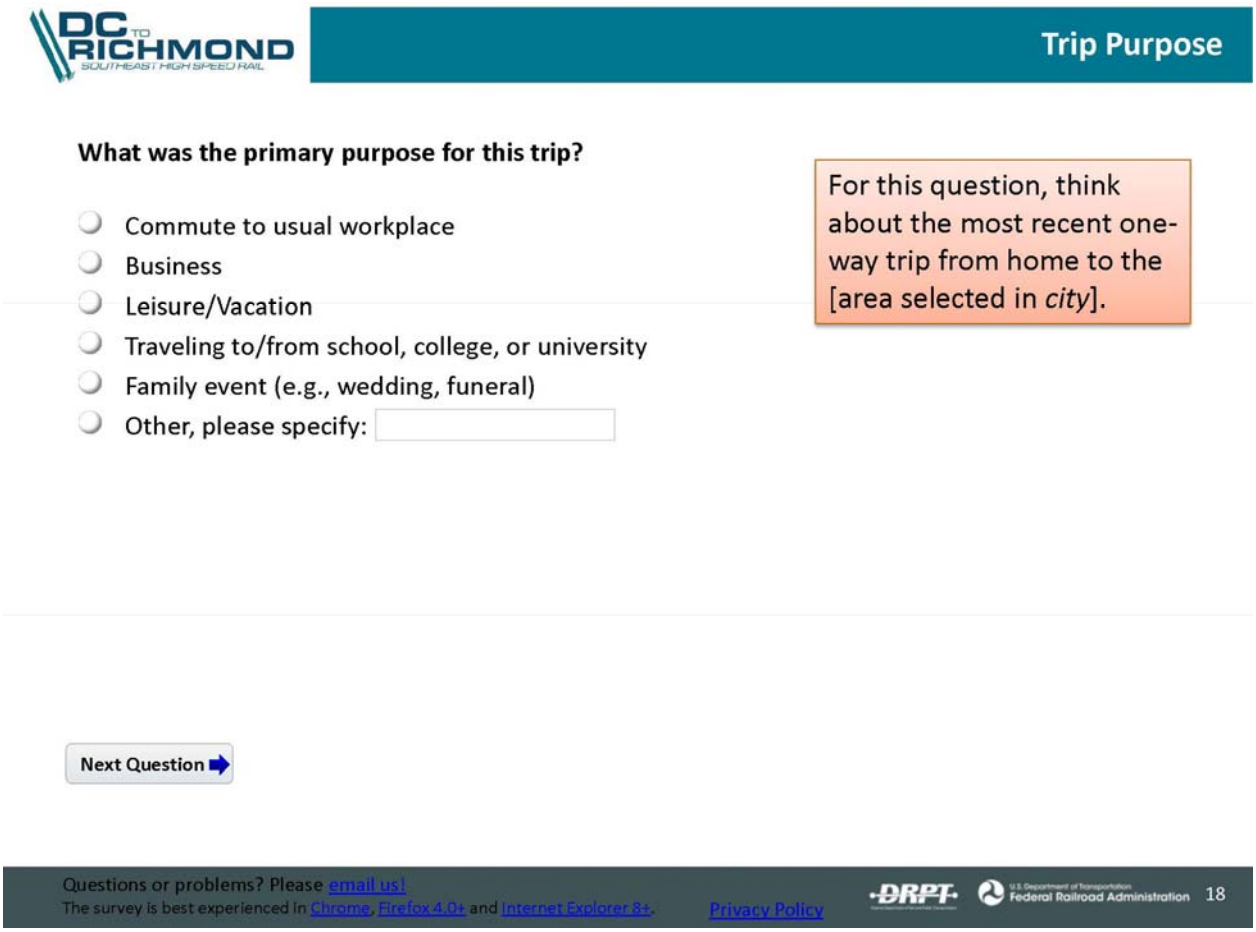
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Trip Purpose
What was the primary purpose for this trip?
For this question, think about the most recent one-way trip from home to the [area selected in city].
Commute to usual workplace
Business
Leisure/Vacation
Traveling to/from school, college, or university
Family event (e.g., wedding, funeral)
Other, please specify:
Next Question
Questions or problems? Please email us!
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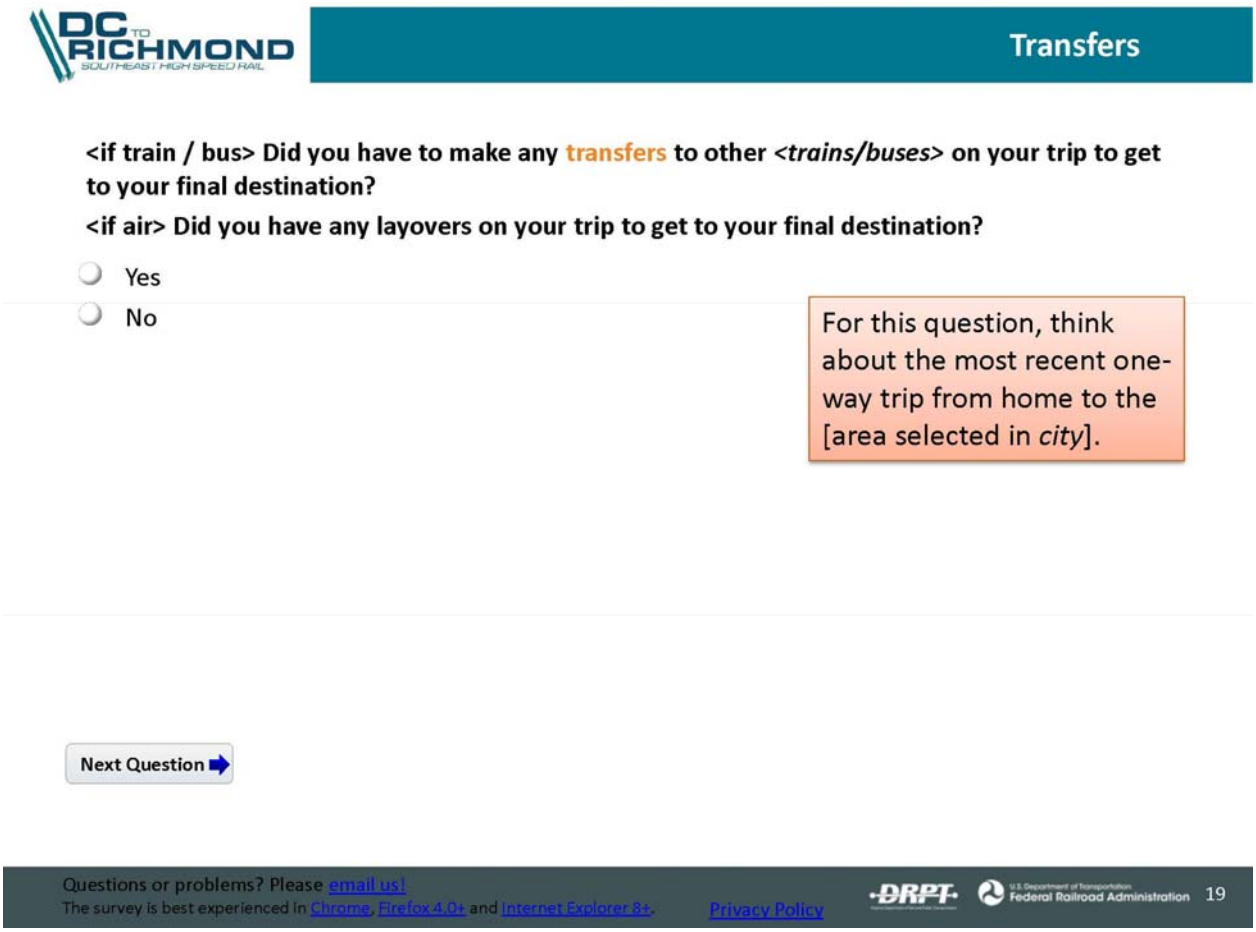
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Transfers
<if train / bus> Did you have to make any transfers to other <trains/buses> on your trip to get to your final destination?
<if air> Did you have any layovers on your trip to get to your final destination?
Yes
No
For this question, think about the most recent one-way trip from home to the [area selected in city].
Next Question
Questions or problems? Please email us!
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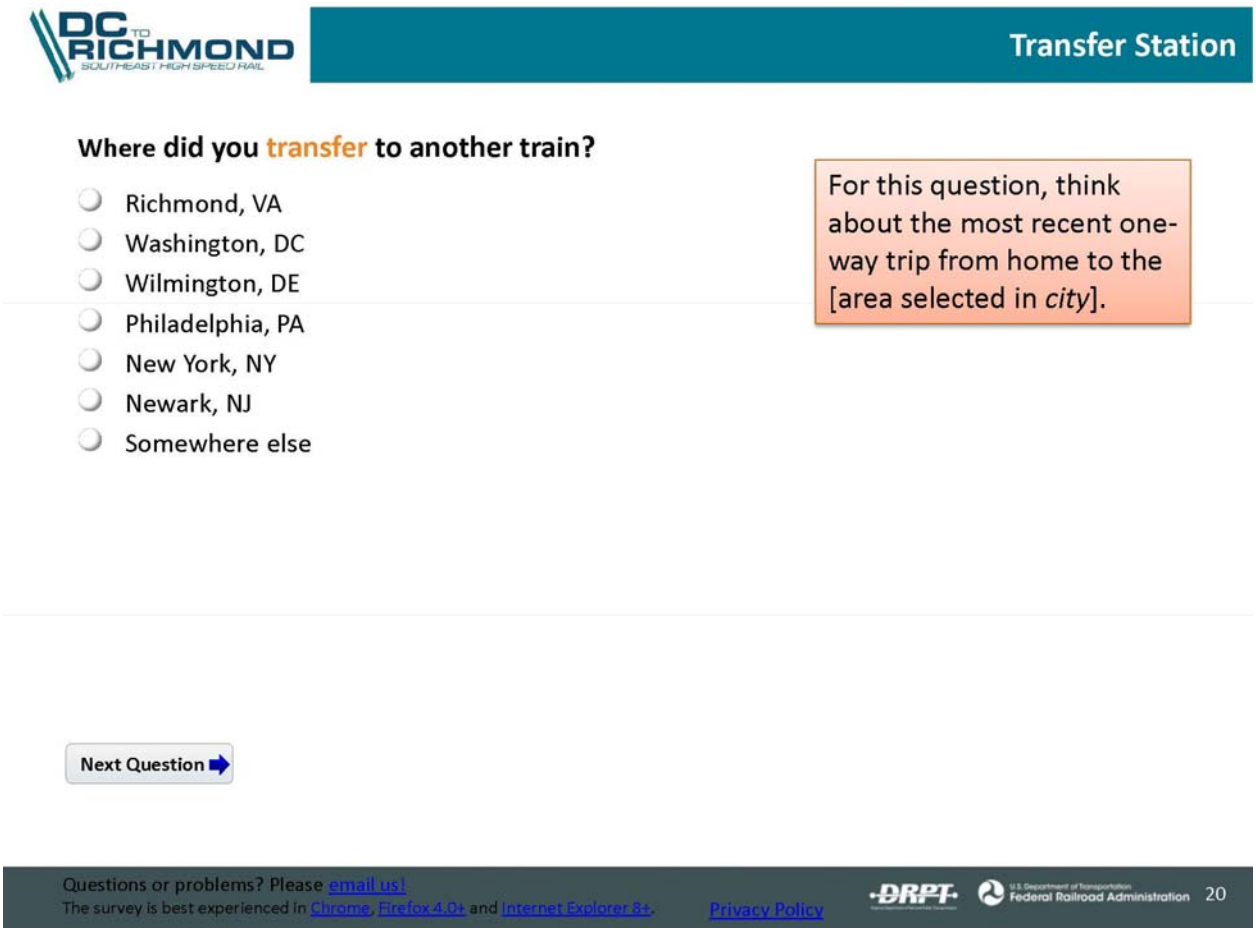
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Transfer Station
Where did you transfer to another train?
Richmond, VA
Washington, DC
Wilmington, DE
Philadelphia, PA
New York, NY
Newark, NJ
Somewhere else
For this question, think about the most recent one-way trip from home to the [area selected in city].
Next Question
Questions or problems? Please email us!
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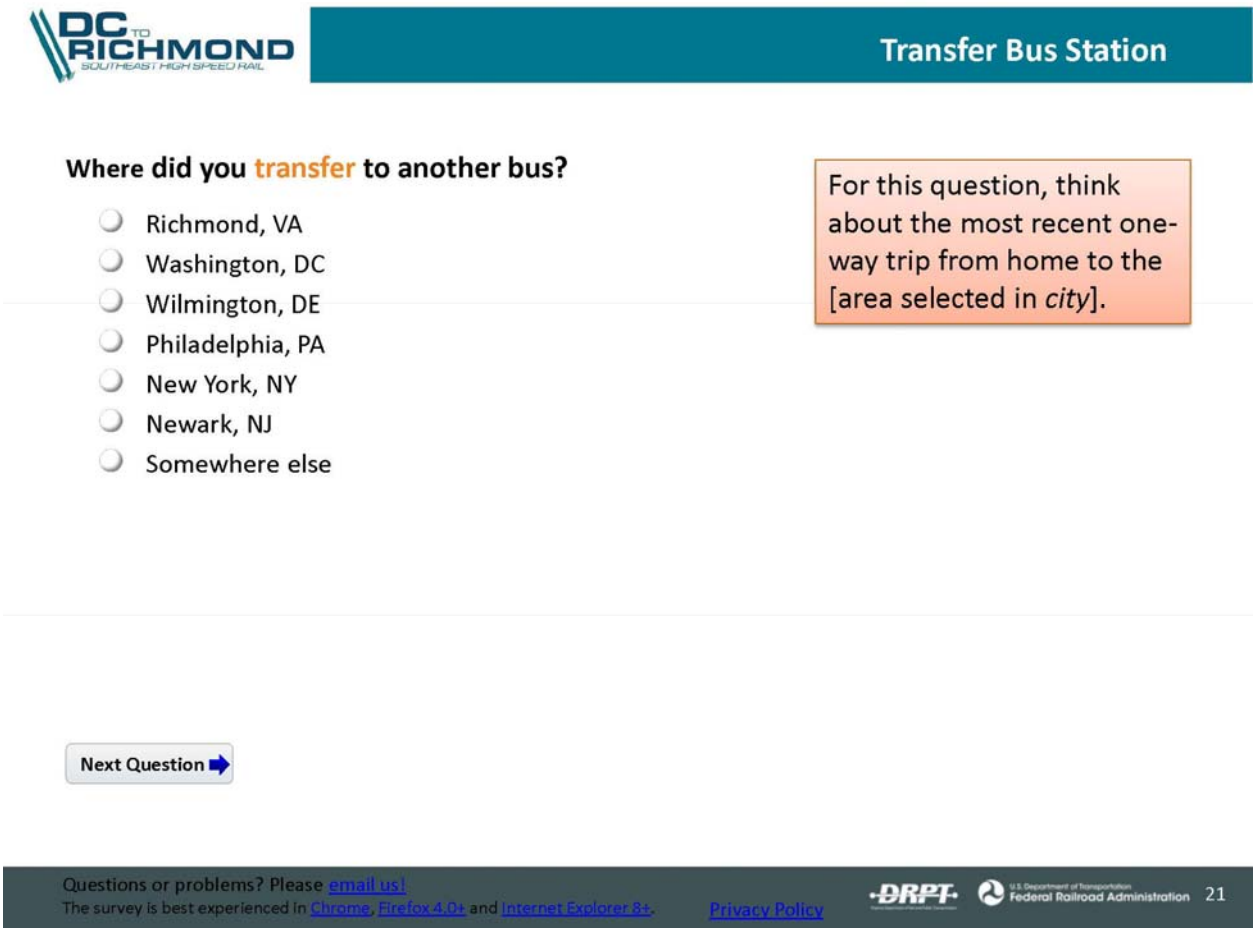
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Transfer Bus Station
Where did you transfer to another bus?
Richmond, VA
Washington, DC
Wilmington, DE
Philadelphia, PA
New York, NY
Newark, NJ
Somewhere else
For this question, think about the most recent one-way trip from home to the [area selected in city].
Next Question
Questions or problems? Please email us!
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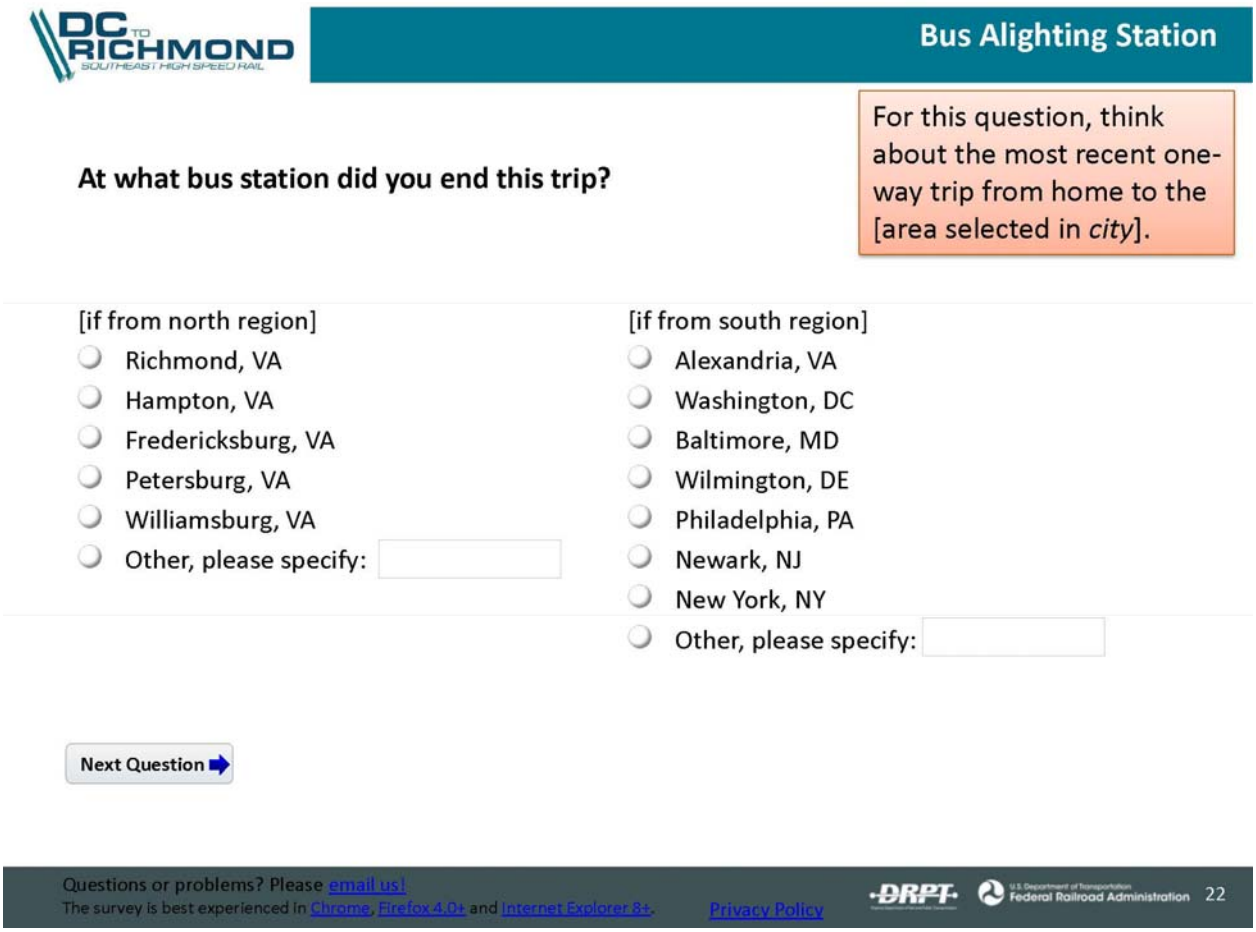
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Bus Alighting Station
For this question, think about the most recent one-way trip from home to the [area selected in *city*].
At what bus station did you end this trip?
[if from north region]
Richmond, VA
Hampton, VA
Fredericksburg, VA
Petersburg, VA
Williamsburg, VA
Other, please specify:
[if from south region]
Alexandria, VA
Washington, DC
Baltimore, MD
Wilmington, DE
Philadelphia, PA
Newark, NJ
New York, NY
Other, please specify:
Next Question
Questions or problems? Please email us!
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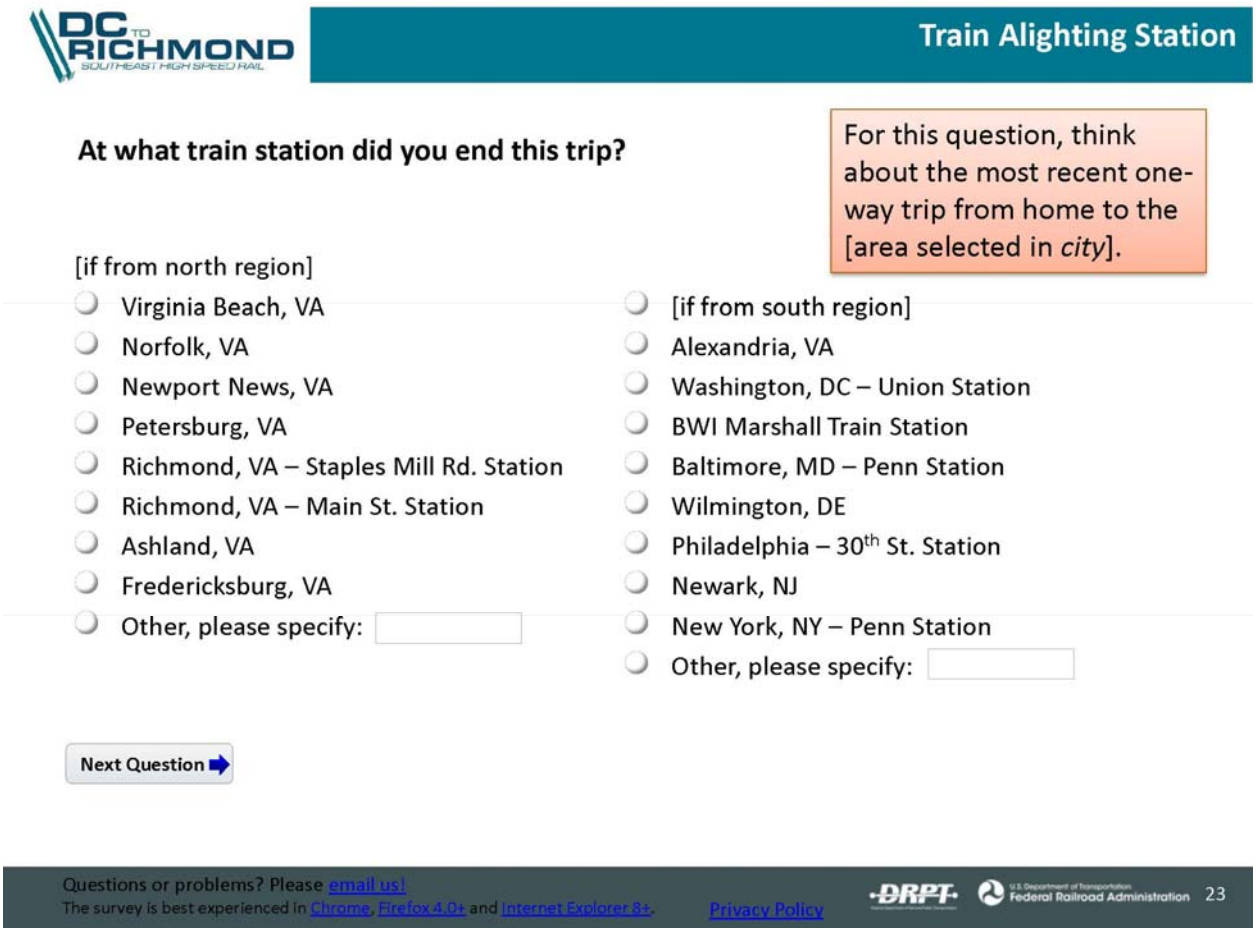
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Train Alighting Station
At what train station did you end this trip?
For this question, think about the most recent one-way trip from home to the [area selected in *city*].
[if from north region]
Virginia Beach, VA
Norfolk, VA
Newport News, VA
Petersburg, VA
Richmond, VA – Staples Mill Rd. Station
Richmond, VA – Main St. Station
Ashland, VA
Fredericksburg, VA
Other, please specify:
[if from south region]
Alexandria, VA
Washington, DC – Union Station
BWI Marshall Train Station
Baltimore, MD – Penn Station
Wilmington, DE
Philadelphia – 30th St. Station
Newark, NJ
New York, NY – Penn Station
Other, please specify:
Next Question
Questions or problems? Please email us!
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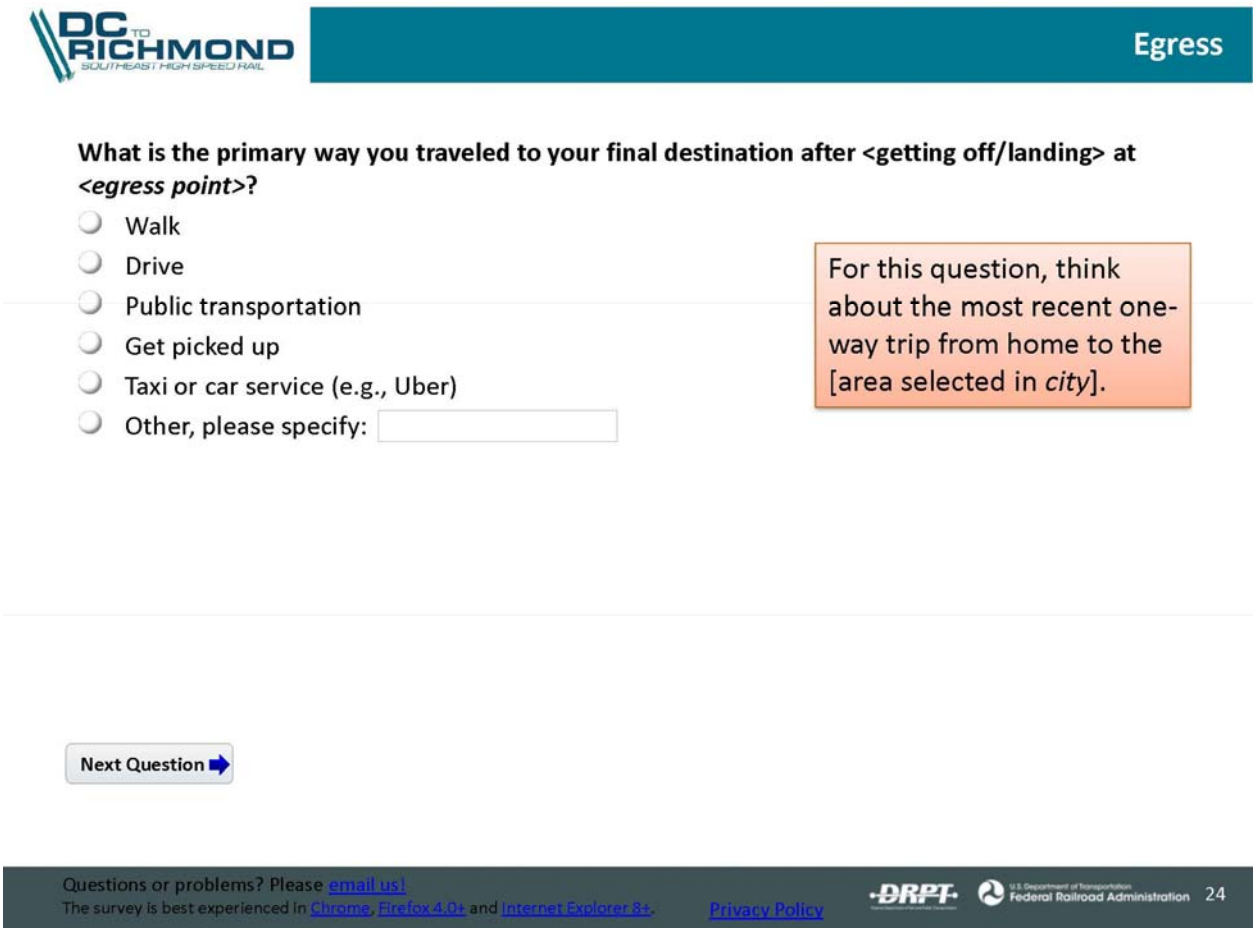
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Egress
What is the primary way you traveled to your final destination after <getting off/landing> at <egress point>?
Walk
Drive
Public transportation
Get picked up
Taxi or car service (e.g., Uber)
Other, please specify:
For this question, think about the most recent one-way trip from home to the [area selected in city].
Next Question
Questions or problems? Please email us!
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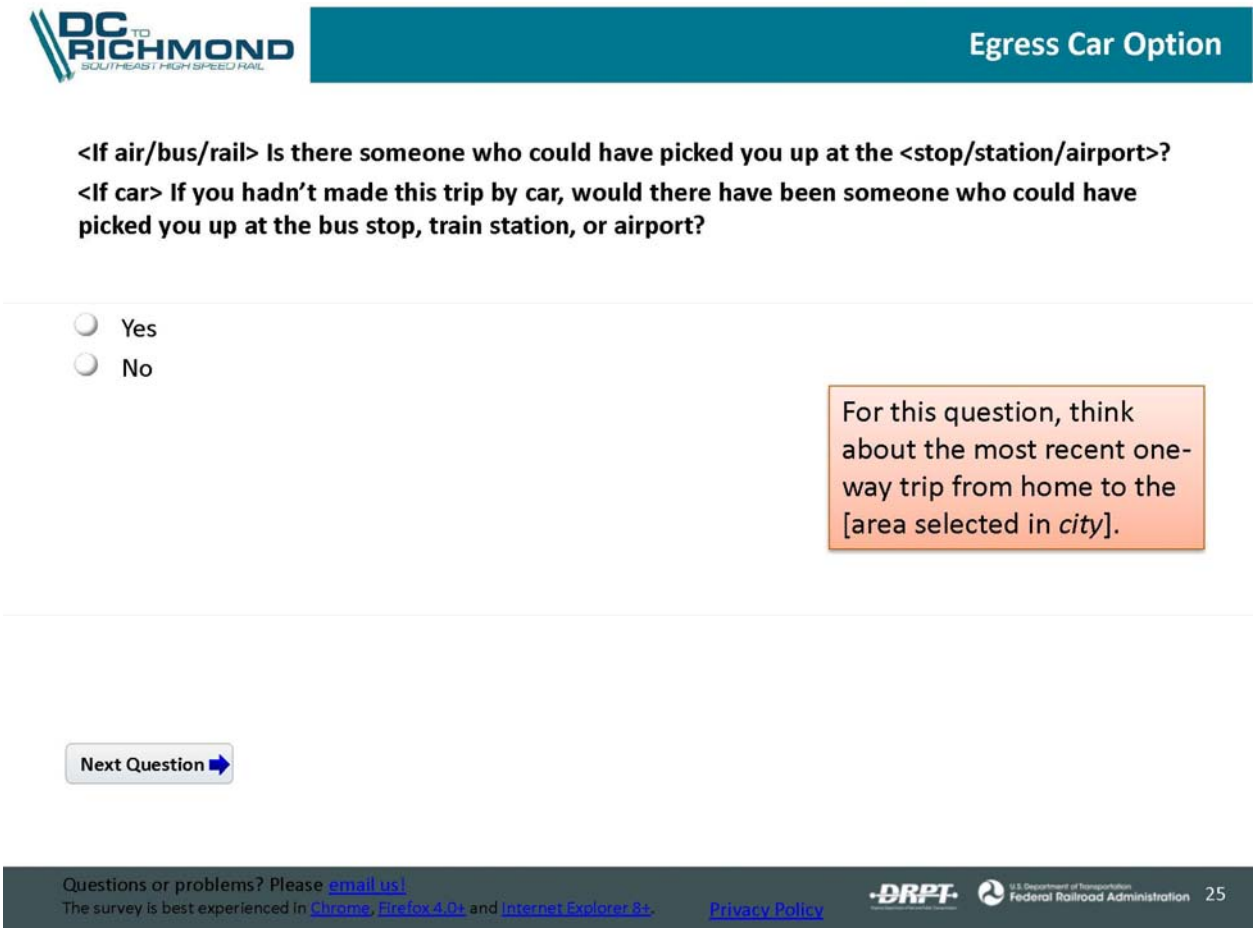
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Egress Car Option
<If air/bus/rail> Is there someone who could have picked you up at the <stop/station/airport>?
<If car> If you hadn't made this trip by car, would there have been someone who could have picked you up at the bus stop, train station, or airport?
Yes
No
For this question, think about the most recent one-way trip from home to the [area selected in *city*].
Next Question
Questions or problems? Please email us!
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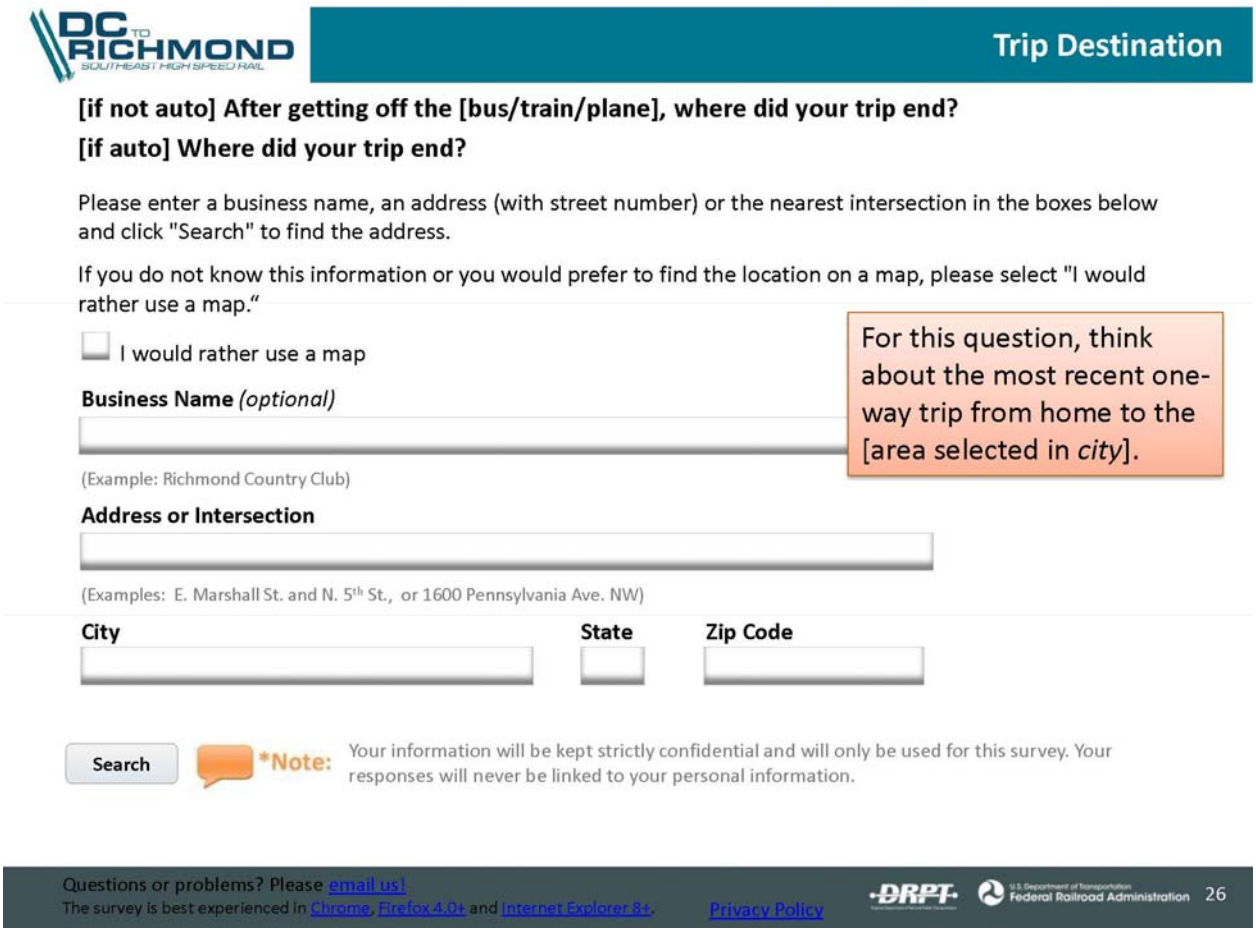
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Trip Destination
[if not auto] After getting off the [bus/train/plane], where did your trip end?
[if auto] Where did your trip end?
Please enter a business name, an address (with street number) or the nearest intersection in the boxes below and click "Search" to find the address.
If you do not know this information or you would prefer to find the location on a map, please select "I would rather use a map."
I would rather use a map
For this question, think about the most recent one-way trip from home to the [area selected in city].
Business Name (optional)
(Example: Richmond Country Club)
Address or Intersection
(Examples: E. Marshall St. and N. 5th St., or 1600 Pennsylvania Ave. NW)
City
State
Zip Code
Search
*Note:
Your information will be kept strictly confidential and will only be used for this survey. Your responses will never be linked to your personal information.
Questions or problems? Please email us!
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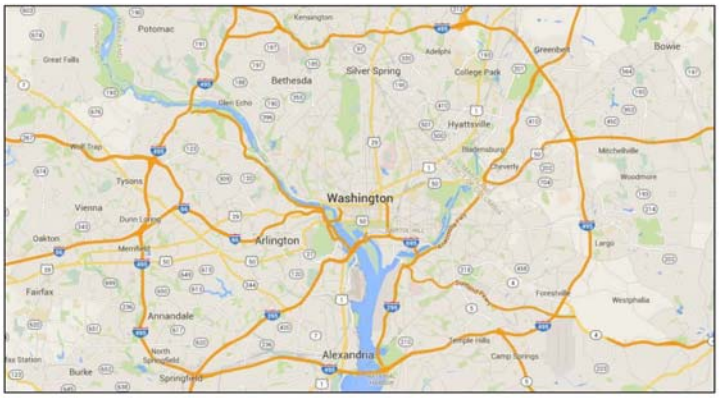
DC TO RICHMOND SOUTHEAST HIGH SPEED RAIL

Trip Destination Map

☑ I would rather use a map

To use the map:

1. Click on the map to zoom in on your location
2. Keep zooming until a marker appears
3. Continue to drag the map and click on the location until the marker is in the right place (the street number does not have to be exact)
4. Click "Next Question" to proceed



Next Question

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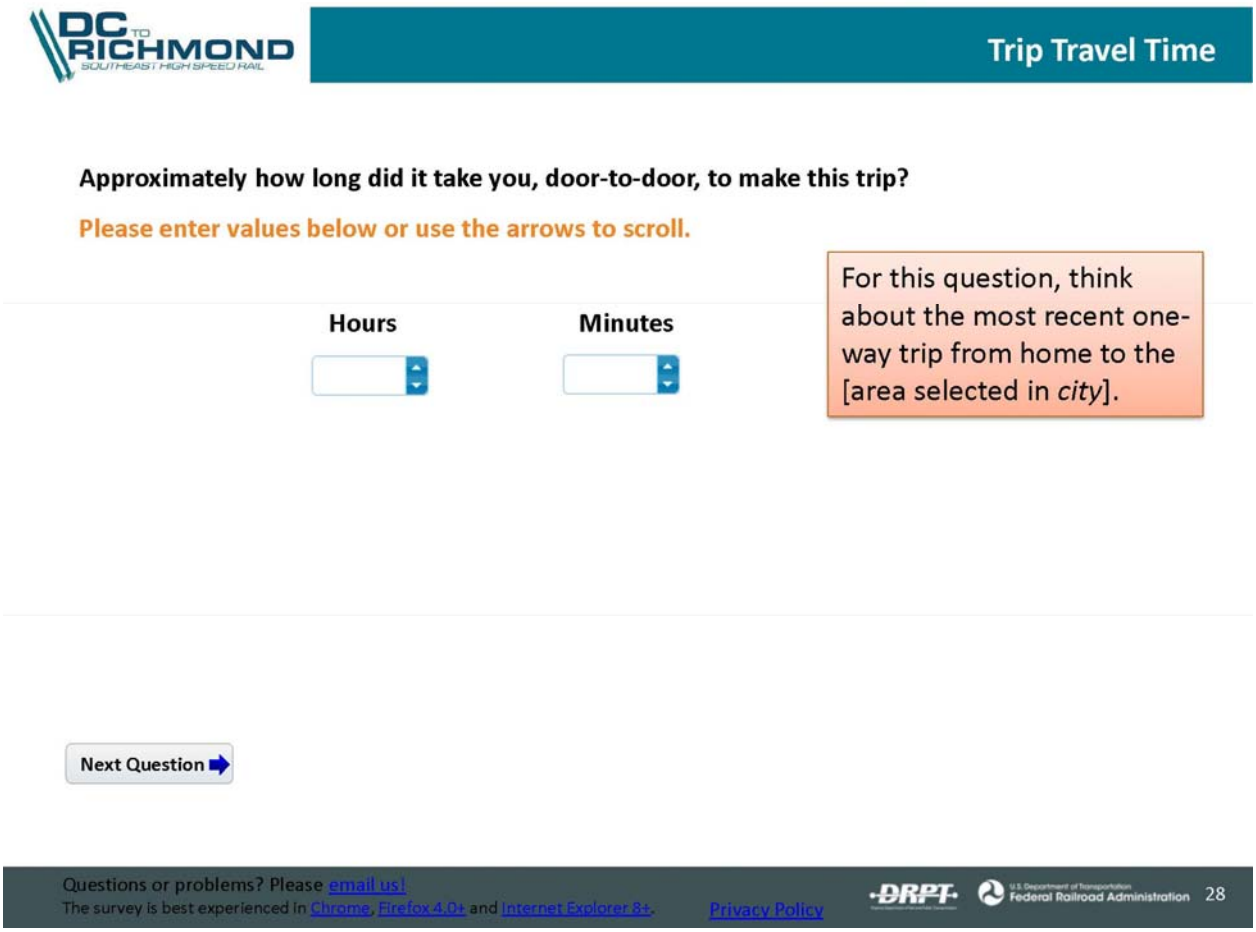
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Trip Travel Time
Approximately how long did it take you, door-to-door, to make this trip?
Please enter values below or use the arrows to scroll.
Hours
Minutes
For this question, think about the most recent one-way trip from home to the [area selected in *city*].
Next Question
Questions or problems? Please email us!
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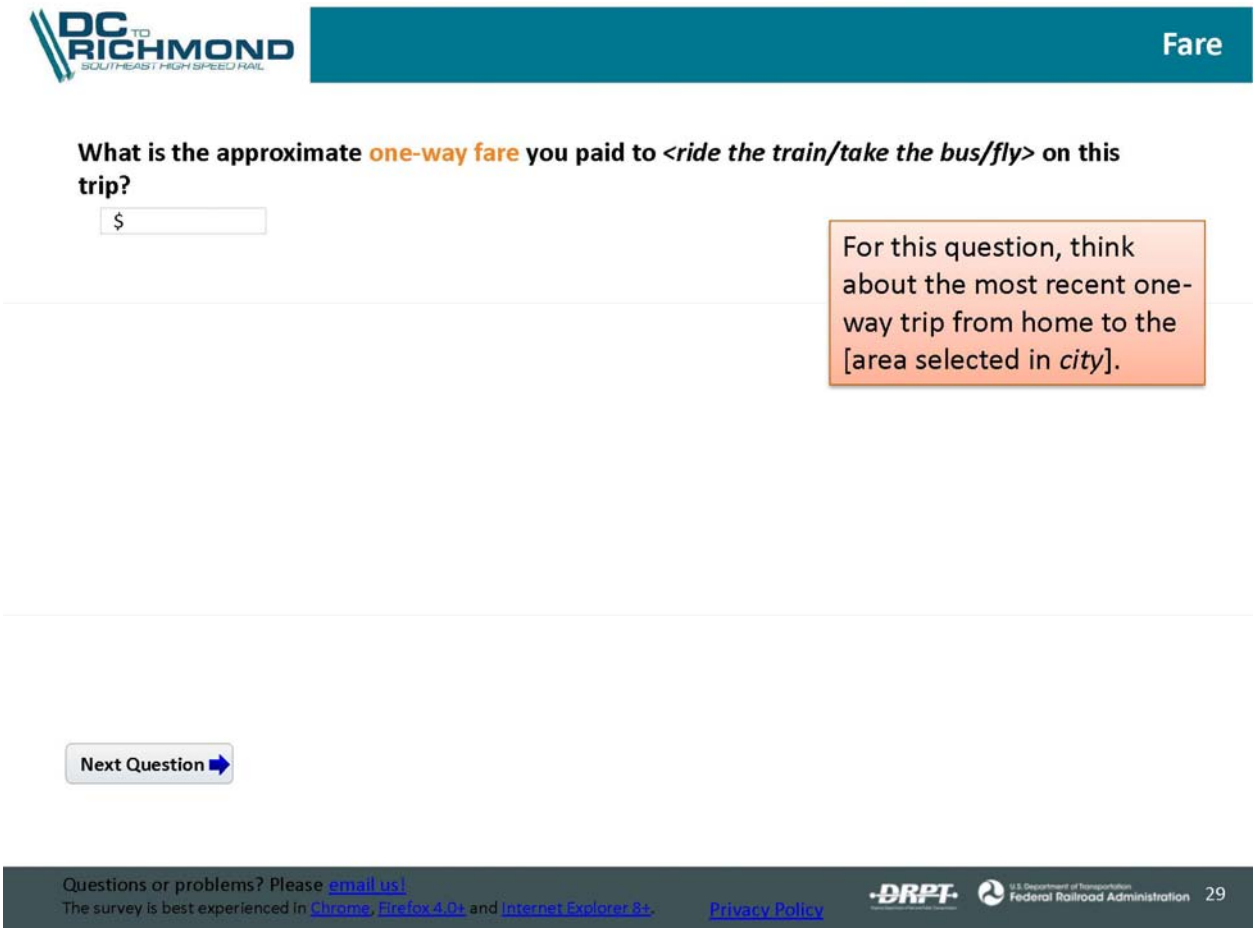
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Fare
What is the approximate one-way fare you paid to <ride the train/take the bus/fly> on this trip?
$
For this question, think about the most recent one-way trip from home to the [area selected in city].
Next Question
Questions or problems? Please email us!
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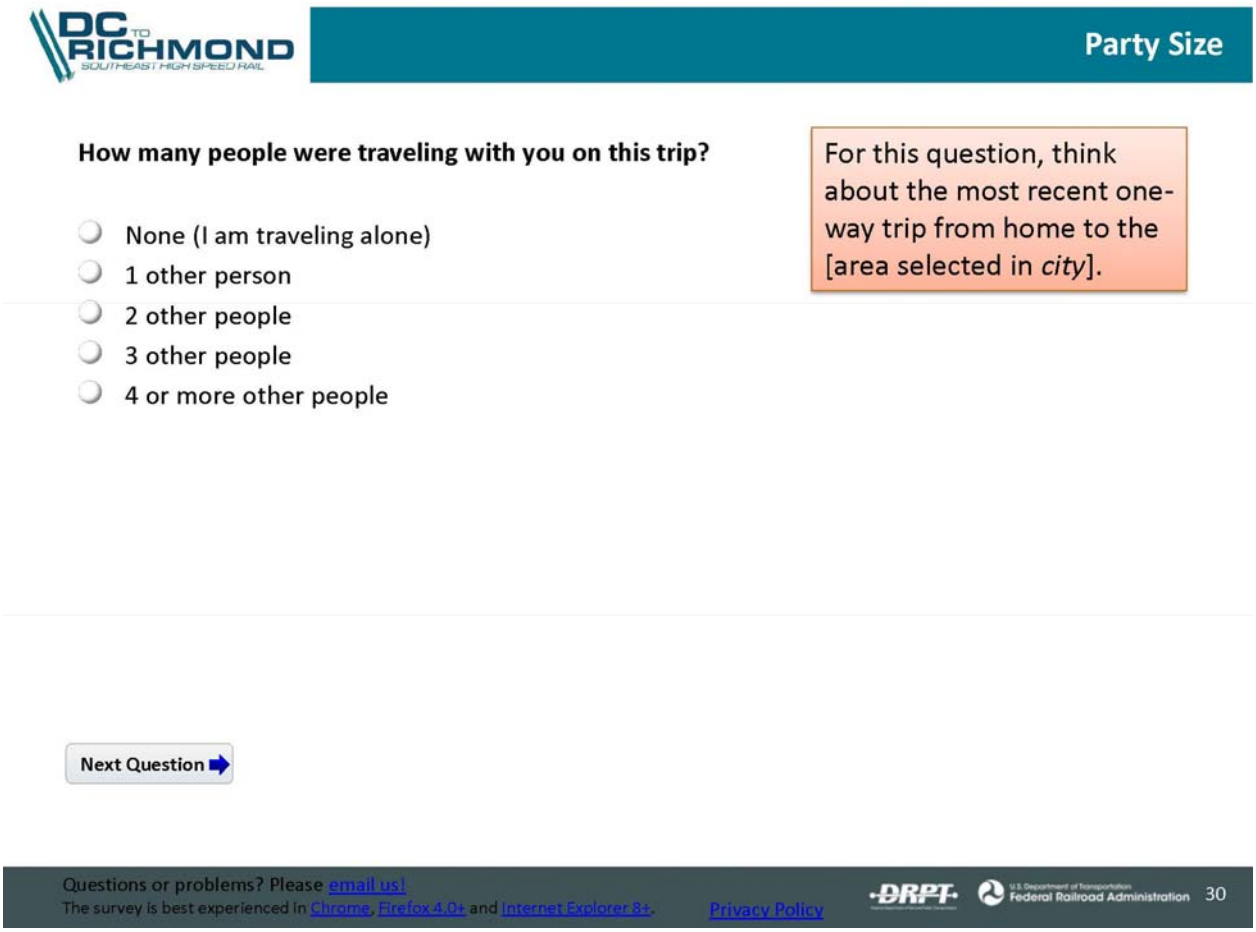
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Party Size
How many people were traveling with you on this trip?
For this question, think about the most recent one-way trip from home to the [area selected in *city*].
None (I am traveling alone)
1 other person
2 other people
3 other people
4 or more other people
Next Question
Questions or problems? Please email us!
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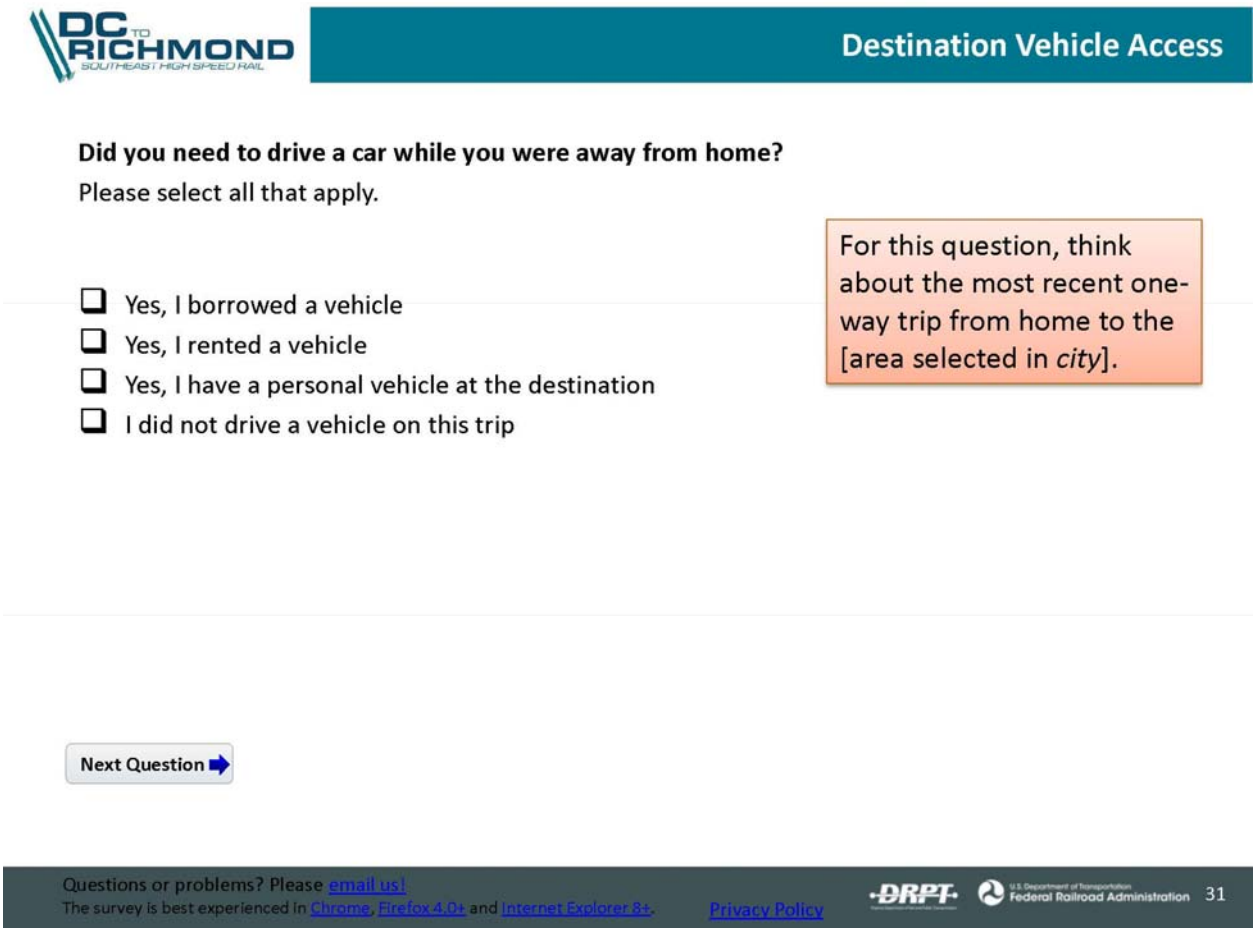
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Destination Vehicle Access
Did you need to drive a car while you were away from home?
Please select all that apply.
For this question, think about the most recent one-way trip from home to the [area selected in city].
Yes, I borrowed a vehicle
Yes, I rented a vehicle
Yes, I have a personal vehicle at the destination
I did not drive a vehicle on this trip
Next Question
Questions or problems? Please email us!
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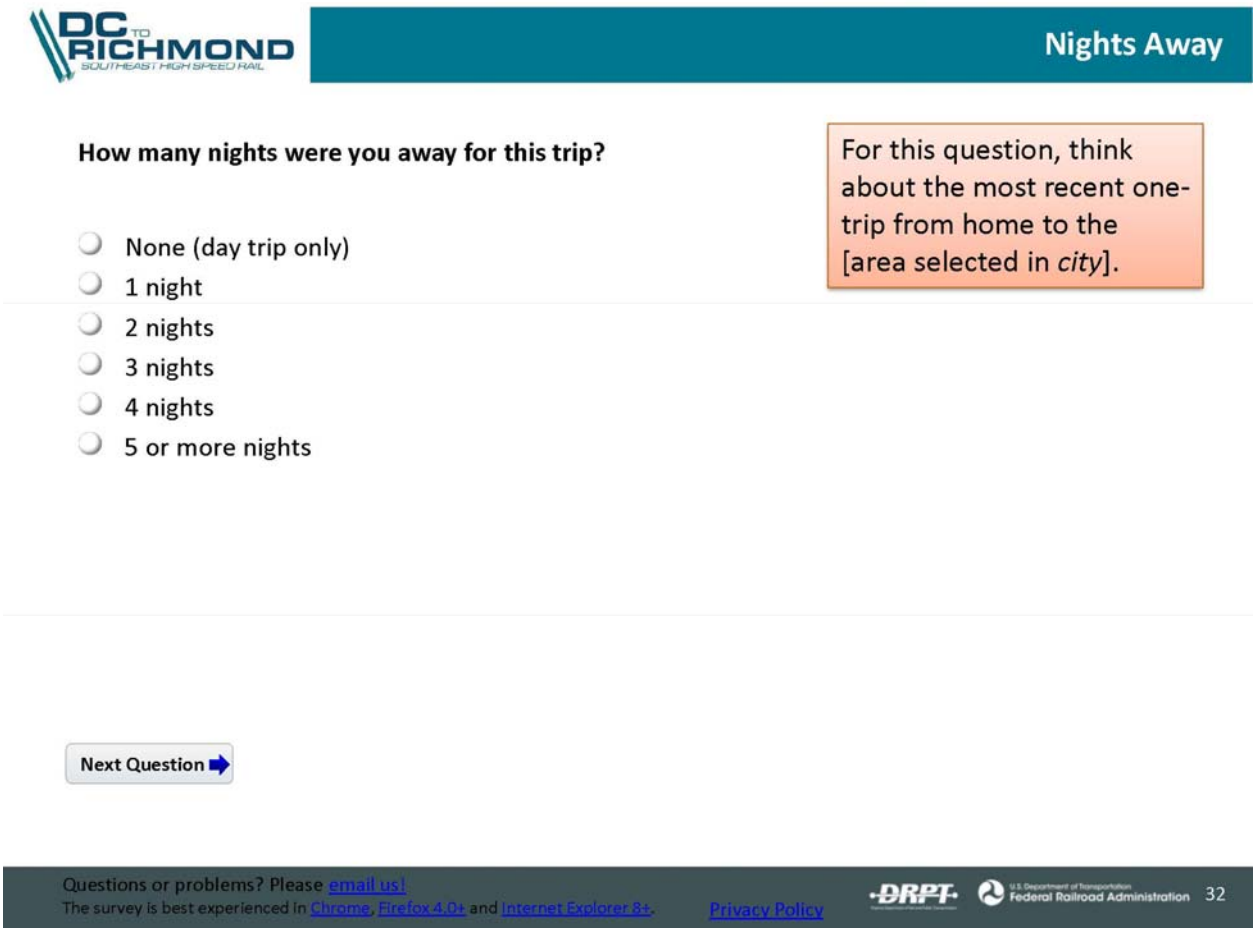
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Nights Away
How many nights were you away for this trip?
For this question, think about the most recent one-trip from home to the [area selected in *city*].
None (day trip only)
1 night
2 nights
3 nights
4 nights
5 or more nights
Next Question
Questions or problems? Please email us!
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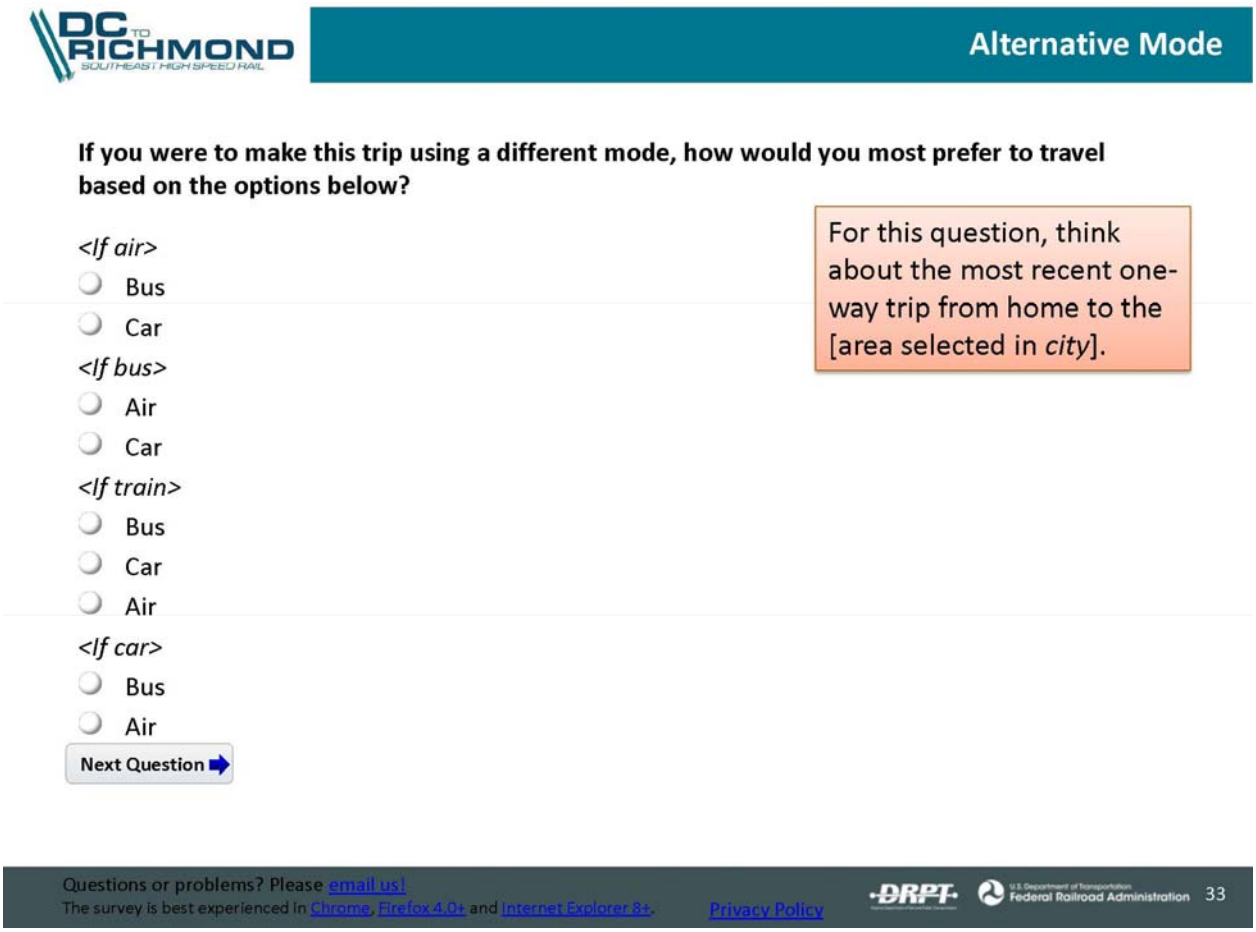
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Alternative Mode
If you were to make this trip using a different mode, how would you most prefer to travel based on the options below?
For this question, think about the most recent one-way trip from home to the [area selected in city].
<If air>
Bus
Car
<If bus>
Air
Car
<If train>
Bus
Car
Air
<If car>
Bus
Air
Next Question
Questions or problems? Please email us!
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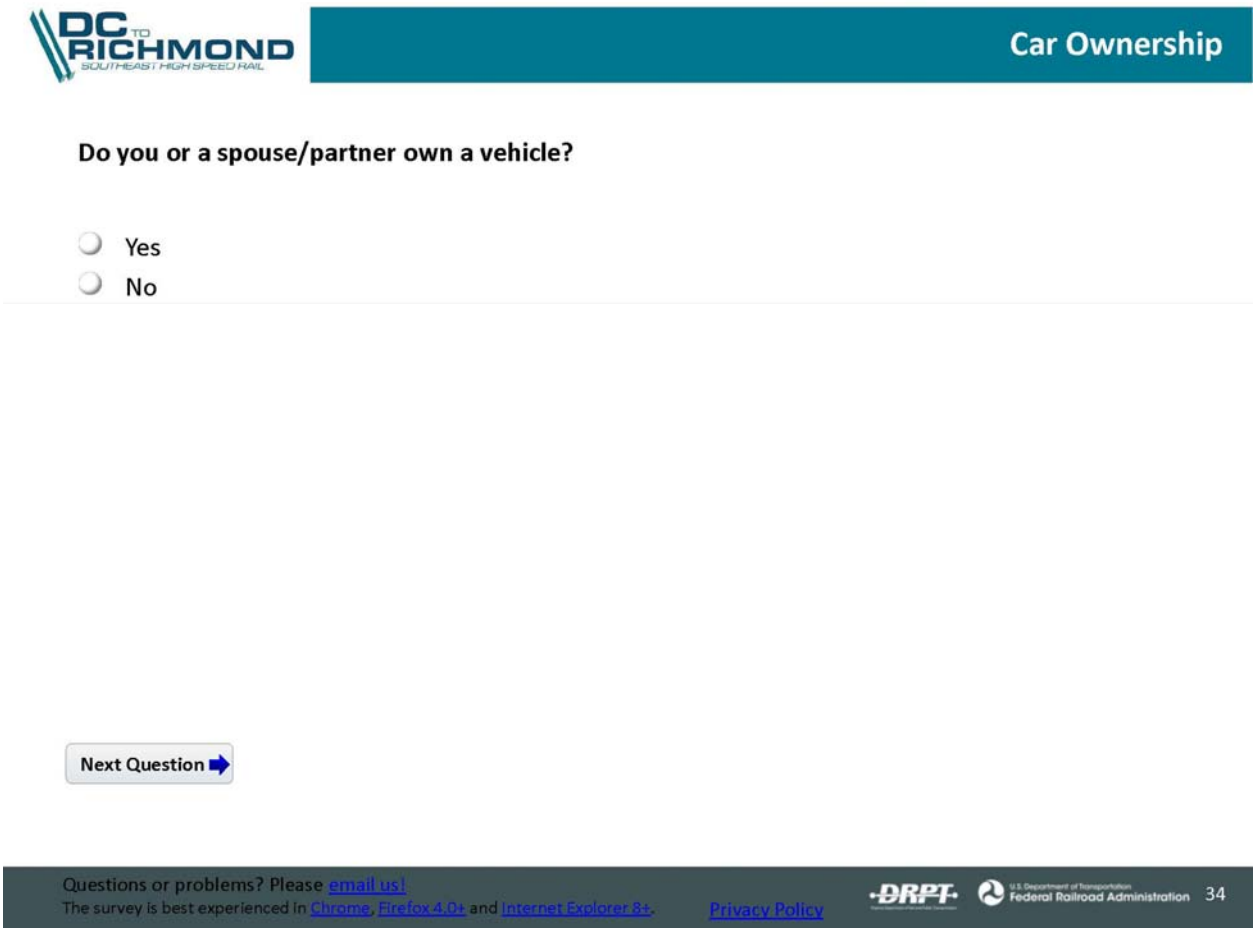
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Car Ownership
Do you or a spouse/partner own a vehicle?
Yes
No
Next Question
Questions or problems? Please email us!
The survey is best experienced in Chrome, Firefox 4.0+ and Internet Explorer 8+.
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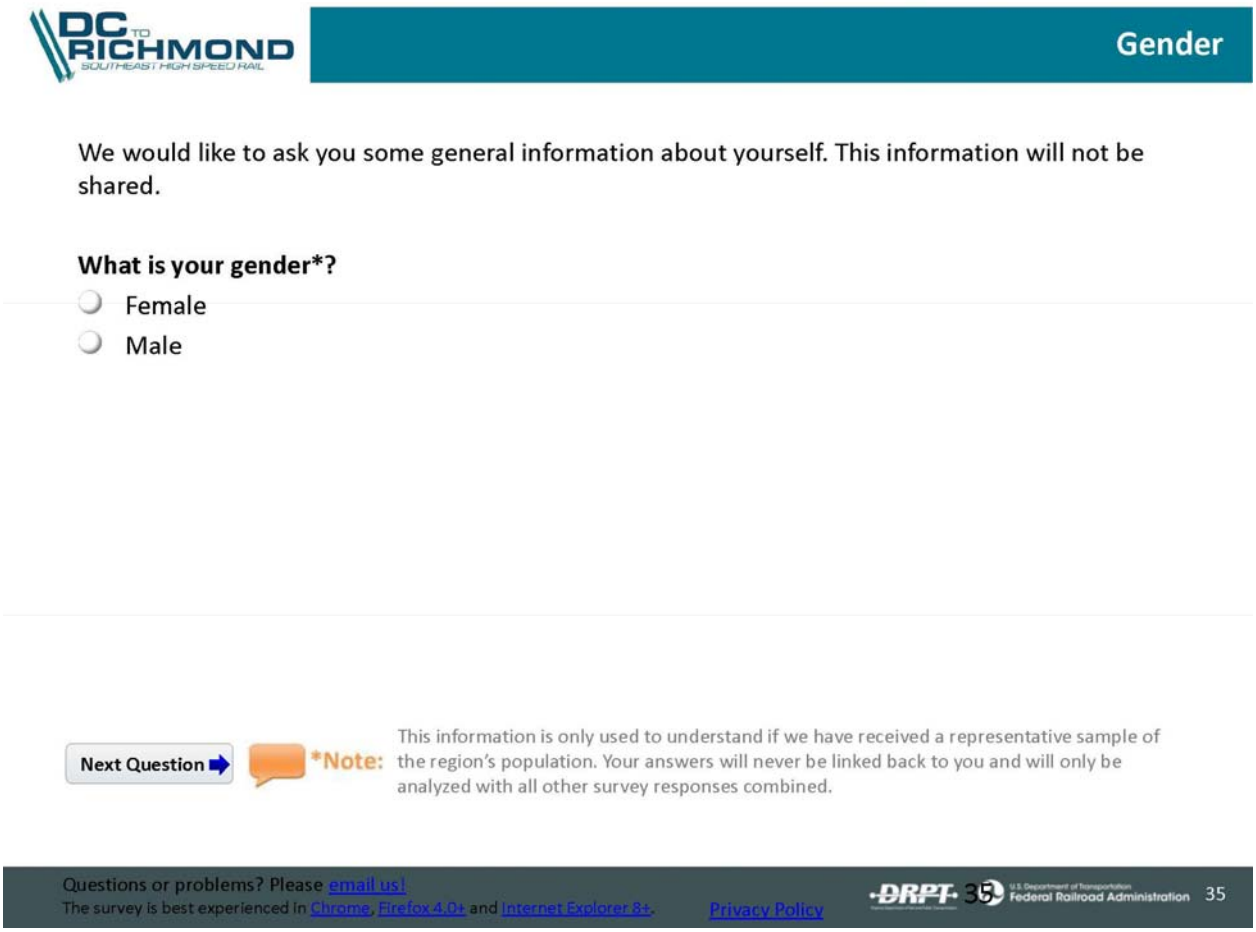
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Gender
We would like to ask you some general information about yourself. This information will not be shared.
What is your gender*?
Female
Male
Next Question
*Note:
This information is only used to understand if we have received a representative sample of the region's population. Your answers will never be linked back to you and will only be analyzed with all other survey responses combined.
Questions or problems? Please email us!
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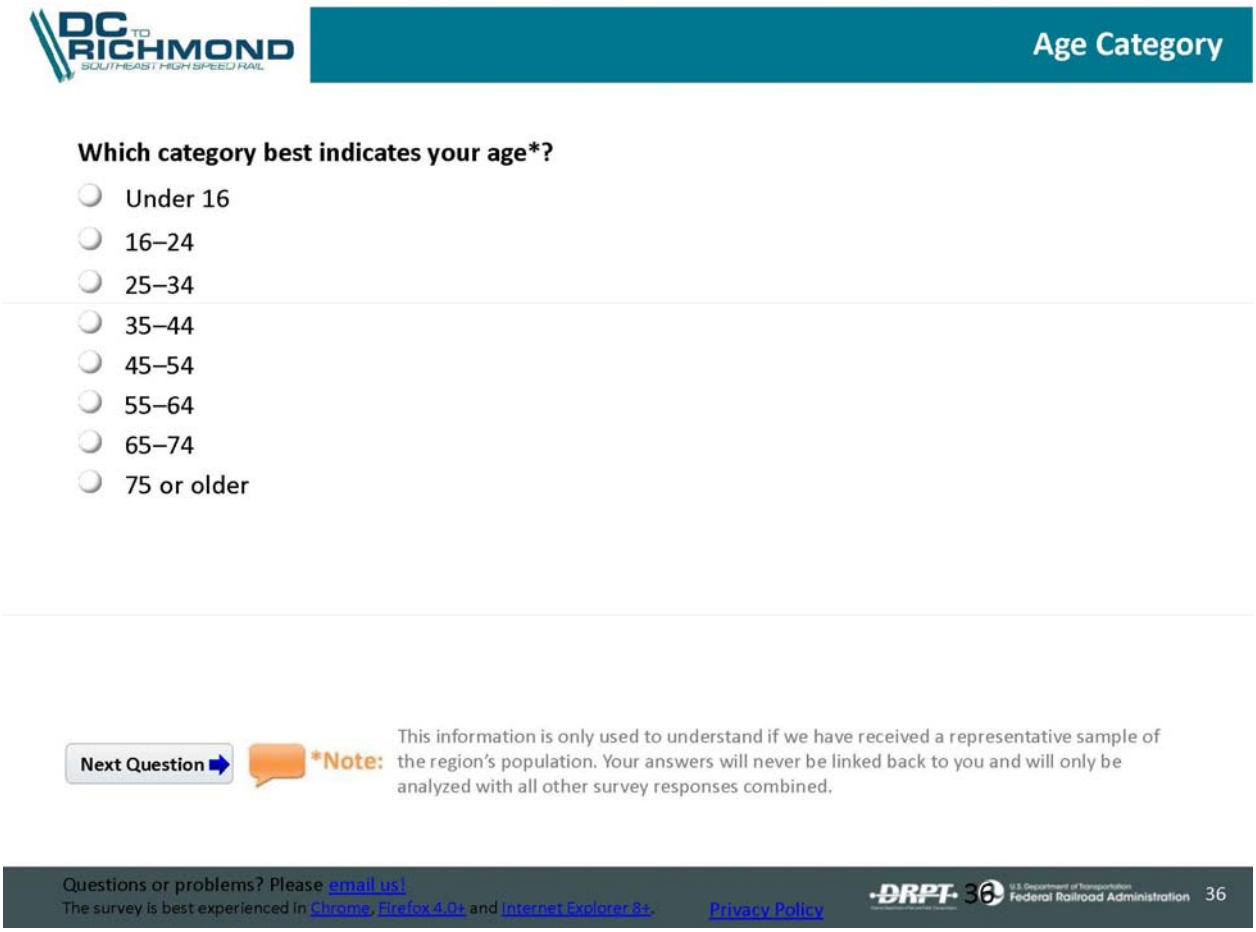
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Age Category
Which category best indicates your age*?
Under 16
16–24
25–34
35–44
45–54
55–64
65–74
75 or older
Next Question
*Note:
This information is only used to understand if we have received a representative sample of the region's population. Your answers will never be linked back to you and will only be analyzed with all other survey responses combined.
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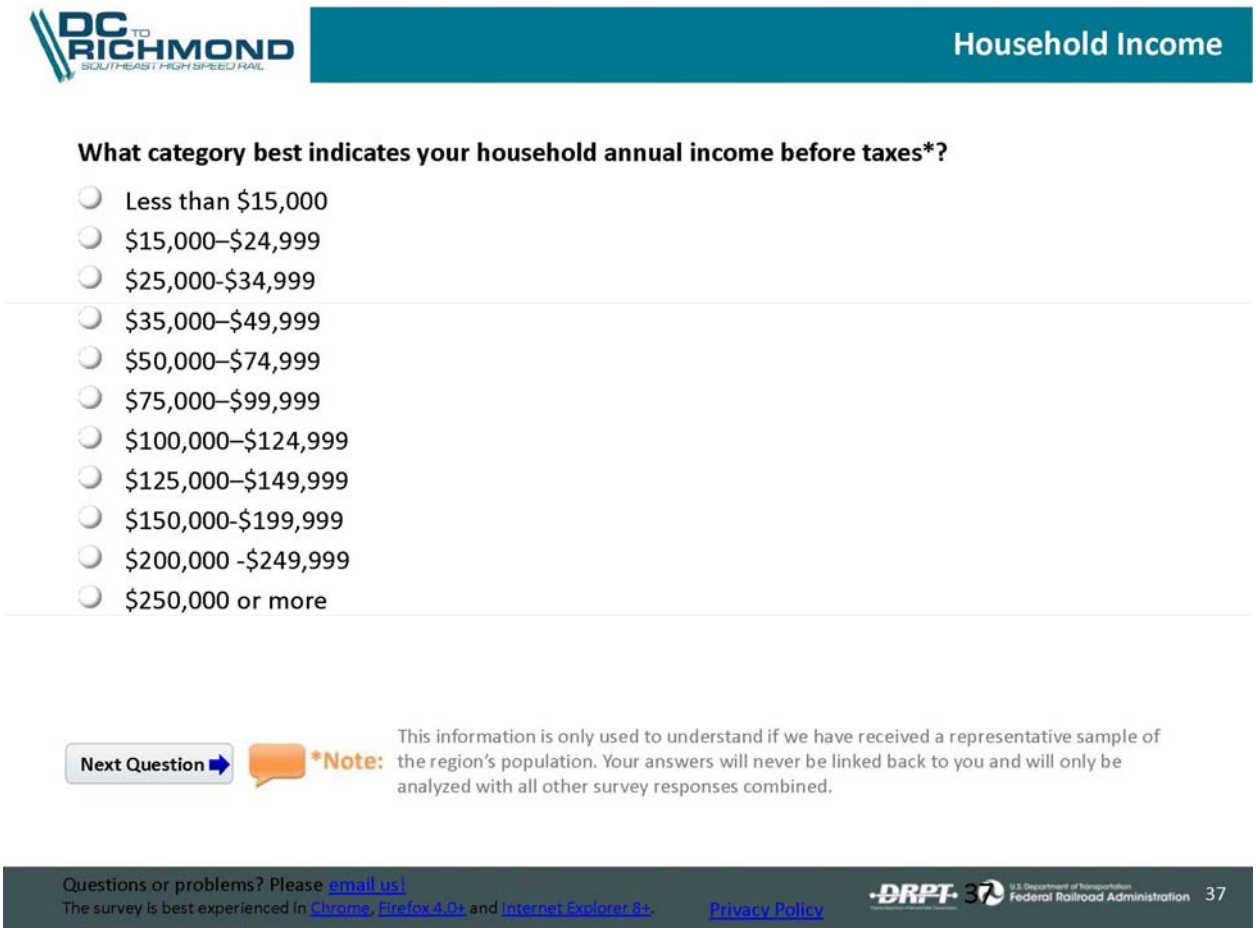
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Household Income
What category best indicates your household annual income before taxes*?
Less than $15,000
$15,000–$24,999
$25,000-$34,999
$35,000–$49,999
$50,000–$74,999
$75,000–$99,999
$100,000–$124,999
$125,000–$149,999
$150,000-$199,999
$200,000 -$249,999
$250,000 or more
Next Question
*Note:
This information is only used to understand if we have received a representative sample of the region's population. Your answers will never be linked back to you and will only be analyzed with all other survey responses combined.
Questions or problems? Please email us!
The survey is best experienced in Chrome, Firefox 4.0+ and Internet Explorer 8+.
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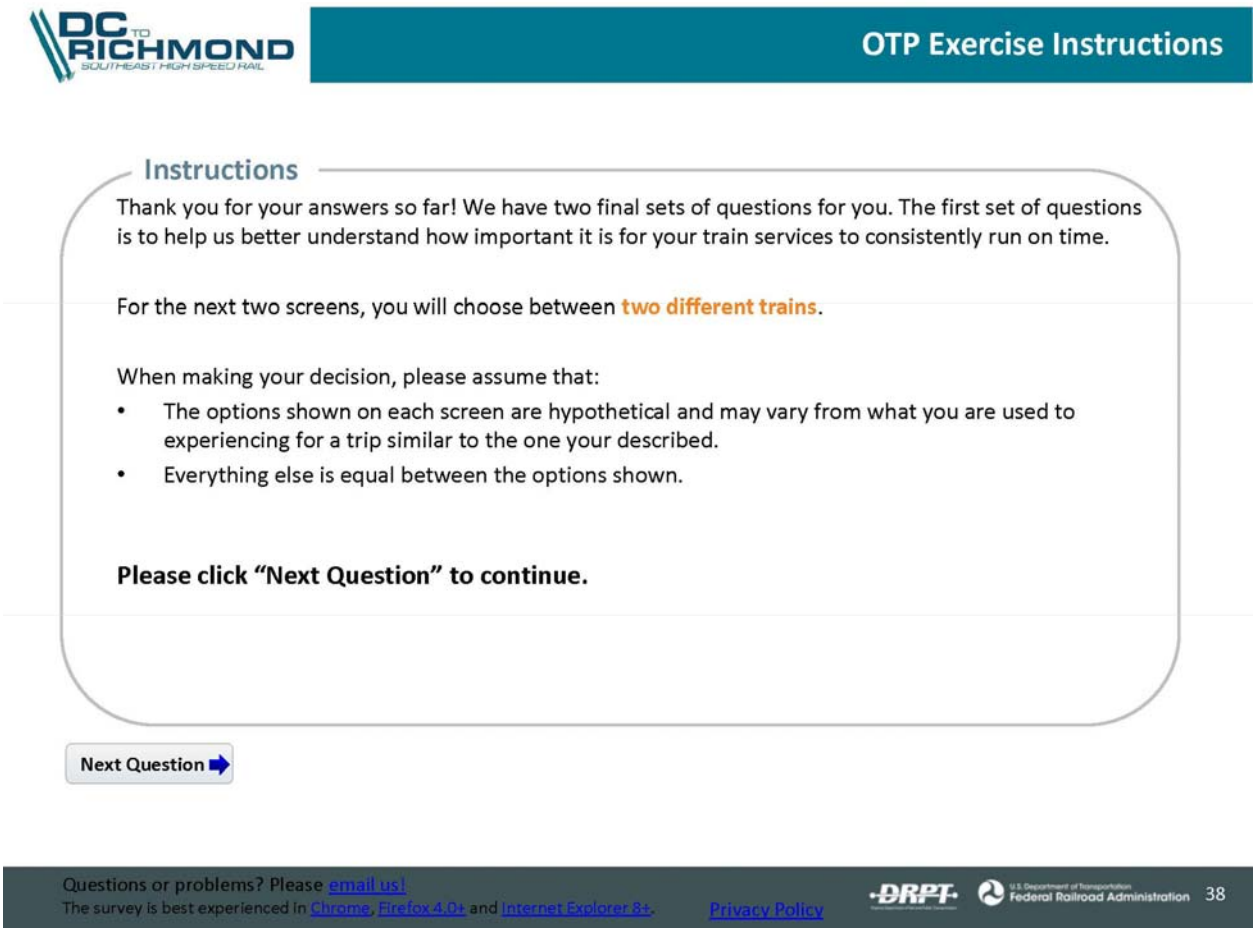
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
OTP Exercise Instructions
Instructions
Thank you for your answers so far! We have two final sets of questions for you. The first set of questions is to help us better understand how important it is for your train services to consistently run on time.
For the next two screens, you will choose between two different trains.
When making your decision, please assume that:
• The options shown on each screen are hypothetical and may vary from what you are used to experiencing for a trip similar to the one your described.
• Everything else is equal between the options shown.
Please click "Next Question" to continue.
Next Question
Questions or problems? Please email us!
The survey is best experienced in Chrome, Firefox 4.0+ and Internet Explorer 8+.
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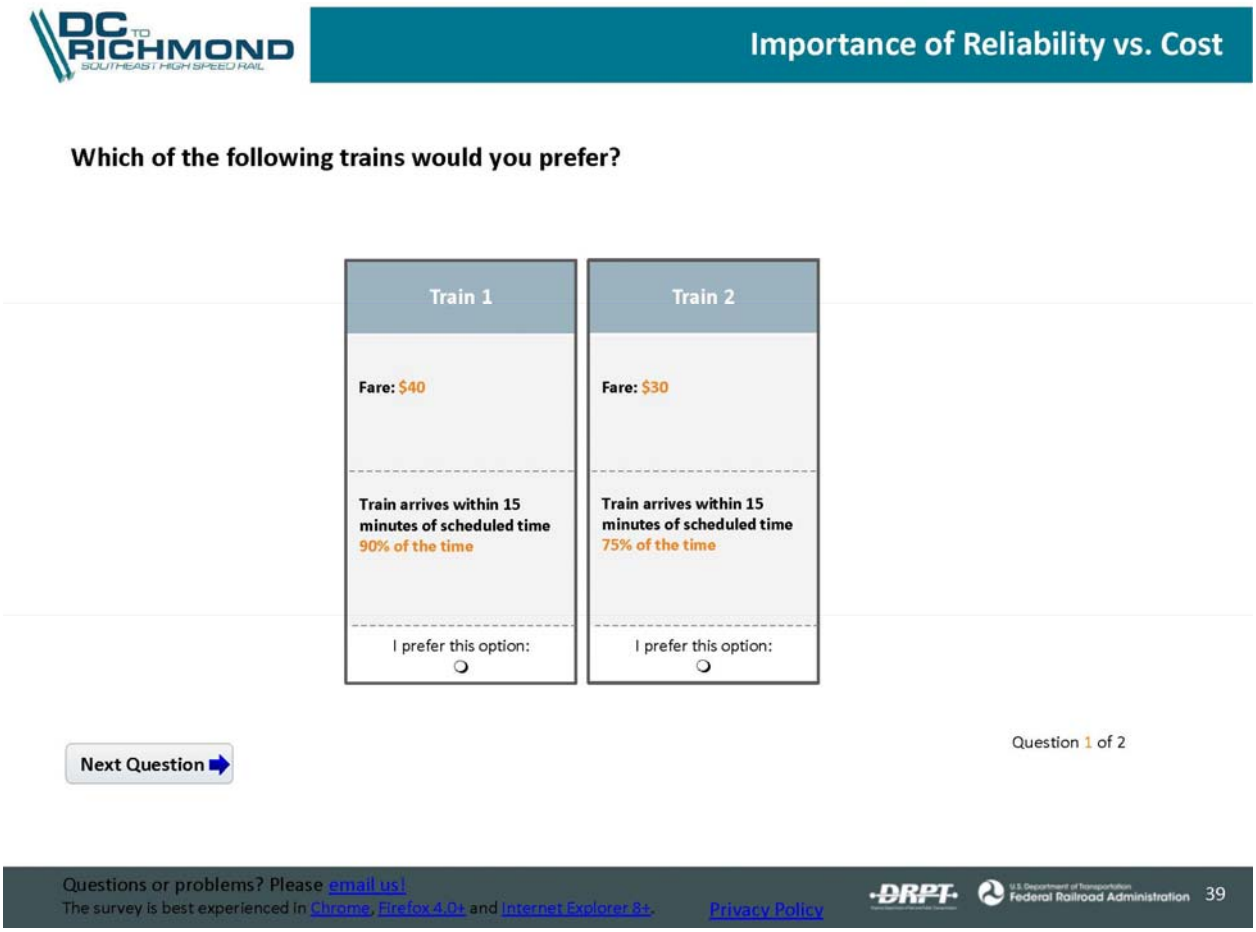
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Importance of Reliability vs. Cost
Which of the following trains would you prefer?
Train 1
Fare: $40
Train arrives within 15 minutes of scheduled time
90% of the time
I prefer this option:
Train 2
Fare: $30
Train arrives within 15 minutes of scheduled time
75% of the time
I prefer this option:
Question 1 of 2
Next Question
Questions or problems? Please email us!
The survey is best experienced in Chrome, Firefox 4.0+ and Internet Explorer 8+.
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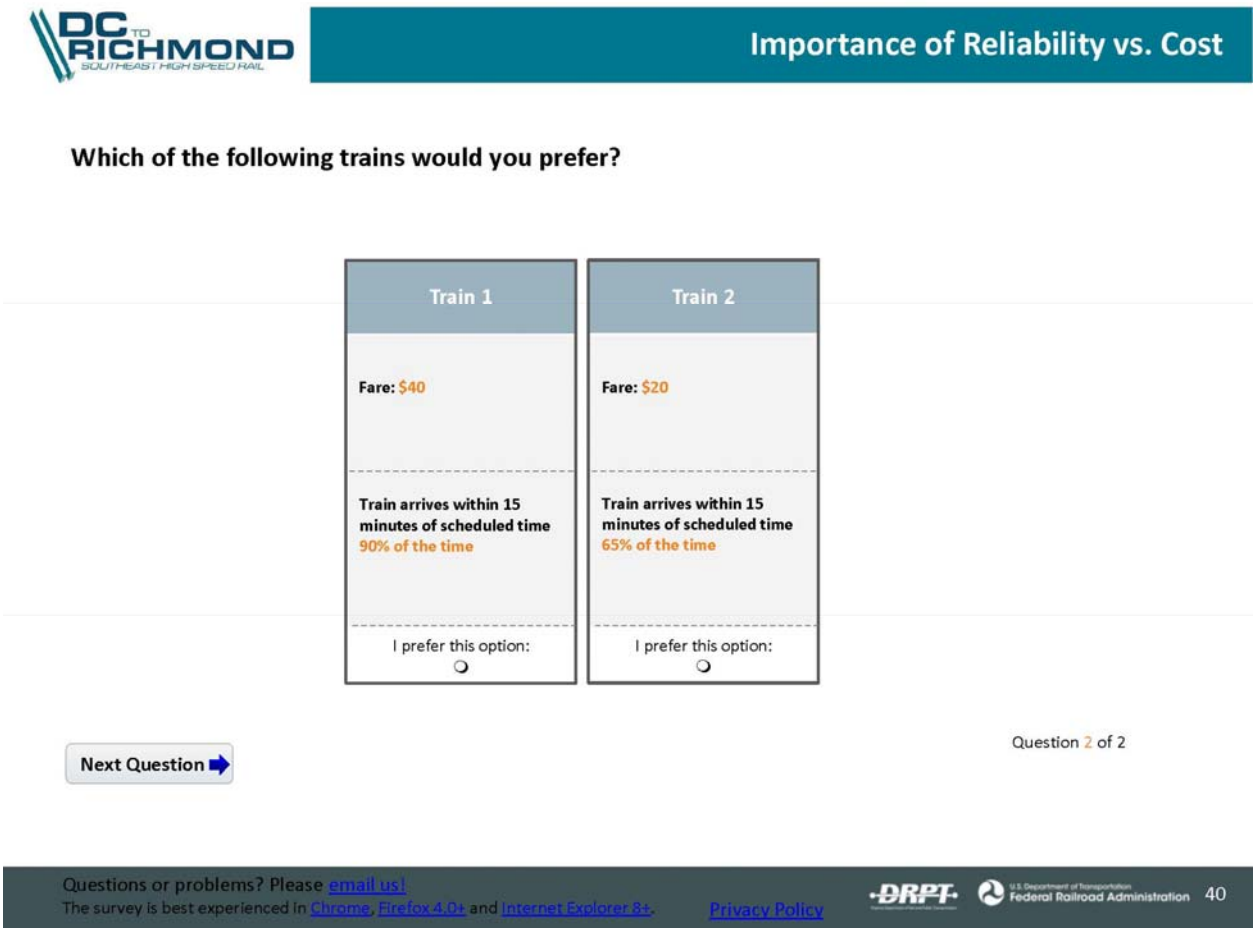
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Importance of Reliability vs. Cost
Which of the following trains would you prefer?
Train 1
Fare: $40
Train arrives within 15 minutes of scheduled time
90% of the time
I prefer this option:
Train 2
Fare: $20
Train arrives within 15 minutes of scheduled time
65% of the time
I prefer this option:
Question 2 of 2
Next Question
Questions or problems? Please email us!
The survey is best experienced in Chrome, Firefox 4.0+ and Internet Explorer 8+.
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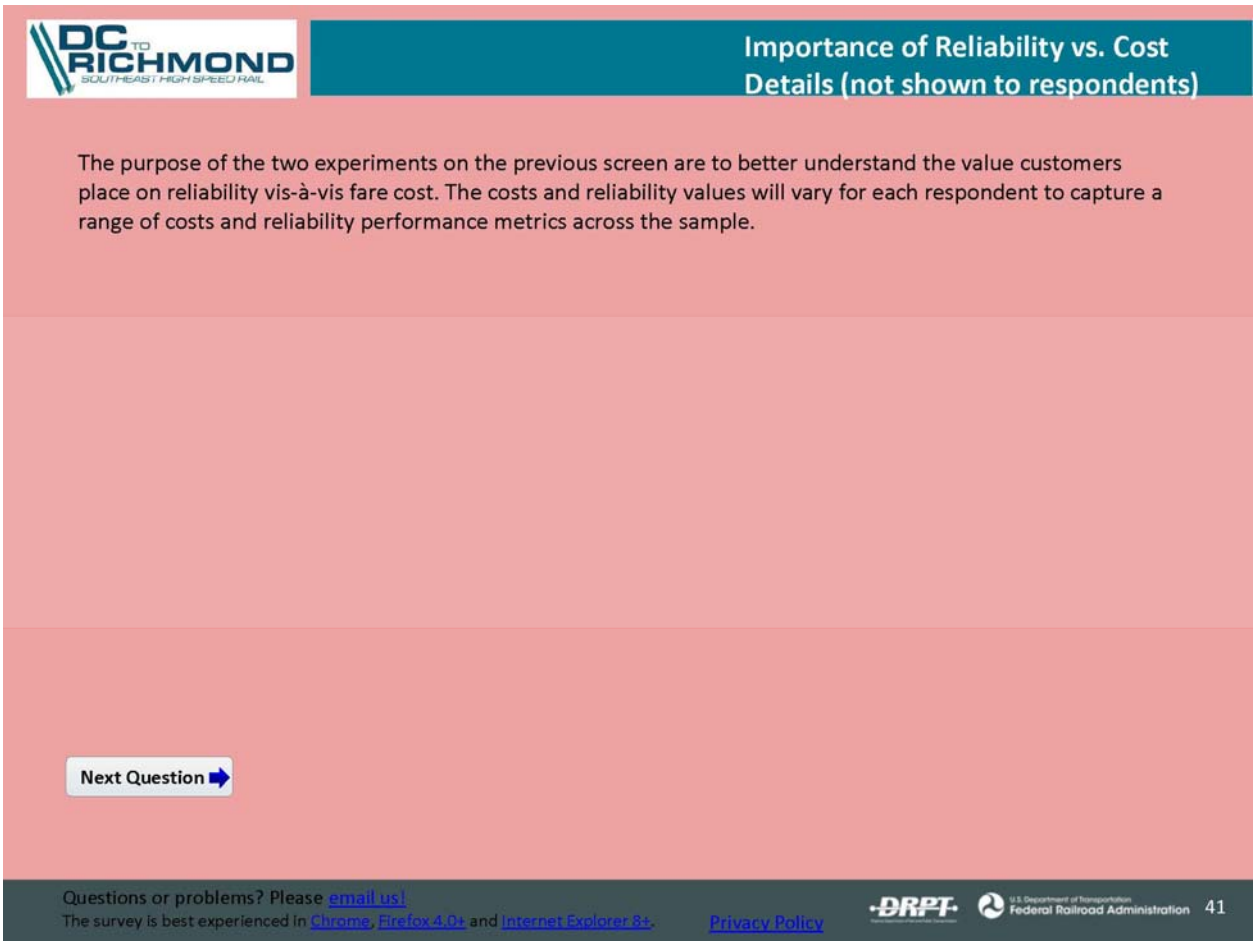
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Importance of Reliability vs. Cost
Details (not shown to respondents)
The purpose of the two experiments on the previous screen are to better understand the value customers place on reliability vis-à-vis fare cost. The costs and reliability values will vary for each respondent to capture a range of costs and reliability performance metrics across the sample.
Next Question
Questions or problems? Please email us!
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DC TO RICHMOND SOUTHEAST HIGH SPEED RAIL

SP Introduction

Thanks for you answers so far! There's just one more section. Please read the information below and proceed to the next question when you're ready.

Project Information

In order to provide faster and more reliable travel between Richmond, VA and points north, officials are considering new transportation options to connect Richmond and Washington DC.

One option is the development of a new **transit system** along Interstate 95. The system will operate along a rail line that is separated from road traffic and will not be impacted by traffic conditions.

As part of this process, we want to better understand the needs and preferences of travelers in the region. The results of this survey will help transportation planners design services to better meet your needs in the future.

Please click "Next Question" to continue.

Next Question

Questions or problems? Please email us!
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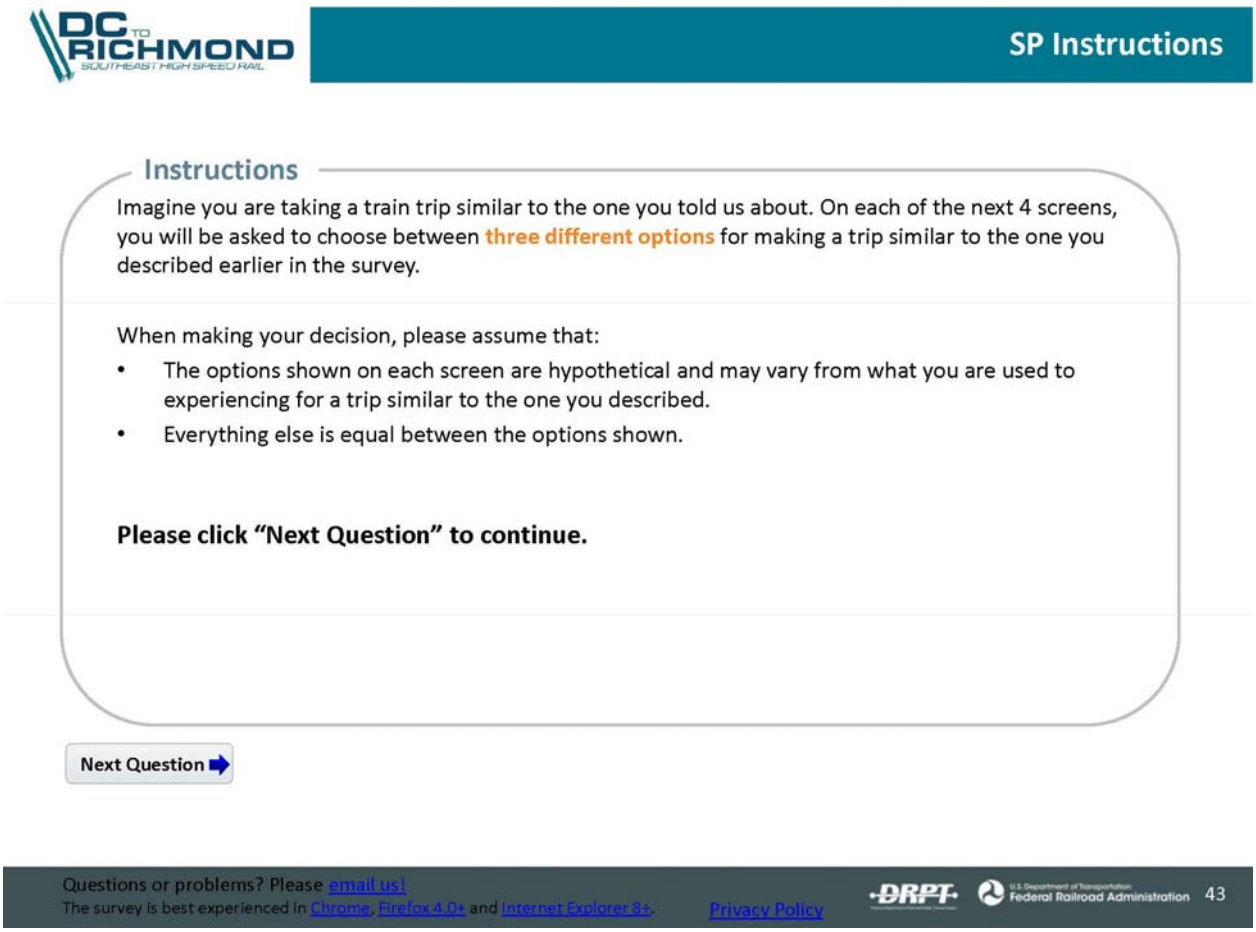
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
SP Instructions
Instructions
Imagine you are taking a train trip similar to the one you told us about. On each of the next 4 screens, you will be asked to choose between three different options for making a trip similar to the one you described earlier in the survey.
When making your decision, please assume that:
• The options shown on each screen are hypothetical and may vary from what you are used to experiencing for a trip similar to the one you described.
• Everything else is equal between the options shown.
Please click "Next Question" to continue.
Next Question
Questions or problems? Please email us!
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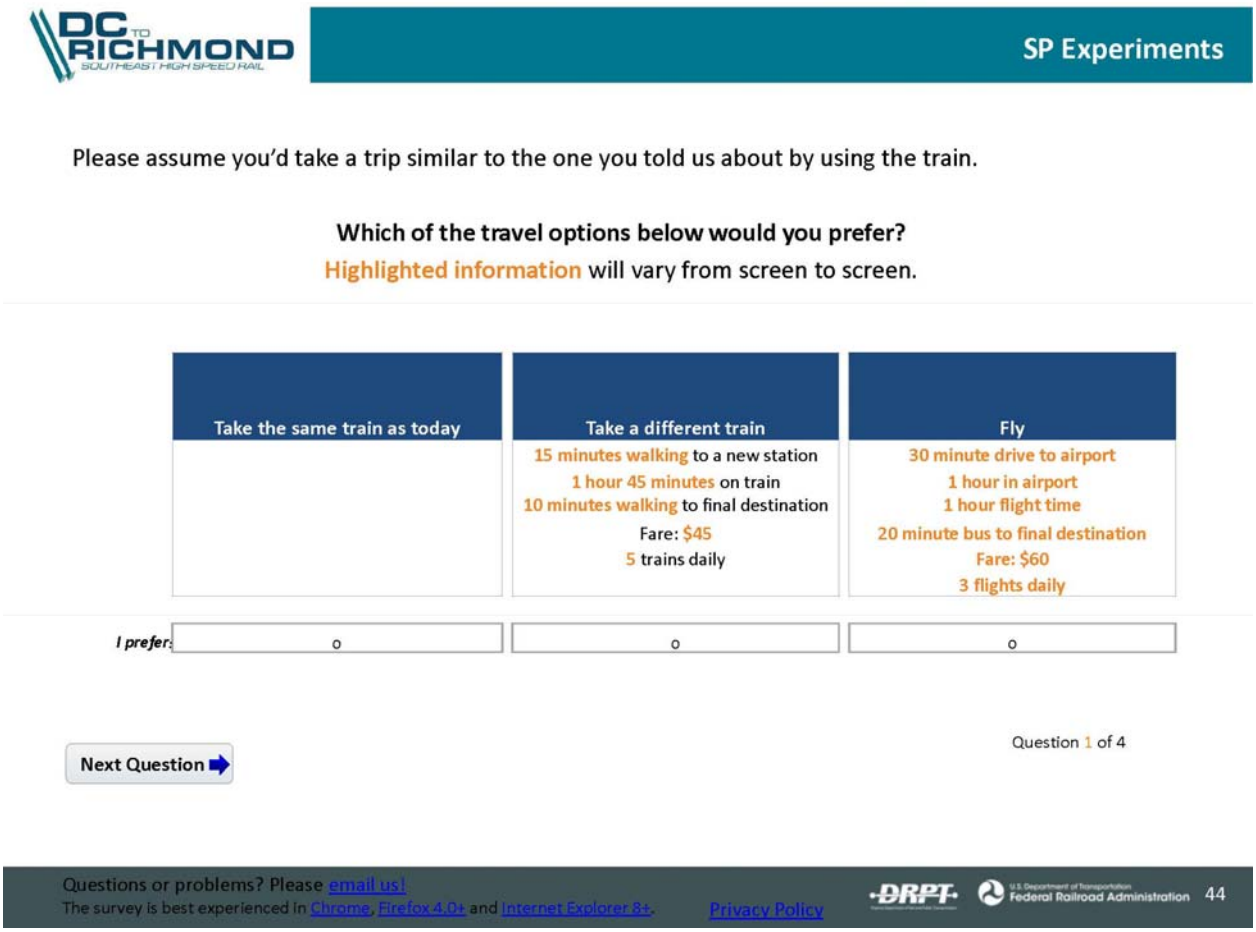
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
SP Experiments
Please assume you'd take a trip similar to the one you told us about by using the train.
Which of the travel options below would you prefer?
Highlighted information will vary from screen to screen.
Take the same train as today
Take a different train
15 minutes walking to a new station
1 hour 45 minutes on train
10 minutes walking to final destination
Fare: $45
5 trains daily
Fly
30 minute drive to airport
1 hour in airport
1 hour flight time
20 minute bus to final destination
Fare: $60
3 flights daily
I prefer:
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Next Question
Question 1 of 4
Questions or problems? Please email us!
The survey is best experienced in Chrome, Firefox 4.0+ and Internet Explorer 8+.
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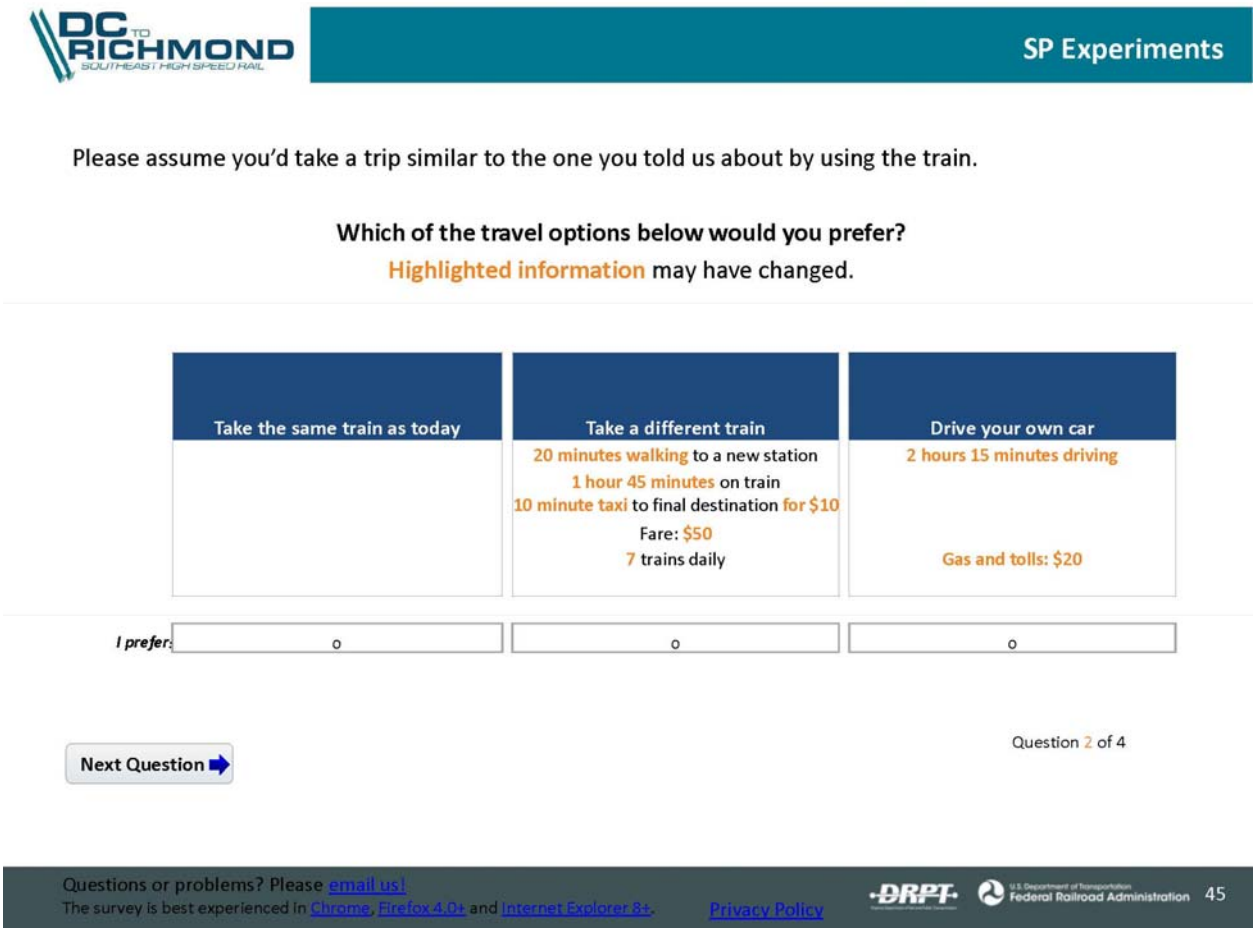
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
SP Experiments
Please assume you'd take a trip similar to the one you told us about by using the train.
Which of the travel options below would you prefer?
Highlighted information may have changed.
Take the same train as today
Take a different train
20 minutes walking to a new station
1 hour 45 minutes on train
10 minute taxi to final destination for $10
Fare: $50
7 trains daily
Drive your own car
2 hours 15 minutes driving
Gas and tolls: $20
I prefer:
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Next Question
Question 2 of 4
Questions or problems? Please email us!
The survey is best experienced in Chrome, Firefox 4.0+ and Internet Explorer 8+.
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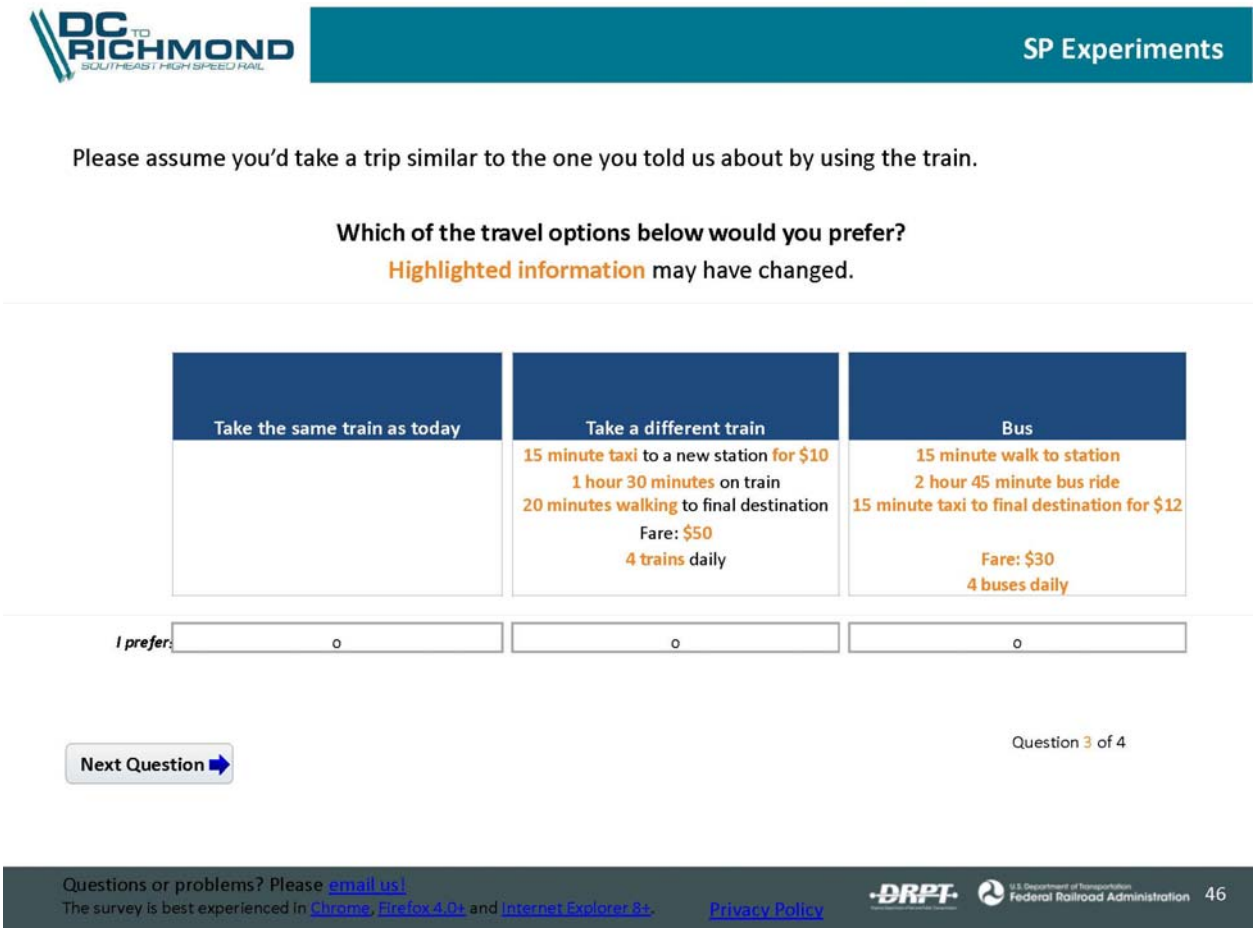
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
SP Experiments
Please assume you'd take a trip similar to the one you told us about by using the train.
Which of the travel options below would you prefer?
Highlighted information may have changed.
Take the same train as today
Take a different train
15 minute taxi to a new station for $10
1 hour 30 minutes on train
20 minutes walking to final destination
Fare: $50
4 trains daily
Bus
15 minute walk to station
2 hour 45 minute bus ride
15 minute taxi to final destination for $12
Fare: $30
4 buses daily
I prefer:
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Next Question
Question 3 of 4
Questions or problems? Please email us!
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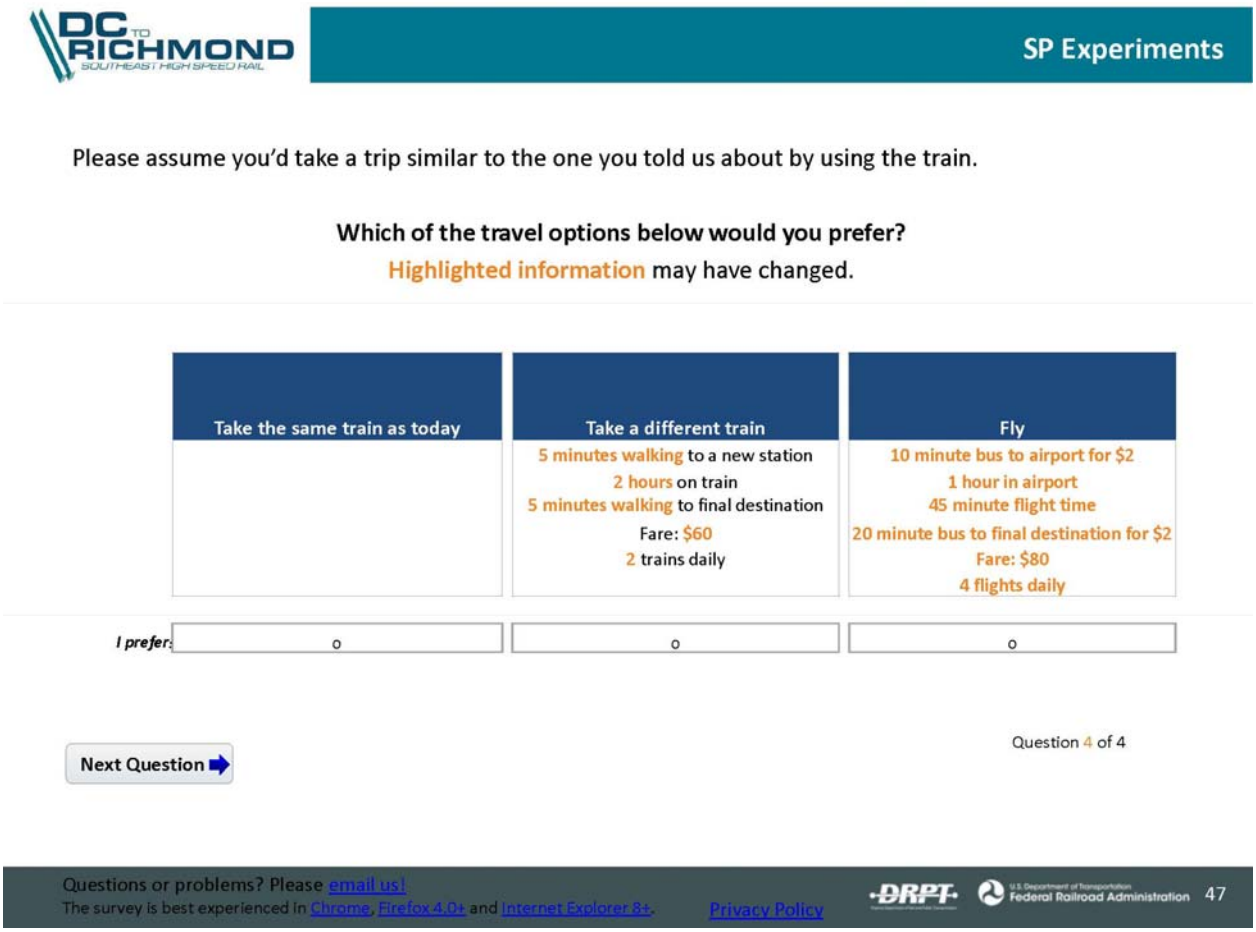
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
SP Experiments
Please assume you'd take a trip similar to the one you told us about by using the train.
Which of the travel options below would you prefer?
Highlighted information may have changed.
Take the same train as today
Take a different train
5 minutes walking to a new station
2 hours on train
5 minutes walking to final destination
Fare: $60
2 trains daily
Fly
10 minute bus to airport for $2
1 hour in airport
45 minute flight time
20 minute bus to final destination for $2
Fare: $80
4 flights daily
I prefer:
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Question 4 of 4
Next Question
Questions or problems? Please email us!
The survey is best experienced in Chrome, Firefox 4.0+ and Internet Explorer 8+.
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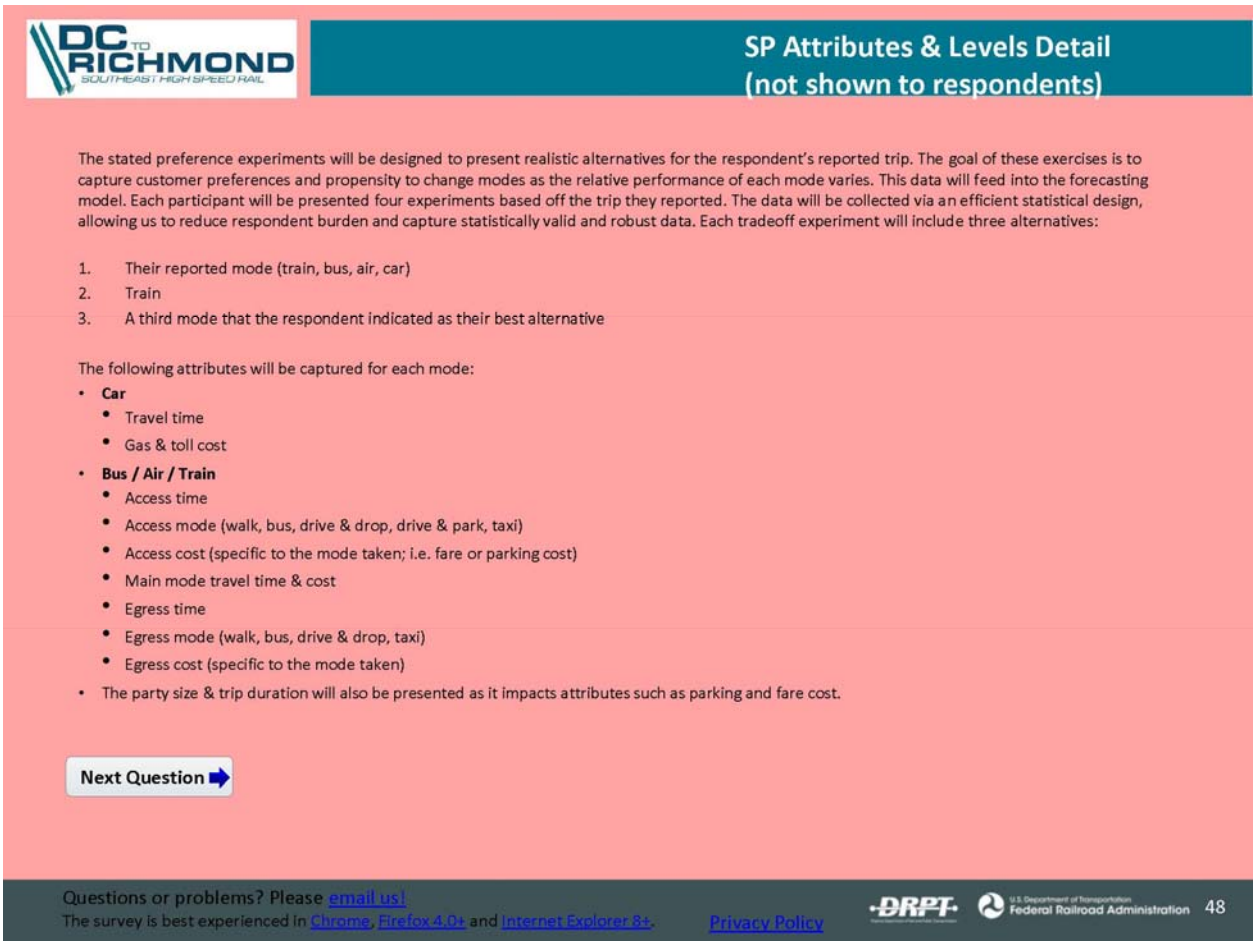
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
SP Attributes & Levels Detail
(not shown to respondents)
The stated preference experiments will be designed to present realistic alternatives for the respondent's reported trip. The goal of these exercises is to capture customer preferences and propensity to change modes as the relative performance of each mode varies. This data will feed into the forecasting model. Each participant will be presented four experiments based off the trip they reported. The data will be collected via an efficient statistical design, allowing us to reduce respondent burden and capture statistically valid and robust data. Each tradeoff experiment will include three alternatives:
1. Their reported mode (train, bus, air, car)
2. Train
3. A third mode that the respondent indicated as their best alternative
The following attributes will be captured for each mode:
Car
Travel time
Gas & toll cost
Bus / Air / Train
Access time
Access mode (walk, bus, drive & drop, drive & park, taxi)
Access cost (specific to the mode taken; i.e. fare or parking cost)
Main mode travel time & cost
Egress time
Egress mode (walk, bus, drive & drop, taxi)
Egress cost (specific to the mode taken)
The party size & trip duration will also be presented as it impacts attributes such as parking and fare cost.
Next Question
Questions or problems? Please email us!
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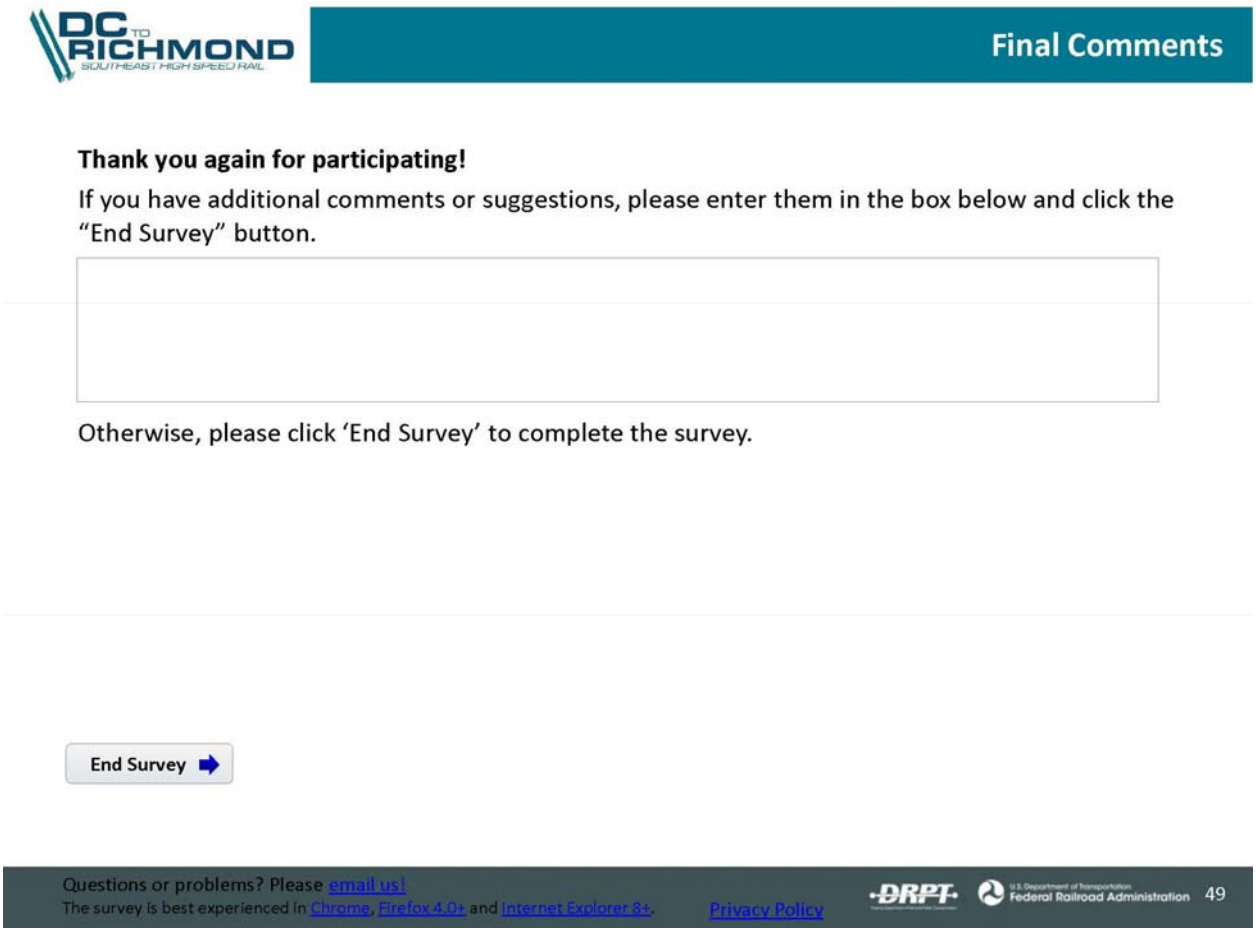
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL
Final Comments
Thank you again for participating!
If you have additional comments or suggestions, please enter them in the box below and click the "End Survey" button.
Otherwise, please click 'End Survey' to complete the survey.
End Survey
Questions or problems? Please email us!
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DC TO RICHMOND SOUTHEAST HIGH SPEED RAIL

End

Thank you for taking the time to complete this survey. All of your responses have been saved, so you may now exit your browser.

If you want to learn more about the DC to Richmond Southeast High Speed Rail Project, check out the project's website.

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FEDERAL RAILROAD ADMINISTRATION

Questions or problems? Please email us!
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