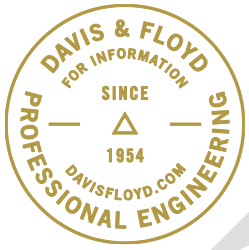
i-26ALT

I-26 Fixed Guideway Alternatives Analysis

CHAPTER VI: Screen Two – Project Justification Screening

Draft Report – February 2016



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1 Introduction

The Berkeley-Charleston-Dorchester Council of Governments (BCDCOG) initiated the I-26 Regional Fixed Guideway Transit Alternatives Analysis (i-26*ALT*) to improve transit options for residents and businesses along the I-26 Corridor. The purpose of the I-26 Alternatives Analysis is to improve transit service and enhance regional mobility along the I-26 Corridor connecting Summerville, North Charleston, and Charleston in South Carolina.

Upon the conclusion of this Alternatives Analysis and selection of a preferred alternative, the project sponsor intends to submit a request for entry into Project Development under the Federal Transit Administration (FTA's) Capital Investment Grant (CIG) Program, which provides grant funding for capital projects on a competitive basis and uses a set of Project Justification and Financial Commitment Criteria to rate projects. Projects must receive a project rating of medium or better in order to move forward in each phase of the process.

Although projects do not need to be rated in order to begin project development, this Screen Two Analysis rates each potential alternative using the FTA's Project Justification and Financial Commitment criteria, where sufficient information is available, to aid in the selection of a preferred alternative that can move forward into the Project Development phase of the CIG program and compete for federal funds. Once the preferred alternative enters into Project Development, project sponsors have two years to complete NEPA, develop preliminary engineering, and meet the required "medium" ranking or better to move forward into the next phase.

The project justification criteria are worth 50 percent of the overall score, and a project must receive an overall medium or better rating. The criteria as outlined in MAP-21 include: mobility improvements, cost effectiveness, congestion relief, environmental benefits, land use, and economic development. Since each of these criteria correspond to a project goal, this Screen Two Analysis utilizes these measures to compare each of the Screen Two Alternatives. This memorandum outlines the measures and rankings for each of the project justification criteria.

2 Screen Two Build Alternatives Overview

A total of 20 alternatives were evaluated in the Initial Alternatives Screening: Screen One Analysis. This phase of screening utilized a combination of subjective and objective analyses to identify those modes and alignments that best meet the project goals and objectives and warrant a more detailed analysis – Screen Two.

Results from the Screen One Analysis, input from the project Steering and Technical Advisory Committees, and community feedback identified 12 Build alternatives to move forward into Screen Two. A detailed description of the alternatives can be found in the Screen Two Alternatives Report.

2.1 BRT Alternatives

The following BRT alternatives are analyzed in this Screen Two Analysis. Figures A-1 through A-6 (Appendix 6-A) show the BRT Screen Two Build Alternatives.

- Alternative B-1: US 78/US 52/Meeting– BRT
- Alternative B-3: US 78/US 52/East Bay – BRT
- Alternative C-1: US 176/US 52/Meeting – BRT
- Alternative C-3: US 176/US 52/East Bay – BRT
- Alternative D-1: Dorchester Rd/US 52/Meeting – BRT
- Alternative D-3: Dorchester Rd/US 52/East Bay – BRT

2.2 LRT Alternatives

The following LRT alternatives are analyzed in this Screen Two Analysis. Figures A-1 through A-6 (Appendix 6-A) show the LRT Screen Two Build Alternatives.

- Alternative B-2: US 78/US 52/Meeting – LRT
- Alternative B-4: US 78/US 52/East Bay – LRT
- Alternative C-2: US 176/US 52/Meeting – LRT
- Alternative C-4: US 176/US 52/East Bay – LRT
- Alternative D-2: Dorchester Rd/US 52/Meeting – LRT
- Alternative D-4: Dorchester Rd /US 52/East Bay – LRT

3 Cost Effectiveness Evaluation Criteria & Rating

Cost-effectiveness is a measure of how well the funds invested in the project will improve transit based on the number of transit riders that use the system. The variables used to develop this ranking include annualized capital costs and operating & maintenance (O&M) costs, as well as the total estimated trips on the project.

3.1 Annualized Capital and O&M Costs

The Financial Commitment Memorandum provides the planning level capital construction and O&M cost estimates used to develop these rankings. Annualization factors from FTA's Standard Cost Categories as described in that document were used to estimate the annualized capital costs for the project. It is important to note that the annualized costs are planning level only and not an engineering based estimate. The following Table 3-1 shows the annualized capital construction and O&M costs used in the cost effectiveness evaluation ranking. The annualization factor tables for each alternative are provided in Appendix 6-B.

Table 3 - 1: Annualized Capital and O&M Costs (Current Year – 2015)

BRT Annualized Cost Estimates (FY 2015)	Alt B-1: US 78/Mtg BRT	Alt B-3: US 78/EB BRT	Alt C-1: US 176/Mtg BRT	Alt C-3: US 176/EB BRT	Alt D-1: Dorch/Mtg BRT	Alt D-3: Dorch/EB BRT
Annualized Project Capital Cost	$12,257,933	$12,869,651	$11,530,768	$12,145,835	$13,009,074	$13,624,141
Annual Project Operating and Maintenance Costs	$5,850,240	$6,654,480	$5,465,280	$5,645,280	$6,694,800	$6,874,800
Total Annualized Capital and Operating Cost of Project	**$18,108,173**	**$ 19,524,131**	**$16,996,048**	**$17,791,115**	**$ 19,703,874**	**$ 20,498,941**

LRT Annualized Cost Estimates (FY 2015)	Alt B-2: US 78/Mtg LRT	Alt B-4: US 78/EB LRT	Alt C-2: US 176/Mtg LRT	Alt C-4: US 176/EB LRT	Alt D-2: Dorch/Mtg LRT	Alt D-4: Dorch/EB LRT
Annualized Project Capital Cost	$83,307,534	$87,441,224	$78,633,747	$82,767,611	$87,056,711	$91,190,575
Annual Project Operating and Maintenance Costs	$13,696,390	$15,805,991	$13,259,680	$13,696,390	$15,805,991	$16,242,701
Total Annualized Capital and Operating Cost of Project	**$97,003,924**	**$ 103,247,215**	**$91,893,427**	**$96,464,001**	**$ 102,862,702**	**$ 107,433,276**

3.2 Trips on Project

As part of this Screen Two Analysis, transit ridership was forecasted for each of the alternatives using FTA's Simplified Trips-on Projects Software (STOPS). STOPS is a forecasting model developed by FTA to simplify the forecasting process and includes data from 24 fixed guideway systems that are used to calibrate the model. The Travel Demand Forecasting Memorandum in Appendix 6-C provides the results of the forecasting effort. Tables 3-2 and 3-3 provide a summary of the forecasting results for the BRT & LRT alternatives by Current Year (2015) and Horizon Year (2035). The value used in the Cost Effectiveness Rating is listed as the "Total Trips Annualized."

Table 3 - 2: Travel Demand Forecast Summary (Current Year-2015)

Trips on the Project (Current Year) BRT	Alt B-1: US 78/Mtg BRT		Alt B-3: US 78/EB BRT		Alt C-1: US 176/Mtg BRT		Alt C-3: US 176/EB BRT		ALT D-1: Dorch/Mtg BRT		Alt D-3: Dorch/EB BRT	
Modeled Trips (HBW)	Daily	Annualized	Daily	Annualized	Daily	Annualized	Daily	Annualized	Daily	Annualized	Daily	Annualized
Non-Transit Dependent	2,467	712,963	2,473	714,697	1,396	403,444	1,392	402,288	2,099	606,611	2,112	610,368
Transit Dependent	1,034	298,826	1,133	327,437	1,088	314,432	1,154	333,506	619	178,891	755	218,195
Modeled Trips All other Purposes												
Non-Transit Dependent	2,074	599,386	2,036	588,404	1,112	321,368	1,104	319,056	2,274	657,186	2,271	656,319
Transit Dependent	1,299	375,411	1,364	394,196	1,143	330,327	1,300	375,700	673	194,497	904	261,256
Sub-Total												
Non-Transit Dependent	4,541	1,312,349	4,509	1,303,101	2,508	724,812	2,496	721,344	4,373	1,263,797	4,383	1,266,687
Transit Dependent	2,333	674,237	2,497	721,633	2,231	644,759	2,454	709,206	1,292	373,388	1,659	479,451
Total Trips	**6,874**	**1,986,586**	**7,006**	**2,024,734**	**4,739**	**1,369,571**	**4,950**	**1,430,550**	**5,665**	**1,637,185**	**6,042**	**1,746,138**
New Weekday Transit Trips	**3,772**		**3,629**		**1,801**		**1,687**		**3,793**		**3,762**	

Trips on the Project (Current Year) LRT	Alt B-2: US 78/Mtg LRT		Alt B-4: US 78/EB LRT		Alt C-2: US 176/Mtg LRT		Alt C-4: US 176/EB LRT		Alt D-2: Dorch/Mtg LRT		Alt D-4: Dorch/EB LRT	
Modeled Trips (HBW)	Daily	Annualized	Daily	Annualized	Daily	Annualized	Daily	Annualized	Daily	Annualized	Daily	Annualized
Non-Transit Dependent	3,477	1,004,853	3,458	999,362	1,995	576,555	1,993	575,977	2,867	828,563	2,853	824,517
Transit Dependent	1,200	346,800	1,276	368,764	1,171	338,419	1,268	366,452	763	220,507	840	242,760
Modeled Trips All other Purposes		0		0		0		0		0		0
Non-Transit Dependent	3,110	898,790	3,040	878,560	1,668	482,052	1,674	483,786	3,319	959,191	3,252	939,828
Transit Dependent	1,456	420,784	1,621	468,469	1,306	377,434	1,515	437,835	1,047	302,583	1,149	332,061
Sub-Total												
Non-Transit Dependent	6,587	1,903,643	6,498	1,877,922	3,663	1,058,607	3,667	1,059,763	6,186	1,787,754	6,105	1,764,345
Transit Dependent	2,656	767,584	2,897	837,233	2,477	715,853	2,783	804,287	1,810	523,090	1,989	574,821
Total Trips	**9,243**	**2,671,227**	**9,395**	**2,715,155**	**6,140**	**1,774,460**	**6,450**	**1,864,050**	**7,996**	**2,310,844**	**8,094**	**2,339,166**
New Weekday Transit Trips	**6,293**		**6,118**		**3,396**		**3,343**		**5,919**		**5,807**	

Table 3 - 3: Travel Demand Forecast Summary (Horizon Year – 2035)

Trips on the Project (Horizon Year) BRT	Alt B-1: US 78/Mtg BRT		Alt B-3: US 78/EB BRT		Alt C-1: US 176/Mtg BRT		Alt C-3: US 176/EB BRT		ALT D-1: Dorch/Mtg BRT		Alt D-3: Dorch/EB BRT	
Modeled Trips (HBW)	Daily	Annualized	Daily	Annualized	Daily	Annualized	Daily	Annualized	Daily	Annualized	Daily	Annualized
Non-Transit Dependent	2,731	789,259	2,732	789,548	1,626	469,914	1,614	466,446	2,353	680,017	2,370	684,930
Transit Dependent	1,197	345,933	1,274	368,186	1,259	363,851	1,284	371,076	786	227,154	872	252,008
Modeled Trips All other Purposes		0		0		0		0		0		0
Non-Transit Dependent	2,276	657,764	2,202	636,378	1,280	369,920	1,267	366,163	2,519	727,991	2,510	725,390
Transit Dependent	1,492	431,188	1,539	444,771	1,345	388,705	1,460	421,940	832	240,448	1,060	306,340
Sub-Total												
Non-Transit Dependent	5,007	1,447,023	4,934	1,425,926	2,906	839,834	2,881	832,609	4,872	1,408,008	4,880	1,410,320
Transit Dependent	2,689	777,121	2,813	812,957	2,604	752,556	2,744	793,016	1,618	467,602	1,932	558,348
Total Trips	**7,696**	**2,224,144**	**7,747**	**2,238,883**	**5,510**	**1,592,390**	**5,625**	**1,625,625**	**6,490**	**1,875,610**	**6,812**	**1,968,668**
New Weekday Transit Trips	**4,174**		**4,006**		**2,134**		**1,992**		**4,227**		**4,177**	

Trips on the Project (Horizon Year) LRT	Alt B-2: US 78/Mtg LRT		Alt B-4: US 78/EB LRT		Alt C-2: US 176/Mtg LRT		Alt C-4: US 176/EB LRT		Alt D-2: Dorch/Mtg LRT		Alt D-4: Dorch/EB LRT	
Modeled Trips (HBW)	Daily	Annualized	Daily	Annualized	Daily	Annualized	Daily	Annualized	Daily	Annualized	Daily	Annualized
Non-Transit Dependent	3,839	1,109,471	3,809	1,100,801	2,303	665,567	2,291	662,099	3,215	929,135	3,190	921,910
Transit Dependent	1,377	397,953	1,407	406,623	1,341	387,549	1,402	405,178	916	264,724	954	275,706
Modeled Trips All other Purposes		0		0		0		0		0		0
Non-Transit Dependent	3,390	979,710	3,308	956,012	1,883	544,187	1,882	543,898	3,653	1,055,717	3,572	1,032,308
Transit Dependent	1,674	483,786	1,765	510,085	1,508	435,812	1,659	479,451	1,221	352,869	1,289	372,521
Sub-Total		0		0		0		0		0		0
Non-Transit Dependent	7,229	2,089,181	7,117	2,056,813	4,186	1,209,754	4,173	1,205,997	6,868	1,984,852	6,762	1,954,218
Transit Dependent	3,051	881,739	3,172	916,708	2,849	823,361	3,061	884,629	2,137	617,593	2,243	648,227
Total Trips	**10,280**	**2,970,920**	**10,289**	**2,973,521**	**7,035**	**2,033,115**	**7,234**	**2,090,626**	**9,005**	**2,602,445**	**9,005**	**2,602,445**
New Weekday Transit Trips	**6,940**		**6,705**		**3,929**		**3,828**		**6,591**		**6,432**	

3.3 Cost Effectiveness Screen Two Project Justification Rating

The cost effectiveness preliminary project justification rating is the ratio of costs over trips. The values used to develop the ratings are shown in Table 3-4.

Table 3 - 4: Cost Effectivness Values Used in Rating

Cost Effectiveness (CY) BRT	Alt B-1: US 78/Mtg BRT	Alt B-3: US 78/EB BRT	Alt C-1: US 176/Mtg BRT	Alt C-3: US 176/EB BRT	Alt D-1: Dorch/Mtg BRT	Alt D-3: Dorch/EB BRT
Annualized project capital cost (2015)	$12,257,933	$12,869,651	$11,530,768	$12,145,835	$13,009,074	$13,624,141
Annual O&M Cost	$5,850,240	$6,654,480	$5,465,280	$5,645,280	$6,694,800	$6,874,800
Annual Linked Trips	1,986,586	2,024,734	1,369,571	1,430,550	1,637,185	1,746,138
Annualized capital and operating costs	$18,108,173	$19,524,131	$16,996,048	$17,791,115	$19,703,874	$20,498,941
Annualized cost per annual linked trip on the project	$9.12	$9.64	$12.41	$12.44	$12.04	$11.74
Value used in Rating	**$9.12**	**$9.64**	**$12.41**	**$12.44**	**$12.04**	**$11.74**

Cost Effectiveness (CY) LRT	Alt B-2: US 78/Mtg LRT	Alt B-4: US 78/EB LRT	Alt C-2: US 176/Mtg LRT	Alt C-4: US 176/EB LRT	Alt D-2: Dorch/Mtg LRT	Alt D-4: Dorch/EB LRT
Annualized project capital cost (2015)	$83,307,534	$87,441,224	$78,633,747	$82,767,611	$87,056,711	$91,190,575
Annual O&M Cost	$13,696,390	$15,805,991	$13,259,680	$13,696,390	$15,805,991	$16,242,701
Annual Linked Trips	2,671,227	2,715,155	1,774,460	1,864,050	2,310,844	2,339,166
Annualized capital and operating costs	$97,003,924	$103,247,215	$91,893,427	$96,464,001	$102,862,702	$107,433,276
Annualized cost per annual linked trip on the project	$36.31	$38.03	$51.79	$51.75	$44.51	$45.93
Value used in Rating	**$36.31**	**$38.03**	**$51.79**	**$51.75**	**$44.51**	**$45.93**

Table 3-5 shows where each BRT and LRT alternative would rate using FTA's ratings. Based on the planning level analysis, the BRT "B" Alternatives operating on US 78 from Summerville to downtown Charleston have the greatest potential to receive a medium rating. The remaining BRT alternatives using US 176 and Dorchester Road are more likely to rate medium-low. All of the LRT alternatives scored low under this rating.

Table 3 - 5: Screen Two Alternatives Potential Cost Effectiveness Rating

Cost Effectiveness (BRT)	Alt B-1: US 78/Mtg BRT	Alt B-3: US 78/EB BRT	Alt C-1: US 176/Mtg BRT	Alt C-3: US 176/EB BRT	Alt D-1: Dorch/Mtg BRT	Alt D-3: Dorch/EB BRT
<4.00 (High)						
Between $4.00 and $5.99 (Medium-High)						
Between $6.00 and $9.99 (Medium)	**$9.12**	$9.64				
Between 10.00 and $14.99 (Medium-Low)			$12.41	$12.44	$12.04	$11.74
>$15.00 (Low)						

Cost Effectiveness (LRT)	Alt B-2: US 78/Mtg LRT	Alt B-4: US 78/EB LRT	Alt C-2: US 176/Mtg LRT	Alt C-4: US 176/EB LRT	Alt D-2: Dorch/Mtg LRT	Alt D-4: Dorch/EB LRT
<4.00 (High)						
Between $4.00 and $5.99 (Medium-High)						
Between $6.00 and $9.99 (Medium)						
Between 10.00 and $14.99 (Medium-Low)						
>$15.00 (Low)	$36.31	**$38.03**	$51.79	$51.75	$44.51	$45.93

4 Mobility Improvements Evaluation Criteria and Rating

Mobility improvements are evaluated based on the total number of "linked trips" using the project. Linked trips include the complete trip on the project from origin to destination including trips that may start or end on a different route. Trips made by transit dependent persons, which are defined as persons in households that do not own a car, are given a weight of two to encourage projects that support this population. Since the project may have future mobility improvements, the current year (2015) and horizon year (2035) total linked trips are used. Each is given a weight of 0.5, as required by MAP-21 when both current year and horizon year are used. Table 4-1 shows the Mobility Improvement Criteria used to rate the alternatives' mobility improvements.

Table 4 - 1: Mobility Improvements Value Used in Rating

Mobility Improvements (BRT)	Alt B-1: US 78/Mtg BRT	Alt B-3: US 78/EB BRT	Alt C-1: US 176/Mtg BRT	Alt C-3: US 176/EB BRT	Alt D-1: Dorch/Mtg BRT	Alt D-3: Dorch/EB BRT
Annual Linked Trips on Project: (CY)	2,660,823	2,746,367	2,014,330	2,139,756	2,010,573	2,225,589
Annual Linked Trips on Project: (HY)	3,001,265	3,051,840	2,344,946	2,418,641	2,343,212	2,527,016
Value used in Rating	**2,831,044**	**2,899,104**	**2,179,638**	**2,279,199**	**2,176,893**	**2,376,303**

Mobility Improvements (LRT)	Alt B-2: US 78/Mtg LRT	Alt B-4: US 78/EB LRT	Alt C-2: US 176/Mtg LRT	Alt C-4: US 176/EB LRT	Alt D-2: Dorch/Mtg LRT	Alt D-4: Dorch/EB LRT
Annual Linked Trips on Project: (CY)	3,438,811	3,552,388	2,490,313	2,668,337	2,833,934	2,913,987
Annual Linked Trips on Project: (HY)	3,852,659	3,890,229	2,856,476	2,975,255	3,220,038	3,250,672
Value used in Rating	**3,645,735**	**3,721,309**	**2,673,395**	**2,821,796**	**3,026,986**	**3,082,330**

Table 4-2 shows the potential mobility improvements ratings for each Screen Two Alternative based on current planning level information. All of the BRT alternatives ranked low, with the exception of the "B" alternatives which ranked medium-low. Among the LRT alternatives, all received a medium-low rating, with the "B" alternatives carrying the most passengers.

Table 4 - 2: Screen Two Alternatives Potential Mobility Improvements Rankings

Mobility Improvements (Annual Trips) (BRT)	Alt B-1: US 78/Mtg BRT	Alt B-3: US 78/EB BRT	Alt C-1: US 176/Mtg BRT	Alt C-3: US 176/EB BRT	Alt D-1: Dorch/Mtg BRT	Alt D-3: Dorch/EB BRT
>= 30 Million (High)						
15 Million - 29.9 Million (Medium-High)						
5 Million - 14.9 Million (Medium)						
2.5 Million - 4.9 Million (Medium-Low)	2,831,044	**2,899,104**				
<2.5 Million (Low)			2,179,638	2,279,199	2,176,893	2,376,303

Mobility Improvements (Annual Trips) (LRT)	Alt B-2: US 78/Mtg LRT	Alt B-4: US 78/EB LRT	Alt C-2: US 176/Mtg LRT	Alt C-4: US 176/EB LRT	Alt D-2: Dorch/Mtg LRT	Alt D-4: Dorch/EB LRT
>= 30 Million (High)						
15 Million - 29.9 Million (Medium-High)						
5 Million - 14.9 Million (Medium)						
2.5 Million - 4.9 Million (Medium-Low)	3,645,735	**3,721,309**	2,673,395	2,821,796	3,026,986	3,082,330
<2.5 Million (Low)						

5 Congestion Relief Evaluation Criteria and Ranking

Congestion relief is measured by the number of new weekday linked transit trips resulting from implementation of the proposed project. This is considered an indirect measure of roadway congestion relief as a result of the transit project and serves as an indicator of potential cars taken off of the road. Table 5-1 shows the values used in the rating.

Table 5 - 1: Congestion Relief Values Used in Rating

Congestion Relief (BRT)	Alt B-1: US 78/Mtg BRT	Alt B-3: US 78/EB BRT	Alt C-1: US 176/Mtg BRT	Alt C-3: US 176/EB BRT	Alt D-1: Dorch/Mtg BRT	Alt D-3: Dorch/EB BRT
New Weekday Linked Transit Trips (CY)	3,772	3,629	1,801	1,687	3,793	3,762
New Weekday Linked Transit Trips (HY)	4,174	4,006	2,134	1,992	4,227	4,177
Value used in Rating	3,973	3,818	1,968	1,840	4,010	3,970

Congestion Relief (LRT)	Alt B-2: US 78/Mtg LRT	Alt B-4: US 78/EB LRT	Alt C-2: US 176/Mtg LRT	Alt C-4: US 176/EB LRT	Alt D-2: Dorch/Mtg LRT	Alt D-4: Dorch/EB LRT
New Weekday Linked Transit Trips (CY)	6,293	6,118	3,396	3,343	5,919	5,807
New Weekday Linked Transit Trips (HY)	6,940	6,705	3,929	3,828	6,591	6,432
Value used in Rating	6,617	6,412	3,663	3,586	6,255	6,120

Table 5-2 shows the potential congestion relief rating for each Screen Two Alternative. Among the BRT alternatives, the "B" and "D" alternatives rate medium, and the "C" alternatives rate medium-low. The Dorchester BRT alignment to Line Street carried the greatest number of new trips. All of the LRT alternatives rate medium.

Table 5 - 2: Screen Two Alternatives Potential Congestion Relief Rating

Congestion Relief - new transit trips (BRT)	Alt B-1: US 78/Mtg BRT	Alt B-3: US 78/EB BRT	Alt C-1: US 176/Mtg BRT	Alt C-3: US 176/EB BRT	Alt D-1: Dorch/Mtg BRT	Alt D-3: Dorch/EB BRT
18,000 and Above (High)						
10,000 to 17,999 (Medium-High)						
2,500 to 9,999 (Medium)	3,772	3,629			**3,793**	3,762
500 to 2,499 (Medium-Low)			1,801	1,687		
0 to 499 (Low)						

Congestion Relief - new transit trips (LRT)	Alt B-2: US 78/Mtg LRT	Alt B-4: US 78/EB LRT	Alt C-2: US 176/Mtg LRT	Alt C-4: US 176/EB LRT	Alt D-2: Dorch/Mtg LRT	Alt D-4: Dorch/EB LRT
18,000 and Above (High)						
10,000 to 17,999 (Medium-High)						
2,500 to 9,999 (Medium)	**6,293**	6,118	3,396	3,343	5,919	5,807
500 to 2,499 (Medium-Low)						
0 to 499 (Low)						

6 Environmental Benefits Evaluation Criteria and Rating

Environmental benefits are measured based on the dollar value of the anticipated direct and indirect benefits to human health, safety, energy, and the air quality environment scaled by the annualized capital and operating costs for the project. FTA provides templates with factors to develop this rating.

6.1 Vehicle Miles Traveled

The variables used in this measure include the change in the vehicle miles traveled (VMT) resulting from the implementation of the proposed project. For this planning level analysis, reductions in Automobile Annual VMT and the additional VMT as a result of project transit vehicles are used. BRT projects assume the vehicle would be a hybrid bus (diesel-electric) and light rail trains would include two cars. Automobile vehicle miles saved are estimated using the STOPS model. Project vehicle and train-car miles are based on the operating plans provided in the Screen Two Alternatives Report. The following Table 6-1 shows the anticipated change in automobile vehicle miles (positive) and additional project transit vehicle and train-car miles (negative) for the Screen Two Alternatives.

Table 6 - 1: Change in Vehicle Miles Traveled

Vehicle-Miles of Travel (VMT) BRT (Savings)	Alt B-1: US 78/Mtg BRT		Alt B-3: US 78/EB BRT		Alt C-1: US 176/Mtg BRT		Alt C-3: US 176/EB BRT		ALT D-1: Dorch/Mtg BRT		Alt D-3: Dorch/EB BRT	
Mode/Technology	*VMT*	*VMT Change*	*VMT*	*VMT Change*	*VMT*	*VMT Change*	*VMT*	*VMT Change*	*VMT*	*VMT Change*	*VMT*	*VMT Change*
Automobile Annual VMT	23,695	6,847,855	22,929	6,626,481	12,684	3,665,676	12,033	3,477,537	19,479	5,629,431	19,096	5,518,744
Hybrid Bus		-1,096,831		-1,137,759		-1,017,562		-1,058,490		-1,201,504		-1,242,432

Vehicle-Miles of Travel (VMT) LRT (Savings)	Alt B-2: US 78/Mtg LRT		Alt B-4: US 78/EB LRT		Alt C-2: US 176/Mtg LRT		Alt C-4: US 176/EB LRT		Alt D-2: Dorch/Mtg LRT		Alt D-4: Dorch/EB LRT	
Mode/Technology	*VMT*	*VMT Change*	*VMT*	*VMT Change*	*VMT*	*VMT Change*	*VMT*	*VMT Change*	*VMT*	*VMT Change*	*VMT*	*VMT Change*
Automobile Annual VMT	40,448	11,689,472	38,743	11,196,727	23,785	6,873,865	22,981	6,641,509	31,915	9,223,435	30,789	8,898,021
Light Rail/Street Car (Car Miles)		-2,193,662		-2,275,518		-2,035,123		-2,116,980		-2,403,006		-2,485,008

6.2 Air Quality Evaluation Criteria

The environmental measure for air quality includes the change in total air quality criteria pollutants: Carbon Monoxide (COU), Mono-Nitrogen Oxides (NOx), Particulate Matter (PM2.5), and Volatile Organic Compounds (VOC) as a result of the project. For the change in air quality measures, FTA uses emission rates per VMT for automobiles (cars and light trucks) and transit vehicles. Air quality measures are based on grams/VMT factors that are monetized depending on whether an area is in attainment status or non-attainment status. Because the Charleston region has attainment status, the following air quality monetization factors are used, as shown in Table 6-2. Appendix 6-D shows the Screen Two Alternative values used to rate each air quality criteria pollutant.

Table 6 - 2: Air Quality Evaluation Factors

Year	CO	NOx – Mobile	NOx – EGU	VOC	PM2.5 - Mobile	PM2.5 - EGU
	$ / KG					
Current Year	$0.08	$12.96	$18.36	$3.02	$680.40	$561.60
10-Year Horizon	$0.08	$15.66	$22.95	$3.75	$861.30	$688.50
20-Year Horizon	$0.08	$16.20	$23.76	$3.89	$896.40	$712.80

6.3 Greenhouse Gases Evaluation Criteria

To evaluate change in greenhouse gas emissions (GHG), unit rates by fuel type are factored based on a $38 midrange estimate of the social cost of carbon. The FTA factors are provided in Table 6-3. Appendix 6-E shows the Screen Two Alternative values used to evaluate greenhouse gas emissions.

Table 6 - 3: Greenhouse Gas Emission Factors

	Current Year	10-year Horizon	20-year Horizon
Mode	(g CO2e/VMT)		
Automobile	532	434	397
Bus – Diesel	3319	2854	2721
Bus – Hybrid	2655	2283	2177
Bus – CNG	2935	2524	2406
Bus - Electric	2934	2441	2303
Heavy Rail	3211	3106	3073
Light Rail and Streetcar	4779	4623	4574
Commuter Rail - Diesel (new) and DMU	7970	7970	7970
Commuter Rail - Diesel (used)	7970	7970	7970
Commuter Rail - Electric and EMU	5821	5632	5572

6.4 Energy Used Evaluation Criteria

Change in energy used is intended to capture the benefits coming from reduce reliance on foreign fuels, and as such, change in energy use is only computed for modes that use petroleum fuel. The BRT alternatives for this analysis assume Hybrid (Diesel-Electric) buses. The light rail cars are assumed to be electrified. The factors shown in Table 6-4 are monetized using a value of $0.20 per gallon of petroleum fuel based on the economic cost of dependence on imported petroleum for fuels. Appendix 6-F shows the values used in the evaluation.

Table 6 - 4: Energy Used Evaluation Factors

	Current Year	10-year Horizon	20-year Horizon
MODE	Btu/VMT		
Automobile	7,559	6,167	5,633
Bus – Diesel	41,436	35,635	33,978
Bus – Hybrid	33,149	28,508	27,182
Commuter Rail - Diesel (new) and DMU	96,138	96,138	96,138
Commuter Rail - Diesel (used)	96,138	96,138	96,138

6.5 Safety

The change in safety evaluation uses changes in vehicle miles traveled to estimate changes in disabling injuries and fatalities for automobiles and transit. It does not address pedestrian or bicyclist accidents. The safety factors provided in Table 6-5 are monetized based on US DOT guidance on the value of a statistical life and injuries, which in 2015 was $9.2 million. The value for disabling injuries for both transit and automobiles is $490,000 (5.39 percent of the US DOT value of a statistical life). Appendix 6-G shows the values used in the safety ratings.

Table 6 - 5: Change in Safety Evaluation Factors

	Current Year		10-year Horizon		20-year Horizon	
Mode	Fatalities	Injuries	Fatalities	Injuries	Fatalities	Injuries
	(per million VMT)					
Automobile	0.013	0.195	0.013	0.195	0.013	0.195
Bus – Diesel	0.004	1.824	0.004	1.824	0.004	1.824
Bus – Hybrid	0.004	1.824	0.004	1.824	0.004	1.824
Bus – CNG	0.004	1.824	0.004	1.824	0.004	1.824
Bus - Electric	0.004	1.458	0.004	1.458	0.004	1.458
Heavy Rail	0.007	0.155	0.007	0.155	0.007	0.155
Light Rail and Streetcar	0.009	1.696	0.009	1.696	0.009	1.696
Commuter Rail - Diesel (new) and DMU	0.012	1.746	0.012	1.746	0.012	1.746
Commuter Rail - Diesel (used)	0.012	1.746	0.012	1.746	0.012	1.746
Commuter Rail - Electric and EMU	0.012	1.746	0.012	1.746	0.012	1.746

6.6 Environmental Preliminary Justification Rating

The monetized value of the benefits resulting from changes in air quality and GHG emissions, energy use, and safety is summed and divided by the annualized capital and operating costs of the project, as discussed in the cost effectiveness measure, to develop the rating. Table 6-6 shows the values used in the ratio. Table 6-7 shows the potential rankings for the Screen Two alternatives. Among the BRT alternatives, the "B" alignments rate medium, and the remaining "C" and "D" alternatives rate medium-low. All of the LRT alternatives rate medium-low based on the planning level analysis.

Table 6 - 6: Environmental Benefits Value Used in Rating

Environmental Benefits Summary	Alt B-1: US 78/Mtg BRT	Alt B-3: US 78/EB BRT	Alt C-1: US 176/Mtg BRT	Alt C-3: US 176/EB BRT	Alt D-1: Dorch/Mtg BRT	Alt D-3: Dorch/EB BRT
Value of Environmental Benefits	$168,834.84	$46,934.77	($565,757.34)	($678,723.23)	($318,262.47)	($410,407.81)
Annualized Capital and Operating Cost of Project	$18,108,173.00	$19,524,131.00	$16,996,048.00	$17,791,115.00	$19,703,874.00	$20,498,941.00
Ratio of Environmental Benefits to Annualized Costs	**0.9%**	**0.2%**	**-3.3%**	**-3.8%**	**-1.6%**	**-2.0%**

Environmental Benefits Summary	Alt B-2: US 78/Mtg LRT	Alt B-4: US 78/EB LRT	Alt C-2: US 176/Mtg LRT	Alt C-4: US 176/EB LRT	Alt D-2: Dorch/Mtg LRT	Alt D-4: Dorch/EB LRT
Value of Environmental Benefits	($402,083.74)	($666,803.41)	($1,440,448.95)	($1,635,171.19)	($1,403,250.79)	($1,623,222.98)
Annualized Capital and Operating Cost of Project	$97,003,924.16	$103,247,214.60	$91,893,427.16	$96,464,001.16	$102,862,701.60	$107,433,275.60
Ratio of Environmental Benefits to Annualized Costs	**-0.4%**	**-0.6%**	**-1.6%**	**-1.7%**	**-1.4%**	**-1.5%**

Table 6 - 7: Screen Two Alternatives Potential Environmental Ratings

Environmental Rating (BRT)		Alt B-1: US 78/Mtg BRT	Alt B-3: US 78/EB BRT	Alt C-1: US 176/Mtg BRT	Alt C-3: US 176/EB BRT	Alt D-1: Dorch/Mtg BRT	Alt D-3: Dorch/EB BRT
>10%	High						
5 to 10%	Medium High						
0 to 5%	Medium	**0.9%**	**0.2%**				
0 to -10%	Medium-Low			**-3.3%**	**-3.8%**	**-1.6%**	**-2.0%**
<-10%	Low						

Environmental Rating (LRT)		Alt B-2: US 78/Mtg LRT	Alt B-4: US 78/EB LRT	Alt C-2: US 176/Mtg LRT	Alt C-4: US 176/EB LRT	Alt D-2: Dorch/Mtg LRT	Alt D-4: Dorch/EB LRT
>10%	High						
5 to 10%	Medium High						
0 to 5%	Medium						
0 to -10%	Medium-Low	**-0.4%**	**-0.6%**	**-1.6%**	**-1.7%**	**-1.4%**	**-1.5%**
<-10%	Low						

7 Land Use Evaluation Criteria and Rating

The land use measure includes an examination of the existing corridor and station area development character; existing station area pedestrian facilities, including access for persons with disabilities; existing corridor and station area parking supply; and the proportion of existing "legally binding affordability restricted" housing within ½ mile of station areas to the proportion of "legally binding affordability restricted" housing in the counties through which the project travels.

7.1 Population, Employment and Household Criteria and Ratings

The Screen One analysis included a station area assessment and qualitative review of the land use measures. This is further refined in Screen Two Land Use and Economic Development Analysis in Appendix 6-H. Quantitative measures by station area (defined as ½ mile radius of station areas) are provided and include population densities, total employment served by the project, and the proportion of "legally binding affordability restricted" housing.

Because this project is still in the planning stages, conceptual station area locations were used to estimate the overall impact each alternative may have on this measure. During the project development phase, a station area planning exercise will further refine the station locations. These station area plans should in effect direct housing and employment to station locations which would increase the future measures. For the purpose of this analysis, current year (2010) and future year (2040) projections are used to rate corridors since all fall below the medium rating criteria.

Table 7-1 shows the quantitative employment, population and household data obtained from the BCDCOG Travel Demand Model. Table 7-2 shows the potential quantitative land use rating for those criteria that are known at this planning stage for the Current Year 2010. The values for BRT and LRT are the same, since the same station locations are assumed for both modes. Although all of the Screen Two Alternatives scored low, Table 7-3 shows updated numbers based on the 2040 BCDCOG Travel Demand Model projections. Under those estimates, the employment served by the system increases to a medium-low rating for the "B" alternatives serving East Bay & Calhoun, and the population density ratings for all alternatives increase to medium-low.

7.2 Affordable Housing Criteria and Rankings

Affordable Housing criteria are described in the Screen Two Land Use and Economic Development Memorandum in Appendix 6-H. The following provides the measures and rating from that analysis for affordable housing measures. FTA defines legally binding affordable housing as legally binding affordability restricted units to renters with incomes below 60 percent of the area median income and/or owners with incomes below the area median. For the preliminary rating review, all the corridors score well for the criteria as defined in Appendix 6-H. Data from the Land Use Analysis is provided in Table 7-4. It is important to note that this is a preliminary rating, and additional verification of affordable housing will need to be gathered during the project development phase for the preferred alternative.

Table 7-5 shows the values used in the rating, and Table 7-6 provides the potential affordable housing rating. Based on this planning level analysis, all of the corridors are anticipated to serve a higher proportion of affordable housing units as compared to the counties.

Table 7 - 1: Quantitative Land Use Analysis Values Used in Rating

Total - All Station Areas (1/2-mile radius) (2010 BCDCOG Travel Demand Model)	Alt B-1: US 78/Mtg BRT	Alt B-3: US 78/EB BRT	Alt C-1: US 176/Mtg BRT	Alt C-3: US 176/EB BRT	Alt D-1: Dorch/Mtg BRT	Alt D-3: Dorch/EB BRT
	Alt B-2: US 78/Mtg LRT	Alt B-4: US 78/EB LRT	Alt C-2: US 176/Mtg EB LRT	Alt C-4: US 176/EB LRT	Alt D-2: Dorch/Mtg LRT	Alt D-4: Dorch/EB LRT
Housing Units - All Types (2013 Census)	14,534	13,932	13,964	13,362	13,107	12,505
Housing Units - Legally Binding Affordability Restricted	1,225	1,126	1,382	1,279	932	829
Population	28,861	26,857	27,989	25,985	28,697	26,693
Employment at New Project Stations	28,058	33,336	23,521	28,799	18,730	24,008
Land Area (Square Miles)	13	14	11	12	11	12
Housing Unit Density (units per square mile)	1,136	1,030	1,228	1,103	1,149	1,030
Population Density (person per square mile)	2,257	1,986	2,462	2,146	2,515	2,199
Employment Density (person per square mile)	2,194	2,466	2,069	2,378	1,642	1,978
Station Area Share of Legally Binding Affordability Restricted Housing Units	8.4%	8.1%	9.9%	9.6%	7.1%	6.6%

**Note – Housing Unit data used for Current Year 2010 summary table obtained from Census 2013 ACS data. Legally Binding Affordability Restricted Housing Units obtained from the National Housing Preservation Database*

Total - All Station Areas (1/2-mile radius) (2040 BCDCOG Travel Demand Model)	Alt B-1: US 78/Mtg BRT	Alt B-3: US 78/EB BRT	Alt C-1: US 176/Mtg BRT	Alt C-3: US 176/EB BRT	Alt D-1: Dorch/Mtg BRT	Alt D-3: Dorch/EB BRT
	Alt B-2: US 78/Mtg LRT	Alt B-4: US 78/EB LRT	Alt C-2: US 176/Mtg EB LRT	Alt C-4: US 176/EB LRT	Alt D-2: Dorch/Mtg LRT	Alt D-4: Dorch/EB LRT
Housing Units - All Types*	16,995	16,365	15,786	15,156	16,048	15,418
Housing Units - Legally Binding Affordability Restricted						
Population	37,511	36,019	35,046	33,554	36,108	34,616
Employment at New Project Stations	36,017	42,018	29,368	35,369	23,189	29,190
Land Area (Square Miles)	13	14	11	12	11	12
Housing Unit Density (units per square mile)*	1,329	1,210	1,388	1,252	1,406	1,270
Population Density (person per square mile)	2,933	2,664	3,082	2,771	3,165	2,851
Employment Density (person per square mile)	2,816	3,108	2,583	2,921	2,032	2,404
Station Area Share of Legally Binding Affordability Restricted Housing Units						

**Note – In the absence of future housing units projections, household estimates obtained from the BCDCOG Travel Demand Model were used as a proxy for housing units in Future Year 2040 summary table*

Table 7 - 2: Screen Two Alternatives Potential Land Use Rating: Employment, Household, and Population Measures (CY 2010)

FTA Breakpoints (2010 BCDCOG Travel Demand Model)	Breakpoints	Alt B-1: US 78/Mtg BRT Alt B-2: US 78/Mtg LRT	Alt B-3: US 78/EB BRT Alt B-4: US 78/EB LRT	Alt C-1: US 176/Mtg BRT Alt C-2: US 176/Mtg EB LRT	Alt C-3: US 176/EB BRT Alt C-4: US 176/EB LRT	Alt D-1: Dorch/Mtg BRT Alt D-2: Dorch/Mtg LRT	Alt D-3: Dorch/EB BRT Alt D-4: Dorch/EB LRT
Employment Served by System							
High	>220,000						
Medium - High	140,000 - 219,000						
Medium	70,000 - 139,999						
Medium -Low	40,000 - 69,999						
Low	<40,000	28,058	33,336	23,521	28,799	18,730	24,008

FTA Breakpoints (2010 BCDCOG Travel Demand Model)	Breakpoints	Alt B-1: US 78/Mtg BRT Alt B-2: US 78/Mtg LRT	Alt B-3: US 78/EB BRT Alt B-4: US 78/EB LRT	Alt C-1: US 176/Mtg BRT Alt C-2: US 176/Mtg EB LRT	Alt C-3: US 176/EB BRT Alt C-4: US 176/EB LRT	Alt D-1: Dorch/Mtg BRT Alt D-2: Dorch/Mtg LRT	Alt D-3: Dorch/EB BRT Alt D-4: Dorch/EB LRT
Avg. Population Density (persons/square mile)							
High	>15,000						
Medium - High	9,600 - 15,000						
Medium	5760 - 9599						
Medium -Low	2,561 - 5,759						
Low	<2,560	2,257	1,986	2,462	2,146	2,515	2,199

Table 7 - 3: Screen Two Alternatives Potential Land Use Rating: Employment and Population Measures (Future Year 2040)

BRT Land Use Breakpoint (2040 BCDCOG Travel Demand Model)	Breakpoints	Alt B-1: US 78/Mtg BRT Alt B-2: US 78/Mtg LRT	Alt B-3: US 78/EB BRT Alt B-4: US 78/EB LRT	Alt C-1: US 176/Mtg BRT Alt C-2: US 176/Mtg EB LRT	Alt C-3: US 176/EB BRT Alt C-4: US 176/EB LRT	Alt D-1: Dorch/Mtg BRT Alt D-2: Dorch/Mtg LRT	Alt D-3: Dorch/EB BRT Alt D-4: Dorch/EB LRT
Employment Served by System							
High	>220,000						
Medium - High	140,000 - 219,000						
Medium	70,000 - 139,999						
Medium -Low	40,000 - 69,999		42,018				
Low	<40,000	36,017		29,368	35,369	23,189	29,190

BRT Land Use Breakpoint (2040 BCDCOG Travel Demand Model)	Breakpoints	Alt B-1: US 78/Mtg BRT Alt B-2: US 78/Mtg LRT	Alt B-3: US 78/EB BRT Alt B-4: US 78/EB LRT	Alt C-1: US 176/Mtg BRT Alt C-2: US 176/Mtg EB LRT	Alt C-3: US 176/EB BRT Alt C-4: US 176/EB LRT	Alt D-1: Dorch/Mtg BRT Alt D-2: Dorch/Mtg LRT	Alt D-3: Dorch/EB BRT Alt D-4: Dorch/EB LRT
Avg. Population Density (persons/square mile)							
High	>15,000						
Medium - High	9,600 - 15,000						
Medium	5760 - 9599						
Medium -Low	2,561 - 5,759	2,933	2,664	3,082	2,771	3,165	2,851
Low	<2,560						

Table 7 - 4: Affordable Housing Data used in Evaluation (CY)

Housing Totals for Each County in which Project Stations are Located	Alt B-1: US 78/Mtg BRT Alt B-2: US 78/Mtg LRT	Alt B-3: US 78/EB BRT Alt B-4: US 78/EB LRT	Alt C-1: US 176/Mtg BRT Alt C-2: US 176/Mtg EB LRT	Alt C-3: US 176/EB BRT Alt C-4: US 176/EB LRT	Alt D-1: Dorch/Mtg BRT Alt D-2: Dorch/Mtg LRT	Alt D-3: Dorch/EB BRT Alt D-4: Dorch/EB LRT
Charleston County	***Y***	***Y***	***Y***	***Y***	***Y***	***Y***
Housing Units - All Types	171,625	171,625	171,625	171,625	171,625	171,625
Housing Units - Legally Binding Affordability Restricted	3,292	3,292	3,292	3,292	3,292	3,292
Berkeley County	***Y***	***Y***	***Y***	***Y***	***N***	***N***
Housing Units - All Types	74,281	74,281	74,281	74,281	-	-
Housing Units - Legally Binding Affordability Restricted	1,024	1,024	1,024	1,024	-	-
Dorchester County	***Y***	***Y***	***N***	***N***	***Y***	***Y***
Housing Units - All Types	55,571	55,571	-	-	55,571	55,571
Housing Units - Legally Binding Affordability Restricted	1200	1,200	-	-	1,200	1,200

**Note – Housing Unit data used for Current Year 2010 summary table obtained from Census 2013 ACS data. Legally Binding Affordability Restricted Housing Units obtained from the National Housing Preservation Database*

Table 7 - 5: Affordable Housing Values Used in Rating

Total - All Counties in which Project Stations Are Located	Alt B-1: US 78/Mtg BRT Alt B-2: US 78/Mtg LRT	Alt B-3: US 78/EB BRT Alt B-4: US 78/EB LRT	Alt C-1: US 176/Mtg BRT Alt C-2: US 176/Mtg EB LRT	Alt C-3: US 176/EB BRT Alt C-4: US 176/EB LRT	Alt D-1: Dorch/Mtg BRT Alt D-2: Dorch/Mtg LRT	Alt D-3: Dorch/EB BRT Alt D-4: Dorch/EB LRT
Housing Units-All Types	301,477	301,477	245,906	245,906	227,196	227,196
Housing Units - Legally Binding Affordability Restricted	5,516	5,516	4,316	4,316	4,492	4,492
Number of Counties	3	3	2	2	2	2
Total Station Area Housing Units - Legally Binding Affordability Restricted Housing	1,225	1,126	1,382	1,279	932	829
Station-Area Share of Legally Binding Affordability Restricted Housing	8.4%	8.1%	9.9%	9.6%	7.1%	6.6%

Share of Housing Units that are Legally Binding Affordability Restricted in the Corridor compared to Share in the Counties	Alt B-1: US 78/Mtg BRT Alt B-2: US 78/Mtg LRT	Alt B-3: US 78/EB BRT Alt B-4: US 78/EB LRT	Alt C-1: US 176/Mtg BRT Alt C-2: US 176/Mtg EB LRT	Alt C-3: US 176/EB BRT Alt C-4: US 176/EB LRT	Alt D-1: Dorch/Mtg BRT Alt D-2: Dorch/Mtg LRT	Alt D-3: Dorch/EB BRT Alt D-4: Dorch/EB LRT
Proportion in All Station Areas	8.4%	8.1%	9.9%	9.6%	7.1%	6.6%
Proportion in All Counties in which Project Stations are Located	1.8%	1.8%	1.8%	1.8%	2.0%	2.0%
Ratio, Proportion in All Station Areas to Proportion in All Counties in which Project Stations are Located	4.61	4.42	5.64	5.45	3.60	3.35

**Note – Housing Unit data used for Current Year 2010 summary table obtained from Census 2013 ACS data. Legally Binding Affordability Restricted Housing Units obtained from the National Housing Preservation Database*

Table 7 - 6: Screen Two Potential Affordable Housing Rating

FTA Criteria: Proportion of legally binding affordability restricted housing in the project corridor compared to the proportion in the counties through which the project travels	Criteria	Alt B-1: US 78/Mtg BRT Alt B-2: US 78/Mtg LRT	Alt B-3: US 78/EB BRT Alt B-4: US 78/EB LRT	Alt C-1: US 176/Mtg BRT Alt C-2: US 176/Mtg EB LRT	Alt C-3: US 176/EB BRT Alt C-4: US 176/EB LRT	Alt D-1: Dorch/Mtg BRT Alt D-2: Dorch/Mtg LRT	Alt D-3: Dorch/EB BRT Alt D-4: Dorch/EB LRT
High	>=2.50	4.61	4.42	5.64	5.45	3.60	3.35
Medium High	2.25 to 2.49						
Medium	1.5 to 2.49						
Medium-Low	1.10 to 1.49						
Low	<1.10						

8 Economic Development

The economic development measure assesses how likely a proposed transit project is to induce additional transit-supportive development in the future based on a qualitative examination of the existing local plans and policies to support economic development proximate to the projects. Evaluation criteria look at factors such as transit supportive policies and plans, growth management plans, transit supportive zoning, and affordable housing policies. While a clearly defined project is needed to accurately assess the Economic Development impacts, the qualitative assessment in the Screen One Analysis provides an initial comparison of the corridors' likely performance. This Screen Two Analysis further refines the qualitative assessment conducted in Screen One to apply the FTA qualitative criteria to each alternative to understand how each could potentially rate, as described in the Land Use and Economic Development Analysis in Appendix 6-H, and as summarized in Table 8-1 and 8-2. All of the corridors have the potential to score well under the transit supportive plans evaluation; however, improvement is needed to demonstrate performance under these plans and policies. Additionally, the alternatives scored low with measures rating affordable housing policies and plans in place.

Table 8 - 1: Screen Two Alternatives Potential Economic Development Rankings: Transit Supportive Plans and Policies

Transit Supportive Plans and Policies	Alt B-1: US 78/Mtg BRT Alt B-2: US 78/Mtg LRT	Alt B-3: US 78/EB BRT Alt B-4: US 78/EB LRT	Alt C-1: US 176/Mtg BRT Alt C-2: US 176/Mtg LRT	Alt C-3: US 176/EB BRT Alt C-4: US 176/EB LRT	Alt D-1: Dorch/Mtg BRT Alt D-2: Dorch/Mtg LRT	Alt D-3: Dorch/EB BRT Alt D-4: Dorch/EB LRT
Growth Management:						
Concentration of development around established activity centers and regional transit	High	High	Medium-High	Medium-High	Medium-High	Medium-High
Land conservation and management	Medium	Medium	Medium-Low	Medium-Low	High	High
Transit Supportive Corridor Policies						
Plans and policies to increase corridor and station area development	Yes	Yes	Yes	Yes	Yes	Yes
Plans and policies to enhance transit-friendly character of corridor and station area development	Nexton/Ingleside/Mixson/Magnolia/Courier Square ; City of Charleston Peninsula Mobility Report; Neck Area Plan	Nexton/Ingleside/Mixson/Magnolia/Courier Square; City of Charleston Peninsula Mobility Report; Neck Area Plan	Cane Bay/Carnes Crossing/Mixson/Magnolia/Courier Square; City of Charleston Peninsula Mobility Report; Neck Area Plan	Cane Bay/Carnes Crossing/Mixson/Magnolia/Courier Square; City of Charleston Peninsula Mobility Report; Neck Area Plan	Oakbrook/Courier Square/Wescott/Magnolia; City of Charleston Peninsula Mobility Report; Neck Area Plan	Oakbrook/Courier Square/Wescott/Magnolia; City of Charleston Peninsula Mobility Report; Neck Area Plan
Plans to improve pedestrian facilities including facilities for persons with disabilities	Yes	Yes	Yes	Yes	Yes	Yes
Parking policies	City of Charleston Peninsula Mobility Report	City of Charleston Peninsula Mobility Report	City of Charleston Peninsula Mobility Report	City of Charleston Peninsula Mobility Report	City of Charleston Peninsula Mobility Report	City of Charleston Peninsula Mobility Report
Supportive Zoning Regulations Near Transit Station						
Zoning ordinances that support increased development density in transit station areas	Yes - Proposed Upper Peninsula Zoning District	Yes - Proposed Upper Peninsula Zoning District	Yes - Proposed Upper Peninsula Zoning District	Yes - Proposed Upper Peninsula Zoning District	Yes - Proposed Upper Peninsula Zoning District	Yes - Proposed Upper Peninsula Zoning District
Zoning ordinances that enhance transit-oriented character of station area development and pedestrian access	Yes - PDD zoning (Mixson/Horizon Village/Ingleside)	Yes - PDD zoning (Mixson/Horizon Village/Ingleside)	Yes - PDD zoning (Mixson/Horizon Village)	Yes - PDD zoning (Mixson/Horizon Village)	No - Dorchester Rd. Overlay District (restrictive)	No - Dorchester Rd. Overlay District (restrictive)
Zoning allowances for reduced parking and traffic mitigation	Yes - Proposed Upper Peninsula Zoning District	Yes - Proposed Upper Peninsula Zoning District	Yes - Proposed Upper Peninsula Zoning District	Yes - Proposed Upper Peninsula Zoning District	Yes - Proposed Upper Peninsula Zoning District	Yes - Proposed Upper Peninsula Zoning District
Tools to Implement Land Use Policies						
Outreach to government agencies and the community in support of transit supportive planning	Upper Peninsula Initiative (http://charlestonup.com/)	Upper Peninsula Initiative (http://charlestonup.com/)	Upper Peninsula Initiative (http://charlestonup.com/)	Upper Peninsula Initiative (http://charlestonup.com/)	Upper Peninsula Initiative (http://charlestonup.com/)	Upper Peninsula Initiative (http://charlestonup.com/)
Regulatory and financial incentives to promote transit-supportive development	Yes - Proposed Upper Peninsula Zoning District	Yes - Proposed Upper Peninsula Zoning District	Yes - Proposed Upper Peninsula Zoning District	Yes - Proposed Upper Peninsula Zoning District	Yes - Proposed Upper Peninsula Zoning District	Yes - Proposed Upper Peninsula Zoning District
Efforts to engage the development community in station area planning and transit-supportive development	Upper Peninsula Initiative (http://charlestonup.com/)	Upper Peninsula Initiative (http://charlestonup.com/)	Upper Peninsula Initiative (http://charlestonup.com/)	Upper Peninsula Initiative (http://charlestonup.com/)	Upper Peninsula Initiative (http://charlestonup.com/)	Upper Peninsula Initiative (http://charlestonup.com/)

Table 8 - 2: Screen Two Alternatives: Potential Economic Development Rating: Performance and Impacts of Land Use Policies & Affordable Housing

Performance and Impacts of Land Use Policies	Alt B-1: US 78/Mtg BRT Alt B-2: US 78/Mtg LRT	Alt B-3: US 78/EB BRT Alt B-4: US 78/EB LRT	Alt C-1: US 176/Mtg BRT Alt C-2: US 176/Mtg LRT	Alt C-3: US 176/EB BRT Alt C-4: US 176/EB LRT	Alt D-1: Dorch/Mtg BRT Alt D-2: Dorch/Mtg LRT	Alt D-3: Dorch/EB BRT Alt D-4: Dorch/EB LRT
Performance of Land Use Policies						
Demonstrated cases of developments affected by transit-supportive policies	Yes - Mixson	Yes - Mixson	Yes - Mixson	Yes - Mixson		
Station area development proposals and status						
Potential impact of Transit Project on Regional Land Use						
Adaptability of station area land for development	Medium-High	Medium-High	High	High	Low	Low
Corridor economic environment	High	High	Medium-High	Medium-High	Low	Low

Tools to Maintain or increase the Share of Affordable Housing	Alt B-1: US 78/Mtg BRT Alt B-2: US 78/Mtg LRT	Alt B-3: US 78/EB BRT Alt B-4: US 78/EB LRT	Alt C-1: US 176/Mtg BRT Alt C-2: US 176/Mtg LRT	Alt C-3: US 176/EB BRT Alt C-4: US 176/EB LRT	Alt D-1: Dorch/Mtg BRT Alt D-2: Dorch/Mtg LRT	Alt D-3: Dorch/EB BRT Alt D-4: Dorch/EB LRT
Evaluation of corridor-specific affordable housing needs and supply						
Plans and polices to preserve and increase affordable housing in the region and/or corridor	Medium-Low	Medium-Low	Medium-Low	Medium-Low	Medium-Low	Medium-Low
Adopted financing tools and strategies targeted to preserving and increasing affordable housing in the region and/or corridor	Low	Low	Low	Low	Low	Low
Evidence of public sector and developer activity to preserve and increase affordable housing in the corridor						
Extent to which plans and policies account for long-term affordability and needs of the very-and extremely-low income households in the corridor	Low	Low	Low	Low	Low	Low

9 Summary

Based on the planning level analysis conducted in Screen Two of this alternatives analysis, the following Table 9-1 summarizes the overall rating for each of the six project justification criteria as well as an overall ranking for each Screen Two alternative. The cost effectiveness, mobility improvements, congestion relief and environmental benefits rating is based on the quantitative analysis describe in previous sections of this analysis. The land use rating is given a low rating based on the 2010 quantitative data on employment and population. This rating can likely be improved during project development once a preferred alternative is selective and station area planning is conducted. Additional information on parking supply in the Central Business District (Downtown Charleston) as well as verified affordable housing numbers were not available, and as such not included in these ratings. The economic development rating is qualitative and the steps taken during project development to implement transit supportive plans and policies could greatly influence how the preferred alternative is rated, and as such, all of the Screen Two alternatives are given a medium rating for this Screen Two Analysis.

Table 9 - 1: Screen Two Potential Project Justification Criteria Ratings

Screen Two BRT Alternatives	Alt B-1: US 78/Mtg BRT	Alt B-3: US 78/EB BRT	Alt C-1: US 176/Mtg BRT	Alt C-3: US 176/EB BRT	Alt D-1: Dorch/Mtg BRT	Alt D-3: Dorch/EB BRT
Cost Effectiveness	Medium	Medium	Medium-Low	Medium-Low	Medium-Low	Medium-Low
Mobility Improvements	Medium-Low	Medium-Low	Low	Low	Low	Low
Congestion Relief	Medium	Medium	Medium-Low	Medium-Low	Medium	Medium
Environmental Benefits	Medium	Medium	Medium-Low	Medium-Low	Medium-Low	Medium-Low
Land Use	Low	Low	Low	Low	Low	Low
Economic Development	Medium	Medium	Medium	Medium	Medium	Medium
Overall Ranking	**Medium**	**Medium**	**Medium-Low**	**Medium-Low**	**Medium-Low**	**Medium-Low**

Screen Two LRT Alternatives	Alt B-2: US 78/Mtg LRT	Alt B-4: US 78/EB LRT	Alt C-2: US 176/Mtg LRT	Alt C-4: US 176/EB LRT	Alt D-2: Dorch/Mtg LRT	Alt D-4: Dorch/EB LRT
Cost Effectiveness	Low	Low	Low	Low	Low	Low
Mobility Improvements	Medium-Low	Medium-Low	Medium-Low	Medium-Low	Medium-Low	Medium-Low
Congestion Relief	Medium	Medium	Medium	Medium	Medium	Medium
Environmental Benefits	Medium-Low	Medium-Low	Medium-Low	Medium-Low	Medium-Low	Medium-Low
Land Use	Low	Low	Low	Low	Low	Low
Economic Development	Medium	Medium	Medium	Medium	Medium	Medium
Overall Ranking	**Medium-Low**	**Medium-Low**	**Medium-Low**	**Medium-Low**	**Medium-Low**	**Medium-Low**

For this Screen Two Analysis, the alternatives that scored highest under the overall project justification criteria were:

1) Alternatives B-1 & B-3: US 78/US 52 BRT alternatives to Line Street or East Bay (Overall Score: 2.5/5)
2) Alternatives D-1 &D-3: Dorchester Rd/US 52 BRT alternatives to Line Street or East Bay (Overall Score: 2.2/5)
3) BRT Alternatives C-1 & C-3: US 176/US 52 and all LRT Alternatives (Overall Score: 2.0/5)

10 List of Appendices

Appendix 6-A: Screen Two Build Alternatives

Appendix 6-B: Annualization Factor Tables

Appendix 6-C: Travel Demand Forecasting Memorandum

Appendix 6-D: Air Quality Evaluation

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Appendix 6-G: Safety Evaluation

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Appendix 6-A

(Screen Two Build Alternatives)

Appendix 6-B

(Annualization Factor Tables)

Appendix 6-C

(Travel Demand Forecasting Memorandum)

Appendix 6-D

(Air Quality Evaluation)

Appendix 6-E

(Greenhouse Gases Evaluation)

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(Energy Use Evaluation)

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Appendix 6-H

(Screen Two Land Use and Economic Development Analysis Memorandum)