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MEMORANDUM

To:	Joana Conklin, Darcey Buckley, Montgomery County DOT
From:	James A. Bunch, Senior Transportation Planner, SWAI
Subject:	US 29 Bus Rapid Transit Improvements, Montgomery County MD, TIGER VIII Grant Benefit Cost Analysis (Revised)
Date:	February 3, 2017
CC:	Gary Erenrich, MCDOT, Paul Silberman: SWAI

1 Executive Summary

A benefit-cost analysis (BCA) was conducted for the US29 Bus Rapid Transit Improvements project for submission to the US DOT as a requirement of a discretionary grant application for the TIGER VIII program. The analysis was conducted in accordance with the benefit-cost methodology as recommended by the US DOT in the Federal Register (81 FR 9935)(18), and the 2016 Benefit-Cost Analysis Guidance for TIGER and Grant Applications (16) and the 2016 Tiger Benefit-Cost Analysis (BCA) 2016 TIGER and Fast Lane BCA Resource Guide (17). As recommended the BCA was conducted for a period of over 20 years starting when operations begin in 2020 and ending in 2040 (21 years). The BCA provides conservative estimates of both benefits and costs. Full life-cycle costs including replacement of assets at the end of their economic life, operations and maintenance of the system, and recovery of remaining useful life at the end of the analysis period were incorporated into the analysis. Sensitivity analyses using discount rates of 7% and 3% along with various assumptions on the methods and inputs for estimating the benefits measures (travel time savings, user cost savings, air quality, etc.) were also performed.

The BCA analysis was originally carried out in April 2016 assuming Managed/HOV Lanes along portions of the Right of Way (ROW), and 12 minute headways for each BRT service pattern (6 minute combined headway on the trunk portions of the ROW). Since the original submittal, the Grant Proposal has been revised to:

- Convert the Managed/HOV lane portions of the ROW back to mixed use
- Provide 15 minute headways for each BRT service pattern (7.5 minute combined headways) in the opening year (2020).
- Restore the Ride On route 21 and 22 to their current service patterns (previously they were terminated at the White Oak Transit Center).

These changes change the transit travel times and reduce the capital costs for roadway improvements, signage, and traffic operations. Consequently the BCA analysis was revised to account for these changes, as documented in the remainder of this memorandum.

This memorandum provides additional detail on the assumptions, methods, and results discussed in the revised grant submittal. Printouts of all calculations and assumptions can also be found the accompanying PDF file: MoCo_MD_2016_US29BRT_BCA_Calculations_r4.pdf. Table 1 provides the Project Benefit Summary Matrix summarizing the existing conditions, changes, impacts, affected populations, results, and location in the Excel Workbook.

1.1 Summary of Results

Table 2 provides a summary of the Benefit Analysis results. As shown, the project enhances the mobility and travel options within the US 29 corridor resulting in net benefits over the 21 year analysis period of $852.91 Million in undiscounted 2015$, and Net Present Value (NPV) of $269.42 Million when a 7% discount rate is applied to future costs and benefits, or $520.30 Million when a 3% discount rate is applied.

The $39.25 Million initial capital costs funded by the TIGER Grant increase to $111.61 Million in undiscounted 2015$ ($44.61 Million NPV at 7% discount and $63.45 Million NPV at a 3% discount rate) over the 21 year life of the project primarily due to the replacement of the different components at the end of their economic life (Vehicles at 12 years, TSP equipment at 10 years, Passenger information displays at 5 years, and other assets at 20 years). Note that the assets replaced at 20 years such as the concrete shoulder pads are in service for only 1 year, before the end of the analysis, All remaining value for these and other assets that have not reached the end of their economic value is subtracted in the Residual Capital Recovery calculations.

Table 1 Project Benefit Summary Matrix

Change to Baseline/Alternative	Type of Impact	Population Affected By Impacts	Economic Benefit	Summary of Results (7% Discount, 20 years)	Page Reference in BCA (Spreadsheet)
* US 29 BRT service from Burtonsville to Silver Spring * 13.5 miles with 11 stations * Bus on Shoulder, and mixed flow ROW * Frequent (7.5 min. peak, 10 min. offpeak headways along the trunk) * All Day service in both directions * Related bicycle and pedestrian improvements such as Bikeshare stations where feasible * Improved station amenities (canopies, seating, passenger information, bike parking, etc.) * Branding and Marketing * Transit Signal Priority * Specialty BRT Vehicles * Service revisions to the WMATA Express Lines that run dupliate service. * Implementation of feeder and circulator service to BRT stations.	Change in system use (transit riders, road volumes, etc.)	Nobuild Transit Users that change route Nobuild Auto Users that change mode	Input into other impacts (below)	Travellers changing to transit from autos increases from 3,950 in 2020 to 5,700 in 2040 (62%). US 29 BRT Dailiy Boardings increase from 13,300 to 20,000 in 2040. Savings in Regional VMT is 26,400 in 2020 and 34,600 in 2040.	Demand Analysis & Travel time NVP
	Travel Time Savings	Existing transit users will divert to the new US 29 BRT service New transit users will divert to the US 29 BRT service	Monetized value of travel time savings	$218,163,568	Travel Time NVP
	User Cost Savings	New transit riders that divert from using autos	Monetized value of User Cost Savings	$41,157,061	User Cost NPV
	Air Quality reduction in emissions	New transit riders that divert from using autos All auto users	Monetized value of emission reductions	$670,864	Air Quality NPV
	Reduced accidents on roadways due to lower VMT	Auto users on roadway after US 29 BRT implementation	Monetized value of accident costs	$141,231,927	Safety NPV
	Good Repair savings	Reduction in parallel service provided by WMATA Metrobus Z Express Lines, and Ride On Service to White Oak	Savings in Ride On Operations and Maintenance Costs	Qualitative at this time	In main narrative
	Quality of Life due to lower congestion, increased bike use, healthier users	US 29 BRT Riders, and all residents, workers within corridor.		Qualitative at this time	In main narrative

Table 2 Benefit-Cost Analysis Summary (2015$)

		Discount Rate		
		No Discount	7%	3%
Benefits				
Good Repair	**Qualitative at this time**			
Economic Competitveness	**User Time Savings**	$605,396,242	$218,163,568	$379,785,330
	User Cost Savings	$111,141,990	$41,157,061	$70,565,878
Quality of Life	**Qualitative at this time**			
Sustainability	**Greenhouse Gas & Emissions Cost Reductions**	$1,642,439	$670,864	$1,089,589
Safety	**Accident Reduction**	$368,635,273	$141,231,927	$237,808,961
	Total Benefits	$ 1,086,815,944	$ 401,223,419	$ 689,249,758
Costs				
	Capital Costs	$111,609,505	$44,607,834	$63,454,217
	O&M Costs	$122,293,395	$87,193,500	$105,491,357
	Total Costs	$233,902,900	$131,801,335	$168,945,574
Benefits - Costs		$852,913,043	$269,422,085	$520,304,184

The operation and maintenance (O&M) costs of $122.29 Million in undiscounted 2015$ ($87.19 Million NPV at 7% discount and $105.49 Million NPV at a 3% discount rate) is significant and driven by the additional $5.1 million annual cost to operate the US 29 BRT service. Other significant annual expenses include the maintenance of way at $546.69 Thousand per year, fare equipment at $127.8 and TSP systems (vehicles, roadside and central) at $23 Thousand per year. The additional costs for the service operations are likely to be higher than they actually would be, since the concomitant savings from the service reductions of parallel service on the Express Z line routes in the corridor were not included (they are operated by the Washington Area Metropolitan Transit Authority and could not be used to offset Montgomery County costs). While the specific reduction in parallel service has not been calculated at this time, benefits can be realized by assuming reductions in parallel route service of up to 10% per route since the ridership estimation and forecasts predicted a noticeable shift in existing riders to the new US 29 service.

After the remaining life at the end of the 21 year analysis period of all capital cost items is valued and subtracted this results in a total cost over the 21 years of $233.91 Million in undiscounted 2015$ ($121.80 Million NPV at 7% discount and $168.94 Million NPV at a 3% discount rate).

The benefits that were quantified and valued for the cost-benefit analysis include those for Economic Competiveness (travel time savings and user cost savings), Sustainability (reduction in emissions), and Safety (reduction in accidents). The benefits are the result of the improved transit travel times along the corridor, the institution of service in both directions throughout the day, and a reduction in wait times due to the more frequent service. On an average weekday, these led to 3,950 new riders shifting from autos in 2020 and approximately 13,000 boardings (the difference is due to existing riders changing to the new service throughout the day), In 2040 this grows to 5,700 new riders and 20,000 boardings.

Consequently, the most significant benefits are shown to be from user travel time savings of of $605.40 Million in undiscounted 2015$ ($218.16 Million NPV at 7% and $379.85 Million NPV at 3%). These benefits are conservative based upon the average time on the US 29 service and actual travel times. They would be higher if the travel forecast door to door times accounting for the full trip, or the perceived times accounting for the additional inconvenience that travelers attribute to waiting or transferring were used.

Travelers that switch from automobile to transit also can receive benefits due to reduced out of pocket costs of driving a car and parking versus the transit fare that they pay for their new transit trip. These changes in user costs result in $111.14 Million in undiscounted 2015$ ($41.16 Million NPV at 7% and $70.56 Million NPV at 3%).

The air quality and safety benefits from reduced auto travel on the roads within the region and primarily along the corridor are also quantified for the cost-benefit analysis. The value of the air quality savings is $1,642 Thousand in undiscounted 2015$ ($670 Thousand NPV at 7% and $1,089 Thousand at 3%). This will be higher increase due to service reductions in the parallel Z line service. Last are the safety benefits due to the reduction in auto travel. These are mostly due to injury only accidents and sum to $368.63 Thousand in undiscounted 2015$ ($141.23 Thousand NPV at 7% and $237.81 Thousand at 3%).

Overall this results in a positive net benefit – costs over the 21 year life of the project: $852.91 Million in undiscounted 2015$ ($269.42 Million NPV at 7% and $520.30 Million NPV at 3%).

2 Methodologies and Assumptions

This section describes the basic methodologies and assumptions that were used to develop the inputs and carry out Benefit-Cost Analysis. Throughout, general best practices in conducting economic assessments were used (see, 1, 13, 16, 17) and will not be discussed here.

2.1 Travel Demand Analysis Model

This section summarizes the methods used to forecast the change is system usage due to the US 29 BRT Build alternative (transit ridership, transit boardings, auto vehicles miles traveled, etc. between the Nobuild and the Build US 29 BRT Alternative, and how these change over time). The travel demand analysis model that was developed and calibrated for the Montgomery County US 29 BRT Corridor System Planning Study (see reference 6 for a full description) was chosen as a base model for the TIGER Grant analysis. It was based on the adopted regional travel forecasting model, MWCOG V 2.3.57 Regional Travel Demand Model with the 2014 CLRP networks and Round 8.3 Cooperative Land Use Forecasts (8, 10, 12). The regional model was last updated and adopted with the constrained long ranged plan networks and demographics in October 2014. It is a traditional A trip-based, "four-step" travel model utilizing 4 feedback iterations with additional features including estimation of motorized and non-motorized trips, time-of-day modeling, and incorporation of detailed transit schedules from General Transit Feed Specification (GTFS) data. It was calibrated to the most recent transit ridership and other data in 2012 (9), and validated to the 2010 U.S. Census data in 2013 (11). (see http://www.mwcog.org/transportation/activities/models/current.asp for more). For the US 29 BRT Corridor System Planning Study (ongoing) carried out in coordination with Montgomery County, and the Maryland State Highway and Maryland Transit Administrations, additional Land Use reflecting the recently adopted White Oak Science Gateway Master Plan was incorporated in the land use forecasts along with additional network detail. This model was validated to 2014/2015 conditions and a Nobuild 2040 land use and travel forecast scenario developed.

The US 29 BRT Corridor, study area, and Traffic Analysis Zones (TAZs) used is shown in Figure 1 (6). The 2014/2015 to 2040 Household and Employment Growth input into the models is shown in Figure 2 and Figure 3 (6).

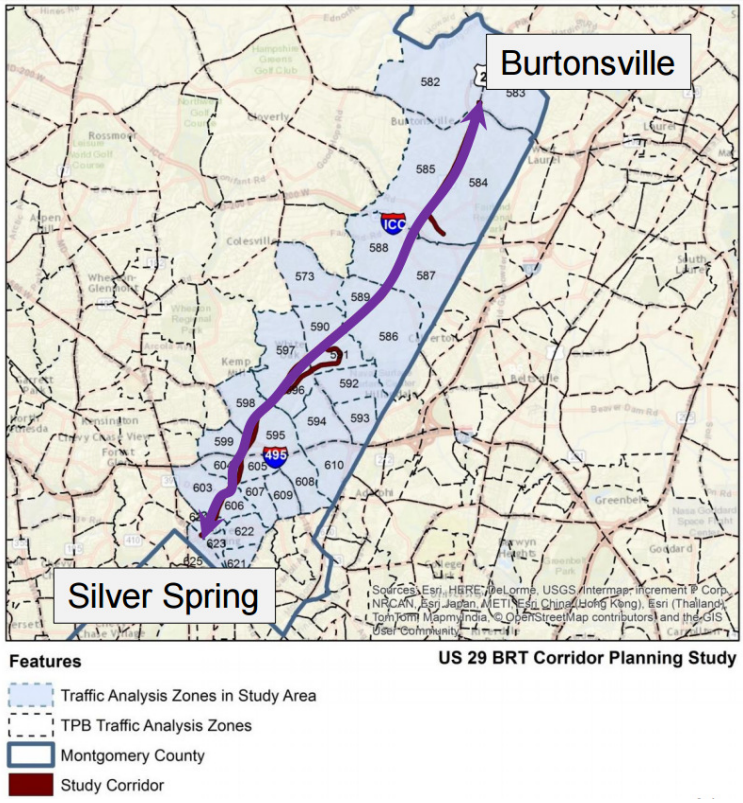

Figure 1 US 29 BRT Corridor and Traffic Analysis Zones (TAZs)

Household Growth 2014/2015 to 2040

- 52,100 Households in 2014
- 61,000 Households in 2040
  (17% increase)

Where do these numbers come from?

MWCOG Round 8.3, with update from Montgomery County, which provides the future forecasts of both households and employment through the Parks & Planning office.
(http://www.montgomeryplanning.org/)

Source: Cambridge Systematics, based on MWCOG Round 8.3 and Montgomery County

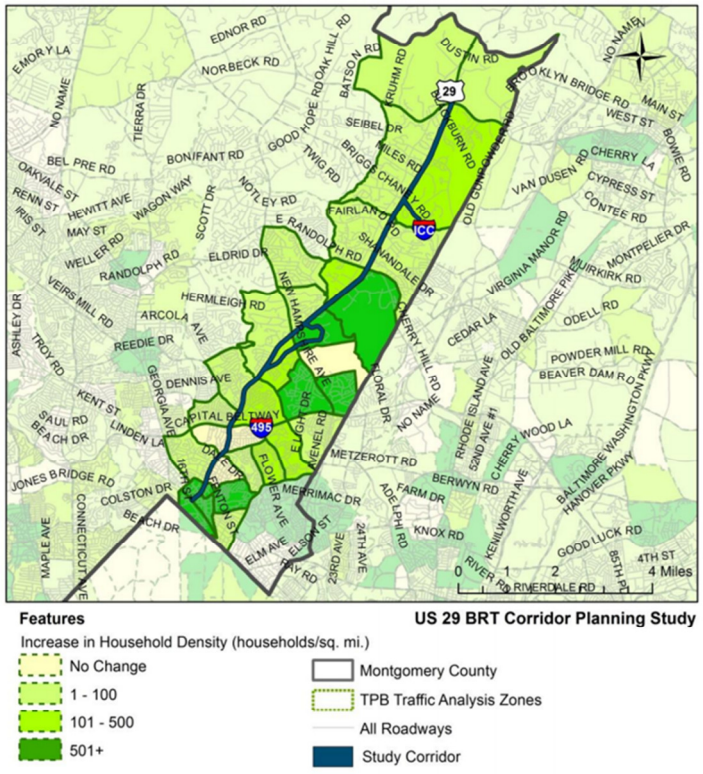

Figure 2 Household Growth 2014/2015 to 2040

Employment Growth 2014/2015 to 2040

- 2014 Employment 67,400
- 2040 Employment 120,000
  (78% increase)

Where do these numbers come from?

MWCOG Round 8.3, with update from Montgomery County, which provides the future forecasts of both households and employment through the Parks & Planning office.
(http://www.montgomeryplanning.org/)

Source: Cambridge Systematics, based on MWCOG Round 8.3 and Montgomery County

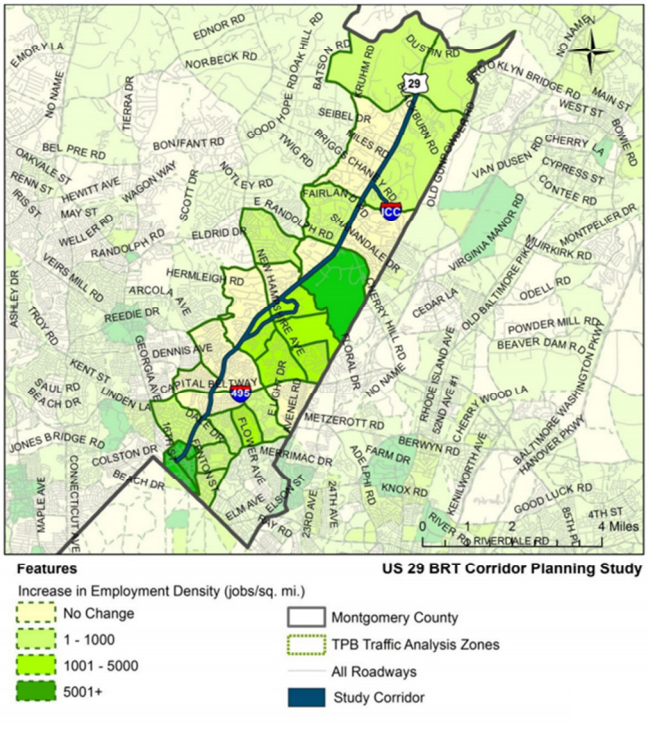

Figure 3 2014/2015 Employment Growth

For this analysis a pivot point approach was chosen for carrying out the forecasts. In this approach, the trip generation and trip distribution (person trips) from the baseline regional model runs remain fixed and the last iteration skims (highway and transit), mode choice, and assignments (highway and transit) are rerun with the new transit inputs. This approach was warranted because it is unlikely that a single new transit line should impact regional trip productions and overall travel patterns, and using the person trip distribution from a Nobuild alternative is recommended by the FTA for transit alternative analyses. The results of the travel demand analysis are shown in Table 3 (see the Travel Demand" tab in the accompanying pdf file). The change was distributed by year from 2015 to 2040 using a straight line allocation (see the Travel NVP TAB rows 56-83)

Table 3 Summary of Travel Demand Results

			Regional Linked Transit Trips	US 29 BRT Boardings	Veh Trips	VMT	VMT/Trip	Ave Spd	Auto		
	Year								VHT	Occ	APHT
Model	2015	No Build	1159626		16681291	165465035	9.92	32.28	5126358	1.41	7228165
		US 29	1163147	11612	16,678,451	165440731	9.92	32.28	5124491	1.41	7225532
		Change	3521		-2840	-24304			-1867		-2632
Model	2040	No Build	1583928		20452069	207777313	10.16	27.59	7531933	1.43	10770664
		US 29	1589604	19942	20447914	207742726	10.16	27.59	7528724	1.43	10766075
		Change	5676		-4155	-34587			-3209		-4589
% change	2015-2040	Nobuild	36.59%		22.60%	25.57%	0.02	-0.15	0.47		0.49
% change	2015-2040	BRT	36.66%	71.74%	22.60%	25.57%	0.02	-0.15	0.47		0.49

Source: US 29 BRT Study Model (MWCOG V 2.3.57 Regional Travel Demand Model 2014 CLRP and Round 8.3 Cooperative Forecasts with White Oak Science Gateway Land Use) pivot analyses.
Trip Generation and Trip Distribution Fixed
Final iteration

2.2 Alternatives (Nobuild and US 29 BRT)

Key to any economic analysis is the careful definition of the Nobuild and US 29 BRT Build service to capture all of the potential impacts and costs that may be caused by a project's implementation. If too narrow a corridor or system is defined then impacts or costs may be overlooked. Consequently, the following was assumed for the NoBuild and Build (US 29 BRT) service:

- Nobuild Alternatives (2014/2015 and 2040):
  - MWCOG 2014 CLRP system plus US 29 BRT Corridor current and 2040 Nobuild network changes
  - Regional Round 8.3 cooperative land use forecasts with White Oak Science Gateway Master Plan growth in the White Oak Area.
  - Current transit service for 2014/2015 and 2040. All inputs and outputs prorated for the analysis of the years of operation (2020-2040).
  - Current Transit Service schedule run times (degraded in model for future years by forecast congestion factor) (10).
- Build US 29 BRT Alternative.
  - The 2014/2015 and 2040 Nobuild transit service as background service with the following changes (see reference 1 for service configuration details).
  - 7.5 minute peak and 10 minute off peak headways on the trunk portions of the ROW
  - Station Dwell at BRT Stops of 30 seconds (reflects off board fare payment, multi-door boarding, etc.)
  - Transit Signal Priority on all Vehicles with TSP at 15 signals along corridor. Travel time savings due to TSP in the peak are assumed to be 7.5% and for the off peak 5 seconds per intersection) (5).

- The following US 29 BRT Stations/Stops as shown in Figure 4:

Pattern 1	Pattern 2
Burtonsville PNR	--
--	Castle Terrace
--	Castle Ridge
--	Briggs Chaney PNR
Tech Rd	Tech Rd
Stewart Lane	--
White Oak TC	--
OakLeaf Dr.	--
Burnt Mills Ave	Burnt Mills Ave
University Blvd	University Blvd
Fenton St	Fenton St
Silver Spring TC	Silver Spring TC

- Modifications to current service as follows:
  - Remove WMATA Z11 and Z13 Express service to Briggs Chaney Park and Ride
  - Remove WMATA Z9/29 Express service to Burtonsville Park and Ride
  - Extend WMATA Z8 local service to cover area previously served by the Z11
  - Extend the WMATA Z6 local peak service to cover area previously served by the Z9/Z229
  - Create new feeder service from South Laurel to Burtonsville (previously Z9/Z29)
  - Extend the WMATA Express Service from FDA to the White Oak Transit Center
  - Add a White Oak Science Center circulator/Shuttle to and from the Tech Road BRT Station.
- Reflect recommended priority treatments shown in Figure 5 US 29 BRT ROW Treatments:
  - Bus on Shoulder = 20 mph above parallel Roadway. In 2015 ~ 45 mph
  - Mixed Use = Congested speeds. In 2015 varies from 15 to 25 mph
  - Reverse direction in mixed use

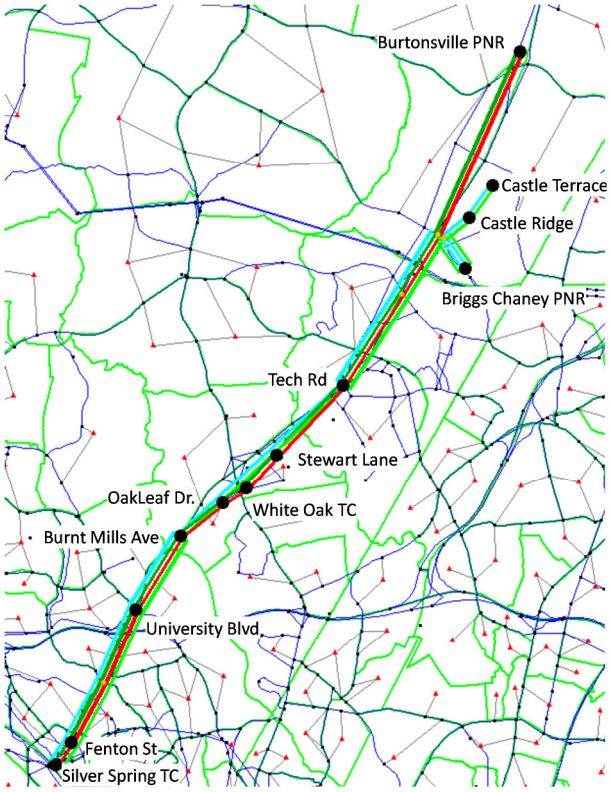

Figure 4 US 29 BRT Build Coded Routes

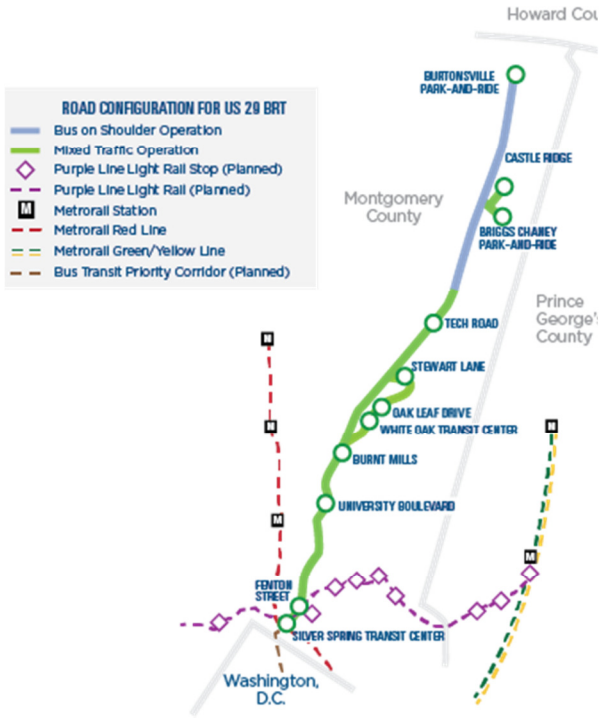

Figure 5 US 29 BRT ROW Treatments

2.3 General Assumptions

The general assumptions used throughout the Benefit-Cost Analysis are as follows:

- All input dollar values are expressed in 2015$ constant dollars

- The analysis period begins in 2017 with a 3 year start up (2017, 2018, 2019), and 21 years of operation (2020 – 2040).
- No construction or start up costs or significant user impacts are anticipated
- A constant 7 percent real discount rate is used throughout the analysis. Sensitivity analyses are also provided for both 3 and 0 percent real discount rates
- Standard formulas for discounting and converting life cycles of costs and benefits to Net Present Value are used throughout (17, 13)
  - Average Weekday Annualization factor of 290. This is in between the current ratio of average weekday to annual boardings for Montgomery Count Ride On of 302, and a focused peak period service provided only on weekdays (~290). New Starts Projects for the FTA often use values ranging from 280 to 300, with special justification requested for values approaching 300.

3 Benefits (Impacts)

The analyses and their major assumptions that were used to estimate the quantifiable benefits(impacts) from the US 29 BRT Service are described in this section. This includes User Time Savings, User Cost Savings, Greenhouse Gas and Emissions Cost Reductions, and Accident Cost Savings. All are documented in the accompanying Excel Workbook.

3.1 User Time Savings

The User Time Savings benefits are due to the improved transit travel times along the corridor (from mixed flow service along US 29 to a mixture of Bus on Shoulder at 20 mph above the parallel general traffic lanes, and segments of mixed flow), institution of 2 way service throughout the day, and a reduction in wait times caused by BRT headways of 7.5 minutes in the peak and 15 minutes in the offpeak periods initially improving to 6 minutes in the peak and 10 minutes in the off peak in 2040. On an average weekday, these lead to 3,950 new riders shifting from autos in 2020 and approximately 13,000 boardings (the difference is due to existing riders changing to the new service throughout the day), In 2040 this grows to 5,700 new riders and 20,000 boardings.

Time savings are calculated first by estimating difference in Auto Passenger Hours Traveled from the Vehicle Hours Traveled from the highway assignments between the Nobuild and US 29 BRT Build alternatives. Second, hours saved by those using the US 29 BRT Service are estimated from the change in wait time plus the time saved due to the faster speeds for those boarding the system (see the Demand Analysis and Travel Time NVP Tabs). These time savings are then multiplied by the average $13.45 /hour value of time in 2015 grown by 1.2 % a year for urban areas as recommended in the 2016 TIGER CBA Resource Guide (17).

The User Time Saving Calculations are calculated in the Travel Time NVP tab and shown in Table 4. The Net Present Value (NPV) of the savings across the 21 year analysis period is of $605.40 Million in undiscounted 2015$ ($218.16 Million NPV at 7% and $379.85 Million NPV at 3%). These benefits are conservative based upon the average time on the US 29 service and actual travel times. They would be higher if the travel forecast door to door times accounting for the full trip, or the perceived times accounting for the additional inconvenience that travelers attribute to waiting or transferring were used. The time savings from these alternative methods are also sown in the Travel Time NVP tab.

Table 4 User Value of Time NPV

	Year	Transit Time Savings (Hours)	Auto Time Savings (Hours)	Ave. Wk. day Time Savings (Hrs)	Annualization Factor	Annual Time Savings (Hrs)	VOT (All Trips) (2015$)/hr	Total 2015 $	NPV 7%	NPV 3%
	2015						$13.45			
	2016						$13.61			
Startup	**2017**						$13.77			
	2018						$13.94			
	2019						$14.11			
1	**2020**	1615	3024	4639	290	1345316	$14.28	$ 19,206,545	$ 13,694,001	$ 16,567,735
2	**2021**	1683	3102	4785	290	1387688	$14.45	$ 20,049,211	$ 13,359,636	$ 16,790,899
3	**2022**	1751	3180	4931	290	1430060	$14.62	$ 20,909,335	$ 13,021,283	$ 17,001,203
4	**2023**	1819	3259	5077	290	1472432	$14.80	$ 21,787,216	$ 12,680,358	$ 17,199,029
5	**2024**	1887	3337	5223	290	1514804	$14.97	$ 22,683,154	$ 12,338,133	$ 17,384,749
6	**2025**	1955	3415	5370	290	1557176	$15.15	$ 23,597,457	$ 11,995,751	$ 17,558,724
7	**2026**	2022	3493	5516	290	1599548	$15.34	$ 24,530,437	$ 11,654,234	$ 17,721,310
8	**2027**	2090	3572	5662	290	1641920	$15.52	$ 25,482,411	$ 11,314,495	$ 17,872,851
9	**2028**	2158	3650	5808	290	1684292	$15.71	$ 26,453,700	$ 10,977,345	$ 18,013,682
10	**2029**	2226	3728	5954	290	1726664	$15.89	$ 27,444,630	$ 10,643,501	$ 18,144,134
11	**2030**	2294	3806	6100	290	1769036	$16.09	$ 28,455,533	$ 10,313,595	$ 18,264,524
12	**2031**	2362	3885	6246	290	1811408	$16.28	$ 29,486,746	$ 9,988,181	$ 18,375,165
13	**2032**	2430	3963	6392	290	1853780	$16.47	$ 30,538,611	$ 9,667,742	$ 18,476,362
14	**2033**	2497	4041	6538	290	1896152	$16.67	$ 31,611,474	$ 9,352,694	$ 18,568,409
15	**2034**	2565	4119	6685	290	1938524	$16.87	$ 32,705,688	$ 9,043,395	$ 18,651,597
16	**2035**	2633	4198	6831	290	1980896	$17.07	$ 33,821,611	$ 8,740,147	$ 18,726,206
17	**2036**	2701	4276	6977	290	2023268	$17.28	$ 34,959,607	$ 8,443,203	$ 18,792,511
18	**2037**	2769	4354	7123	290	2065640	$17.49	$ 36,120,044	$ 8,152,770	$ 18,850,780
19	**2038**	2837	4432	7269	290	2108012	$17.70	$ 37,303,298	$ 7,869,014	$ 18,901,273
20	**2039**	2905	4511	7415	290	2150384	$17.91	$ 38,509,749	$ 7,592,067	$ 18,944,245
21	**2040**	2972	4589	7561	290	2192756	$18.12	$ 39,739,782	$ 7,322,022	$ 18,979,941
							Total	$ 605,396,242	$218,163,568	$ 379,785,330

3.2 User Cost Savings

Travelers that switch from automobile to transit also can receive benefits due to reduced out of pocket costs of driving a car and parking versus the transit fare that they pay for their new transit trip. These benefits are estimated from the new transit trips that use the US 29 BRT Service. This is provided from the change in Vehicle Miles Travelled from the travel demand model. The change in VMT is multiplied by the 2015 total cost of driving a car of $0.54 provided by the Internal Revenue Service (14). The potential cost of parking is also added assuming an average $5.00 in 2015$ and 25% pay for parking currently and 50% pay for parking in 2040. The increased percentage is due to the additional development and densification in the activity centers along the corridor (Silver Spring, White Oak) and the implementation of travel demand management strategies to meet reduction in drive alone vehicle trips. An average US 29 BRT fare is also incorporated.

The User Cost Savings are calculated in the User Cost NPV tab and also shown in Table 5. These changes in user costs result in $111.14 Million in undiscounted 2015$ ($41.16 Million NPV at 7% and $70.56 Million NPV at 3%).

Table 5 User Cost Savings NPV

	Year	Change in Transit Person Trips	Avg weekday change in Auto VMT	Avg weekday change in mile costs	Avg Weekday change in Parking Costs	Avg Weekday Fares Paid ($1.75/Trip)	Avg Weekday Cost Savings	Annual Auto Cost Savings	Total 2015 $	NPV 7%	NPV 3%
	2015										
	2016										
Startup	**2017**										
	2018										
	2019										
1	**2020**	3952	26361	$14,235	$6,359	$6,916	$13,678	$3,966,540	$ 3,966,540	$ 2,828,088	$ 3,421,572
2	**2021**	4038	26772	$14,457	$6,751	$7,067	$14,141	$4,100,756	$ 4,100,756	$ 2,732,507	$ 3,434,318
3	**2022**	4124	27183	$14,679	$7,142	$7,218	$14,603	$4,234,971	$ 4,234,971	$ 2,637,327	$ 3,443,419
4	**2023**	4211	27595	$14,901	$7,534	$7,369	$15,066	$4,369,187	$ 4,369,187	$ 2,542,907	$ 3,449,077
5	**2024**	4297	28006	$15,123	$7,925	$7,519	$15,529	$4,503,403	$ 4,503,403	$ 2,449,553	$ 3,451,483
6	**2025**	4383	28417	$15,345	$8,317	$7,670	$15,992	$4,637,619	$ 4,637,619	$ 2,357,530	$ 3,450,824
7	**2026**	4469	28829	$15,567	$8,708	$7,821	$16,455	$4,771,834	$ 4,771,834	$ 2,267,064	$ 3,447,275
8	**2027**	4555	29240	$15,790	$9,100	$7,972	$16,917	$4,906,050	$ 4,906,050	$ 2,178,345	$ 3,441,005
9	**2028**	4642	29651	$16,012	$9,491	$8,123	$17,380	$5,040,266	$ 5,040,266	$ 2,091,531	$ 3,432,176
10	**2029**	4728	30062	$16,234	$9,883	$8,274	$17,843	$5,174,481	$ 5,174,481	$ 2,006,753	$ 3,420,942
11	**2030**	4814	30474	$16,456	$10,275	$8,424	$18,306	$5,308,697	$ 5,308,697	$ 1,924,116	$ 3,407,451
12	**2031**	4900	30885	$16,678	$10,666	$8,575	$18,769	$5,442,913	$ 5,442,913	$ 1,843,703	$ 3,391,843
13	**2032**	4986	31296	$16,900	$11,058	$8,726	$19,231	$5,577,129	$ 5,577,129	$ 1,765,576	$ 3,374,254
14	**2033**	5073	31708	$17,122	$11,449	$8,877	$19,694	$5,711,344	$ 5,711,344	$ 1,689,781	$ 3,354,813
15	**2034**	5159	32119	$17,344	$11,841	$9,028	$20,157	$5,845,560	$ 5,845,560	$ 1,616,346	$ 3,333,641
16	**2035**	5245	32530	$17,566	$12,232	$9,179	$20,620	$5,979,776	$ 5,979,776	$ 1,545,288	$ 3,310,857
17	**2036**	5331	32942	$17,789	$12,624	$9,330	$21,083	$6,113,991	$ 6,113,991	$ 1,476,609	$ 3,286,572
18	**2037**	5417	33353	$18,011	$13,015	$9,480	$21,546	$6,248,207	$ 6,248,207	$ 1,410,303	$ 3,260,892
19	**2038**	5504	33764	$18,233	$13,407	$9,631	$22,008	$6,382,423	$ 6,382,423	$ 1,346,352	$ 3,233,921
20	**2039**	5590	34176	$18,455	$13,798	$9,782	$22,471	$6,516,638	$ 6,516,638	$ 1,284,733	$ 3,205,754
21	**2040**	5676	34587	$18,677	$13,015	$9,933	$21,759	$6,310,206	$ 6,310,206	$ 1,162,650	$ 3,013,789
				Total Auto Cost Per mile =		$0.540		**Total**	$ 111,141,990	$ 41,157,061	$ 70,565,878
				Annualization Factor =		290					
					Avg Fare =	$1.75					

3.3 Greenhouse Gas & Emissions Cost Reductions

The Greenhouse Gas & Emissions Cost Reductions are estimated from the change in auto vehicle miles traveled from the Nobuild and US 29 BRT Build alternative highway assignments, multiplied by the emissions rates recommended by the Federal Transit Administration for New Starts Analyses (3) and the valuation of emissions savings from the 2016 TIGER CBA Resource Guide (17).

The Greenhouse Gas & Emissions Cost Reductions are calculated in the Air Quality NPV tab and also shown in Table 6 Air Quality NPV. The value of the air quality savings is $1,642 Thousand in undiscounted 2015$ ($670 Thousand NPV at 7% and $1,089 Thousand at 3%).

Table 6 Air Quality NPV

	Year	Avg Weekday Savings in Auto VMT	Annual Savings in Auto VMT	Change in CO (Metric Tons)	Change in Nox (Metric Tons)	Change in VOC (Metric Tons)	Change in PM2.5 (Metric Tons)	Value of CO 2015$	Value of Nox 2015$	Value of VOC 2015$	Value of PM2.5 2015$	Total Value Emissions (2015$)	Total 2015 $	NPV 7%	NPV 3%
	2015														
	2016														
Startup	**2017**														
	2018														
	2019														
1	**2020**	26361	7644574	118.24627	5.87103	3.99047	0.07645	$ 5,439	$ 47,027	8108.63022	$ 28,011	$ 88,586	$ 88,586	$ 63,160	$ 76,415
2	**2021**	26772	7763857	118.06963	5.74215	3.93162	0.07764	$ 5,549	$ 45,995	7989.04591	$ 28,448	$ 87,981	$ 87,981	$ 58,625	$ 73,683
3	**2022**	27183	7883140	117.83086	5.60649	3.86904	0.07883	$ 5,538	$ 44,908	7861.89927	$ 28,885	$ 87,193	$ 87,193	$ 54,299	$ 70,896
4	**2023**	27595	8002422	117.52998	5.46405	3.80275	0.08002	$ 5,641	$ 43,767	7727.19028	$ 29,322	$ 86,458	$ 86,458	$ 50,319	$ 68,251
5	**2024**	28006	8121705	117.16697	5.31484	3.73274	0.08122	$ 5,858	$ 42,572	7584.91896	$ 29,759	$ 85,774	$ 85,774	$ 46,656	$ 65,739
6	**2025**	28417	8240988	116.74184	5.15886	3.65900	0.08241	$ 5,954	$ 41,322	7435.08530	$ 30,196	$ 84,908	$ 84,908	$ 43,163	$ 63,179
7	**2026**	28829	8360271	116.25458	4.99610	3.58154	0.08360	$ 6,045	$ 40,019	7277.68930	$ 30,633	$ 83,975	$ 83,975	$ 39,896	$ 60,665
8	**2027**	29240	8479554	115.70520	4.82656	3.50036	0.08480	$ 6,132	$ 38,661	7112.73096	$ 31,070	$ 82,976	$ 82,976	$ 36,842	$ 58,198
9	**2028**	29651	8598836	115.09371	4.65025	3.41546	0.08599	$ 6,215	$ 37,249	6940.21029	$ 31,507	$ 81,911	$ 81,911	$ 33,990	$ 55,778
10	**2029**	30062	8718119	114.42008	4.46716	3.32683	0.08718	$ 6,293	$ 35,782	6760.12727	$ 31,944	$ 80,780	$ 80,780	$ 31,328	$ 53,405
11	**2030**	30474	8837402	113.68434	4.27730	3.23449	0.08837	$ 6,253	$ 34,261	6572.48192	$ 32,381	$ 79,468	$ 79,468	$ 28,803	$ 51,007
12	**2031**	30885	8956685	112.88647	4.08067	3.13842	0.08957	$ 6,322	$ 32,686	6377.27422	$ 32,819	$ 78,204	$ 78,204	$ 26,490	$ 48,734
13	**2032**	31296	9075968	112.02648	3.87725	3.03863	0.09076	$ 6,498	$ 31,057	6174.50419	$ 33,256	$ 76,985	$ 76,985	$ 24,371	$ 46,577
14	**2033**	31708	9195250	111.10437	3.66707	2.93512	0.09195	$ 6,555	$ 29,373	5964.17182	$ 33,693	$ 75,585	$ 75,585	$ 22,363	$ 44,398
15	**2034**	32119	9314533	110.12014	3.45010	2.82789	0.09315	$ 6,607	$ 27,635	5746.27711	$ 34,130	$ 74,119	$ 74,119	$ 20,494	$ 42,269
16	**2035**	32530	9433816	109.07378	3.22637	2.71694	0.09434	$ 6,654	$ 25,843	5520.82006	$ 34,567	$ 72,584	$ 72,584	$ 18,757	$ 40,188
17	**2036**	32942	9553099	107.96530	2.99585	2.60226	0.09553	$ 6,694	$ 23,997	5287.80068	$ 35,004	$ 70,982	$ 70,982	$ 17,143	$ 38,157
18	**2037**	33353	9672382	106.79470	2.75856	2.48387	0.09672	$ 6,728	$ 22,096	5047.21895	$ 35,441	$ 69,312	$ 69,312	$ 15,645	$ 36,174
19	**2038**	33764	9791664	105.56198	2.51450	2.36175	0.09792	$ 6,756	$ 20,141	4799.07489	$ 35,878	$ 67,574	$ 67,574	$ 14,255	$ 34,239
20	**2039**	34176	9910947	104.26713	2.26366	2.23591	0.09911	$ 6,777	$ 18,132	4543.36849	$ 36,315	$ 65,768	$ 65,768	$ 12,966	$ 32,353
21	**2040**	33353	9672382	99.23864	1.93448	2.03120	0.09672	$ 6,252	$ 15,495	4127.39868	$ 35,441	$ 61,316	$ 61,316	$ 11,297	$ 29,285
												Total	$ 1,642,439	$ 670,864	$ 1,089,589

Note, that the air quality benefits assume that the US29 BRT service will use Clean Diesel or CNG vehicles with a zero net impact in emissions when the current service that is being reduced is taken into account.

3.4 Accident Reductions

The savings due to accident reductions are estimated based on the savings in auto vehicle mile traveled from Nobuild and US 29 BRT Build alternative highway assignments multiplied by the Montgomery County accident rates obtained from the Maryland State Highway Administration (**Error! Reference source not found.**). These produce estimated changes in Property Damage Only (PDO), Injury, and Fatal crashes which are then multiplied by the recommended values described in the 2016 TIGER BCA Resource Guide (17).

The Accident Reduction cost savings are calculated in the Safety NPV tab and shown in Table 7. These are mostly due to injury only accidents and sum to $368.63 Thousand in undiscounted 2015$ ($141.23 Thousand NPV at 7% and $237.81 Thousand at 3%).

Table 7 Accident Reduction NPV

	Year	Avg Weekday Savings in VMT	Annual Savings in VMT	Annual Change PDO Crashes	Annual Change Inj Crashes	Annual Change Fatal Crashes	Value PDO Crashes (2015$)	Value Inj Crashes (2014$)	Value Fatal Crashes (2015$)	Total Value Crashes (2015$)	**Total 2015 $**	**NPV 7%**	**NPV 3%**
	2015												
	2016												
Startup	**2017**												
	2018												
	2019												
1	**2020**	26361	7644574	6.06252	3.55442	0.03061	$ 25,450	$ 14,865,364	$ 293,888	$ 15,184,702	$ 15,184,702	$ 10,826,483	$ 13,098,457
2	**2021**	26772	7763857	6.15712	3.60988	0.03109	$ 25,848	$ 15,097,317	$ 298,473	$ 15,421,638	$ 15,421,638	$ 10,276,088	$ 12,915,379
3	**2022**	27183	7883140	6.25172	3.66534	0.03157	$ 26,245	$ 15,329,270	$ 303,059	$ 15,658,574	$ 15,658,574	$ 9,751,373	$ 12,731,853
4	**2023**	27595	8002422	6.34631	3.72081	0.03205	$ 26,642	$ 15,561,223	$ 307,645	$ 15,895,510	$ 15,895,510	$ 9,251,331	$ 12,548,062
5	**2024**	28006	8121705	6.44091	3.77627	0.03252	$ 27,039	$ 15,793,176	$ 312,230	$ 16,132,445	$ 16,132,445	$ 8,774,981	$ 12,364,176
6	**2025**	28417	8240988	6.53551	3.83173	0.03300	$ 27,436	$ 16,025,129	$ 316,816	$ 16,369,381	$ 16,369,381	$ 8,321,363	$ 12,180,357
7	**2026**	28829	8360271	6.63011	3.88719	0.03348	$ 27,833	$ 16,257,082	$ 321,402	$ 16,606,317	$ 16,606,317	$ 7,889,542	$ 11,996,757
8	**2027**	29240	8479554	6.72470	3.94265	0.03396	$ 28,230	$ 16,489,035	$ 325,987	$ 16,843,253	$ 16,843,253	$ 7,478,606	$ 11,813,519
9	**2028**	29651	8598836	6.81930	3.99811	0.03443	$ 28,627	$ 16,720,988	$ 330,573	$ 17,080,189	$ 17,080,189	$ 7,087,671	$ 11,630,778
10	**2029**	30062	8718119	6.91390	4.05358	0.03491	$ 29,025	$ 16,952,941	$ 335,159	$ 17,317,125	$ 17,317,125	$ 6,715,880	$ 11,448,660
11	**2030**	30474	8837402	7.00849	4.10904	0.03539	$ 29,422	$ 17,184,894	$ 339,745	$ 17,554,061	$ 17,554,061	$ 6,362,399	$ 11,267,284
12	**2031**	30885	8956685	7.10309	4.16450	0.03587	$ 29,819	$ 17,416,848	$ 344,330	$ 17,790,996	$ 17,790,996	$ 6,026,426	$ 11,086,761
13	**2032**	31296	9075968	7.19769	4.21996	0.03635	$ 30,216	$ 17,648,801	$ 348,916	$ 18,027,932	$ 18,027,932	$ 5,707,182	$ 10,907,196
14	**2033**	31708	9195250	7.29229	4.27542	0.03682	$ 30,613	$ 17,880,754	$ 353,502	$ 18,264,868	$ 18,264,868	$ 5,403,915	$ 10,728,685
15	**2034**	32119	9314533	7.38688	4.33088	0.03730	$ 31,010	$ 18,112,707	$ 358,087	$ 18,501,804	$ 18,501,804	$ 5,115,903	$ 10,551,320
16	**2035**	32530	9433816	7.48148	4.38635	0.03778	$ 31,407	$ 18,344,660	$ 362,673	$ 18,738,740	$ 18,738,740	$ 4,842,446	$ 10,375,186
17	**2036**	32942	9553099	7.57608	4.44181	0.03826	$ 31,804	$ 18,576,613	$ 367,259	$ 18,975,676	$ 18,975,676	$ 4,582,874	$ 10,200,361
18	**2037**	33353	9672382	7.67067	4.49727	0.03873	$ 32,201	$ 18,808,566	$ 371,844	$ 19,212,612	$ 19,212,612	$ 4,336,539	$ 10,026,918
19	**2038**	33764	9791664	7.76527	4.55273	0.03921	$ 32,599	$ 19,040,519	$ 376,430	$ 19,449,548	$ 19,449,548	$ 4,102,821	$ 9,854,925
20	**2039**	34176	9910947	7.85987	4.60819	0.03969	$ 32,996	$ 19,272,472	$ 381,016	$ 19,686,483	$ 19,686,483	$ 3,881,124	$ 9,684,445
21	**2037**	34587	10030230	7.95447	4.66366	0.04017	$ 33,393	$ 19,504,425	$ 385,602	$ 19,923,419	$ 19,923,419	$ 4,496,978	$ 10,397,883
			Annualization Factor =		290					**Total**	$ 368,635,273	$ 141,231,927	$ 237,808,961

4 Costs

The cost items used for the Benefit-Cost Analysis are provided in the Cost Items tab and shown in Table 8. All items were provided based upon current experience by the Montgomery County Department of Transportation and Ride On. Note, that the costs assume that the US 29 BRT service will be implemented with reductions in the Z 29 express current transit service routes that provide parallel service and some Ride On service into White Oak. Since these services are provided by WMATA and it would be difficult to offset the savings to Montgomery County the savings were not included in the analysis. This leads to a conservative overall benefits-costs assessment.

The economic life of each capital asset is also an important input for carrying out full life cycle costing in a BCA. The values shown in Table 8 are those recommended by the Federal Transit Administration for transit assets (1) and for technology components from the USDOT ITS Cost database (4).

Table 8 Cost Items

Element	Starting Year	Economic Life [a]	Units	Unit Cost (2015$) Capital	Unit Cost (2015$) Annual O&M	Total Cost (2015$) Capital	Total Cost (2015$) Annual O&M
Planning/Design							
Planning, Engineering, Design	2017	-	1	$ 6,500,000		$ 6,500,000	
Vehicles							
Bus - BRT Articulated (including CAD/AVL and Fare Colle	2020	12	14	$ 1,000,000	See US29 BRT Service	$ 14,000,000	See US29 BRT Service
TSP OnBoard Purchase & Install (w Engineering)	2020	10	14	$ 20,000	$ 357	$ 280,000	$ 5,000
Stops/Stations							
Stations and amenities (10 + SSTC)	2020	25	10			$ 10,933,900	$ 546,695
RTPI Signs	2020	5	17	$ 21,300	$ 1,000	$ 362,100	$ 17,000
Off Board Fare Collection Equipment	2020	25	16	$ 106,500	$ 7,988	$ 1,704,000	$ 127,800
Bike and Pedestrian Improvements	2020	25	Throughout			$ 2,000,000	$ 7,000
Roadside/Right of Way							
TSP Field Hardware & Install (w Engineering)	2020	10	15	$ 43,000	$ 1,200	$ 645,000	$ 18,000
Signing and Marking of BAT and HOV Lanes (lane miles)	2020	20	0	$ 250,000	$ 12,500	$ -	$ -
Signal changes for BAT Lane	2020	20	0	$ 500,000	$ 250	$ -	$ -
Bus on Shoulder Burtonsville to Tech Road (lane miles)	2020	20	0	$ 2,000,000	$ 100,000	$ -	$ -
Central Facilities & Systems							
TSP Traffic System Software	2020	20	1	$ 75,000	$ 2,000	$ 75,000	$ 2,000
Grant Overhead and Administration (3% of Total)	2017 to 2020	-	1	$ 1,500,000	-	$ 1,500,000	
US 29 BRT Service							
Marketing & Startup	2019	-	1	$ 1,250,000	-	$ 1,250,000	
Operations	2020	-	1		$ 5,100,000	$ -	$ 5,100,000
Subtotal						$ 39,250,000	
Other							
Contingency							
Total						$ 39,250,000	

a Economic Life:
ITS from the ITS Joint Program Office Cost Database(5/12/2015): http://www.itscosts.its.dot.gov/its/benecost.nsf/AdjustedUnitCosts
Transit Structures, Sidewalks, vehicles, from FTA New Starts/Small Starts Evaluation of Alternatives (5/12/2015): http://www.fta.dot.gov/12304_9718.html

4.1 Capital Costs

The life cycle capital costs are shown in the Capital Cost NPV tab and also shown in

Table 9. As shown each asset is replaced at the end of its economic life. For those that extend beyond the 21 year analysis period a residual capital value is estimated for the remaining years of useful life. Note, that this leads to a higher overall life cycle cost than the initial $39.25 million. The life cycle capital costs increase to $111.61 Million in undiscounted 2015$ ($44.61 Million NPV at 7% discount and $63.45 Million NPV at a 3% discount rate) over the 21 year life of the project. This is primarily due to the replacement of the different components at the end of their economic life (Vehicles at 12 years, TSP equipment at 10 years, Passenger information displays at 5 years, and other assets at 20 years). Note that the assets replaced at 20 years such as concrete bus pads are in service for only 1 year, before the end of the analysis, All remaining value for these and other assets that have not reached the end of their economic value is subtracted in the Residual Capital Recovery calculations.

Table 9 Capital Cost NPV

	Vehicles			Stops/Stations				Roadside ROW	Central	US 29 BRT Service					
Plan, Eng, Design	Vehicles	TSP	Concreate Pad	Stations	RTPI Signs	Off Board Fare Equip.	Bike & Pedestrian	TSP Field Equip	TSP Software	Grant Admin	Marketing & Startup	US 29 BRT O&M		Current Year =	2015
--	12	10	20	25	5	25	25	10	20	-	-	-	Total 2015 $	NPV 7%	NPV 3%
													$ -	$ -	$ -
$ 2,166,667										$ 375,000			$ 375,000	$ 327,540	$ 353,473
$ 2,166,667										$ 375,000			$ 375,000	$ 306,112	$ 343,178
$ 2,166,667	$ 14,000,000	$ 280,000	$10,933,900	$ 10,933,900	$ 362,100	$ 1,704,000	$ 2,000,000	$ 645,000	$ 75,000	$ 375,000	$ 625,000		$ 41,933,900	$ 31,991,172	$ 37,257,727
										$ 375,000	$ 625,000		$ 1,000,000	$ 712,986	$ 862,609
													$ -	$ -	$ -
													$ -	$ -	$ -
													$ -	$ -	$ -
													$ -	$ -	$ -
					$ 362,100								$ 362,100	$ 184,073	$ 269,436
													$ -	$ -	$ -
													$ -	$ -	$ -
													$ -	$ -	$ -
													$ -	$ -	$ -
		$ 280,000			$ 362,100			$ 645,000					$ 1,287,100	$ 466,504	$ 826,141
													$ -	$ -	$ -
	$ 14,000,000												$ 14,000,000	$ 4,432,041	$ 8,470,230
													$ -	$ -	$ -
													$ -	$ -	$ -
					$ 362,100								$ 362,100	$ 93,574	$ 200,486
													$ -	$ -	$ -
		$ 280,000	$10,933,900		$ 362,100			$ 645,000	$ 75,000				$ 12,296,000	$ 2,265,528	$ 5,872,638
	$ 4,625,693	$ 259,734	$10,667,190	$ 3,178,029	$ 299,134	$ 495,282	$ 581,317	$ 598,317	$ 73,171				$ 20,777,866	$ 3,828,305	
	$ 3,978,355	$ 255,575	$10,526,987	$ 2,334,005	$ 293,897	$ 363,744	$ 426,930	$ 588,736	$ 72,209				$ 18,840,439		$ 8,998,299
												Total	$ 111,609,505	$ 44,607,834	$ 63,454,217

4.2 Operations and Maintenance Costs

The life cycle operations and maintenance costs are provided in the O&M NPV tab and also in Table 10. The operation and maintenance (O&M) costs of $122.29 Million in undiscounted 2015$ ($87.19 Million NPV at 7% discount and $105.49 Million NPV at a 3% discount rate) is significant and driven by the additional $5.1 million annual cost to operate the US 29 BRT service. Other significant annual expenses include the maintenance of way at $546.69 Thousand per year, fare equipment at $127.8 and TSP systems (vehicles, roadside and central) at $23 Thousand per year. The additional costs for the service operations are likely to be high since the concomitant savings from the service reductions of parallel service on the Express Z line routes in the corridor were not included (they are operated by the Washington Area Metropolitan Transit Authority and could not be used to offset Montgomery County costs). While the specific reduction in parallel service has not been calculated at this time, benefits can be realized by assuming reductions in parallel route service of up to 10% per route since the ridership estimation and forecasts predicted a noticeable shift in existing riders to the new US 29 service.

Table 10 O&M Cost NPV

		Vehicles		Stops/Stations				Roadside ROW	Central			Current Year =	2015
	Year	Vehicles[a]	TSP	Stations	RTPI Signs	Off Board Fare Equip	Station Amenities	TSP Field Equip	TSP Software	US 29 BRT O&M	Total 2015 $	NPV 7%	NPV 3%
	2015												
	2016												
Startup	2017												
	2018												
	2019												
1	2020		$ 5,000	$ 546,695	$ 17,000	$ 127,800	$ 7,000	$ 18,000	$ 2,000	$ 5,100,000	$ 5,823,495	$ 4,152,071	$ 5,023,398
2	2021		$ 5,000	$ 546,695	$ 17,000	$ 127,800	$ 7,000	$ 18,000	$ 2,000	$ 5,100,000	$ 5,823,495	$ 4,152,071	$ 5,023,398
3	2022		$ 5,000	$ 546,695	$ 17,000	$ 127,800	$ 7,000	$ 18,000	$ 2,000	$ 5,100,000	$ 5,823,495	$ 4,152,071	$ 5,023,398
4	2023		$ 5,000	$ 546,695	$ 17,000	$ 127,800	$ 7,000	$ 18,000	$ 2,000	$ 5,100,000	$ 5,823,495	$ 4,152,071	$ 5,023,398
5	2024		$ 5,000	$ 546,695	$ 17,000	$ 127,800	$ 7,000	$ 18,000	$ 2,000	$ 5,100,000	$ 5,823,495	$ 4,152,071	$ 5,023,398
6	2025		$ 5,000	$ 546,695	$ 17,000	$ 127,800	$ 7,000	$ 18,000	$ 2,000	$ 5,100,000	$ 5,823,495	$ 4,152,071	$ 5,023,398
7	2026		$ 5,000	$ 546,695	$ 17,000	$ 127,800	$ 7,000	$ 18,000	$ 2,000	$ 5,100,000	$ 5,823,495	$ 4,152,071	$ 5,023,398
8	2027		$ 5,000	$ 546,695	$ 17,000	$ 127,800	$ 7,000	$ 18,000	$ 2,000	$ 5,100,000	$ 5,823,495	$ 4,152,071	$ 5,023,398
9	2028		$ 5,000	$ 546,695	$ 17,000	$ 127,800	$ 7,000	$ 18,000	$ 2,000	$ 5,100,000	$ 5,823,495	$ 4,152,071	$ 5,023,398
10	2029		$ 5,000	$ 546,695	$ 17,000	$ 127,800	$ 7,000	$ 18,000	$ 2,000	$ 5,100,000	$ 5,823,495	$ 4,152,071	$ 5,023,398
11	2030		$ 5,000	$ 546,695	$ 17,000	$ 127,800	$ 7,000	$ 18,000	$ 2,000	$ 5,100,000	$ 5,823,495	$ 4,152,071	$ 5,023,398
12	2031		$ 5,000	$ 546,695	$ 17,000	$ 127,800	$ 7,000	$ 18,000	$ 2,000	$ 5,100,000	$ 5,823,495	$ 4,152,071	$ 5,023,398
13	2032		$ 5,000	$ 546,695	$ 17,000	$ 127,800	$ 7,000	$ 18,000	$ 2,000	$ 5,100,000	$ 5,823,495	$ 4,152,071	$ 5,023,398
14	2033		$ 5,000	$ 546,695	$ 17,000	$ 127,800	$ 7,000	$ 18,000	$ 2,000	$ 5,100,000	$ 5,823,495	$ 4,152,071	$ 5,023,398
15	2034		$ 5,000	$ 546,695	$ 17,000	$ 127,800	$ 7,000	$ 18,000	$ 2,000	$ 5,100,000	$ 5,823,495	$ 4,152,071	$ 5,023,398
16	2035		$ 5,000	$ 546,695	$ 17,000	$ 127,800	$ 7,000	$ 18,000	$ 2,000	$ 5,100,000	$ 5,823,495	$ 4,152,071	$ 5,023,398
17	2036		$ 5,000	$ 546,695	$ 17,000	$ 127,800	$ 7,000	$ 18,000	$ 2,000	$ 5,100,000	$ 5,823,495	$ 4,152,071	$ 5,023,398
18	2037		$ 5,000	$ 546,695	$ 17,000	$ 127,800	$ 7,000	$ 18,000	$ 2,000	$ 5,100,000	$ 5,823,495	$ 4,152,071	$ 5,023,398
19	2038		$ 5,000	$ 546,695	$ 17,000	$ 127,800	$ 7,000	$ 18,000	$ 2,000	$ 5,100,000	$ 5,823,495	$ 4,152,071	$ 5,023,398
20	2039		$ 5,000	$ 546,695	$ 17,000	$ 127,800	$ 7,000	$ 18,000	$ 2,000	$ 5,100,000	$ 5,823,495	$ 4,152,071	$ 5,023,398
21	2040		$ 5,000	$ 546,695	$ 17,000	$ 127,800	$ 7,000	$ 18,000	$ 2,000	$ 5,100,000	$ 5,823,495	$ 4,152,071	$ 5,023,398
		a Vehicle maintenance included in the US 29 BRT Service O&M								Total	$122,293,395	$ 87,193,500	$105,491,357

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