

Welcome to the Excel Workbook for the Broad Street BRT Benefit-Cost Analysis (BCA)

This workbook contains 12 numbered tabs that highlight the assumptions, sources, calculations, and monetized impacts for the project's anticipated costs and benefits.

The tabs and table of contents (below) are color-coded and correspond to various components of the BCA. You can access the individual tabs by clicking on the Table of Contents items below.

Excel Workbook: Table of Contents

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1. EXECUTIVE SUMMARY MATRIX

Current Status/ No Build & Problem to be Addressed	Change to No Build/Alternatives	Types of Impacts	Population Affected by Impacts	Economic Benefit (2014 Dollars)	Summary of Results (Net Present Values at 7% and 3% discount rates)	Page Reference in BCA
<p>The Broad Street project corridor accounts for approximately 6% of the population and 25% of all jobs in the City of Richmond and Henrico County.</p> <p>Transit along the project corridor is currently characterized by slow bus speeds and long travel times for bus patrons, many of whom are disadvantaged.</p> <p>There are nearly 20,000 boardings and alightings on an average weekday along the Broad Street corridor. The majority of bus stops handle more than 50 boardings and alightings per day (150 - 2,000 in the downtown area). Over 15% of AM peak period buses cannot maintain their target average run times.</p>	<p>Reduced corridor travel time (14 minutes).</p> <p>Improved transit and vehicle operations in the corridor through the designation of an exclusive standard width bus lane, minimizing conflicts between automobiles and transit vehicles.</p> <p>Signal prioritization at intersections will help increase route efficiency.</p> <p>Consolidated stations and improved bus lanes downtown will enhance operations on Broad Street between 2nd and 14th Streets. A total of 11,900 daily linked trips are projected for the BRT system in the opening year, with 6,100 of those trips coming from zero-car households.</p> <p>Unique branding (stations, vehicles, guideway, signage, and marketing efforts) will help distinguish BRT and make it an attractive transportation alternative.</p>	<p>State of Good Repair</p> <ul style="list-style-type: none"> Asset management Reduction in vehicles miles traveled 	<ul style="list-style-type: none"> GRTC system and its users Corridor travelers (all modes) 	<ul style="list-style-type: none"> Qualitative 	<ul style="list-style-type: none"> Qualitative impacts 	TBD
		<p>Economic Competitiveness</p> <ul style="list-style-type: none"> Movement of workers or goods (travel time savings) 	<ul style="list-style-type: none"> Existing transit users who are expected to switch from Route 6 to BRT (2,560 riders) 	<ul style="list-style-type: none"> +\$1.5 million, annually 	<ul style="list-style-type: none"> +\$14.6 million at 7% +\$23.8 million at 3% 	TBD
		<p>Economic Competitiveness</p> <ul style="list-style-type: none"> Movement of workers or goods (travel time delays) 	<ul style="list-style-type: none"> Corridor motorists 	<ul style="list-style-type: none"> -\$260,000, annually 	<ul style="list-style-type: none"> -\$2.6 million at 7% -\$4.1 million at 3% 	TBD
		<p>Economic Competitiveness</p> <ul style="list-style-type: none"> Economic productivity of land, capital, and labor (increased property values) 	<ul style="list-style-type: none"> Property owners along the corridor [1] (approximately 3,000 residential properties, 1,500 commercial properties) 	<ul style="list-style-type: none"> +\$14.1 million - \$16.6 million, annually (for six-year period) 	<ul style="list-style-type: none"> +\$72.8 at 7% +\$83.0 million at 3% 	TBD
		<p>Economic Competitiveness</p> <ul style="list-style-type: none"> Development/redevelopment 	<ul style="list-style-type: none"> Property owners along the corridor [1] (~ 3,000 residential properties, ~ 1,500 commercial properties) 	<ul style="list-style-type: none"> Qualitative 	<ul style="list-style-type: none"> Qualitative impacts 	TBD
		<p>Quality of Life</p> <ul style="list-style-type: none"> Mayor's Anti-Poverty Comm. Increased transportation choices Improved connectivity Land use / econ. development 	<ul style="list-style-type: none"> Disadvantaged pop. [2] Low-income: ~ 37,800 Minorities: ~ 13,350 Metro-area residents 	<ul style="list-style-type: none"> Qualitative 	<ul style="list-style-type: none"> Qualitative impacts 	TBD
		<p>Environmental Sustainability</p> <ul style="list-style-type: none"> Reduced operating costs for owners of personal vehicles Other environmental impacts 	<ul style="list-style-type: none"> New transit users (490 riders) Metro-area residents 	<ul style="list-style-type: none"> +\$118,000 annually Qualitative 	<ul style="list-style-type: none"> +\$1.1 million at 7% +\$1.8 million at 3% Qualitative impacts 	TBD
		<p>Safety</p> <ul style="list-style-type: none"> Crash reduction 	<ul style="list-style-type: none"> Corridor motorists/transit users 	<ul style="list-style-type: none"> +\$16,000 annually 	<ul style="list-style-type: none"> +\$150,000 at 7% +\$245,000 at 3% 	TBD

[1] Source: City of Richmond and Henrico County Assessment Data (2009)

[2] Source: 2010 U.S. Census, based on population within 1/2 mile of proposed BRT stations

Note: + Indicates benefits; - indicates costs

2. BCA SUMMARY

Summary of Costs (2014 Dollars)

Calendar Year	Project Year	Undiscounted Costs (2014 dollars)				Total Cost Discounted at 7%	Total Cost Discounted at 3%
		Engineering and Construction Costs	Operating Costs (Build/No Build)	Delay Costs for Motorists	Total Costs		
2014	0	\$0	\$0	\$0	\$0	\$0	
2015	1	\$9,721,718	\$0	\$0	\$9,721,718	\$9,438,561	
2016	2	\$19,443,436	\$0	\$0	\$19,443,436	\$18,327,303	
2017	3	\$19,443,436	\$0	\$259,598	\$19,703,034	\$16,083,545	
2018	4	\$0	\$355,635	\$259,598	\$615,233	\$469,358	
2019	5	\$0	\$355,635	\$259,598	\$615,233	\$438,652	
2020	6	\$0	\$355,635	\$259,598	\$615,233	\$409,956	
2021	7	\$0	\$355,635	\$259,598	\$615,233	\$383,136	
2022	8	\$0	\$355,635	\$259,598	\$615,233	\$358,071	
2023	9	\$0	\$355,635	\$259,598	\$615,233	\$334,646	
2024	10	\$0	\$355,635	\$259,598	\$615,233	\$312,753	
2025	11	\$0	\$355,635	\$259,598	\$615,233	\$292,293	
2026	12	\$0	\$355,635	\$259,598	\$615,233	\$273,171	
2027	13	\$0	\$355,635	\$259,598	\$615,233	\$255,300	
2028	14	\$0	\$355,635	\$259,598	\$615,233	\$238,598	
2029	15	\$0	\$355,635	\$259,598	\$615,233	\$222,989	
2030	16	\$0	\$355,635	\$259,598	\$615,233	\$208,401	
2031	17	\$0	\$355,635	\$259,598	\$615,233	\$194,767	
2032	18	\$0	\$355,635	\$259,598	\$615,233	\$182,025	
2033	19	\$0	\$355,635	\$259,598	\$615,233	\$170,117	
2034	20	\$0	\$355,635	\$259,598	\$615,233	\$158,988	
2035	21	\$0	\$355,635	\$259,598	\$615,233	\$148,587	
2036	22	\$0	\$355,635	\$259,598	\$615,233	\$138,866	
2037	23	\$0	\$355,635	\$259,598	\$615,233	\$129,781	
2038	24	\$0	\$355,635	\$259,598	\$615,233	\$121,291	
2039	25	\$0	\$355,635	\$259,598	\$615,233	\$113,356	
2040	26	\$0	\$355,635	\$259,598	\$615,233	\$105,940	
Total		\$48,608,590	\$8,179,610	\$6,230,341	\$63,018,541	\$47,812,954	\$55,055,096

[1] 46.56 hours per day x 365 days (assuming 365 days is intentionally conservative since delays are minimal during weekends/holidays).
 [2] 16.994 hours of delay per year x ((% personal travelers x \$12.63) + (% business travelers x \$25.65))

Benefit-Cost Results

	Discounted	Discounted
Benefits	\$88,591,193	\$108,870,025
Costs	\$47,812,954	\$55,055,096
Net Benefit	\$40,778,240	\$53,814,929
BCA Ratio	1.85	1.98

Summary of Benefits (2014 Dollars)

Calendar Year	Project Year	Undiscounted Benefits (2014 Dollars)				Total Benefits	Total Benefit Discounted at 7%	Total Benefit Discounted at 3%
		Travel Time Benefits for Transit Users [1]	Property Value Benefits [3]	User Benefits [4] [5]	Crash Reduction Benefits [6]			
2014	0	\$0	\$0	\$0	\$0	\$0	\$0	
2015	1	\$0	\$14,132,855	\$0	\$0	\$14,132,855	\$13,208,276	\$13,721,219
2016	2	\$0	\$14,606,306	\$0	\$0	\$14,606,306	\$12,757,713	\$13,767,844
2017	3	\$0	\$15,095,617	\$0	\$0	\$15,095,617	\$12,322,520	\$13,814,628
2018	4	\$1,582,198	\$15,601,320	\$118,643	\$16,315	\$17,318,476	\$13,212,182	\$15,387,241
2019	5	\$1,582,198	\$16,123,964	\$118,643	\$16,315	\$17,841,120	\$12,720,472	\$15,389,907
2020	6	\$1,582,198	\$16,664,117	\$118,643	\$16,315	\$18,381,273	\$12,248,218	\$15,394,027
2021	7	\$1,582,198	\$0	\$118,643	\$16,315	\$1,717,156	\$1,069,358	\$1,396,205
2022	8	\$1,582,198	\$0	\$118,643	\$16,315	\$1,717,156	\$999,400	\$1,355,538
2023	9	\$1,582,198	\$0	\$118,643	\$16,315	\$1,717,156	\$934,019	\$1,316,057
2024	10	\$1,582,198	\$0	\$118,643	\$16,315	\$1,717,156	\$872,915	\$1,277,725
2025	11	\$1,582,198	\$0	\$118,643	\$16,315	\$1,717,156	\$815,808	\$1,240,510
2026	12	\$1,582,198	\$0	\$118,643	\$16,315	\$1,717,156	\$762,438	\$1,204,378
2027	13	\$1,582,198	\$0	\$118,643	\$16,315	\$1,717,156	\$712,559	\$1,169,299
2028	14	\$1,582,198	\$0	\$118,643	\$16,315	\$1,717,156	\$665,943	\$1,135,242
2029	15	\$1,582,198	\$0	\$118,643	\$16,315	\$1,717,156	\$622,376	\$1,102,177
2030	16	\$1,582,198	\$0	\$118,643	\$16,315	\$1,717,156	\$581,660	\$1,070,075
2031	17	\$1,582,198	\$0	\$118,643	\$16,315	\$1,717,156	\$543,607	\$1,038,907
2032	18	\$1,582,198	\$0	\$118,643	\$16,315	\$1,717,156	\$508,044	\$1,008,648
2033	19	\$1,582,198	\$0	\$118,643	\$16,315	\$1,717,156	\$474,808	\$979,270
2034	20	\$1,582,198	\$0	\$118,643	\$16,315	\$1,717,156	\$443,746	\$950,747
2035	21	\$1,582,198	\$0	\$118,643	\$16,315	\$1,717,156	\$414,716	\$922,056
2036	22	\$1,582,198	\$0	\$118,643	\$16,315	\$1,717,156	\$387,585	\$896,171
2037	23	\$1,582,198	\$0	\$118,643	\$16,315	\$1,717,156	\$362,229	\$870,069
2038	24	\$1,582,198	\$0	\$118,643	\$16,315	\$1,717,156	\$338,531	\$844,727
2039	25	\$1,582,198	\$0	\$118,643	\$16,315	\$1,717,156	\$316,385	\$820,123
2040	26	\$1,582,198	\$0	\$118,643	\$16,315	\$1,717,156	\$295,686	\$796,236
Total		\$36,390,544	\$92,224,180	\$2,728,796	\$375,238	\$131,718,758	\$88,591,193	\$108,870,025

[1] 6 minutes saved per day x 365 days x 2,560 riders
 [2] 93,195 hours saved per year x ((% personal travelers x \$12.63) + (% business travelers x \$25.65))
 [3] Property value premium (residential = 1.4% per year; office and retail = 2.4% per year) applied to 2015 - 2020 (6 year period)
 [4] Assumes that property value benefits are reduced by 50.0% to account for capitalized travel benefit
 [5] 490 *choice riders x 3.24 miles x \$20 per mile x 365 days
 [6] FHWA crash reduction factors (ranging from 8% to 31%) were applied to the average annual crash rates (and costs) along the corridor
 The "Long-Term" Benefits section of this BCA and the Excel workbook provide additional detail

3. CAPITAL AND OPERATING COSTS

Capital Cost by Element

Category/Element	Cost 2015 \$	Cost 2014 \$
Guideway & Track Elements	\$4,115,200	\$4,020,632
Stations, Stops, Terminals, Intermodal Support Facilities	\$4,015,600	\$3,923,321
Stitework & Special Conditions	N/A	N/A
Systems	\$11,454,000	\$11,190,785
Raw, Land, Existing Improvements	\$9,775,200	\$9,548,610
Vehicles	\$1,847,800	\$1,805,337
Professional Services	\$9,831,800	\$9,605,863
Unallocated Contingency	\$6,156,000	\$6,014,534
	\$2,558,300	\$2,499,510
Total Project Cost	\$49,751,900	\$48,608,590

Source: Broad Street Rapid Transit Study - Capital Cost Technical Report, Page 1, October 2013.
 Prior estimates reflected total of \$53.8 million (which included \$4 million in committed funding).
 This \$4 million will precede the project and should not be considered in final project costs.
 Deflated Costs to 2014 dollars using average annual CPI (2004-2013).

Construction phasing assumption:

Year	Percent of total	Cost (2014 \$)
2015	20%	\$9,721,718
2016	40%	\$19,443,436
2017	40%	\$19,443,436
Total Project Cost		\$48,608,590

Operating Cost: No-Build and Build Alternatives

	Cost 2015 \$	Cost 2014 \$
No-Build	\$46,535,000	\$45,465,615
Build	\$46,899,000	\$45,821,251

Source: Broad Street Rapid Transit Study, Operating and Maintenance Cost Technical Report, Page 5, October 2013.
 Deflated to 2014 dollars using average annual CPI (2004-2013).

Discount Rates

7%
3%

Consumer Price Index - All Urban Consumers

Year	March	% Change
2004	187.4	
2005	193.3	3.1%
2006	199.8	3.4%
2007	205.352	2.8%
2008	213.528	4.0%
2009	212.709	-0.4%
2010	217.631	2.3%
2011	223.467	2.7%
2012	229.392	2.7%
2013	232.773	1.5%
2014	236.293	1.5%
2015 (anticipated based on avg. annual)	241.851	

Average 2.4%

Source: BLS

<http://data.bls.gov/timeseries/CIUR0000SA0>
http://faculty.washington.edu/hoths/Presentations/Lecture6205/CI3_inflation.pdf

Capital Costs (2014 dollars)

Calendar Year	Project Year	Engineering and Construction Costs Actual (2014 \$)	Engineering and Construction Costs Discounted 7%	Engineering and Construction Costs Discounted 3%
2014	0	\$0	\$0	\$0
2015	1	\$9,721,718	\$9,085,718	\$9,438,561
2016	2	\$19,443,436	\$16,982,650	\$18,327,303
2017	3	\$19,443,436	\$15,871,636	\$17,793,498
2018	4	\$0	\$0	\$0
2019	5	\$0	\$0	\$0
2020	6	\$0	\$0	\$0
2021	7	\$0	\$0	\$0
2022	8	\$0	\$0	\$0
2023	9	\$0	\$0	\$0
2024	10	\$0	\$0	\$0
2025	11	\$0	\$0	\$0
2026	12	\$0	\$0	\$0
2027	13	\$0	\$0	\$0
2028	14	\$0	\$0	\$0
2029	15	\$0	\$0	\$0
2030	16	\$0	\$0	\$0
2031	17	\$0	\$0	\$0
2032	18	\$0	\$0	\$0
2033	19	\$0	\$0	\$0
2034	20	\$0	\$0	\$0
2035	21	\$0	\$0	\$0
2036	22	\$0	\$0	\$0
2037	23	\$0	\$0	\$0
2038	24	\$0	\$0	\$0
2039	25	\$0	\$0	\$0
2040	26	\$0	\$0	\$0
Total		\$48,608,590	\$41,940,004	\$45,559,363

Source: Broad Street Rapid Transit Study Capital Cost Estimate Report

Increased Annual Operating Costs (2014 dollars)

Calendar Year	Project Year	Increased Operating Costs Actual (2014 \$)	Increased Operating Costs Discounted 7%	Increased Operating Costs Discounted 3%
2014	0	\$0	\$0	\$0
2015	1	\$0	\$0	\$0
2016	2	\$0	\$0	\$0
2017	3	\$0	\$0	\$0
2018	4	\$355,635	\$271,312	\$315,977
2019	5	\$355,635	\$235,563	\$306,774
2020	6	\$355,635	\$206,975	\$297,839
2021	7	\$355,635	\$181,472	\$289,164
2022	8	\$355,635	\$160,983	\$280,742
2023	9	\$355,635	\$143,442	\$272,565
2024	10	\$355,635	\$128,787	\$264,626
2025	11	\$355,635	\$116,960	\$256,918
2026	12	\$355,635	\$107,906	\$249,435
2027	13	\$355,635	\$101,576	\$242,170
2028	14	\$355,635	\$96,921	\$235,117
2029	15	\$355,635	\$93,899	\$228,269
2030	16	\$355,635	\$91,466	\$221,620
2031	17	\$355,635	\$89,585	\$215,165
2032	18	\$355,635	\$88,220	\$208,898
2033	19	\$355,635	\$87,336	\$202,814
2034	20	\$355,635	\$86,903	\$196,907
2035	21	\$355,635	\$86,891	\$191,171
2036	22	\$355,635	\$87,272	\$185,603
2037	23	\$355,635	\$87,920	\$180,197
2038	24	\$355,635	\$88,712	\$174,949
2039	25	\$355,635	\$89,625	\$169,853
2040	26	\$355,635	\$90,639	\$164,906
Total		\$8,179,610	\$3,272,364	\$5,351,681

Source: Broad Street Rapid Transit Study Opening and Maintenance Cost Estimate Report

4. VEHICLE DELAY COSTS (DURING CONSTRUCTION AND BEYOND ON MEDIAN-RUNNING SEGMENT OF BRT ROUTE)

ASSUMPTIONS

Anticipated Impacts on Motorist Delay

	Period	No-Build Condition	Build Condition	Difference
Number of Vehicles Impacted	AM Peak	1477 vehicles	1478 vehicles	-49 vehicles
	PM Peak	1784 vehicles	1784 vehicles	+10 vehicles
Average Delay per Vehicle in the Corridor	AM Peak	58 seconds	65 seconds	-7 seconds
	PM Peak	71 seconds	82 seconds	-10 seconds
Total Delay for Simulated Traffic in the Corridor	AM Peak	23.8 hours	25.8 hours	2.0 hours
	PM Peak	34.6 hours	40.2 hours	5.6 hours

Source: Broad Street Rapid Transit Study, Anticipated Motorist Delay Technical Report, Page 2, 2011, (BCA Appendix A)

Off-peak hour delay was estimated based on the peak hour delay as hourly traffic volumes corridor-wide are not available for the whole day. The associated increases in delay (below) are conservative in nature.

Daily Delay Assumptions	Total Hours in Time Period	Increased Hours of Delay (Build-No-Build)	Total Hours of Daily Delay
Time Period			
12:00 a.m. to 6:00 a.m. (No Delays)	6	Notifiable	0
6:00 a.m. to 11:00 a.m. (Equivalent to AM Peak)	5	2	12
11:00 a.m. to 1:00 p.m. (Average of AM and PM Peaks)	2	3.8	9.12
1:00 p.m. to 4:00 p.m. (Equivalent to AM Peak)	3	2	7.2
4:00 p.m. to 6:00 p.m. (PM Peak)	2	5.6	13.44
6:00 p.m. to 8:00 p.m. (Equivalent to AM Peak)	2	2	4.8
8:00 p.m. to 12:00 a.m. (No Delays)	6	Notifiable	0
Total Hours of Delay			46.56

Source: Broad Street Rapid Transit Study, Anticipated Motorist Delay Technical Report, Page 2, 2011, (BCA Appendix A)

Total increase in delay for the 24-hour period is estimated at 38.8 hours of delay for vehicles. Using a vehicle occupancy rate of 1.2 persons per vehicle, the total increase in person hours of delay for the build condition versus the no-build condition equates to 47.656 hours of delay.

Vehicle Occupancy Assumption	1.2
Typical Travel Days Assumption	365

Value of Time - Recommended Monetized Values

	2012 Dollars	2014 dollars
Local Travel		
Personal	\$12.26	\$12.63
Business	\$24.90	\$25.65
All Purposes**	\$12.81	\$13.20

Source: TIGER BCA Resource Guide 2014
<http://www.dot.gov/policy/initiatives/tiger-bca-resource-guide-2014>

Travel Trips by Purpose - Personal Vehicles

Year	Mode	Purpose	Person Trips (in millions)	Person Miles (in millions)	Vehicle Trips (in millions)	Vehicle Miles (in millions)	Percent
2009	POV	Earn a Living	66014	862208	69824	779532	26.3%
2009	POV	Family/Personal Business	146158	1106430	109447	754480	44.7%
2009	POV	School/Church	26654	186116	11492	80960	8.1%
2009	POV	Social & Recreational	82887	1031400	49355	547646	25.3%
2009	POV	Other	1815	12561	655	12276	0.6%
2009	POV	Unimported	3110	121532	2075	72219	1.0%
TOTAL			327118	3298168	233849	2245111	

Source: National Household Travel Surveys (NHTS)
<http://nhts.ornl.gov/doc/Extracts3.aspx>

Consumer Price Index - All Urban Consumers

Original Data Value

Series ID: CUURO005A0
 Not Seasonally Adjusted
 Area: U.S. city average
 Item: All items
 Base Period: 1982=84=100
 Year: 2004 to 2014

Year	March
2004	187.4
2005	193.3
2006	199.8
2007	205.352
2008	213.528
2009	212.709
2010	217.631
2011	223.467
2012	229.392
2013	232.773
2014	236.293

Source: BLS
<http://data.bls.gov/timeseries/CLURO005A0>

Delay Costs

Calendar Year	Project Year	Hours of Delay (1)	Travel Time Costs Annual (2014 \$) (2)	Travel Time Costs Discounted @ 2%	Travel Time Costs Discounted @ 2%
2014	0	\$0	\$0	\$0	\$0
2015	1	\$0	\$0	\$0	\$0
2016	2	\$0	\$0	\$0	\$0
2017	3	16,994	\$259,508	\$211,909	\$237,569
2018	4	16,994	\$259,508	\$198,046	\$230,649
2019	5	16,994	\$259,508	\$185,089	\$223,931
2020	6	16,994	\$259,508	\$172,981	\$217,409
2021	7	16,994	\$259,508	\$161,664	\$211,077
2022	8	16,994	\$259,508	\$151,088	\$204,929
2023	9	16,994	\$259,508	\$141,204	\$198,960
2024	10	16,994	\$259,508	\$131,966	\$193,165
2025	11	16,994	\$259,508	\$123,333	\$187,539
2026	12	16,994	\$259,508	\$115,264	\$182,077
2027	13	16,994	\$259,508	\$107,724	\$176,773
2028	14	16,994	\$259,508	\$100,676	\$171,625
2029	15	16,994	\$259,508	\$94,090	\$166,626
2030	16	16,994	\$259,508	\$87,935	\$161,773
2031	17	16,994	\$259,508	\$82,182	\$157,061
2032	18	16,994	\$259,508	\$76,806	\$152,486
2033	19	16,994	\$259,508	\$71,781	\$148,045
2034	20	16,994	\$259,508	\$67,085	\$143,733
2035	21	16,994	\$259,508	\$62,696	\$139,546
2036	22	16,994	\$259,508	\$58,595	\$135,482
2037	23	16,994	\$259,508	\$54,761	\$131,536
2038	24	16,994	\$259,508	\$51,179	\$127,705
2039	25	16,994	\$259,508	\$47,831	\$123,985
2040	26	16,994	\$259,508	\$44,702	\$120,374
Total		407,866	6,230,341	2,600,586	4,144,053

(1) 46.56 hours per day x 365 days (assuming 365 days is intentionally conservative since delays are minimal during weekends and holidays).

(2) 16,994 hours of delay per year x (% personal travelers x \$12.63) + (% business travelers x \$25.65)

5. TRAVEL TIME SAVINGS FOR TRANSIT USERS

ASSUMPTIONS

Corridor travel time (minutes) - No-Build	36.4
Source: Environmental Assessment	
Corridor travel time (minutes) - Build	22.4
Source: Environmental Assessment	
Corridor length (miles)	7.6
Average trip length (miles)	3.25
Source: Greater Richmond Transit Company (GRTC)	
Travel time savings per passenger (minutes)	6.0
Travel days assumption	365
Riders expected to switch from Route 6 to BRT	2,560
Total travel time savings per year (hours)	93,195

Value of Time - Recommended Monetized Values

	2012 Dollars	2014 Dollars
Local Travel		
Personal	\$12.26	\$12.63
Business	\$24.90	\$25.65
All Purposes **	\$12.81	\$13.20

Source: USDOT, TIGER BCA Resource Guide, 2014.

<http://www.dot.gov/policy-initiatives/tiger/tiger-bca-resource-guide-2014>

Consumer Price Index - All Urban Consumers

Original Data Value

Series Id: CUUR0000SA0

Not Seasonally Adjusted

Area: U.S. city average

Item: All items

Base Period: 1982-84=100

Years: 2004 to 2014

Year	March
2004	187.4
2005	193.3
2006	199.8
2007	205.352
2008	213.528
2009	212.709
2010	217.631
2011	223.467
2012	229.392
2013	232.773
2014	236.293

Source: BLS

<http://data.bls.gov/timeseries/CUUR0000SA0>

http://faculty.washington.edu/tothb/Presentations/Lecture%205.Ch3_Inflation.pdf

Travel Trips by Purpose - Transit

Year	Mode	Purpose	Person Trips (in millions)	Person Miles (in millions)	Vehicle Trips (in millions)	Vehicle Miles (in millions)	Percent
2009	Transit	Earn a Living	2,511	20,702	-	-	33.4%
2009	Transit	Family/Personal Bus	2,344	10,298	-	-	31.2%
2009	Transit	School/Church	829	4,663	-	-	11.0%
2009	Transit	Social & Recreation	1,426	10,025	-	-	19.0%
2009	Transit	Other	268	3,199	-	-	3.6%
2009	Transit	Unreported	141	5,505	-	-	1.9%
TOTAL			7,520	54,393	-	-	

Source: National Household Travel Surveys (NHTS)

<http://nhts.omni.gov/det/Extraction3.aspx>

Average GRTC Transit Trip Length

Year	Unlinked passenger trips	Passenger miles	Average trip length
2009	43,509,395	13,785,039	3.156
2010	43,334,584	13,583,303	3.190
2011	34,377,993	12,191,071	2.820
2012	37,675,698	9,352,988	4.028
Weighted average over four years			3.25

Source: National Transit Database (NTD), 2009-2012

Existing and Forecast Weekday Boardings by route

Group	Route Number	2009 Surveyed Boardings	2015 No-Build Boardings	2015 Build Alternative Boardings
Local Routes	112	2,340	2,770	2,720
	3/4	1,660	2,900	2,970
	5	-	-	-
	6	3,630	3,000	440
	7	1,010	1,840	1,860
	8	-	-	-
	10	1,860	590	650
	11	160	190	140
	13	310	0	0
	16	630	340	310
	18	250	170	200
	19	290	610	410
	20	30	0	0
	22	330	40	40
	24	430	540	580
	32	2,180	2,470	2,480
	34	1,650	1,890	1,790
	53	-	940	660
	37	1,900	1,880	1,850
	45	-	260	260
	61	-	-	-
	62/63	3,300	2,570	2,540
	67	-	400	410
	68	20	0	0
	70/71	1,410	1,510	1,360
	72/73	1,460	1,330	1,350
	74	900	560	560
	91	220	370	360
	92	20	0	0
	93	60	30	30
	95	-	30	30
	100	-	-	-
	101	-	60	20
999-Express/BRT	-	-	-	3,280

Travel Time Savings

Calendar Year	Project Year	Hours Saved [1]	Travel Time Savings Actual (2014 \$) [2]	Travel Time Savings Discounted at 7%	Travel Time Savings Discounted at 3%
2014	0	\$0	\$0	\$0	\$0
2015	1	\$0	\$0	\$0	\$0
2016	2	\$0	\$0	\$0	\$0
2017	3	\$0	\$0	\$0	\$0
2018	4	93,195	\$1,582,198	\$1,207,051	\$1,405,762
2019	5	93,195	\$1,582,198	\$1,128,085	\$1,364,818
2020	6	93,195	\$1,582,198	\$1,054,285	\$1,325,066
2021	7	93,195	\$1,582,198	\$985,313	\$1,286,471
2022	8	93,195	\$1,582,198	\$920,853	\$1,249,001
2023	9	93,195	\$1,582,198	\$860,611	\$1,212,623
2024	10	93,195	\$1,582,198	\$804,309	\$1,177,304
2025	11	93,195	\$1,582,198	\$751,691	\$1,143,013
2026	12	93,195	\$1,582,198	\$702,515	\$1,109,722
2027	13	93,195	\$1,582,198	\$656,556	\$1,077,400
2028	14	93,195	\$1,582,198	\$613,604	\$1,046,019
2029	15	93,195	\$1,582,198	\$573,461	\$1,015,552
2030	16	93,195	\$1,582,198	\$535,945	\$985,973
2031	17	93,195	\$1,582,198	\$500,883	\$957,256
2032	18	93,195	\$1,582,198	\$468,115	\$929,374
2033	19	93,195	\$1,582,198	\$437,491	\$902,305
2034	20	93,195	\$1,582,198	\$408,870	\$876,024
2035	21	93,195	\$1,582,198	\$382,121	\$850,509
2036	22	93,195	\$1,582,198	\$357,123	\$825,737
2037	23	93,195	\$1,582,198	\$333,760	\$801,686
2038	24	93,195	\$1,582,198	\$311,925	\$778,336
2039	25	93,195	\$1,582,198	\$291,519	\$755,666
2040	26	93,195	\$1,582,198	\$272,447	\$733,657
Total		2,143,495	\$36,390,544	\$14,558,532	\$23,809,275

[1] 6 minutes saved per day x 365 days x 2,560 riders

[2] 93,195 hours saved per year x ((% personal travelers x \$12.63) + (% business travelers x \$25.65))

<i>Subtotal*</i>		26,035	27,330	27,360
	26	200	450	430
	27	230	230	220
	28	30	10	10
Express Routes	29	460	510	510
	64	210	310	310
	65	-	-	-
	66	-	360	390
	81	180	40	40
	82	310	430	430
<i>Subtotal*</i>		1,610	2,340	2,340
Total*		27,650	29,670	29,700

Source: Broad Street Rapid Transit Study Transportation System Technical Report, 2014. Pages 36-37.

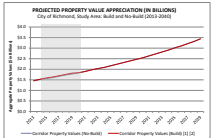
4. PROPERTY VALUE BENEFITS

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------

Consider Property Values: No Build and Build Scenarios
 (If there are no improvements listed, then the amount of value added is zero)

Scenario	Year	Property Value (No Build)	Property Value (Build)	Value Added (Build - No Build)	Total Property Value (No Build)	Total Property Value (Build)
Scenario 1	2014	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2015	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2016	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2017	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2018	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2019	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2020	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2021	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2022	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2023	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2024	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2025	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2026	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2027	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2028	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2029	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2030	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2031	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2032	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2033	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2034	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2035	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2036	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2037	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2038	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2039	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2040	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2041	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2042	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2043	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2044	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2045	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2046	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2047	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2048	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2049	100,000,000	100,000,000	0	100,000,000	100,000,000
Scenario 1	2050	100,000,000	100,000,000	0	100,000,000	100,000,000

Value added is projected to be \$0 through 2020. From 2021 onwards, value added is projected to be \$100,000,000 per year. This is based on the assumption that the value added from the build scenario is \$100,000,000 per year, and the value added from the no build scenario is \$0 per year.



(If property value appreciation is 1% per year, then the value added is \$100,000,000 per year.)
 (If property value appreciation is 0% per year, then the value added is \$0 per year.)

7. PROPERTY VALUE ASSUMPTIONS AND CALCULATIONS

LAND Property Values - Percent Change
BRT Study Area (Quarter Mile Buffer)
Richmond - Study Area Property Values
Retail/other commercial
Office
Residential

[1] Note: An economic impact study was initially conducted in 2011 to estimate the economic impacts generated by the proposed BRT investment. At that time, 2009 assessment data were the most up-to-date data available. Using existing resources, this BCR revisited the 2009 data and recalculated the analysis based on TIGER guidance...

Property Values: No-Build Scenario
Richmond Study Area, No-Build
Retail/other commercial
Office
Residential
Henrico Study Area, No-Build
Retail/other commercial
Office
Residential
Total

Property Values: Build Scenario
Richmond Study Area, Build
Retail/other commercial
Office
Residential
Henrico Study Area, Build
Retail/other commercial
Office
Residential
Total

Induced Property Value Impacts (20 Year Period, Build-No-Build)
Richmond Study Area
Retail/other commercial
Office
Residential
Henrico Study Area
Retail/other commercial
Office
Residential
Total

TOTAL Induced Property Value Impacts (2013 Dollars)
Induced Value [1]
Induced Value (per year for 6 years)
Retail/other commercial
Office
Residential
Total

KEY ASSUMPTIONS
Capitalization Factor for Travel Benefits
Assumes that property value benefits are reduced to account for capitalized travel benefit
See Page 20 of DOT Practitioner's Workshop (2010)
http://mt.tamu.edu/groups/tec/files/2011/09/benefit-cost10-proceedings.pdf

Study Area Compounded Property Value Growth Rates
Richmond
Henrico
Compounded Annual Property Value Premium (Build, first 6 years)
Retail/other commercial
Office
Residential

8. NEW USER BENEFITS (MOTORIST OPERATING SAVINGS FOR THOSE WHO SWITCH FROM DRIVING TO BRT)

ASSUMPTIONS

Choice Riders on BRT (who previously did not ride bus) 490

Reflects change (build-no build) in passengers on East-West routes

Average trip length (miles) 3.25

Source: Greater Richmond Transit Company (GRTC)

AAA average maintenance costs for vehicles (per mile) \$0.20

Source: AAA Study <https://exchange.aaa.com/wp-content/uploads/2013/04/Your-Driving-Costs-2013.pdf>

Travel days assumption 365

Estimated annual savings **\$118,643**

Average GRTC Transit Trip Length

Year	Unlinked passenger trips	Passenger miles	Average trip length
2009	43,509,395	13,785,039	3.156
2010	43,334,584	13,583,303	3.190
2011	34,377,993	12,191,071	2.820
2012	37,675,698	9,352,988	4.028
Weighted average over four years			3.25

Source: National Transit Database (NTD), 2009-2012

Existing and Forecast Weekday Boardings by route

Group	Route Number	2009 survey	2012 800 survey	2015 8000 survey	Change (Build - No Build)
	12	Yes	2,340	2,770	2,720
	34	Yes	1,660	2,900	2,970
	5	Yes	-	-	-
	6	Yes	3,630	3,000	440
	7	Yes	1,010	1,840	1,860
	8	Yes	-	-	-
	10	Yes	1,860	590	650
	11	Yes	160	190	140
	13	Yes	310	0	0
	16	Yes	630	340	310
	18	Yes	250	170	200
	19	Yes	290	610	410
	20	Yes	30	0	0
	22	Yes	330	40	40
	24	Yes	430	540	580
	32	Yes	2,180	2,470	2,480
	34	Yes	1,650	1,890	1,790
	53	Yes	-	940	660
	37	Yes	1,900	1,880	1,850
	45	Yes	-	260	260
	61	Yes	-	-	-
	62/63	Yes	3,300	2,570	2,540
	67	Yes	-	400	410
	68	Yes	20	0	0
	70/71	Yes	1,410	1,510	1,360
	72/73	Yes	1,460	1,330	1,350
	74	Yes	900	560	560
	91	Yes	220	370	360
	92	Yes	20	0	0
	93	Yes	60	30	30
	95	Yes	-	30	30
	100	Yes	-	-	-
	101	Yes	-	60	20
	999-Express BRT	Yes	-	-	3,280
Subtotal*			26,035	27,330	27,360
	26	Yes	200	450	430
	27	Yes	230	230	220
	28	Yes	30	10	10
	29	Yes	460	510	510
	64	Yes	210	310	310
	65	Yes	-	-	-
	66	Yes	-	360	390
	81	Yes	180	40	40
	82	Yes	310	430	430
Subtotal*			1,610	2,340	2,340
Total*			27,650	29,670	29,700

Source: Broad Street Rapid Transit Study Transportation System Technical Report, 2014, Pages 36-37.

Motorist Savings

Calendar Year	Project Year	Motorist Operating Cost Savings Actual (2014 \$)(1)	Motorist Operating Cost Savings Discounted at 7%	Motorist Operating Cost Savings Discounted at 7%
2014	0	\$0	\$0	\$0
2015	1	\$0	\$0	\$0
2016	2	\$0	\$0	\$0
2017	3	\$0	\$0	\$0
2018	4	\$118,643	\$90,512	\$105,413
2019	5	\$118,643	\$84,591	\$102,343
2020	6	\$118,643	\$79,057	\$99,362
2021	7	\$118,643	\$73,885	\$96,468
2022	8	\$118,643	\$69,051	\$93,658
2023	9	\$118,643	\$64,554	\$90,920
2024	10	\$118,643	\$60,312	\$88,282
2025	11	\$118,643	\$56,367	\$85,710
2026	12	\$118,643	\$52,679	\$83,214
2027	13	\$118,643	\$49,233	\$80,790
2028	14	\$118,643	\$46,012	\$78,437
2029	15	\$118,643	\$43,002	\$76,153
2030	16	\$118,643	\$40,189	\$73,935
2031	17	\$118,643	\$37,559	\$71,781
2032	18	\$118,643	\$35,102	\$69,690
2033	19	\$118,643	\$32,806	\$67,661
2034	20	\$118,643	\$30,660	\$65,690
2035	21	\$118,643	\$28,664	\$63,777
2036	22	\$118,643	\$26,779	\$61,919
2037	23	\$118,643	\$25,027	\$60,116
2038	24	\$118,643	\$23,390	\$58,365
2039	25	\$118,643	\$21,860	\$56,665
2040	26	\$118,643	\$20,430	\$55,014
Total		\$2,728,796	\$1,091,692	\$1,788,372

9. CRASH "BENEFITS" SUMMARY

Anticipated Crashes: No Build and Build

Anticipated Crashes: No Build and Build

Anticipated Crashes:
No Build and Build

Median Running Segment

Curb Running Segment

BRT Route - Total

Calendar Year	Undiscounted Values (2014 \$)	
	No-Build	Build
2014		
2015		
2016		
2017		
2018	\$73,689	\$60,425
2019	\$73,689	\$60,425
2020	\$73,689	\$60,425
2021	\$73,689	\$60,425
2022	\$73,689	\$60,425
2023	\$73,689	\$60,425
2024	\$73,689	\$60,425
2025	\$73,689	\$60,425
2026	\$73,689	\$60,425
2027	\$73,689	\$60,425
2028	\$73,689	\$60,425
2029	\$73,689	\$60,425
2030	\$73,689	\$60,425
2031	\$73,689	\$60,425
2032	\$73,689	\$60,425
2033	\$73,689	\$60,425
2034	\$73,689	\$60,425
2035	\$73,689	\$60,425
2036	\$73,689	\$60,425
2037	\$73,689	\$60,425
2038	\$73,689	\$60,425
2039	\$73,689	\$60,425
2040	\$73,689	\$60,425

Calendar Year	Undiscounted Values (2014 \$)	
	No-Build	Build
2014		
2015		
2016		
2017		
2018	\$15,742	\$12,691
2019	\$15,742	\$12,691
2020	\$15,742	\$12,691
2021	\$15,742	\$12,691
2022	\$15,742	\$12,691
2023	\$15,742	\$12,691
2024	\$15,742	\$12,691
2025	\$15,742	\$12,691
2026	\$15,742	\$12,691
2027	\$15,742	\$12,691
2028	\$15,742	\$12,691
2029	\$15,742	\$12,691
2030	\$15,742	\$12,691
2031	\$15,742	\$12,691
2032	\$15,742	\$12,691
2033	\$15,742	\$12,691
2034	\$15,742	\$12,691
2035	\$15,742	\$12,691
2036	\$15,742	\$12,691
2037	\$15,742	\$12,691
2038	\$15,742	\$12,691
2039	\$15,742	\$12,691
2040	\$15,742	\$12,691

Calendar Year	Project Year	Undiscounted Values (2014 \$)			Net Impact (Build-No Build) Discounted at 7%	Net Impact (Build-No Build) Discounted at 3%
		No-Build	Build	Net Impact (Build-No Build)		
2014	0	\$0	\$0	\$0	\$0	
2015	1	\$0	\$0	\$0	\$0	
2016	2	\$0	\$0	\$0	\$0	
2017	3	\$0	\$0	\$0	\$0	
2018	4	\$89,431	\$73,116	\$16,315	\$12,446	
2019	5	\$89,431	\$73,116	\$16,315	\$11,632	
2020	6	\$89,431	\$73,116	\$16,315	\$10,871	
2021	7	\$89,431	\$73,116	\$16,315	\$10,160	
2022	8	\$89,431	\$73,116	\$16,315	\$9,495	
2023	9	\$89,431	\$73,116	\$16,315	\$8,874	
2024	10	\$89,431	\$73,116	\$16,315	\$8,294	
2025	11	\$89,431	\$73,116	\$16,315	\$7,751	
2026	12	\$89,431	\$73,116	\$16,315	\$7,244	
2027	13	\$89,431	\$73,116	\$16,315	\$6,770	
2028	14	\$89,431	\$73,116	\$16,315	\$6,327	
2029	15	\$89,431	\$73,116	\$16,315	\$5,913	
2030	16	\$89,431	\$73,116	\$16,315	\$5,526	
2031	17	\$89,431	\$73,116	\$16,315	\$5,165	
2032	18	\$89,431	\$73,116	\$16,315	\$4,827	
2033	19	\$89,431	\$73,116	\$16,315	\$4,511	
2034	20	\$89,431	\$73,116	\$16,315	\$4,216	
2035	21	\$89,431	\$73,116	\$16,315	\$3,940	
2036	22	\$89,431	\$73,116	\$16,315	\$3,682	
2037	23	\$89,431	\$73,116	\$16,315	\$3,442	
2038	24	\$89,431	\$73,116	\$16,315	\$3,216	
2039	25	\$89,431	\$73,116	\$16,315	\$3,006	
2040	26	\$89,431	\$73,116	\$16,315	\$2,809	
Total		\$2,056,910	\$1,681,673	\$375,238	\$150,119	\$245,507

FHWA crash reduction factors (ranging from 8% to 31%) were applied to the average annual crash rates (and costs) along the corridor applied to the average annual crash rates (and costs) along the corridor

10. CRASH ASSUMPTIONS (REDUCTIONS FACTORS)

Crash Reduction factors for Shoulder-Running Designated Bus Lanes
Used on the Curb-Running BRT Segment (4th street to 14th street)

Countermeasures	Crash Type	Crash Severity	Area Type	Road Type	Daily Traffic Volume (veh/day)	Effectiveness			Study Type	
						Crash Reduction Factor/Function	Std Error	Range		
								Low		High
Install shoulder bus lanes	Head-on	Fatal/Injury				50%				
	Head-on	PDO				86%				
	Left-turn	Fatal/Injury				42%				
	Left-turn	PDO				57%				
	ROR	PDO				27%				
	Right-angle	Fatal/Injury				34%				
	Right-angle	PDO				31%			Used to monetize angle crashes along shoulder-running segment of BRT	
	Sideswipe	Fatal/Injury				27%			Used to monetize sideswipe crashes along shoulder-running segment of BRT	
	Sideswipe	PDO				8%				

Source: http://safety.fhwa.dot.gov/tools/crf/resources/fhwass08011/ssac3.cfm#linktarget_c7

40.2%

Crash Reduction factors for Road Diet
Used as Proxy for the Median-Running BRT Segment (Thompson to Adams)

Install Road diet 18% *Used to monetize all crashes all the median-running BRT segment. Since designated bus lanes along median aptly reflect a "road diet" approach.*

Source: Evaluation of Lane Reduction "Road Diet" Measures on Crashes
Highway Safety Information System, USDOT and FHWA

Value of Statistical Life (2013) \$9,200,000 *Not applicable to this study since there were no fatalities along the corridor between 2009-2013 (years available for crash data).*

Value of Injuries (2013)	AIS Level	Severity	Fraction of VSL	Unit value (\$2013)	Unit value (\$2014)
	AIS 1	Minor	0.003	\$ 27,600	\$28,017
	AIS 2	Moderate	0.047	\$ 432,400	\$438,939
	AIS 3	Serious	0.105	\$ 966,000	\$980,608
	AIS 4	Severe	0.266	\$ 2,447,200	\$2,484,207
	AIS 5	Critical	0.593	\$ 5,455,600	\$5,538,100
	AIS 6	Unsurvivable	1.000	\$ 9,200,000	\$9,339,123

In efforts to remain conservative, all recorded injuries (see crash data tabs) were assumed to be AIS 1 - Minor.

Source: TIGER Benefit-Cost Analysis Resource Guide, 2014
http://www.dot.gov/sites/dot.gov/files/docs/TIGER_BCARG_2014.pdf

Property Damage Crash See crash data tabs (Tab 11 and Tab 12)

Source: Police crash data include property damage estimates. See Crash Data tabs.

Consumer Price Index - All Urban Consumers

Original Data Value

Series Id: CUUR0000ISA
0

Not Seasonally Adjusted

Area: U.S. city
average

Item: All items
Base Period: 1982-84=100

Years: 2009 to 2013

Year (March as reference point)	Value	Ratio to 2014
2009	212,709	1.09
2010	217,631	1.07
2011	223,467	1.04
2012	229,392	1.01
2013	232,773	1.02
2014	236,293	1

Ratios used to inflate crash cost estimates on following tabs (Tab 11 and Tab 12).

Source: BLS
<http://download.bls.gov/pub/time.series/cu/cu.data.1.AllItems>

11. CRASHES ALONG MEDIAN-RUNNING SEGMENT OF BRT CORRIDOR
2009-2013

Crash Locations	Year	Cost (Year Crash Occurred)	Cost (2014 \$)	Crash Type	Injuries - Incapacitated	Injuries - Non Incapacitated
****BELVIDERE ST & BROAD ST 201001090487 01/09/2010 1800 3885 2 ANGLE \$4,100.00 0 0 0 0 0 0 413 Driver: 1 Action: IMPROPER TURN W/ WIDE RIGHT TURN W/ MAKING RIGHT TURN Driver: 2 Action: NO IMPROPER ACTION W GOING STRAIGHT AHEAD 15 GREATER RICHMOND TRANS 201102190388 02/19/2011 1257 2927 1 PEDESTRIAN \$0.00 0 1 0 0 0 0 413 Driver: 1 Action: NO IMPROPER ACTION GOING STRAIGHT AHEAD 14 GRTC	2010	\$4,100	\$4,385	Angle	1	
****BROAD ST & DAVIS AVE 201011100182 11/10/2010 0903 1997 2 REAR END \$2,500.00 0 0 0 0 0 0 412 Driver: 1 Action: FOLLOWING TOO CLOSE W GOING STRAIGHT AHEAD Driver: 2 Action: NO IMPROPER ACTION W STOPPED IN TRAFFIC LANE 14 GREATER RICHMOND TRANS	2010	\$2,500	\$2,673.94	Rear end		
****BROAD ST & HENRY ST 201211020261 11/02/2012 1115 2157 2 ANGLE \$1,600.00 0 0 0 0 0 0 413 Driver: 1 Action: IMPROPER OR UNSAFE LANE CHANGE W MAKING RIGHT TURN Driver: 2 Action: NO IMPROPER ACTION W GOING STRAIGHT AHEAD 14 GRTC	2012	\$1,600	\$1,623.58	Angle		
****BROAD ST & JEFFERSON ST 200912170283 12/17/2009 1151 2927 2 SIDESWIPE - SAME DIRECTION \$2,500.00 0 0 0 0 0 1 Driver: 1 Action: OTHER OTHER Driver: 2 Action: NO IMPROPER ACTION GOING STRAIGHT AHEAD 14 GRTC	2009	\$2,500	\$2,735.82	Sideswipe		
****BROAD ST & LOMBARDY ST 201206090538 06/09/2012 1906 3261 2 ANGLE \$12,000.00 0 0 0 1 0 0 313 Driver: 1 Action: DID NOT HAVE RIGHT-OF-WAY'S MARKING LEFT TURN Driver: 2 Action: NO IMPROPER ACTION E STARTING IN TRAFFIC LANE 14 GREATER RICHMOND TRANS 201204030220 04/03/2012 1233 1416 2 SIDESWIPE - SAME DIRECTION \$9,500.00 0 1 8 2 0 1 Driver: 1 Action: FAIL TO MAINTAIN PROPER CONTROL E GOING STRAIGHT AHEAD Driver: 2 Action: NO IMPROPER ACTION E STOPPED IN TRAFFIC LANE 14 GREATER RICHMOND TRANS	2012	\$12,000	\$12,176.87	Angle	1	8
****BROAD ST & RYLAND ST 201110170196 10/17/2011 1004 1997 2 REAR END \$0.00 0 0 0 0 0 0 313 Driver: 1 Action: NO IMPROPER ACTION W STOPPED IN TRAFFIC LANE Driver: 2 Action: FAIL TO MAINTAIN PROPER CONTROL W GOING STRAIGHT AHEAD 14 GRTC	2011	\$0	\$0.00	Rear end		
****BROAD ST & SHAFER ST 201310180407 10/18/2013 1630 1988 2 SIDESWIPE - SAME DIRECTION \$6,500.00 0 0 0 0 0 1 Driver: 1 Action: FAIL TO MAINTAIN PROPER CONTROL E GOING STRAIGHT AHEAD Driver: 2 Action: NO IMPROPER ACTION E STOPPED IN TRAFFIC LANE 14 GREATER RICHMOND TRANS 201305300339 05/30/2013 1612 2889 2 SIDESWIPE - SAME DIRECTION \$1,000.00 0 0 0 0 0 1 Driver: 1 Action: IMPROPER OR UNSAFE LANE CHANGE E CHANGING LANES Driver: 2 Action: IMPROPER PARKING LOCATION E PARKED 14 GREATER RICHMOND TRANS	2013	\$6,500	\$6,598.29	Sideswipe		
****BROAD ST & STRAWBERRY ST 201106300491 06/30/2011 1600 1774 2 SIDESWIPE - SAME DIRECTION \$5,500.00 0 0 0 0 0 1 Driver: 1 Action: IMPROPER OR UNSAFE LANE CHANGE W CHANGING LANES Driver: 2 Action: NO IMPROPER ACTION W STOPPED IN TRAFFIC LANE 14 GRTC	2011	\$5,500	\$5,729.04	Sideswipe		
****BROAD ST & 30 FEET W OF RYLAND ST 20130210116 02/10/2013 1818 2209 2 REAR END \$2,000.00 0 0 0 0 0 0 313 Driver: 1 Action: OTHER E STOPPED IN TRAFFIC LANE Driver: 2 Action: OTHER E CHANGING LANES 14 GRTC	2013	\$2,000	\$2,030.24	Rear end		
****BROAD ST & 100 FEET W OF LOMBARDY ST 20130903201 09/03/2013 1000 2209 2 FIXED OBJECT - OFF ROAD \$4,500.00 0 0 0 0 0 0 3 Driver: 1 Action: OTHER PARKED Driver: 2 Action: NO IMPROPER ACTION E GOING STRAIGHT AHEAD 14 GREATER RICHMOND TRANS	2013	\$4,500	\$4,568.05	Other		
****BROAD ST & 220 FEET W OF BOULEVARD 201311210283 11/21/2013 1317 1416 2 REAR END \$1,400.00 0 0 0 0 0 0 Driver: 1 Action: FOLLOWING TOO CLOSE E STOPPED IN TRAFFIC LANE Driver: 2 Action: NO IMPROPER ACTION E STOPPED IN TRAFFIC LANE 14 GREATER RICHMOND TRANS	2013	\$1,400	\$1,421.17	Rear end		
****BROAD ST & 10 FEET E OF JEFFERSON ST 201109210378 09/21/2011 1424 2786 2 SIDESWIPE - SAME DIRECTION \$2,000.00 0 0 0 1 0 1 Driver: 1 Action: OTHER E PARKED Driver: 2 Action: NO IMPROPER ACTION E GOING STRAIGHT AHEAD 14 GREATER RICHMOND TRANS	2011	\$2,000	\$2,083.29	Sideswipe		
****BROAD ST & 180 FEET W OF LOMBARDY ST 201302100419 02/10/2013 2014 1988 2 SIDESWIPE - SAME DIRECTION \$3,000.00 0 0 0 0 0 1 Driver: 1 Action: NOT APPLICABLE E PARKED Driver: 2 Action: NO IMPROPER ACTION E GOING STRAIGHT AHEAD 14 GREATER RICHMOND TRANS	2013	\$3,000	\$3,045.37	Sideswipe		
****BROAD ST & 30 FEET E OF LOMBARDY ST 201006240135 06/24/2010 1305 2544 2 SIDESWIPE - SAME DIRECTION \$210.00 0 0 0 0 0 0 1 Driver: 1 Action: OTHER W GOING STRAIGHT AHEAD Driver: 2 Action: NO IMPROPER ACTION E PARKED 14 GRTC	2010	\$210	\$224.61	Sideswipe		
****BROAD ST & 20 FEET W OF SHAFER ST 201208230257 08/23/2012 1255 1988 2 SIDESWIPE - SAME DIRECTION \$3,500.00 0 0 0 0 0 1 Driver: 1 Action: DID NOT HAVE RIGHT-OF-WAY E GOING STRAIGHT AHEAD Driver: 2 Action: NO IMPROPER ACTION E SLOWING OR STOPPING 14 GREATER RICHMOND TRANS	2012	\$3,500	\$3,551.59	Sideswipe		
****BROAD ST & 30 FEET E OF HANCOCK ST 200904170337 04/17/2009 1300 2239 2 FIXED OBJECT IN ROAD \$1,500.00 0 0 0 0 0 0 413 Driver: 1 Action: OTHER W PARKED Driver: 2 Action: NO IMPROPER ACTION W GOING STRAIGHT AHEAD 14 GRTC	2009	\$1,500	\$1,641.49	Other		
****BROAD ST & 30 FEET W OF JEFFERSON ST 201005050139 05/05/2010 0815 3115 2 SIDESWIPE - SAME DIRECTION \$4,000.00 0 0 0 1 0 1 Driver: 1 Action: OTHER E GOING STRAIGHT AHEAD Driver: 2 Action: NO IMPROPER ACTION E PARKED 14 GREATER RICHMOND TRANS	2010	\$4,000	\$4,278.31	Sideswipe		
****BROAD ST & 300 FEET E OF SHEPPARD ST 201108080304 08/08/2011 1433 1416 3 SIDESWIPE - SAME DIRECTION \$4,900.00 0 0 0 0 0 1 Driver: 1 Action: FOLLOWING TOO CLOSE W GOING STRAIGHT AHEAD Driver: 2 Action: NO IMPROPER ACTION W SLOWING OR STOPPING Driver: 3 Action: NO IMPROPER ACTION W STOPPED IN TRAFFIC LANE 14 GRTC	2011	\$4,900	\$5,104.05	Sideswipe		
****BROAD ST & 40 FEET E OF SHAFER ST 201009200253 09/20/2010 1122 3281 2 SIDESWIPE - SAME DIRECTION \$2,000.00 0 0 0 0 0 1 Driver: 1 Action: OTHER E PARKED Driver: 2 Action: NO IMPROPER ACTION E GOING STRAIGHT AHEAD 14 GRTC	2010	\$2,000	\$2,139.15	Sideswipe		
****BROAD ST & 40 FEET W OF ALLEN AVE 201201200146 01/20/2012 0749 2531 2 ANGLE \$4,000.00 0 0 0 0 0 0 313 Driver: 1 Action: FOLLOWING TOO CLOSE E GOING STRAIGHT AHEAD	2012	\$4,000	\$4,058.96	Angle		

Crash Summary and Calculations

Type	Crashes (2009-2013)	Crashes Per Year (No-Build)	Cost (2014 \$)	Cost Per Year (2014 \$) (No-Build)	Cost Per Year (2014 \$) (Build)
Sideswipe	16	3.2	\$49,033	\$9,807	\$8,041
Rear end	5	1	\$7,140	\$1,428	\$1,171
Angle	5	1	\$25,890	\$5,178	\$4,246
Other	3	0.6	\$6,210	\$1,242	\$1,018
Total	29	5.8	\$88,273	\$17,655	\$14,477

A 18% crash reduction factor was applied to all crash types along on the median-running section of the BRT route
See "Crash Reductions" tab of spreadsheet for source information

Injuries

Injuries (2009-2013)	Injuries Per Year (No-Build)	Cost (2014 \$)	Cost Per Year (2014 \$) (No-Build)	Cost Per Year (2014 \$) (Build)
10	2	\$280,174	\$56,034.74	\$45,948

Due to insufficient information about injuries, all injuries were assumed to be "minor" (AIS 1)

Driver: 2 Action: NO IMPROPER ACTION E SLOWING OR STOPPING 14 GREATER RICHMOND TRANSI 20120118325 01/13/2012 1221 2239 2 REAR END \$100.00 0 0 2 0 0 0 313	2012	\$1,000	\$1,014.74	Rear end
Driver: 1 Action: FOLLOWING TOO CLOSE E GOING STRAIGHT AHEAD Driver: 2 Action: NO IMPROPER ACTION E STOPPED IN TRAFFIC LANE 14 GRTC				
****BROAD ST & 400 FEET E OF HARRISON ST 201010280203 10/28/2010 1145 2531 2 SIDESWIPE - SAME DIRECTION \$450.00 0 0 0 0 0 0 1	2010	\$450	\$481.31	Sideswipe
Driver: 1 Action: IMPROPER PASSING W GOING STRAIGHT AHEAD 14 GREATER RICHMOND TRANSI				
****BROAD ST & 50 FEET E OF ROBINSON ST 201008030400 08/03/2010 0901 5332 2 SIDESWIPE - SAME DIRECTION \$1,600.00 0 0 0 0 0 0 1	2010	\$1,600	\$1,711.32	Sideswipe
Driver: 1 Action: DRIVER INATTENTION E OTHER 14 GREATER RICHMOND TRANSI				
****BROAD ST & 50 FEET W OF DMV DR 201006070541 06/07/2010 1630 5332 2 SIDESWIPE - SAME DIRECTION \$500.00 0 0 0 0 0 0 1	2010	\$500	\$534.79	Sideswipe
Driver: 1 Action: IMPROPER OR UNSAFE LANE CHANGE STARTING IN TRAFFIC LANE Driver: 2 Action: NO IMPROPER ACTION GOING STRAIGHT AHEAD 14 GRTC				
****BROAD ST & 75 FEET E OF RYLAND ST 201104010283 04/01/2011 1243 2096 2 ANGLE \$3,500.00 0 0 0 0 0 0 313	2011	\$3,500	\$3,645.75	Angle
Driver: 1 Action: NO IMPROPER ACTION W CHANGING LANES Driver: 2 Action: NO IMPROPER ACTION W STARTING IN TRAFFIC LANE 15 GREATER RICHMOND TRANSI				
****BROAD ST & 75 FEET W OF HARRISON ST 201006170325 06/17/2010 1255 3247 2 SIDESWIPE - SAME DIRECTION \$600.00 0 0 0 0 0 0 1	2010	\$600	\$641.75	Sideswipe
Driver: 1 Action: IMPROPER OR UNSAFE LANE CHANGE E CHANGING LANES 14 GREATER RICHMOND TRANSI				

Source: City of Richmond Police Department

12. CRASHES ALONG CURB-RUNNING SEGMENT OF BRT CORRIDOR
2009-2013

(see below for summary/calculations)

Year	Cost (Year Crash Occurred)	Cost (2014 \$)	Type	Injuries - Non Incapacitated	Injuries - Non Incapacitated																																				
Crash Summary and Calculations																																									
<table border="1"> <thead> <tr> <th>Type</th> <th>Crashes (2009-2013)</th> <th>Crashes Per Year (No-Build)</th> <th>Cost (2014 \$)</th> <th>Cost Per Year (2014 \$) (No-Build)</th> <th>Cost Per Year (2014 \$) (Build)</th> </tr> </thead> <tbody> <tr> <td>Sideswipe</td> <td>17</td> <td>3.4</td> <td>\$3,724</td> <td>\$6,545</td> <td>\$6,021</td> </tr> <tr> <td>Rear end</td> <td>7</td> <td>1.4</td> <td>\$4,190</td> <td>\$838</td> <td>\$838</td> </tr> <tr> <td>Angle</td> <td>4</td> <td>0.8</td> <td>\$40,759</td> <td>\$8,152</td> <td>\$5,625</td> </tr> <tr> <td>Other</td> <td>1</td> <td>0.2</td> <td>\$1,035</td> <td>\$207</td> <td>\$207</td> </tr> <tr> <td>Total</td> <td>29</td> <td>5.8</td> <td>\$79,708</td> <td>\$15,742</td> <td>\$12,691</td> </tr> </tbody> </table> <p>Crash reduction factors applied to "sideswipe" and "angle" crashes. Did not assume crash reductions for "rear end" and "other" crashes. See "Crash Reductions" tab of spreadsheet for source information</p>						Type	Crashes (2009-2013)	Crashes Per Year (No-Build)	Cost (2014 \$)	Cost Per Year (2014 \$) (No-Build)	Cost Per Year (2014 \$) (Build)	Sideswipe	17	3.4	\$3,724	\$6,545	\$6,021	Rear end	7	1.4	\$4,190	\$838	\$838	Angle	4	0.8	\$40,759	\$8,152	\$5,625	Other	1	0.2	\$1,035	\$207	\$207	Total	29	5.8	\$79,708	\$15,742	\$12,691
Type	Crashes (2009-2013)	Crashes Per Year (No-Build)	Cost (2014 \$)	Cost Per Year (2014 \$) (No-Build)	Cost Per Year (2014 \$) (Build)																																				
Sideswipe	17	3.4	\$3,724	\$6,545	\$6,021																																				
Rear end	7	1.4	\$4,190	\$838	\$838																																				
Angle	4	0.8	\$40,759	\$8,152	\$5,625																																				
Other	1	0.2	\$1,035	\$207	\$207																																				
Total	29	5.8	\$79,708	\$15,742	\$12,691																																				
Injuries																																									
<table border="1"> <thead> <tr> <th>None</th> <th>Injuries (2009-2013)</th> <th>Injuries Per Year (No-Build)</th> <th>Cost (2014 \$)</th> <th>Cost Per Year (2014 \$) (No-Build)</th> <th>Cost Per Year (2014 \$) (Build)</th> </tr> </thead> <tbody> <tr> <td>None</td> <td>0</td> <td>0</td> <td>N/A</td> <td>N/A</td> <td>N/A</td> </tr> </tbody> </table>						None	Injuries (2009-2013)	Injuries Per Year (No-Build)	Cost (2014 \$)	Cost Per Year (2014 \$) (No-Build)	Cost Per Year (2014 \$) (Build)	None	0	0	N/A	N/A	N/A																								
None	Injuries (2009-2013)	Injuries Per Year (No-Build)	Cost (2014 \$)	Cost Per Year (2014 \$) (No-Build)	Cost Per Year (2014 \$) (Build)																																				
None	0	0	N/A	N/A	N/A																																				
****11TH ST & BROAD ST 2010627044 02/27/2009 1645 5184 2 SIDESWIPE - SAME DIRECTION \$1,500.00 0 0 0 0 0 0 41	2010	\$4,100	\$4,385	Sideswipe																																					
Driver: 1 Action: OTHER E GOING STRAIGHT AHEAD 14 GREATER RICHMOND TRANS!																																									
****5TH ST & BROAD ST 20100128616 01/28/2010 1759 1416 2 SIDESWIPE - SAME DIRECTION \$4,500.00 0 0 0 0 0 0 41	2010	\$4,500	\$4,813	Sideswipe																																					
Driver: 1 Action: NO IMPROPER ACTION E GOING STRAIGHT AHEAD Driver: 2 Action: IMPROPER OR UNSAFE LANE CHANGE E CHANGING LANES 14 GREATER RICHMOND TRANS!																																									
201108100380 08/10/2011 1459 2239 2 ANGLE \$18,000.00 0 0 0 2 0 0 413	2011	\$18,000	\$18,750	Angle																																					
Driver: 1 Action: NO IMPROPER ACTION W GOING STRAIGHT AHEAD Driver: 2 Action: NO IMPROPER ACTION S GOING STRAIGHT AHEAD 14 GREATER RICHMOND TRANS!																																									
****6TH ST & BROAD ST 200906150283 06/15/2009 1230 2088 2 ANGLE \$5,000.00 0 0 0 0 0 0 413	2009	\$5,000	\$5,472	Angle																																					
Driver: 1 Action: OTHER W GOING STRAIGHT AHEAD Driver: 2 Action: NO IMPROPER ACTION W PARKED 14 GRTC																																									
****7TH ST & BROAD ST 201004130250 04/13/2010 1119 2127 2 ANGLE \$5,500.00 0 0 0 0 0 0 413	2010	\$5,500	\$5,883	Angle																																					
Driver: 1 Action: DISREGARDED TRAFFIC SIGNAL E GOING STRAIGHT AHEAD Driver: 2 Action: NOT APPLICABLE N MAKING LEFT TURN 15 GRTC																																									
****8TH ST & BROAD ST 200904050289 04/05/2009 1048 2127 2 REAR END \$2,300.00 0 0 0 0 0 0 413	2009	\$2,300	\$2,517	Rear end																																					
Driver: 1 Action: IMPROPER OR UNSAFE LANE CHANGE W CHANGING LANES Driver: 2 Action: NO IMPROPER ACTION W NOT APPLICABLE 15 GREATER RICHMOND TRANS!																																									
20120410445 04/11/2012 1910 2889 2 ANGLE \$10,500.00 0 0 0 0 0 0 413	2012	\$10,500	\$10,655	Angle																																					
Driver: 1 Action: DISREGARDED TRAFFIC SIGNAL E MAKING RIGHT TURN Driver: 2 Action: NO IMPROPER ACTION S GOING STRAIGHT AHEAD 14 GREATER RICHMOND TRANS!																																									
201305130108 05/13/2013 0820 3281 2 SIDESWIPE - SAME DIRECTION \$250.00 0 0 0 0 0 0 413	2013	\$250	\$254	Sideswipe																																					
Driver: 1 Action: OTHER W GOING STRAIGHT AHEAD Driver: 2 Action: OTHER W GOING STRAIGHT AHEAD 14 GREATER RICHMOND TRANS!																																									
201102040517 02/04/2011 1705 2889 2 SIDESWIPE - SAME DIRECTION \$4,000.00 0 0 0 0 0 0 41	2011	\$4,000	\$4,167	Sideswipe																																					
Driver: 1 Action: OTHER W STOPPED IN TRAFFIC LANE Driver: 2 Action: NO IMPROPER ACTION W GOING STRAIGHT AHEAD 14 GREATER RICHMOND TRANS!																																									
****9TH ST & BROAD ST 201107080899 07/08/2011 2340 3262 2 SIDESWIPE - SAME DIRECTION \$3,200.00 0 0 0 0 0 0 41	2011	\$3,200	\$3,333	Sideswipe																																					
Driver: 1 Action: CUTTING IN E CHANGING LANES Driver: 2 Action: NO IMPROPER ACTION E GOING STRAIGHT AHEAD 14 GREATER RICHMOND TRANS!																																									
201310010503 10/01/2013 1640 2889 2 SIDESWIPE - SAME DIRECTION \$200.00 0 0 1 0 0 0 413	2013	\$200	\$203	Sideswipe																																					
Driver: 1 Action: OTHER E GOING STRAIGHT AHEAD Driver: 2 Action: OTHER E GOING STRAIGHT AHEAD 14 GREATER RICHMOND TRANS!																																									
201005206518 05/20/2010 1530 2052 2 SIDESWIPE - SAME DIRECTION \$550.00 0 0 0 0 0 0 413	2010	\$550	\$588	Sideswipe																																					
Driver: Action: 14 GRTC																																									
201202160330 02/16/2012 1352 2239 1 PEDESTRIAN \$0.00 0 0 1 0 0 0 413	2012	\$0	\$0																																						
Driver: 1 Action: NO IMPROPER ACTION GOING STRAIGHT AHEAD 14 GRTC 201305210488 05/21/2013 1730 2239 2 ANGLE \$1,620.00 0 0 2 0 0 0 413																																									
Driver: 1 Action: IMPROPER STARTING FROM PARKED POSITION W STARTING FROM PARKED POSITION Driver: 2 Action: NO IMPROPER ACTION N MAKING RIGHT TURN 14 GRTC																																									
201202020379 02/02/2012 1559 2889 2 SIDESWIPE - SAME DIRECTION \$2,600.00 0 0 0 0 0 0 41	2012	\$2,600	\$2,638	Sideswipe																																					
Driver: 1 Action: OTHER IMPROPER TURN W MARKING RIGHT TURN Driver: 2 Action: NO IMPROPER ACTION W PARKED 14 GREATER RICHMOND TRANS!																																									
201310010477 10/01/2013 1640 2889 2 SIDESWIPE - SAME DIRECTION \$60.00 0 0 1 0 0 0 413	2013	\$60	\$61	Sideswipe																																					
Driver: 1 Action: OTHER E GOING STRAIGHT AHEAD Driver: 2 Action: OTHER E GOING STRAIGHT AHEAD 14 GREATER RICHMOND TRANS!																																									
****BROAD ST & 101 FEET E OF 11TH ST 201312110181 12/11/2013 1120 3398 2 SIDESWIPE - SAME DIRECTION \$1,700.00 0 0 0 0 0 0 41	2013	\$1,700	\$1,726	Sideswipe																																					
Driver: 1 Action: NO IMPROPER ACTION W GOING STRAIGHT AHEAD Driver: 2 Action: NO IMPROPER ACTION W GOING STRAIGHT AHEAD 15 GRTC																																									
****BROAD ST & 150 FEET E OF 11TH ST 201201101079 01/10/2012 1150 2786 2 REAR END \$200.00 0 0 0 2 0 0 413	2012	\$200	\$203	Rear end																																					
Driver: 1 Action: HIT AND RUN CHANGING LANES Driver: 2 Action: NO IMPROPER ACTION PARKED 14 GREATER RICHMOND TRANS!																																									
****BROAD ST & FEET E OF 8TH ST 201306170401 06/17/2013 1717 2538 2 SIDESWIPE - SAME DIRECTION \$400.00 0 0 0 0 0 0 413	2013	\$400	\$406	Sideswipe																																					
Driver: 1 Action: DID NOT HAVE RIGHT-OF-WAY W GOING STRAIGHT AHEAD Driver: 2 Action: NO IMPROPER ACTION W STOPPED IN TRAFFIC LANE 14 GREATER RICHMOND TRANS!																																									
****BROAD ST & 15 FEET E OF 10TH ST 201203290291 03/29/2012 1425 3454 2 SIDESWIPE - SAME DIRECTION \$2,850.00 0 0 0 0 0 0 41	2012	\$2,850	\$2,892	Sideswipe																																					
Driver: 1 Action: OTHER IMPROPER PASSING W PASSING Driver: 2 Action: NO IMPROPER ACTION W STOPPED IN TRAFFIC LANE 14 GRTC																																									
****BROAD ST & 15 FEET W OF 5TH ST 200910050436 10/05/2009 1700 3262 2 REAR END \$15.00 0 0 0 2 0 0 413	2009	\$15	\$16	Rear end																																					
Driver: 1 Action: FAIL TO MAINTAIN PROPER CONTROL E SLOWING OR STOPPING Driver: 2 Action: NO IMPROPER ACTION E PARKED 14 GRTC																																									
200910050436 10/05/2009 1700 3262 2 REAR END \$15.00 0 0 0 2 0 0 413	2009	\$15	\$16	Rear end																																					
Driver: 1 Action: FAIL TO MAINTAIN PROPER CONTROL E SLOWING OR STOPPING Driver: 2 Action: NO IMPROPER ACTION E PARKED 14 GRTC																																									
201311210283 11/21/2013 1317 1416 2 REAR END \$1,400.00 0 0 0 0 0 0 0	2013	\$1,400	\$1,421	Rear end																																					
Driver: 1 Action: FOLLOWING TOO CLOSE E STOPPED IN TRAFFIC LANE Driver: 2 Action: NO IMPROPER ACTION E STOPPED IN TRAFFIC LANE 14 GREATER RICHMOND TRANS!																																									
****BROAD ST & FEET E OF 8TH ST 201306170401 06/17/2013 1717 2538 2 SIDESWIPE - SAME DIRECTION \$400.00 0 0 0 0 0 0 413	2013	\$400	\$406	Sideswipe																																					
Driver: 1 Action: DID NOT HAVE RIGHT-OF-WAY W GOING STRAIGHT AHEAD Driver: 2 Action: NO IMPROPER ACTION W STOPPED IN TRAFFIC LANE 14 GREATER RICHMOND TRANS!																																									
****BROAD ST & 15 FEET E OF 10TH ST 201203290291 03/29/2012 1425 3454 2 SIDESWIPE - SAME DIRECTION \$2,850.00 0 0 0 0 0 0 41	2012	\$2,850	\$2,892	Sideswipe																																					
Driver: 1 Action: OTHER IMPROPER PASSING W PASSING Driver: 2 Action: NO IMPROPER ACTION W STOPPED IN TRAFFIC LANE 14 GRTC																																									
****BROAD ST & 15 FEET W OF 5TH ST 200910050436 10/05/2009 1700 3262 2 REAR END \$15.00 0 0 0 2 0 0 413	2009	\$15	\$16	Rear end																																					
Driver: 1 Action: FAIL TO MAINTAIN PROPER CONTROL E SLOWING OR STOPPING Driver: 2 Action: NO IMPROPER ACTION E PARKED 14 GRTC																																									
200910050436 10/05/2009 1700 3262 2 REAR END \$15.00 0 0 0 2 0 0 413	2009	\$15	\$16	Rear end																																					
Driver: 1 Action: FAIL TO MAINTAIN PROPER CONTROL E SLOWING OR STOPPING Driver: 2 Action: NO IMPROPER ACTION E PARKED 14 GRTC																																									
****BROAD ST & 50 FEET E OF 4TH ST 200912070400 12/07/2009 1545 3586 2 SIDESWIPE - SAME DIRECTION \$2,000.00 0 0 0 0 0 0 41	2009	\$2,000	\$2,189	Sideswipe																																					
Driver: 1 Action: NO IMPROPER ACTION W CHANGING LANES Driver: 2 Action: NO IMPROPER ACTION W CHANGING LANES 14 GREATER RICHMOND TRANS!																																									

****BROAD ST & 50 FEET W OF 11TH ST
201111210596 11/21/2011 1900 3342 3 SIDESWIPE - SAME DIRECTION \$1,700.00 0 0 0 0 0 0 0 41 2011 \$1,700 \$1,771 Sideswipe
Driver: 1 Action: NO IMPROPER ACTION E PARKED
Driver: 2 Action: NO IMPROPER ACTION E GOING STRAIGHT AHEAD
14 GREATER RICHMOND TRANSI

****BROAD ST & 50 FEET W OF 12TH ST
201103150173 03/15/2011 0851 2151 2 SIDESWIPE - SAME DIRECTION \$0.00 0 0 0 1 0 0 0 413 2011 \$0 \$0 Sideswipe
Driver: 1 Action: HIT AND RUN W NOT APPLICABLE
Driver: 2 Action: NO IMPROPER ACTION W STOPPED IN TRAFFIC LANE
14 GREATER RICHMOND TRANSI

Source: City of Richmond Police Department