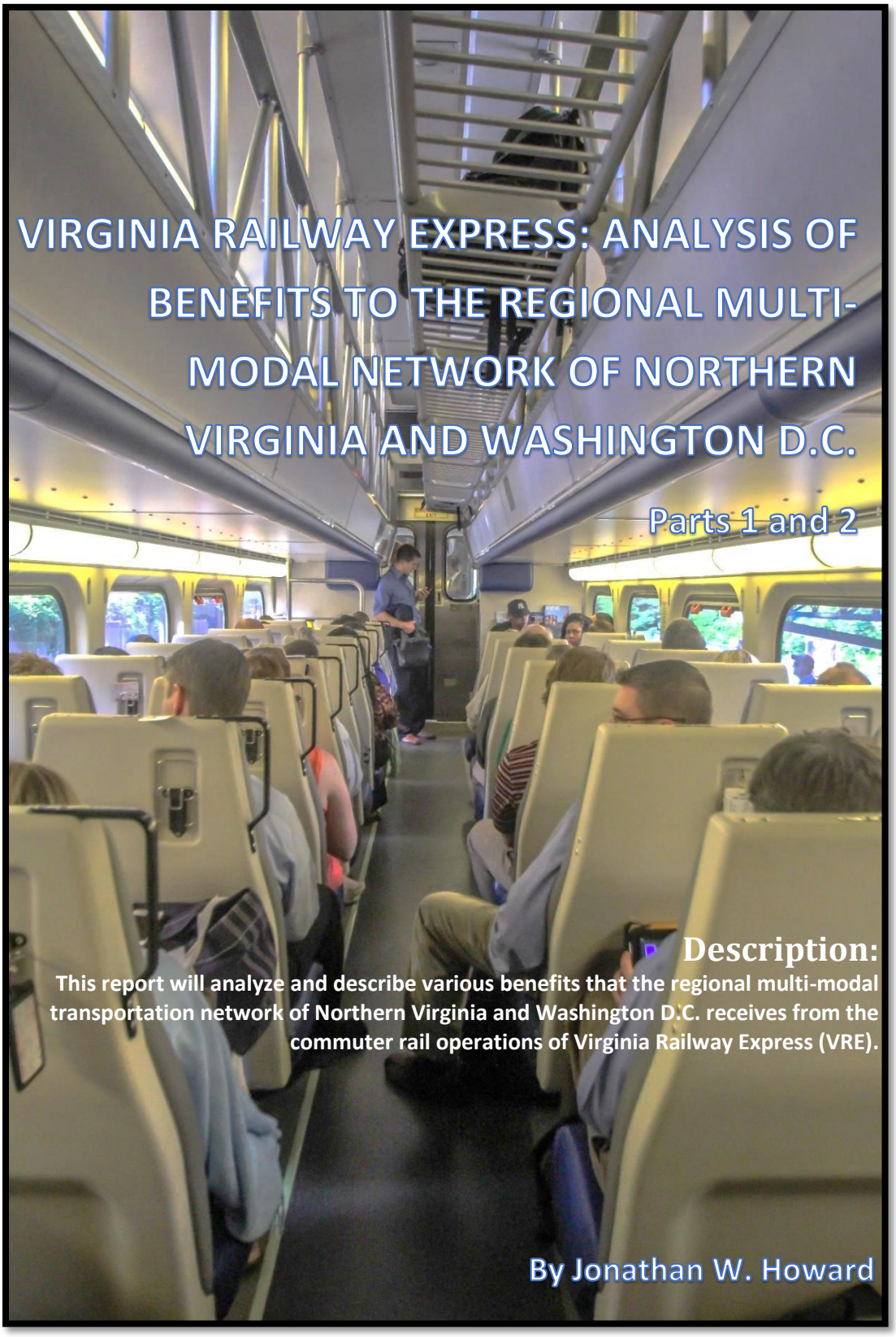

VIRGINIA RAILWAY EXPRESS: ANALYSIS OF BENEFITS TO THE REGIONAL MULTI-MODAL NETWORK OF NORTHERN VIRGINIA AND WASHINGTON D.C.

Parts 1 and 2

Description:

This report will analyze and describe various benefits that the regional multi-modal transportation network of Northern Virginia and Washington D.C. receives from the commuter rail operations of Virginia Railway Express (VRE).

By Jonathan W. Howard

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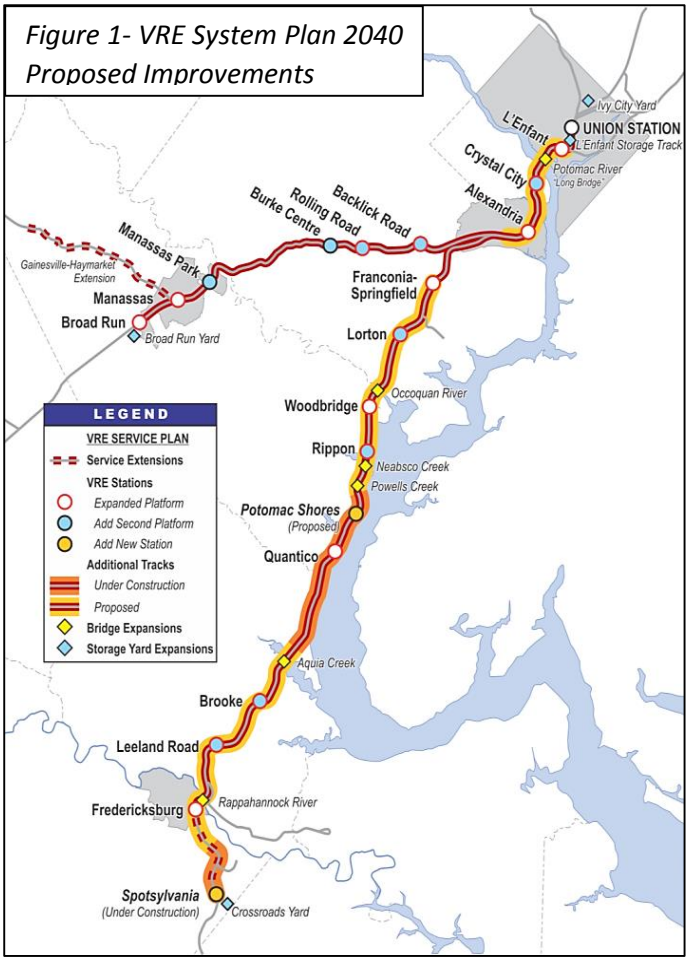
Special Thanks to:

Sonali Soneji, Reuben Juster, Doug Allen, Tom Hickey, Christine Hoeffner, Oscar Gonzalez, Norine Walker, David Koch, Dan Goldfarb, , Chris Henry, Alexis Rice, Bryan Jungwirth, Alex Buchanan, Jeremy Flores and the rest of the VRE staff for their expert advice and feedback on this project.

Introduction

Virginia Railway Express (VRE) operates commuter rail service between Fredericksburg, VA and Washington, DC (Fredericksburg Line) and between Manassas, VA and Alexandria, VA (Manassas Line). The Manassas Line merges with the Fredericksburg Line in Alexandria (see Figure 1). As outlined in the *VRE System 2040 Plan,* the jurisdictions served by VRE are projected to experience steady employment and population growth and VRE has made plans to accommodate this growth.

Figure 1- VRE System Plan 2040 Proposed Improvements



"THE VRE SYSTEM PLAN 2040 CALLS FOR MORE FREQUENT SERVICE, LONGER TRAINS AND IMPROVED FACILITIES AT STATIONS."

Sometimes it is difficult to communicate the types of benefits that VRE offers to the transportation network when speaking to various public or policymaker audiences. This and subsequent reports will clarify the types of benefits that the regional multimodal network of Northern Virginia and Washington, D.C. receives due to VRE service and will present them in a comprehensive manner. Various literature reviews, third party reports, VRE survey data, transportation and socioeconomic data, were analyzed to form five categories of benefits that were identified:

1) **Transportation Efficiency**
2) **Transportation Equity**
3) Public Health and Safety*
4) Environmental Health*
5) Economic Development*

However, transit benefits can be hard to quantify and they often overlap and their effects spill over into each other. For example, while commuter travel time savings may improve the efficiency of the overall transportation system, it also has secondary effects on various aspects of the economy, the environment, society and the individual. This initial report will identify and analyze the transportation efficiency and equity benefits of existing VRE service only. *The public health, environmental and economic benefits are to be analyzed and released in subsequent reports.

1. Transportation System Efficiency

The criteria for what qualifies as an efficiency benefit primarily deals with the ways VRE service enhances the macro level functionality of the Northern Virginia and Washington D.C. transportation system.

1.1 Congestion Reduction

Congestion itself is not a problem. In fact, it can be a positive indicator of a growing economy. However, congestion poses an obstacle to mobility, which can slow economic growth and negatively impact the quality of life in a region. Therefore, it is imperative that improvements in mobility complement growth.

The "Congestion Relief Provided by Virginia Railway Express" study performed by the Texas A&M Transportation Institute (TTI) analyzes the congestion reducing benefits from existing VRE service to the I-95/395, I-66 and I-495 highway corridors adjacent to VRE lines. The primary congestion reduction benefits identified were increased person throughput (i.e. capacity) and travel time savings (i.e. delay).

1.1a Travel Time Savings

Congestion reduction benefits were calculated by examining the relationship between traffic density (traffic per lane) and speed. Generally, as more person-trips are taken on VRE rather than traveling on the freeway, an increase in freeway travel speed occurs.

"ACCORDING TO 2013 VRE CUSTOMER SURVEY DATA, ROUGHLY HALF OF VRE USERS DROVE ALONE BEFORE USING VRE, 20 PERCENT CARPOOLED AND 30 PERCENT USED SOME OTHER FORM OF TRANSIT."

TTI's approach to estimating the congestion benefit from existing VRE service "is to assume travelers returned to some combination of other travel modes." The models simulate the number of people who would otherwise take their own vehicles, carpool, use the metro or ride a bus if VRE were no longer an option. High Occupancy Vehicle (HOV) lanes and vehicle occupancy rates of each mode were also adjusted to reflect different peak hour travel conditions. The models use the fiscal year 2013 VRE average ridership of 18,880 daily riders as a basis for the analysis.

"THE TTI SCENARIOS REVEAL TRAVEL TIME SAVINGS BETWEEN 1.6 TO 3.8 MILLION PERSON HOURS ANNUALLY FROM THE EXISTING VRE SERVICE AND RIDERSHIP IN THE I-66 AND I-95 CORRIDORS."

The highest travel time savings assumes all riders use private vehicles at a person occupancy rate of 1.25 per vehicle. The lowest range of travel time savings assumes half of all riders would use private automobiles at a person occupancy rate of 1.25 per vehicle and the other half of riders would use the bus. The congestion benefits of reduced travel times as VRE riders are taken off the road "also extend to non-VRE freeway travelers", thereby benefitting the entire transportation network.

1.1b Increased Person Throughput

The existing VRE commuter rail fleet provides capacity for approximately 5,000 persons per hour during peak service (or the equivalent of 4,500 vehicles). If VRE service did not exist, traffic per lane would inevitably increase during peak hour. Additional lane capacity (widening) in each direction of the parallel I-95 and I-66 corridors would be needed to provide the same person-moving capacity.

1.2 Cost Efficiency

TTI estimated the amount of added lane capacity that would be needed to accommodate 5,000 more people during peak hour travel conditions on the I-95 and I-66 highway corridors parallel to the VRE lines. TTI determined that "between 0.5 and 1.2 lanes of freeway capacity are being saved by the VRE service." At least one freeway lane in each direction, or 180 total lane-miles on the I-95 and I-66 highway corridors parallel to the VRE lines, would be required because lanes cannot be added in partial increments.

"BASED ON FAIRFAX COUNTY HIGHWAY CONSTRUCTION PROJECT ESTIMATES, VRE'S USE OF EXISTING RAIL AND RIGHT-OF-WAY HAS SAVED AT LEAST $1 BILLION IN COSTS ASSOCIATED WITH HIGHWAY WIDENING." 1

1.3 Reliability

Travel time reliability measures the variability of travel times between the same two points from one time period to the next. Travel time reliability is impacted by non-recurring or event-driven congestion such as traffic accidents or weather. Expected travel times on highways are based on speed limits and wait time at traffic lights. For VRE and most transit agencies, reliability is measured against published schedules. Delays on a VRE train are calculated based on the time it reaches or is anticipated to reach the final destination. VRE strives to achieve on-time performance for over 90% of trains.

Drivers on the other hand, have grown accustomed to computerized mapping applications that display roads with low travel speeds to identify congested areas. Figure 2 is a map created by Reuben Juster, a Faculty Research Assistant at the University of Maryland College Park's Center for Advanced Transportation Technology (CATT). The map compares the median peak afternoon travel times of VRE trains and cars that travel major roads on the I-66, I-395 and I-95 corridors adjacent to the VRE lines.

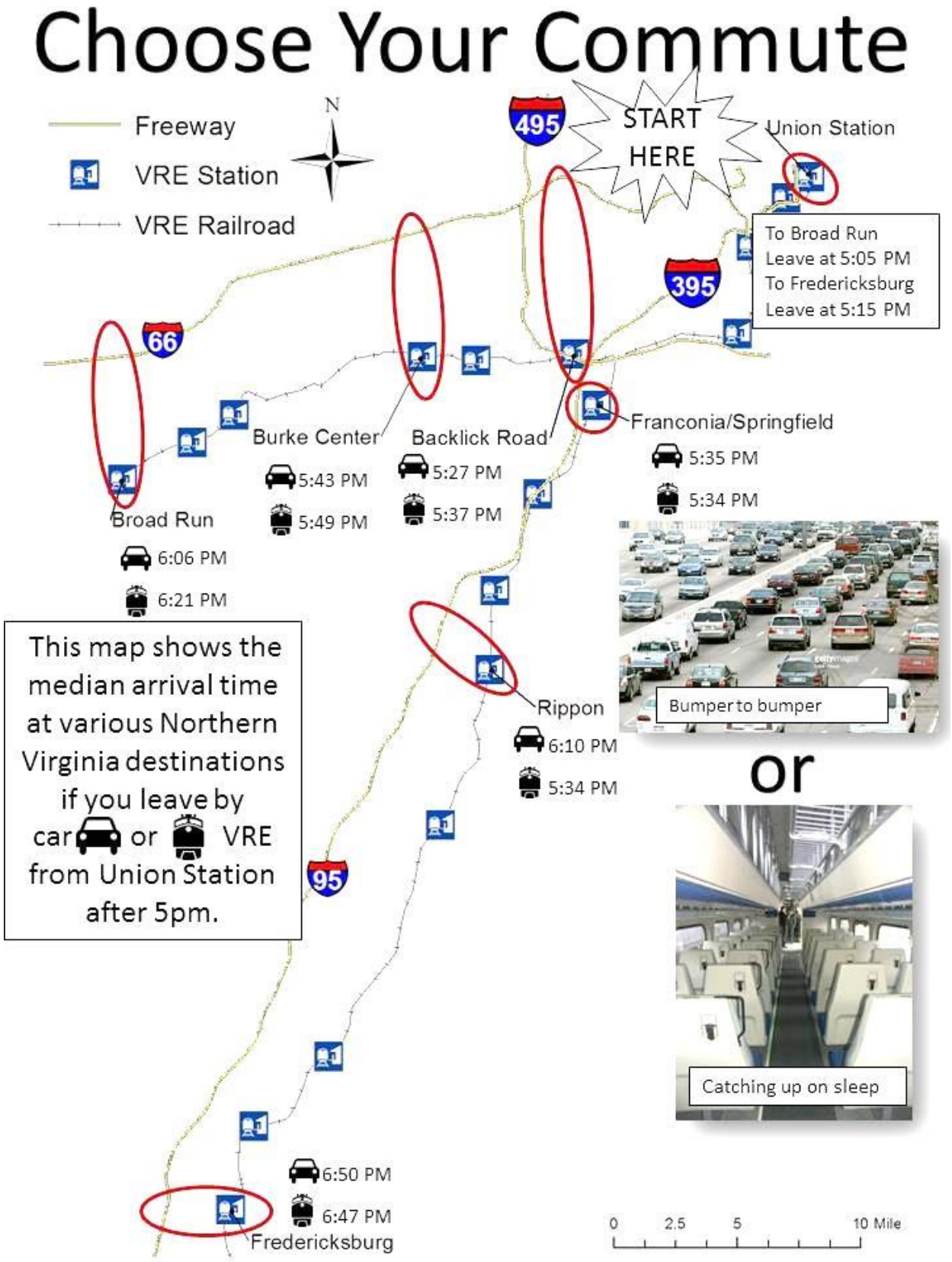
Using the same measure for trains and highways can help make a better comparison between available modes for a trip in those corridors. At the first perpendicular line, the map shows that the train and car left Union Station at the same time. Along the way, the other perpendicular lines will show what time the train and the car pass relative points.

"WHILE VRE MIGHT BE A LITTLE SLOWER, IT IS MUCH MORE RELIABLE."

The passenger car data comes from the Regional Integrated Transportation Information System's (RITIS) Vehicle Probe Project (VPP) suite using data only from weekdays at hourly intervals. The data for the VRE trains was obtained from VRE's TRIP data base. The data represents the time periods July 1st, 2013 - June 30th, 2015. The excel spreadsheet in Appendix 1 explains in detail the 50th (median) and 95th (planning) times for eight (two per line per direction) VRE service runs and the corresponding passenger vehicle.

[1] "Congestion Relief Provided by Virginia Railway Express." Texas A&M Transportation Institute. June 2015

Figure 2- Peak PM Comparison of a Car vs. VRE of median arrival times or Travel Time Index July 1st, 2013 - June 30th, 2015



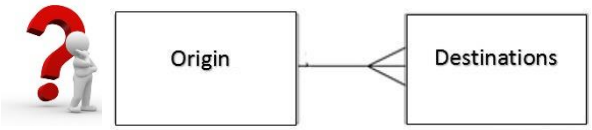
2. Transportation Equity

The criteria for what qualifies as equity benefit primarily deals with how VRE provides a fair and affordable transportation alternative.

2.1 Mobility

Mobility measures how far people can travel. However, people normally travel to get to a specific destination. In this report, mobility is defined as the number of destinations that are connected to an origin. Figure 3 illustrates what a one-to-many relationship between one origin and its possible destinations looks like.

Figure 3. One-to-many relationship schematic

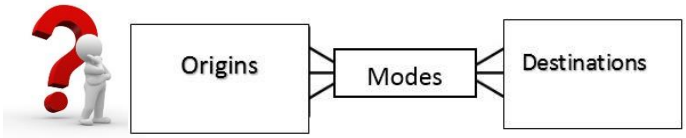


Mobility from this perspective seeks to answer the question: "where can I go?" as opposed to "how far can I go?" or "how long will it take". All of these perspectives are valid ways of measuring mobility. Figure 5 illustrates how VRE contributes to the numerous ways a person can travel and connect to other places in and out of the Washington region.

2.2 Flexibility

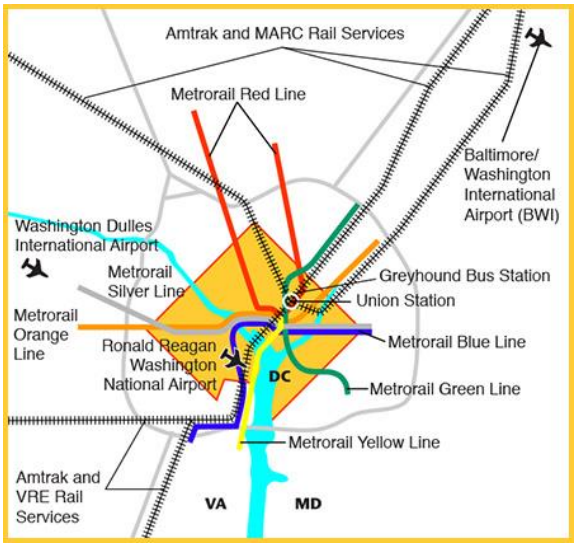
Flexibility as defined in this report is simply the number of travel modes or options available. As the number of travel options increase, the total number of origin-destination possibilities also increase. Flexibility seeks to answer the question "How can I go?" and refers to the many-to-many relationships between origin-destination possibilities made possible by an increased number of travel modes. Figure 4 illustrates what the many-to-many relationship looks like with the lines representing the modes that travelers can use. Increasing the number transportation modes increases the number of origin-destination possibilities in a region.

Figure 4. Many-to-many relationship schematic



Flexibility is important for two reasons. First, flexibility allows travelers to easily switch to another mode or route for the same origin-destination pair when congestion occurs, thereby increasing the overall effectiveness and flow of the transportation system. Second, flexibility facilitates travel decision making. As mentioned previously, VRE service gives commuters an additional travel mode, thereby increasing the number of origin-destination pairs in and beyond the region (Figure 5).

Figure 5- Metro Connections[2]



2 "Connecting between Metro and D.C.-Area Airports and Other Transportation Services". Commuterpage.com. 2015. CommuterPage is a program of Arlington County, Virginia

2.3 Accessibility

Like mobility, accessibility can be measured in many ways depending on the application. Accessibility is defined by the Virginia Department of Transportation (VDOT) as a "road system's capability to provide access to and between land use activities within a defined area."[3] Note the emphasis on land use activities as opposed to the network itself.

The challenge for VRE occurs when a timeframe is attached to this definition. Generally for transit to provide access to and between land use activities within a defined area, anything outside of a 45 or 60 minute range, is considered poorly accessible.

Unfortunately, the majority of VRE riders are outside of this travel timeframe. This section attempts to show why accessibility is viewed differently by those who have a long commute and some of the benefits VRE may be offering to individuals who work in high paying, specialized fields, but live outside of travel timeframes of what would be considered accessible.

The map on page 6 displays the number of jobs per acre at the census block level in the jurisdictions where the majority of VRE riders originate. The maps and information that follow show the spatial relationships of job density, high income job density and the top five industries for each area of analysis. The southern VRE origin jurisdictions consist of Stafford County, City of Fredericksburg, and Spotsylvania County.

The northern VRE origin jurisdictions are Arlington County, City of Alexandria, Fairfax County, Prince William County, City of Manassas, City of Manassas Park. Washington D.C. was analyzed separately as the major destination jurisdiction. The jurisdictions selected for analysis represent 5519 of 5955 VRE rider origins (92%) and 4922 of 5022 destinations (98%) that were collected and geocoded from the 2014 master survey.

The data and spatial analysis on the following pages will compare origin and destination job markets in an effort to explain some possible reasons why people are willing to use transit that is considered poorly accessible.

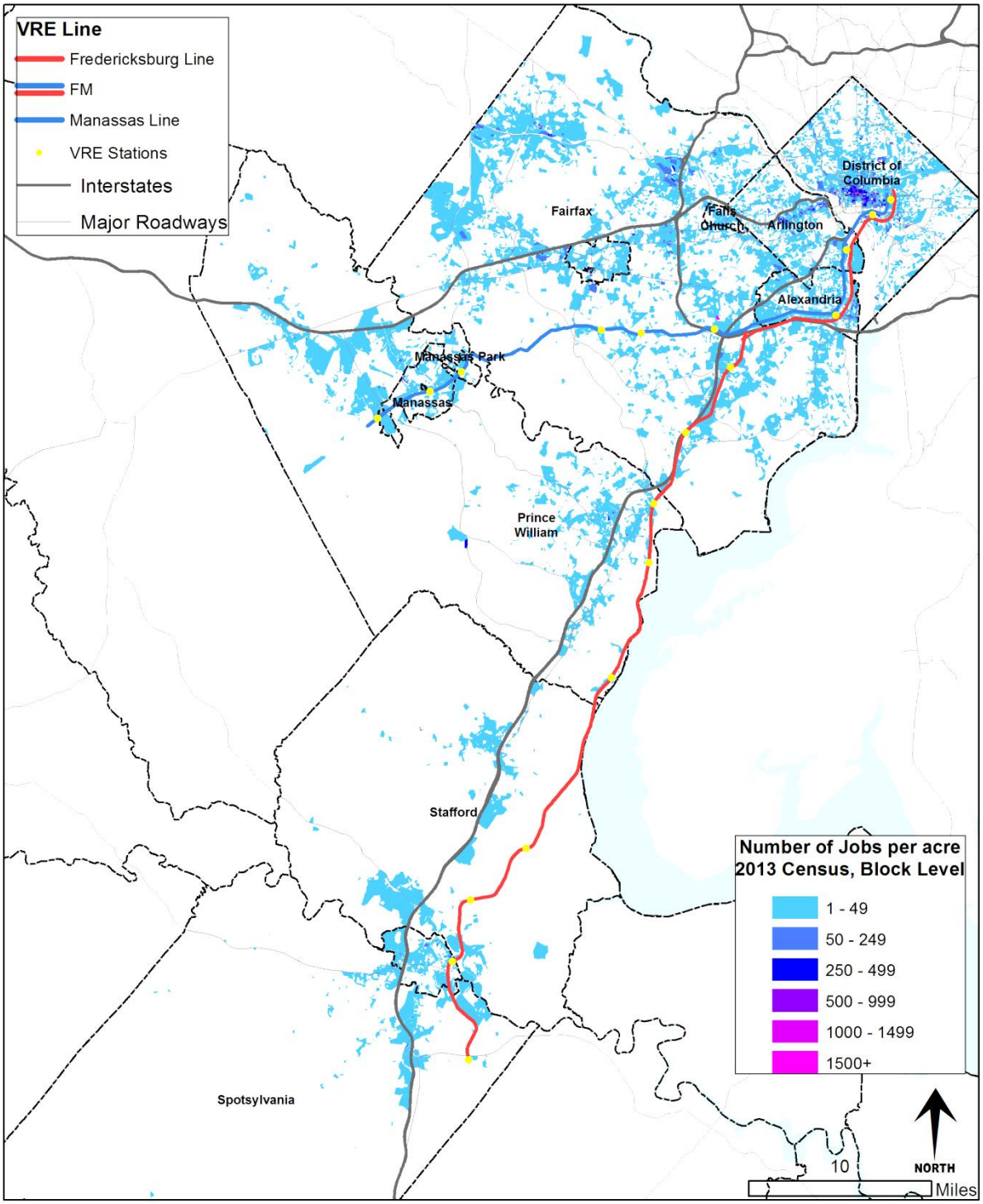
"THERE IS EVIDENCE TO SUGGEST THAT VRE RIDERS MAKE TRAVEL DECISIONS SPECIFICALLY BASED ON ACCESSING DENSE EMPLOYMENT CENTERS WITH HIGH PAYING, SPECIALIZED JOBS IN WASHINGTON D.C."

The primary destination shed within Washington D.C is also unique over the northern and southern VRE jurisdictions in that there is a higher proportion of public administration and professional, scientific, and technical jobs. These findings are consistent with the 2014 VRE Customer Opinion Survey, which states that 64% of VRE riders work for the Federal Government and 96% of VRE riders have an annual household income of $50,000 or more.[4]

[3] "Functional Classification Comprehensive Guide". Virginia Department of Transportation. June 2014

[4] "VRE 2014 Customer Opinion Survey". Virginia Railway Express. 2014.

Number of Jobs per acre at the Census Block level 2013



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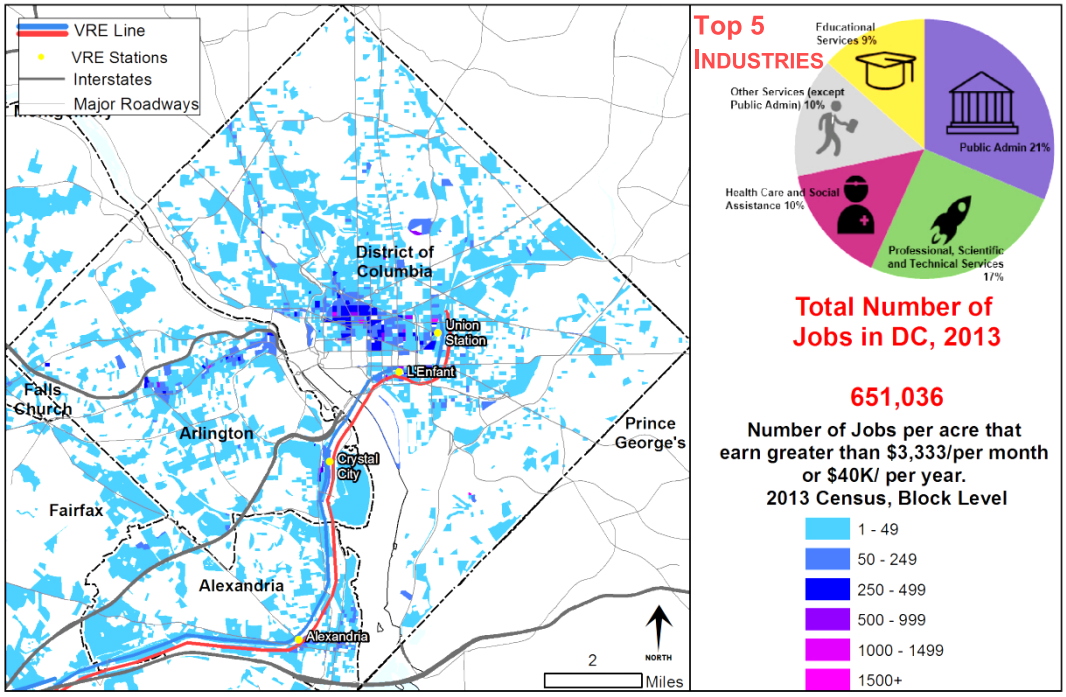
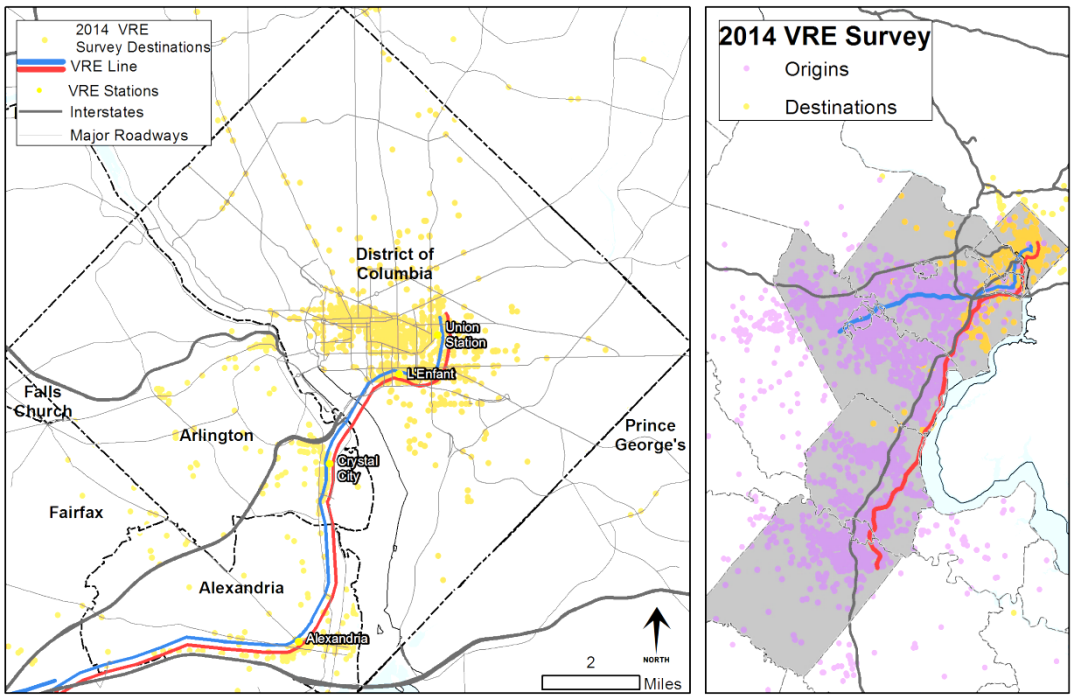
[5] U.S. Census Bureau. Longitudinal Employer-Household Dynamics Origin-Destination Employment Statistics, (LODES), Workplace Area Characteristics 2013.

Accessibility to High Income and Specialized Jobs 2013





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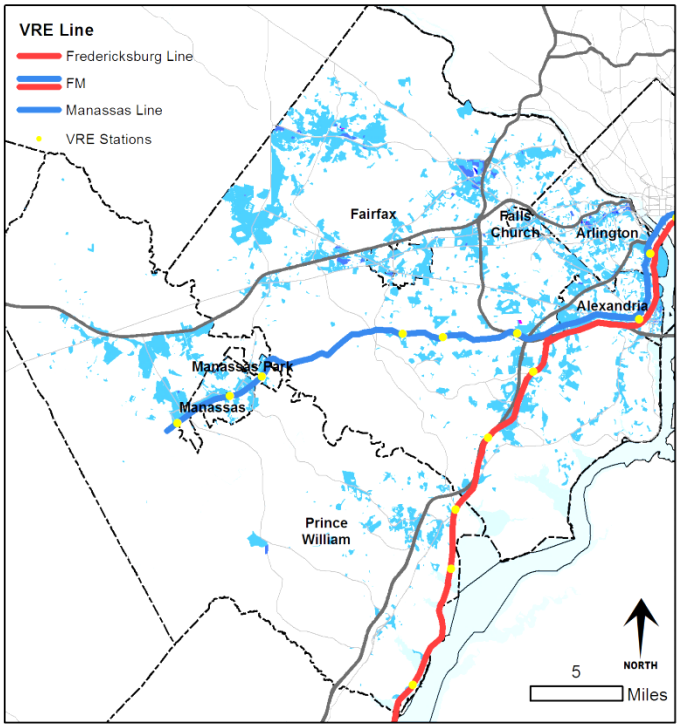
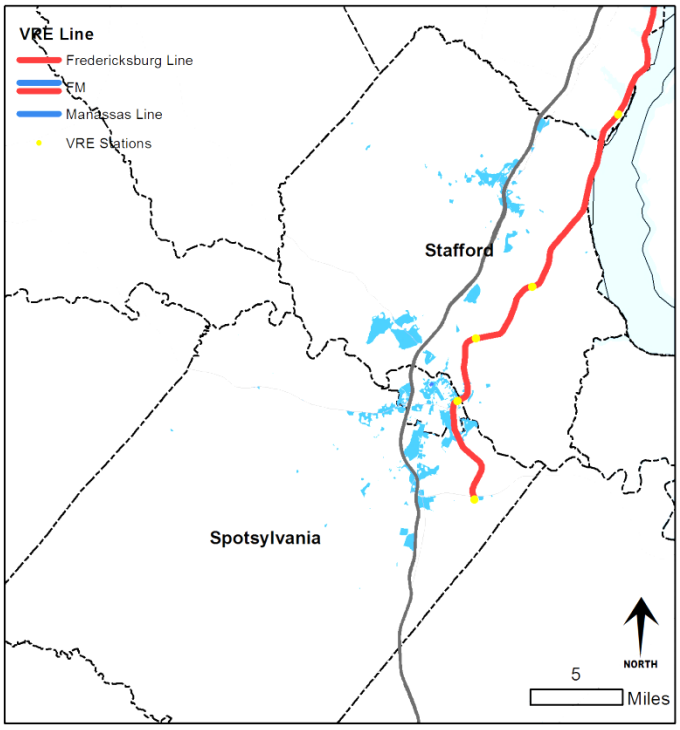
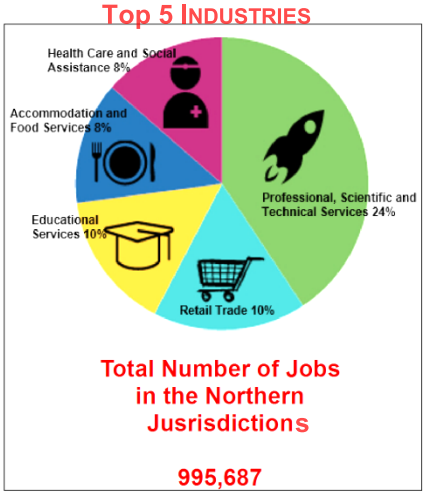
[6] U.S. Census Bureau. Longitudinal Employer-Household Dynamics Origin-Destination Employment Statistics, (LODES), Workplace Area Characteristics 2013.

Accessibility to High Income and Specialized Jobs 2013





Top 5 Industries



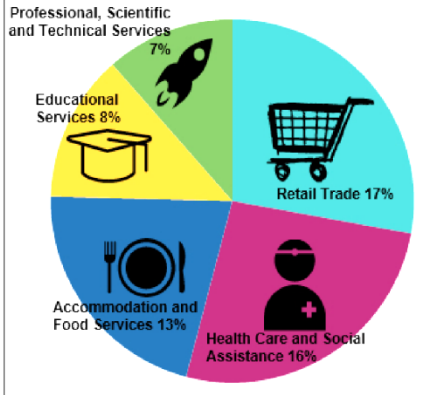
Total Number of Jobs in the Northern Jusrisdictions

995,687

Number of Jobs per acre that earn greater than $3,333/per month or $40K/ per year. Census Block Level.

- 1 - 49
- 50 - 249
- 250 - 499
- 500 - 999
- 1000 - 1499
- 1500+

Top 5 Industries



Total Number of Jobs in the Southern Jusrisdictions

85,549

7

[7] U.S. Census Bureau. Longitudinal Employer-Household Dynamics Origin-Destination Employment Statistics, (LODES), Workplace Area Characteristics 2013.

2.4 Inclusivity

VRE is committed to a policy of non-discrimination and ensures service is open and available to everyone. Federal, state and local laws as well as VRE service policies ensure that fares, service design and operations do not result in discrimination on the basis of race, color, income or national origin. As a part of the Title VI service standards and polices, VRE has identified population catchment areas for each origin station based on data collected through customer surveys on the home locations of riders.

The populations of the catchment areas for VRE's origin stations, as well as the percentage of minority population, are shown in Table 3. Fredericksburg Line stations are shown in red and Manassas Line stations are shown in blue. While the overall population and minority percentage for each Line are similar, station catchment areas vary widely throughout the system.

"WHILE VRE RIDERS ARE PREDOMINANTLY CAUCASIAN, WITH ANNUAL HOUSEHOLD INCOMES OF OVER $100,000, THE CATCHMENT AREAS OF THE VRE ORIGIN STATIONS ARE DIVERSE. MINORITIES RANGE FROM 32% TO 66% (AVERAGE OF 46.3%) OF THE POPULATION WITHIN VRE ORIGIN STATION CATCHMENT AREAS."[8]

Table 3: VRE Station Catchment Area Population

Origin Station	Distance to Next Station (miles)	Catchment Area 2010 Population[2]	Catchment Area Minority %[3]	Difference from System Wide Average
Fredericksburg	Terminus	121,643	32%	-14%
Leeland Road	3.8	67,626	32%	-14%
Brooke	4.8	72,573	35%	-12%
Quantico	10.7	80,766	48%	2%
Rippon	7.0	101,695	66%	20%
Woodbridge	3.2	104,861	61%	14%
Lorton	4.4	59,358	52%	6%
Broad Run	Terminus	132,107	42%	-5%
Manassas	3.1	149,312	51%	4%
Manassas Park	2.0	102,511	50%	4%
Burke Center	9.1	164,039	41%	-5%
Rolling Road	2.3	110,031	38%	-8%
Backlick Road	4.0	119,059	54%	7%
Fredericksburg Line Origins		608,522	46.6%	0.3%
Manassas Line Origins		777,059	45.9%	-0.4%
System Wide		1,385,581	46.3%	

[2] Based on Metropolitan Washington Council of Governments Round 8.2 Land Use Forecasts

[3] Based on American Community Survey 2012 5YR Block Group Level Data

[8] "Virginia Railway Express (VRE) System-Wide Service Standards and Policies". http://www.vre.org/about/Ops_board_items/2015/February/8C.Attachment.pdf

2.5 Trip Cost

How would the typical commuter determine the most affordable option for travel in Northern Virginia? This section will attempt to perform a quick generalized cost-benefit scenario between the annual commuting costs of a single-occupant vehicle (SOV) owner against a VRE commuter on a cost per-mile basis. This scenario is not intended to represent all of the complexities involved with how people make travel decisions. Tax burden, occupancy rates, travel time and non-monetary costs that may more accurately reflect the totality of costs to specific commuters are not included in this analysis.

The AAA 2014 Your Driving Costs study reports that national average car ownership costs ranged from $6,957- $11,039 that year. The cost figures in Table 1 will serve as the baseline for the driver in this scenario. The baseline figures include "variable operating costs" like fuel, maintenance, and tires as well as fixed ownership costs like insurance, license and registration fees, taxes, depreciation and finance charges. The year 2014 was considered a "reasonably cheap" year to own and drive a car because of significant decreases in fuel and tire costs.

Table 1: The findings of the AAA 2014 'Your Driving Costs' study[9]:

15K MILES ANNUALLY	SMALL SEDAN	MEDIUM SEDAN	LARGE SEDAN	SEDAN AVG	SUV 4WD	MINIVAN
COST PER MILE	$0.46	$0.59	$0.72	$0.59	$0.74	$0.65
COST PER YEAR	$6,957	$8,839	$10,831	$8,876	$11,039	$9,753

A VRE monthly pass costs about $333 to travel from Fredericksburg, VA to Union Station, Washington D.C. and would cost about $4000 a year. The VRE rider who uses this option year round, would commute approximately 110 highway miles per day round trip, for an average of 250 service days out of the year. This would equal about a 28,000 highway mile commute per year.

In order to accurately compare the two modes, the AAA study's 15,000 miles must then be adjusted to 28,000 to reflect the true cost of driving. A five percent increase was added to the AAA cost per mile estimates to account for increased wear and tear on the vehicle and multiplied by 28,000 miles for each vehicle type. The results are shown in Table 2.

Table 2: The findings of the AAA 2014 'Your Driving Costs' study reflecting 28,000 miles annually.

28K MILES ANNUALLY	SMALL SEDAN	MEDIUM SEDAN	LARGE SEDAN	SEDAN AVG	SUV 4WD	MINIVAN
COST PER MILE	$0.49	$0.62	$0.76	$0.62	$0.77	$0.68
COST PER YEAR	$13,642	$17,317	$21,227	$17,405	$21,638	$19,110

[9] Stepp, Erin. "Owning and Operating Your Vehicle Just Got a Little Cheaper According to AAA's 2014 'Your DrivingCosts' Study". AAA Public Relations. www.newsroom.aaa.com

"On a cost per mile basis, a small sedan driver who commutes approximately 28,000 miles per year from Fredericksburg, VA to the Central Washington D.C. area, would spend an average of $13,642 or $0.49 cents per mile annually whereas a VRE Rider would spend about $4000 or about $0.14 cents per mile."

The estimated$9,642 cost difference between a single occupant vehicle and the VRE in this general scenario is consistent with the American Public Transportation Association's (APTA) 2014 press release "August Transit Savings Report Shows Individuals Save $10,064 a year." This report uses an average cost figure and a similar methodology. APTA also references the "2013 AAA 'Your Driving Costs' study annual costs", and uses an average sedan with 23.1 mile per gallon, a $3.14 average gallon of gas price and included an average cost of $166 in parking costs.[10]

Though the true mean cost savings could lie anywhere between $0 and $9,642, like the travel time saving ranges mentioned earlier, it's important to have a cost per mile range for reference. Most drivers traveling the route used in this scenario would use some combination of driving and transit, like the bus or metro. There are an infinite number of variable factors that may reflect a more true cost of commuting costs. The key takeaway however, is that no matter what combination of travel modes or factors that may influence commuting costs, it will be substantially cheaper to ride VRE than to own and operate a car.

10 Chitwood, Chad. "August Transit Savings Report Shows Individuals Save $10,064 a year." The American Public Transportation Association. http://www.apta.com/mediacenter/pressreleases/2014/Pages/140814_Transit-Savings.aspx

Sources

Chitwood, Chad. "August Transit Savings Report Shows Individuals Save $10,064 a year." The American Public Transportation Association. http://www.apta.com/mediacenter/pressreleases/2014/Pages/140814_Transit-Savings.aspx

"Congestion Relief Provided by Virginia Railway Express." Texas A&M Transportation Institute. June 2015.

"Functional Classification Comprehensive Guide". Virginia Department of Transportation. June 2014.

Stepp, Erin. "Owning and Operating Your Vehicle Just Got a Little Cheaper According to AAA's 2014 'Your DrivingCosts' Study". AAA Public Relations. http://newsroom.aaa.com/2014/05/owning-and-operating-your-vehicle-just-got-a-little-cheaper-aaas-2014-your-driving-costs-study/

"Virginia Railway Express (VRE) System-Wide Service Standards and Policies". http://www.vre.org/about/Ops_board_items/2015/February/8C.Attachment.pdf

"VRE System Plan 2040." Virginia Railway Express. 2015. http://www.vre.org/about/strategic/2040%20Sys%20Plan%20VRE%20finaltech%20memo%20combined.pdf

"VRE 2014 Master Agreement Survey". Virginia Railway Express. 2014.

"VRE 2014 Customer Opinion Survey". Virginia Railway Express. 2014.

U.S. Census Bureau. Longitudinal Employer-Household Dynamics Origin-Destination Employment Statistics (LODES) Workplace Area Characteristics 2013

Images

"Connecting between Metro and D.C.-Area Airports and Other Transportation Services". Commuterpage.com. 2015. CommuterPage is a program of Arlington County, Virginia.

"Traffic Jam Frustration". By Raysonho. Created 22 June 2015. https://commons.wikimedia.org/w/index.php?title=Special:ListFiles&offset=20150816173819&user=Raysonho

"Stick Man Question Mark". Bing.com image search. License: Free to modify, share and use commercially. Image also found at: http://seolearninginstitute.blogspot.com/2011_11_01_archive.html

Appendix A

Train and passenger car travel time comparison (All times in minutes)

Freeway Segment	Train Segment	Freeway		Train	
		Travel Time (50th Percentile)	Planning Time (95th Percentile)	Travel Time (50th Percentile)	Planning Time (95th Percentile)
I-66	VRE Manassas Line	6:40 am on I-66 EB		VRE Train 328 (Departs Broad Run at 6:40 am)	
PW Parkway - VA-123	Broad Run- Burke Center	22	40	25	26
VA-123 - VA -7	Burke Centre - Backlick	9	13	13	19
VA-7 - Pentagon	Backlick - Crystal City	12	16	23	29
Pentagon - Union Station	Crystal City- Union Station	9	18	14	15
Total		**53**	**87**	**75**	**88**
I-66	VRE Manassas Line	7:20 am on I-66 EB		VRE Train 330 (Departs Broad Run at 7:20 am)	
PW Parkway - VA-123	Broad Run- Burke Center	30	54	23	27
VA-123 - VA -7	Burke Centre - Backlick	9	13	12	20
VA-7 - Pentagon	Backlick - Crystal City	12	16	23	27
Pentagon - Union Station	Crystal City- Union Station	12	22	17	17
Total		**63**	**105**	**75**	**92**
I-66	VRE Manassas Line	4:25 pm on I-66 WB		VRE Train 329 (Departs Union Station at 4:25 pm)	
Union Station - Pentagon	Union Station - Crystal City	9	17	12	16
Pentagon - VA-7	Crystal City - Backlick	13	20	18	27
VA-7 - VA-123	Backlick - Burke Centre	15	28	12	21
VA-123 - PW Parkway	Burke Center - Broad Run	23	46	32	42
Total		**59**	**111**	**74**	**106**
I-66	VRE Manassas Line	5:05 pm on I-66 WB		VRE Train 331 (Departs Union Station at 5:05 pm)	
Union Station - Pentagon	Union Station - Crystal City	11	22	12	14
Pentagon - VA-7	Crystal City - Backlick	11	14	20	27
VA-7 - VA-123	Backlick - Burke Centre	16	31	14	19
VA-123 - PW Parkway	Burke Center - Broad Run	23	46	31	36
Total		**61**	**113**	**77**	**96**
I-95	VRE Fredericksburg Line	6:30 am on I-95 NB		VRE Train 308 (Departs Fredericksburg at 6:30 am)	
VA-3 -Dale Blvd	Fredericksburg - Rippon	28	43	34	44
Dale Blvd - VA-644	Rippon - Franconia/ Springfield	23	52	22	28
VA-644 - Pentagon	Franconia/ Springfield - Crystal City	20	41	22	34
Pentagon - Union Station	Crystal City - Union Station	10	19	16	27
Total		**80**	**155**	**94**	**133**
I-95	VRE Fredericksburg Line	7:15 am on I-95		VRE Train 310 (Departs Fredericksburg at 7:15 am)	
VA-3 -Dale Blvd	Fredericksburg - Rippon	29	48	34	46
Dale Blvd - VA-644	Rippon - Franconia/ Springfield	25	52	22	30
VA-644 - Pentagon	Franconia/ Springfield - Crystal City	25	59	21	26
Pentagon - Union Station	Crystal City - Union Station	12	23	15	19
Total		**91**	**181**	**92**	**121**
I-95	VRE Fredericksburg Line	4:40 pm on I-95 SB		VRE Train 307 (Departs Union Station at 4:40 pm)	
Union Station - Pentagon	Union Station - Crystal City	9	17	15	15
Pentagon - VA-644	Crystal City - Franconia/ Springfield	18	33	19	26
VA-644 - Rippon	Franconia/ Springfield - Rippon	26	54	22	39
Rippon - VA-3	Rippon - Fredericksburg	52	107	44	66
Total		**105**	**212**	**100**	**146**
I-95	VRE Fredericksburg Line	5:15 pm on I-95 SB		VRE Train 309 (Departs Union Station at 5:15 pm)	
Union Station - Pentagon	Union Station - Crystal City	11	22	15	18
Pentagon - VA-644	Crystal City - Franconia/ Springfield	20	38	19	31
VA-644 - Rippon	Franconia/ Springfield - Rippon	24	54	21	44
Rippon - VA-3	Rippon - Fredericksburg	40	86	38	91
Total		**96**	**200**	**93**	**184**

By Reuben Juster