TIGER BENEFIT-COST ANALYSIS (BCA) EXAMPLES

How to Use these BCA Examples

Every project is different, and no two TIGER applications (or their respective BCAs) are alike. **The examples in this supplement are not intended to serve as standard or recommended templates.** They are provided for demonstrative purposes only, so that Applicants may see a range of the possibilities with BCA submissions by successful Applicants across different project types and geographies.

There is no single perfect example of a benefit-cost analysis. While each of the BCAs presented here uses some inappropriate, but correctable, assumptions, they each provide enough information about their assumptions, and enough detail about their calculations, that the TIGER Economic Analysis Team was able to substitute more appropriate assumptions when necessary to produce a useful analysis of benefits and costs. This common feature, that all of these analyses were "transparent and reproducible," allowed us to be confident that the benefits of these projects exceeded their costs.

These BCA examples are well-integrated with their respective Project Narratives, providing logical quantitative evidence that supports the qualitative assertions about benefits and costs of the proposed projects. Finally, these sample BCAs also demonstrate an understanding of the project impacts by linking the proposed project improvements with anticipated transportation outcomes. Ultimately, this helps to fulfill the goal of a successful BCA – by helping to answer questions about the project rather than raising new ones.

In preparing their TIGER Applications and accompanying BCAs, Applicants should consult two specific resources:

- ***Appendix A: Additional Information on Benefit-Cost Analysis,*** as found in the January 31, 2012, Federal Register's Notice of Funding Availability (NOFA) for TIGER Grants (http://www.gpo.gov/fdsys/pkg/FR-2012-01-31/pdf/2012-1996.pdf),is the primary guidance document and introduces the basic concepts of what is expected for a TIGER BCA.

- The ***TIGER Benefit-Cost Analysis (BCA) Resource Guide*** (http://www.dot.gov/tiger/docs/tiger-12_bca-resourceGuide.pdf) supplements the NOFA Appendix A. It provides technical information that Applicants will need for monetizing benefits and costs in their BCAs, as well as guidance on methodology and a selection of frequently asked questions from past TIGER grant applicants.

Any updates to these documents will be posted to the TIGER Discretionary Grants website (http://www.dot.gov/tiger).

Updated 3/6/12

TIGER Benefit-Cost Analysis (BCA) Examples

Project	State	Project Type	Relevant BCA Contents
(1) US 101 Smith River Safety Corridor	CA	Road & Bridge (Rural)	- BCA Summary from Project Narrative - Low Estimate Safety Benefits (12 pages from Excel workbook) - High Estimate Safety Benefits (12 pages from Excel workbook)
(2) Snake Road Improvement	FL	Road & Bridge (Rural)	- BCA Summary from Project Narrative - Benefit-Cost Analysis (Appendix A) (27 pages)
(3) Chicago Blue Line Renewal and City Bike Share	IL	Transit & Multimodal	- BCA Summary from Project Narrative - BCA Calculations (Appendices A-H) (17 pages from Excel workbook)
(4) Kennebec Bridge Replacement	ME	Road & Bridge (Rural)	- BCA Summary from Project Narrative - BCA Narrative (7 pages) - BCA Summary - Life Cycle Cost Analysis (7% discount) - Life Cycle Cost Analysis (3% discount) -
(5) Oklahoma Freight Rail Upgrade	OK	Freight (Rural)	- BCA Summary from Project Narrative - BCA Technical Memo on external project website (14 pages)
(6) IMPaCT Philadelphia	PA	Road & Bridge	- BCA Summary from Project Narrative - Detailed Benefit/Cost Calculation Spreadsheet (Appendix D) (28 pages)
(7) Boundary Street Redevelopment	SC	Road & Bridge	- BCA Summary from Project Narrative - BCA Narrative (7 pages) - BCA Model (44 pages from Excel workbook)

TIGER Benefit-Cost Analysis (BCA) Examples

US 101 Smith River Safety Corridor

Tribe of Smith River Rancheria

BCA Example Contents

- BCA Summary from Project Narrative
- Low Estimate Safety Benefits
- High Estimate Safety Benefits

Smith River Rancheria, CA
A Federally-Recognized Tribal Government

U.S. 101 Multimodal Smith River Safety Corridor

TIGER III Discretionary Grant Application

October 31, 2011

This is a BCA-relevant excerpt from the full TIGER Application

e. Benefit-Cost Analysis (BCA) Summary Results

The BCA was structured around safety, as is this is a major project benefit and the most directly measurable. Various aspects of safety benefits were researched and monetized for this analysis, and two versions of the BCA were performed. One version was very conservative in estimating project benefits (low version); the second version was less conservative but still very reasonable (high version).

Under the low version, the estimated BCA ratio is 6.02, and is calculated by dividing the total estimated 20-year benefit ($18,806,640) by the total project cost ($3,124,800). It is the Tribe's understanding that project costs do not need to be "grown out" for the 20-year period to perform this calculation. Similarly, project benefits were not discounted back to NPV because they also were not grown out (in terms of growth rate or inflation). Using the same methodology described above, under the high version, the estimated BCA ratio is 11.95 ($37,326,039/$3,124,800).

The full BCA calculations are available here: http://www.box.net/shared/cpsy8ad62idutllc0yz7 They consist of two Excel spreadsheets (low and high scenarios). For each spreadsheet, the "CRF-Applied" tab summarizes the total benefit calculations used in discussion above.

Although, as explained above, other project benefits were not monetized or calculated, they are still very important for this project. A context-sensitive highway section with unique, colorized shoulder treatments and gateway signs provide an obvious benefit to community identity and livability. The ground-breaking partnership that has led to this proposed project is an important benefit from the Tribe's perspective.

Finally, a "no-build" scenario is difficult to calculate. This narrative has documented that total and fatal collisions continue to increase in the project area. They will presumably increase even more as growth and development in the project area also continue to increase. While the Tribe and Caltrans will continue to make incremental improvements along the US 101 corridor, there is no other funding for this proposed TIGER project.

Northern Section = 0.6 miles, focused around Indian Rd. intersection (accidents are consider intersection-related)

PM 43.75 to PM 43.15
N Indian Rd Mouth of Smith River

Do not have data on primary collision factors for each accidents, only overall statistics. Need to make assumptions about likely collision factors for accidents of each severity.

3 Pedestrian-related crashes at the intersection, one fatality.
Actual total collistion rate for this segment is 2.8 times than statewide avg. total collision rate
Actual Fatal-Plus-Injury 3.4 times higher than statewide average F-P-I rate.[1]

Primary Collision Factors[1]

Factor	Ped-Related Accidents	Non-Ped Accidents	Total
Failure to Yield	0	3	3
Improper Turn	1	1	2
Influence Alcohol	0	1	1
Other Violations	1	1	2
Unknown	1	0	1
TOTAL	**3**	**6**	**9**

Annual Number of Pedestrian Accidents Occuring 2005-9 Along PM 43.75 to PM 43.15 (Indian Rd. Intersection) Distributed by Collision Factors and Severity[1,2]

Accident Severity	Total Accidents 2006-9	Annual Accidents (total / 3)	Collison Factor	Time of Day
Fatalities	1	0.33	Other Violatio	Darkness
Injuries	1	0.33	Unknown	Dusk/Dawn
PDO	1	0.33	Improper Turn	Daylight
TOTAL	**3**	**1.00**		

Annual Number of Non-Ped Accidents Occuring by Collision Factor

Accident Severity	Non-Ped Accidents 2006-9	Annual Accidents (total / 3)	Accidents Caused by Failure to Yield (50%)	Accidents Caused by Improper Turn (17%)	Accidents Caused by Influence Alcohol (17%)	Accidents Caused by Other Violations (17%)	Total
Fatalities	1	0.33	0.17	0.06	0.06	0.06	0.33
Injuries	2	0.67	0.33	0.11	0.11	0.11	0.67
PDO	3	1	0.50	0.17	0.17	0.17	1.00
TOTAL	**6**	**2.00**	**1.00**	**0.33**	**0.33**	**0.33**	**2.00**

Annual Percent of Non-Ped Accidents Occuring After Dark[1]

	Accidents Occuring in Dark (2006-9)	Annual Accidents Occuring in Dark (2006-9)	Percent of Non-Ped Total (6)
Dark	2	0.67	**33%**

Annual Number of Non-Ped Accidents Occuring After Dark by Collision Factor and Severity

Accident Severity	Annual Accidents	Percent in Dark	Accidents Caused by Failure to Yield (50%)	Accidents Caused by Improper Turn (17%)	Accidents Caused by Influence Alcohol (17%)	Accidents Caused by Other Violations (17%)	Total Accidents in Dark
Fatalities	0.33	0.33	0.06	0.02	0.02	0.02	0.11
Injuries	0.67	0.33	0.11	0.04	0.04	0.04	0.22
PDO	1.00	0.33	0.17	0.06	0.06	0.06	0.33
TOTAL	**2.00**	**1.00**	**0.33**	**0.11**	**0.11**	**0.11**	**0.67**

Annual Number of Non-Ped Accidents A13

Accident Severity	Accidents Caused by Failure to Yield (Daylight)	Accidents Caused by Failure to Yield (Darkness)	Accidents Caused by Improper Turn (Daylight)	Accidents Caused by Improper Turn (Darkness)	Accidents Caused by Influence Alcohol (Daylight)	Accidents in Caused by Influence Alcohol (Darkness)	Accidents Caused by Other Violations (Daylight)	Accidents in Caused by Other Violations (Darkness)	TOTAL
Fatalities	0.11	0.06	0.04	0.02	0.04	0.02	0.04	0.02	**0.33**
Injuries	0.22	0.11	0.07	0.04	0.07	0.04	0.07	0.04	**0.67**
PDO	0.33	0.17	0.11	0.06	0.11	0.06	0.11	0.06	**1.00**
TOTAL	**0.67**	**0.33**	**0.22**	**0.11**	**0.22**	**0.11**	**0.22**	**0.11**	**2.00**

Sources

[1]TASAS Collision Analysis Memorandum 8/10/10, Jeffrey Zimmerer, Dept. of Transportation,

[2]Final [Joint] Roadside Safety Audit/Value Analysis Study Report, D-1 US 101 Smith River Corridor Improvements, Del Norte County, PM 35.90 - 46.49 Federal Highway Administratoin, Task Order Number 184, March 2011

Southern Section = 0.7 miles of highway

PM 40.2 to PM 39.5
South of Westbrook Ln. South of Rowdy Creek Bridge

Do not have data on primary collision factors for each accidents, only overall statistics. Need to make assumptions about likely collision factors for accidents of each severity.

Four Primary Collision Factors[1]
Speeding
Improper Turn (going off shoulder[3])
Influence Alcohol
Other Than Driver (animal crashes, other miscellaneous crash types[2])

Annual Number of Accidents Occuring by Collision Factor (Estimation)

Accident Severity	Total Accidents 2006-9[1,2]	Annual Accidents (total / 3)	Accidents with no know Collision Factor (2006-9)*	Annual Accidents with no know Collision Factor	Annual Number per Collision Factor**	Accidents Caused by Influence Alcohol	Accidents Caused by Other Than Driver	Accidents Caused by Speeding	Accidents Caused by Improper Turn	Total
Fatalities	2	0.67	1	0.33	0.08	0.42	0.08	0.08	0.08	0.67
Injuries	3	1	3	1	0.25	0.25	0.25	0.25	0.25	1
PDO	6	2	6	2	0.50	0.50	0.50	0.50	0.50	2
TOTAL	**11**	**3.67**	**10**	**3.33**	**0.83**	**1.17**	**0.83**	**0.83**	**0.83**	**3.67**

*One fatality is known to have a Primary Collision Factor "Influence Alcohol" so it is not included in the distribution among factors but added in after to Influence Alcohol.[1]
**Accidents are distributed equally over the four collision factors

Annual Percent of Accidents Occuring After Dark (Estimation)[1,2]

	Accidents Occuring in Dark (2006-9)	Annual Accidents Occuring in Dark (2006-9)	Percent of Total (11)
Dark	4	1.33	**36%**

Annual Number of Accidents Occuring After Dark by Collision Factor and Severity

Accident Severity	Annual Accidents	Percent in Dark	Accidents in Dark Caused by Influence Alcohol	Accidents in Dark Caused by Other Than Driver	Accidents in Dark Caused by Speeding	Accidents in Dark Caused by Improper Turn	Total Accidents in Dark
Fatalities	0.67	0.36	0.15	0.03	0.03	0.03	0.24

Injuries	1.00	0.36	0.09	0.09	0.09	0.09	0.36
PDO	2.00	0.36	0.18	0.18	0.18	0.18	0.73
TOTAL	**3.67**	**1.09**	**0.42**	**0.30**	**0.30**	**0.30**	**1.33**

Annual Number of Accidents Occuring 2005-9 Along PM 40.2 to PM 39.5 Distributed by Collision Factors and Severity

Accident Severity	Accidents Caused by Influence Alcohol (Daylight)	Accidents Caused by Influence Alcohol (Darkness)	Accidents Caused by Other Than Driver (Daylight)	Accidents Caused by Other Than Driver (Darkness)	Accidents Caused by Speeding (Daylight)	Accidents in Caused by Speeding (Darkness)	Accidents Caused by Improper Turn (Daylight)	Accidents in Caused by Improper Turn (Darkness)	TOTAL
Fatalities	0.27	0.15	0.05	0.03	0.05	0.03	0.05	0.03	**0.67**
Injuries	0.16	0.09	0.16	0.09	0.16	0.09	0.16	0.09	**1.00**
PDO	0.32	0.18	0.32	0.18	0.32	0.18	0.32	0.18	**2.00**
TOTAL	**0.74**	**0.42**	**0.53**	**0.30**	**0.53**	**0.30**	**0.53**	**0.30**	**3.67**

Sources

[1]TASAS Collision Analysis Memorandum 8/10/10, Jeffrey Zimmerer, Dept. of Transportation,

[2]Final [Joint] Roadside Safety Audit/Value Analysis Study Report, D-1 US 101 Smith River Corridor Improvements, Del Norte County, PM 35.90 - 46.49 Federal Highway Administratoin, Task Order Number 184, March 2011

[3]Phone conversation reviewing TASAS report 10-28-11, Valency Langtry, Advance Planning, CA DOT.

Collision Factors Expected to be Reduced by Upgrades for Non-Pedestrian-Related Accidents

Factor	Crashes Expected to be Reducted?	Reduction Factor -- All Crashes*	Reduction Factor -- Injuries Only*
Influence Alcohol	No		
Other Than Driver	No		
Speeding	Yes	5.5%	10.0%
Improper Turn	Yes	20.0%	
Failure to Yield	Yes	5.5%	10.0%
Other Violations	No		
Dark	Yes	21.0%	29.0%

*See table below for calculations and sources.

Collision Factors Expected to be Reduced by Upgrades for Pedestrian-Related Accidents

Factor	Crashes Expected to be Reducted?	Reduction Factor -- All Crashes*	Reduction Factor -- Injuries Only*
Improper Turn	Yes	20.0%	30.0%
Other Violations	Yes	20.0%	30.0%
Unknown	Yes	20.0%	30.0%
Dark	Yes	21.0%	29.0%
Dusk / Dawn	Yes	15.8%	21.8%

*See table below for calculations and sources.
**In cases where more than one reduction factor applies, the factor with the highest reduction is chosen.

Crash Reduction Factors by Project Upgrade and Collision Factors Affected

Project Upgrade	Collision Factors Affected	All	Injury Only	Source	Notes on assumptions
IPA-9 Community Lighting	Dark	21%	29%	1	
	Dusk Dawn	15.8%	21.8%		The expected reduction that occurs in dark is conservatively reduced by 75%.
IPA-7, IPA-18 Gateway & Community Identity Signs	All Factors	5.50%	10%	1	Assume signage induces traffic calming and driver awareness of shift from rural to urban settings, possibility of increased pedestrian and vehicle conflicts, resulting in decrease of speed by 1 mph (conservative assumption). To ascertain AMFs for 55mph, AMFs for 50mph and 60mph were averaged.
IPA-21 Colorized, stamped shoulder treatments	Improper Turn (going off road)	20%		4	States that edgeline markings decrease accidents by 30%, 20% is chosen as a conservative estimate.
IPA-11 RRFBs at ped crossings	Pedestrian at intersections	20%	30%	2,3	Showed increase in yielding compliance by 70%[2] and decrease in speeds by 4mph[3] (reduction in accidents by 21.5%, 38% injuries[1]); used conservative assumption.

*****This table needs to be standardized with the project upgrade language**

Sources:

[1]Accident Modification Factors for Traffic Engineering and ITS Improvements, NCHRP Report 617, May 2008 (speed reduction see Table 12)
http://onlinepubs.trb.org/Onlinepubs/nchrp/nchrp_rpt_617.pdf

[2]Rectangular Rapid Flash Beacon (RRFB), FHWA-SA-09-009, May 2009
http://safety.fhwa.dot.gov/intersection/resources/techsum/fhwasa09009/

[3]VanWagner, M, Van Houten, R and Betts, B. The Effects of a Rectangular Rapid-Flashing Beacon on Vehicle Speed, Journal of Applied Behavior Analysis, 44, 629-633, Fall 2011.
http://seab.envmed.rochester.edu/Jaba/articles/2011/jaba-44-03-0629.pdf

[4]Toolbox of Countermeasures and Their Potential Effectiveness for Roadway Departure Crashes, Federal Hiway Administration, USDOT, FHWA-SA-07-013, Sept. 2007.
http://www.transportation.org/sites/scohts/docs/Roadway%20Departure%20Issue%20Brief.pdf

Annual Number of Accidents Occuring 2005-9 Along PM 40.2 to PM 39.5 by Collision Factors and

Accident Severity	Accidents Caused by Speeding (Daylight)	Accidents in Caused by Speeding (Darkness)	Accidents Caused by Improper Turn (Daylight)	Accidents in Caused by Improper Turn (Darkness)	TOTAL
Fatalities	0.05	0.03	0.05	0.03	**0.17**
Injuries	0.16	0.09	0.16	0.09	**0.50**
PDO	0.32	0.18	0.32	0.18	**1.00**
TOTAL	**0.53**	**0.30**	**0.53**	**0.30**	**1.67**

Assumptions and calculations for this table can be found in sheet "Corridor Valuatoin"

Current Cost of Accidents Expected to be Affected by Project Upgrades

Accident Severity	Accidents Caused by Speeding (Daylight)	Accidents in Caused by Speeding (Darkness)	Accidents Caused by Improper Turn (Daylight)	Accidents in Caused by Improper Turn (Darkness)	ANNUAL COST	20 Yr Cost, No Discount	20 Yr Cost, 7% Discount
Fatalities	$328,788	$187,879	$328,788	$187,879	**$1,033,333**	$20,666,666.67	
Injuries	$87,984	$50,276	$87,984	$50,276	**$276,520**	$5,530,400.00	
PDO	$1,045	$597	$1,045	$597	**$3,285**	$65,700.00	
TOTAL	**$417,817**	**$238,752**	**$417,817**	**$238,752**	**$1,313,138**	**$26,262,766.67**	

See Injury Severity Assumption in sheet "Valuation Data"

Percent Accidents Expected to be Reduced by Project Improvements

Accident Severity	Accidents Caused by Speeding (Daylight)	Accidents in Caused by Speeding (Darkness)	Accidents Caused by Improper Turn (Daylight)	Accidents in Caused by Improper Turn (Darkness)
Fatalities	5.5%	26.5%	20.0%	41.0%
Injuries	10.0%	39.0%	20.0%	49.0%
PDO	5.5%	26.5%	20.0%	41.0%

For explanation on reduction rates, see sheet "Crash Reduction Factors"

Annual Number of Non-Ped Accidents Occuring 2005-9 Along PM 43.75 to PM 43.15 (Indian Rd. Ir

Accident Severity	Accidents Caused by Failure to Yield (Daylight)	Accidents Caused by Failure to Yield (Darkness)	Accidents Caused by Improper Turn (Daylight)	Accidents Caused by Improper Turn (Darkness)	TOTAL
Fatalities	0.11	0.06	0.04	0.02	**0.22**
Injuries	0.22	0.11	0.07	0.04	**0.44**
PDO	0.33	0.17	0.11	0.06	**0.67**
TOTAL	**0.67**	**0.33**	**0.22**	**0.11**	**1.33**

Assumptions and calculations for this table can be found in sheet "Intersection Valuatoin"

Current Cost of Accidents Expected to be Affected by Project Upgrades

Accident Severity	Accidents Caused by Failure to Yield (Daylight)	Accidents Caused by Failure to Yield (Darkness)	Accidents Caused by Improper Turn (Daylight)	Accidents Caused by Improper Turn (Darkness)	ANNUAL COST	20 Yr Cost, No Discount	20 Yr Cost, 7% Discount
Fatalities	$688,889	$344,444	$229,630	$114,815	**$1,377,778**	$27,555,555.56	
Injuries	$122,898	$61,449	$40,966	$20,483	**$245,796**	$4,915,911.11	
PDO	$1,095	$548	$365	$183	**$2,190**	$43,800.00	
TOTAL	**$812,882**	**$406,441**	**$270,961**	**$135,480**	**$1,625,763**	**$32,515,266.67**	

Percent Accidents Expected to be Reduced by Project Improvements

Accident Severity	Accidents Caused by Failure to Yield (Daylight)	Accidents Caused by Failure to Yield (Darkness)	Accidents Caused by Improper Turn (Daylight)	Accidents Caused by Improper Turn (Darkness)
Fatalities	5.5%	26.5%	20.0%	41.0%
Injuries	10.0%	39.0%	20.0%	49.0%
PDO	5.5%	26.5%	20.0%	41.0%

For explanation on reduction rates, see sheet "Crash Reduction Factors"

Annual Number of Pedestrian Accidents Occuring 2005-9 Along PM 43.75 to PM 43.15 (Indian Rd.

Accident Severity	Total Accidents 2006-9	Annual Accidents (total / 3)	Collison Factor	Time of Day
Fatalities	1	0.33	Other Violatio	Darkness
Injuries	1	0.33	Unknown	Dusk/Dawn
PDO	1	0.33	Improper Turn	Daylight
TOTAL	**3**	**1.00**		

Current Cost of Accidents Expected to be Affected by Project Upgrades

Accident Severity	Annual Accidents (total / 3)	ANNUAL COST	20 Yr Cost, No Discount	20 Yr Cost, 7% Discount
Fatalities	0.33	**$2,066,667**	$41,333,333.33	
Injuries	0.33	**$888,460**	$17,769,200.00	
PDO	0.33	**$1,095**	$21,900.00	
TOTAL	**1.00**	**$2,956,222**	**$59,124,433.33**	

Percent Accidents Expected to be Reduced by Project Improvements

Accident Severity	Percent Reduction Expected	Collison Factor	Time of Day
Fatalities	41.0%	Other Violation	Darkness
Injuries	51.8%	Unknown	Dusk/Dawn
PDO	20.0%	Improper Turn	Daylight

Collision Factors Expected to be Reduced by Upgrades in Non-Pedestrian-Related Accidents and Percent Reduction Expected

Factor	Expected to	Percent Red	Documentati	Notes
Influence Alcohol	No	0%		
Other Than Driver	No	0%		
Speeding	Yes	30%		
Improper Turn	Yes	30%		With speeds reduced due to traffic calming and increased awareness of road boundary due to colorized, unique shoulder treatments, it is less likely that vehicles will travel off the side of the road and/or be able to correct their error much quicker.
Failure to Yield	Yes	5%	**reduction d	With speeds reduced due to traffic calming, it can be expected that that a very small number of accidents will be avoided due to improved detection by oncoming cars of turning vehicles, detection of oncoming cars by turning vehicles, and the ability of turning vehicles to r
Other Violations	No			
Unknown	No			
Dark	Yes	50%		
Dusk / Dawn				

Annual Number of Accidents Expected After Project Upgrades

Accident Severity	Accidents Caused by Speeding (Daylight)	Accidents in Caused by Speeding (Darkness)	Accidents Caused by Improper Turn (Daylight)	Accidents in Caused by Improper Turn (Darkness)	TOTAL
Fatalities	0.05	0.02	0.04	0.02	**0.13**
Injuries	0.14	0.06	0.13	0.05	**0.37**
PDO	0.30	0.13	0.25	0.11	**0.80**
TOTAL	**0.49**	**0.21**	**0.42**	**0.17**	**1.30**

For explanation on reduction rates, see sheet "Crash Reduction Factors"

Expected Cost of Accidents Expected to be Affected by Project Upgrades

Accident Severity	Accidents Caused by Speeding (Daylight)	Accidents in Caused by Speeding (Darkness)	Accidents Caused by Improper Turn (Daylight)	Accidents in Caused by Improper Turn (Darkness)	ANNUAL COST	20 Yr Cost, No Discount	20 Yr Cost, 7% Discount
Fatalities	$310,705	$138,091	$263,030	$110,848	**$822,674**	$16,453,484.85	
Injuries	$79,185	$30,669	$70,387	$25,641	**$205,882**	$4,117,634.18	
PDO	$988	$439	$836	$352	**$2,615**	$52,306.16	
TOTAL	**$390,878**	**$169,198**	**$334,253**	**$136,842**	**$1,031,171**	**$20,623,425.19**	

See Injury Severity Assumption in sheet "Valuation Data"

Project Benefit

Annual	20 Yr Cost, No Discount	20 Yr Cost, 7% Discount
$281,967	**$5,639,341**	$0
$1,866,302	**$37,326,039**	**$0**

Annual Number of Accidents Expected After Project Upgrades

Accident Severity	Accidents Caused by Failure to Yield (Daylight)	Accidents Caused by Failure to Yield (Darkness)	Accidents Caused by Improper Turn (Daylight)	Accidents Caused by Improper Turn (Darkness)	TOTAL
Fatalities	0.11	0.04	0.03	0.01	**0.19**
Injuries	0.20	0.07	0.06	0.02	**0.35**
PDO	0.32	0.12	0.09	0.03	**0.56**
TOTAL	**0.62**	**0.23**	**0.18**	**0.06**	**1.09**

For explanation on reduction rates, see sheet "Crash Reduction Factors"

Expected Cost of Accidents Expected to be Affected by Project Upgrades

Accident Severity	Accidents Caused by Failure to Yield (Daylight)	Accidents Caused by Failure to Yield (Darkness)	Accidents Caused by Improper Turn (Daylight)	Accidents Caused by Improper Turn (Darkness)	ANNUAL COST	20 Yr Cost, No Discount	20 Yr Cost, 7% Discount
Fatalities	$651,000	$253,167	$183,704	$67,741	**$1,155,611**	$23,112,222.22	
Injuries	$110,608	$37,484	$32,773	$10,446	**$191,311**	$3,826,217.48	
PDO	$1,035	$402	$292	$108	**$1,837**	$36,737.25	
TOTAL	**$762,643**	**$291,053**	**$216,768**	**$78,295**	**$1,348,759**	**$26,975,176.95**	

See Injury Severity Assumption in sheet "Valuation Data"

Project Benefit

Annual	20 Yr Cost, No Discount	20 Yr Cost, 7% Discount
$277,004	**$5,540,090**	**$0**

Annual Number of Accidents Expected After Project Upgrades

Accident Severity	Annual Accidents Expected	Collison Factor	Time of Day
Fatalities	0.20	Other Violation	Darkness
Injuries	0.16	Unknown	Dusk/Dawn
PDO	0.27	Improper Turn	Daylight
TOTAL	**0.62**		

Accident Severity	Annual Cost	20 Yr Cost, No Discount	20 Yr Cost, 7% Discount
Fatalities	$1,219,333	$24,386,666.67	
Injuries	$428,682	$8,573,639.00	
PDO	$876	$17,520.00	
TOTAL	**$1,648,891**	**$32,977,825.67**	

Project Benefit

Annual	20 Yr Cost, No Discount	20 Yr Cost, 7% Discount
$1,307,330	**$26,146,608**	**$0**

manuveur out of the path of an oncoming car once having turned.

Value of Injuries ($2011)[1]

AIS Level	Severity	Fraction of VSL	Unit value
AIS 1	Minor	0.003	$18,600
AIS 2	Moderate	0.047	$291,400
AIS 3	Serious	0.105	$651,000
AIS 4	Severe	0.266	$1,649,200
AIS 5	Critical	0.593	$3,676,600
AIS 6	Unsurvivable	1	$6,200,000

Property Damage Only (PDO) ($2011)[2]

Per Vehicle Crash	$3,285

**use with 3% or 7% discount rate

Source

[1]Treatment of the Value of Preventing Fatalities and Injuries in Preparing Economic Analyses -- 2011 Revision (2011). Http://ostpxweb.dot.gov/policy

[2]The Economic Impact of Motor Vehicle Crashes 2000, http://www.nhtsa.gov/DOT/NHTSA

Injury Severity Assumption

No data on injury severity is available, so conservative estimates were used.

	Minor	Moderate	Serious	Severe	Critical	Fraction of VS	Unit Value
Auto-only accidents	30%	30%	20%	20%	0%	0.089	$553,040
Ped-related accider	0%	30%	30%	20%	20%	0.430	$2,665,380

Smith River project

1.3 miles bike / ped safety improvements along US 101
2 sections, separated by 2.8 miles

Northern Section = 0.6 miles	PM 43.75 N Indian Rd	to	PM 43.15 Mouth of Smith River
Southern Section = 0.7 miles	PM 40.2 South of Westbrook Ln.	to	PM 39.5 South of Rowdy Creek Bridge

Factors common to study area (corridor and intersection, PM A5 (PM 40.2 to PM 39.5 and PM 43.75 to 43.15)

31%	improper tı	shoulder treatments	
18%	speeding	traffic calming efforts	
46%	night	lighting	(nighttime crashes statistically seems to be overrepresented in data --i.e., traffic volumes ar

Crash Data 7/1/06 - 6/30/09[1]

Northern Section

PM 43.31 -- 43.80 -- Indian Rd. Intersectic	Total Accidents	Fatal	Injury	PDO
(Intersection at 43.56)	9	2	3	4

Primary Collision Factors				Type				Conditions	
Failure to Y	Improper T	Other Viola	Influence Alcohol	Broadside	**Auto-Ped**	Rear End	Head-On	Daylight	Dry Road
3	2	2	1	4	**3**	1	1	6	8

Actual total collistion rate for this segment is 2.8 times than statewide avg. total collision rate
Actual Fatal-Plus-Injury 3.4 times higher than statewide average F-P-I rate.

Pedestrian Accidents

1 -- Intersection	Injury	Improper Tur	daylight	
2 - South of intersection	FATAL	Other Violatic	After Dark	**no street light
3 - North of intersection	Injury	Unknown	Dusk/Dawn	

Southern Section

PM 39.46 to 40.34	Total Accidents	Fatal	Injury	PDO
	11	2	3	6

Primary Collision Factors			Type	
Improper T	Influence A	Other than Speeding	Hit Object	Rear End

Fatalities

~39.46 -- Southern end of town (Smith R)	Influence Alcohol	Rear End
~40.34 -- Northern end of town (SR)	Influence Alcohol	Hit Object

2008 ADT[2]	US 101	7300	peaks May to October (tourism)

Sources

[1]TASAS Collision Analysis Memorandum 8/10/10, Jeffrey Zimmerer, Dept. of Transportation,
[2]Final [Joint] Roadside Safety Audit/Value Analysis Study Report, D-1 US 101 Smith River Corridor Improvements, Del Norte County, PM 35.90 - 46.49
Federal Highway Administratoin, Task Order Number 184, March 2011

nd number of daylight hours; corridor rates 92nd percentile statewide based on nighttime crashes; also verified by the FHWA (fed hwy admin) RSA (road safety assessment) team observations for the study

Northern Section = 0.6 miles, focused around Indian Rd. intersection (accidents are consider intersection-related)

PM 43.75 to PM 43.15
N Indian Rd Mouth of Smith River

Do not have data on primary collision factors for each accidents, only overall statistics. Need to make assumptions about likely collision factors for accidents of each severity.

3 Pedestrian-related crashes at the intersection, one fatality.
Actual total collistion rate for this segment is 2.8 times than statewide avg. total collision rate
Actual Fatal-Plus-Injury 3.4 times higher than statewide average F-P-I rate.[1]

Primary Collision Factors[1]

Factor	Ped-Related Accidents	Non-Ped Accidents	Total
Failure to Yield	0	3	3
Improper Turn	1	1	2
Influence Alcohol	0	1	1
Other Violations	1	1	2
Unknown	1	0	1
TOTAL	**3**	**6**	**9**

Annual Number of Pedestrian Accidents Occuring 2005-9 Along PM 43.75 to PM 43.15 (Indian Rd. Intersection) Distributed by Collision Factors and Severity[1,2]

Accident Severity	Total Accidents 2006-9	Annual Accidents (total / 3)	Collison Factor	Time of Day
Fatalities	1	0.33	Other Violatio	Darkness
Injuries	1	0.33	Unknown	Dusk/Dawn
PDO	1	0.33	Improper Turn	Daylight
TOTAL	**3**	**1.00**		

Annual Number of Non-Ped Accidents Occuring by Collision Factor

Accident Severity	Non-Ped Accidents 2006-9	Annual Accidents (total / 3)	Accidents Caused by Failure to Yield (50%)	Accidents Caused by Improper Turn (17%)	Accidents Caused by Influence Alcohol (17%)	Accidents Caused by Other Violations (17%)	Total
Fatalities	1	0.33	0.17	0.06	0.06	0.06	0.33
Injuries	2	0.67	0.33	0.11	0.11	0.11	0.67
PDO	3	1	0.50	0.17	0.17	0.17	1.00
TOTAL	**6**	**2.00**	**1.00**	**0.33**	**0.33**	**0.33**	**2.00**

Annual Percent of Non-Ped Accidents Occuring After Dark[1]

	Accidents Occuring in Dark (2006-9)	Annual Accidents Occuring in Dark (2006-9)	Percent of Non-Ped Total (6)
Dark	2	0.67	**33%**

Annual Number of Non-Ped Accidents Occuring After Dark by Collision Factor and Severity

Accident Severity	Annual Accidents	Percent in Dark	Accidents Caused by Failure to Yield (50%)	Accidents Caused by Improper Turn (17%)	Accidents Caused by Influence Alcohol (17%)	Accidents Caused by Other Violations (17%)	Total Accidents in Dark
Fatalities	0.33	0.33	0.06	0.02	0.02	0.02	0.11
Injuries	0.67	0.33	0.11	0.04	0.04	0.04	0.22
PDO	1.00	0.33	0.17	0.06	0.06	0.06	0.33
TOTAL	**2.00**	**1.00**	**0.33**	**0.11**	**0.11**	**0.11**	**0.67**

Annual Number of Non-Ped Accidents A13

Accident Severity	Accidents Caused by Failure to Yield (Daylight)	Accidents Caused by Failure to Yield (Darkness)	Accidents Caused by Improper Turn (Daylight)	Accidents Caused by Improper Turn (Darkness)	Accidents Caused by Influence Alcohol (Daylight)	Accidents in Caused by Influence Alcohol (Darkness)	Accidents Caused by Other Violations (Daylight)	Accidents in Caused by Other Violations (Darkness)	TOTAL
Fatalities	0.11	0.06	0.04	0.02	0.04	0.02	0.04	0.02	**0.33**
Injuries	0.22	0.11	0.07	0.04	0.07	0.04	0.07	0.04	**0.67**
PDO	0.33	0.17	0.11	0.06	0.11	0.06	0.11	0.06	**1.00**
TOTAL	**0.67**	**0.33**	**0.22**	**0.11**	**0.22**	**0.11**	**0.22**	**0.11**	**2.00**

Sources

[1]TASAS Collision Analysis Memorandum 8/10/10, Jeffrey Zimmerer, Dept. of Transportation,

[2]Final [Joint] Roadside Safety Audit/Value Analysis Study Report, D-1 US 101 Smith River Corridor Improvements, Del Norte County, PM 35.90 - 46.49 Federal Highway Administratoin, Task Order Number 184, March 2011

Southern Section = 0.7 miles of highway

PM 40.2 to PM 39.5
South of Westbrook Ln. South of Rowdy Creek Bridge

Do not have data on primary collision factors for each accidents, only overall statistics. Need to make assumptions about likely collision factors for accidents of each severity.

Four Primary Collision Factors[1]
Speeding
Improper Turn (going off shoulder[3])
Influence Alcohol
Other Than Driver (animal crashes, other miscellaneous crash types[2])

Annual Number of Accidents Occuring by Collision Factor (Estimation)

Accident Severity	Total Accidents 2006-9[1,2]	Annual Accidents (total / 3)	Accidents with no know Collision Factor (2006-9)*	Annual Accidents with no know Collision Factor	Annual Number per Collision Factor**	Accidents Caused by Influence Alcohol	Accidents Caused by Other Than Driver	Accidents Caused by Speeding	Accidents Caused by Improper Turn	Total
Fatalities	2	0.67	1	0.33	0.08	0.42	0.08	0.08	0.08	0.67
Injuries	3	1	3	1	0.25	0.25	0.25	0.25	0.25	1
PDO	6	2	6	2	0.50	0.50	0.50	0.50	0.50	2
TOTAL	**11**	**3.67**	**10**	**3.33**	**0.83**	**1.17**	**0.83**	**0.83**	**0.83**	**3.67**

*One fatality is known to have a Primary Collision Factor "Influence Alcohol" so it is not included in the distribution among factors but added in after to Influence Alcohol.[1]
**Accidents are distributed equally over the four collision factors

Annual Percent of Accidents Occuring After Dark (Estimation)[1,2]

	Accidents Occuring in Dark (2006-9)	Annual Accidents Occuring in Dark (2006-9)	Percent of Total (11)
Dark	4	1.33	**36%**

Annual Number of Accidents Occuring After Dark by Collision Factor and Severity

Accident Severity	Annual Accidents	Percent in Dark	Accidents in Dark Caused by Influence Alcohol	Accidents in Dark Caused by Other Than Driver	Accidents in Dark Caused by Speeding	Accidents in Dark Caused by Improper Turn	Total Accidents in Dark
Fatalities	0.67	0.36	0.15	0.03	0.03	0.03	0.24
Injuries	1.00	0.36	0.09	0.09	0.09	0.09	0.36
PDO	2.00	0.36	0.18	0.18	0.18	0.18	0.73
TOTAL	**3.67**	**1.09**	**0.42**	**0.30**	**0.30**	**0.30**	**1.33**

Annual Number of Accidents Occuring 2005-9 Along PM 40.2 to PM 39.5 Distributed by Collision Factors and Severity

Accident Severity	Accidents Caused by Influence Alcohol (Daylight)	Accidents Caused by Influence Alcohol (Darkness)	Accidents Caused by Other Than Driver (Daylight)	Accidents Caused by Other Than Driver (Darkness)	Accidents Caused by Speeding (Daylight)	Accidents in Caused by Speeding (Darkness)	Accidents Caused by Improper Turn (Daylight)	Accidents in Caused by Improper Turn (Darkness)	TOTAL
Fatalities	0.27	0.15	0.05	0.03	0.05	0.03	0.05	0.03	**0.67**
Injuries	0.16	0.09	0.16	0.09	0.16	0.09	0.16	0.09	**1.00**
PDO	0.32	0.18	0.32	0.18	0.32	0.18	0.32	0.18	**2.00**
TOTAL	**0.74**	**0.42**	**0.53**	**0.30**	**0.53**	**0.30**	**0.53**	**0.30**	**3.67**

Sources

[1]TASAS Collision Analysis Memorandum 8/10/10, Jeffrey Zimmerer, Dept. of Transportation,

[2]Final [Joint] Roadside Safety Audit/Value Analysis Study Report, D-1 US 101 Smith River Corridor Improvements, Del Norte County, PM 35.90 - 46.49 Federal Highway Administratoin, Task Order Number 184, March 2011

[3]Phone conversation reviewing TASAS report 10-28-11, Valency Langtry, Advance Planning, CA DOT.

Collision Factors Expected to be Reduced by Upgrades for Non-Pedestrian-Related Accidents

Factor	Crashes Expected to be Reducted?	Reduction Factor -- All Crashes*	Reduction Factor -- Injuries Only*
Influence Alcohol	No		
Other Than Driver	No		
Speeding	Yes	5.5%	10.0%
Improper Turn	Yes	15.0%	
Failure to Yield	Yes	5.5%	10.0%
Other Violations	No		
Dark	Yes	21.0%	29.0%

*See table below for calculations and sources.

Collision Factors Expected to be Reduced by Upgrades for Pedestrian-Related Accidents

Factor	Crashes Expected to be Reducted?	Reduction Factor -- All Crashes*	Reduction Factor -- Injuries Only*
Improper Turn	Yes	10.8%	17.0%
Other Violations	Yes	10.8%	17.0%
Unknown	Yes	10.8%	17.0%
Dark	Yes	21.0%	29.0%
Dusk / Dawn	Yes	5.3%	7.3%

*See table below for calculations and sources.
**In cases where more than one reduction factor applies, the factor with the highest reduction is chosen.

Crash Reduction Factors by Project Upgrade and Collision Factors Affected

Project Upgrade	Collision Factors Affected	All	Injury Only	Source	Notes on assumptions
IPA-9 Community Lighting	Dark	21%	29%	1	
	Dusk Dawn	5.3%	7.3%		The expected reduction that occurs in dark is conservatively reduced by 75%.
IPA-7, IPA-18 Gateway & Community Identity Signs	All Factors	5.50%	10%	1	Assume signage induces traffic calming and driver awareness of shift from rural to urban settings, possibility of increased pedestrian and vehicle conflicts, resulting in decrease of speed by 1 mph (conservative assumption). To ascertain AMFs for 55mph, AMFs for 50mph and
IPA-21 Colorized, stamped shoulder treatments	Improper Turn (going off road)	15%		4	States that edgeline markings decrease accidents by 30%, 15% is chosen as a conservative
IPA-11 RRFBs at ped crossings	Pedestrian at intersections	10.75%	17%	2,3	Showed increase in yielding compliance by 70%[2] and decrease in speeds by 4mph[3] (reduction in accidents by 21.5%, 38% injuries[1]); used conservative assumption.

*****This table needs to be standardized with the project upgrade language**

Sources:
[1]Accident Modification Factors for Traffic Engineering and ITS Improvements, NCHRP Report 617, May 2008 (speed reduction see Table 12)
http://onlinepubs.trb.org/Onlinepubs/nchrp/nchrp_rpt_617.pdf
[2]Rectangular Rapid Flash Beacon (RRFB), FHWA-SA-09-009, May 2009
http://safety.fhwa.dot.gov/intersection/resources/techsum/fhwasa09009/
[3]VanWagner, M, Van Houten, R and Betts, B. The Effects of a Rectangular Rapid-Flashing Beacon on Vehicle Speed, Journal of Applied Behavior Analysis, 44, 629-633, Fall 2011.
http://seab.envmed.rochester.edu/Jaba/articles/2011/jaba-44-03-0629.pdf
[4]Toolbox of Countermeasures and Their Potential Effectiveness for Roadway Departure Crashes, Federal Hiway Administration, USDOT, FHWA-SA-07-013, Sept. 2007.
http://www.transportation.org/sites/scohts/docs/Roadway%20Departure%20Issue%20Brief.pdf

Annual Number of Accidents Occuring 2005-9 Along PM 40.2 to PM 39.5 by Collision Factors and

Accident Severity	Accidents Caused by Speeding (Daylight)	Accidents in Caused by Speeding (Darkness)	Accidents Caused by Improper Turn (Daylight)	Accidents in Caused by Improper Turn (Darkness)	TOTAL
Fatalities	0.05	0.03	0.05	0.03	**0.17**
Injuries	0.16	0.09	0.16	0.09	**0.50**
PDO	0.32	0.18	0.32	0.18	**1.00**
TOTAL	**0.53**	**0.30**	**0.53**	**0.30**	**1.67**

Assumptions and calculations for this table can be found in sheet "Corridor Valuatoin"

Current Cost of Accidents Expected to be Affected by Project Upgrades

Accident Severity	Accidents Caused by Speeding (Daylight)	Accidents in Caused by Speeding (Darkness)	Accidents Caused by Improper Turn (Daylight)	Accidents in Caused by Improper Turn (Darkness)	ANNUAL COST	20 Yr Cost, No Discount	20 Yr Cost, 7% Discount
Fatalities	$328,788	$187,879	$328,788	$187,879	**$1,033,333**	$20,666,666.67	
Injuries	$87,984	$50,276	$87,984	$50,276	**$276,520**	$5,530,400.00	
PDO	$1,045	$597	$1,045	$597	**$3,285**	$65,700.00	
TOTAL	**$417,817**	**$238,752**	**$417,817**	**$238,752**	**$1,313,138**	**$26,262,766.67**	

See Injury Severity Assumption in sheet "Valuation Data"

Percent Accidents Expected to be Reduced by Project Improvements

Accident Severity	Accidents Caused by Speeding (Daylight)	Accidents in Caused by Speeding (Darkness)	Accidents Caused by Improper Turn (Daylight)	Accidents in Caused by Improper Turn (Darkness)
Fatalities	5.5%	5.5%	15.0%	15.0%
Injuries	10.0%	10.0%	15.0%	15.0%
PDO	5.5%	5.5%	15.0%	15.0%

For explanation on reduction rates, see sheet "Crash Reduction Factors"

Annual Number of Non-Ped Accidents Occuring 2005-9 Along PM 43.75 to PM 43.15 (Indian Rd. Ir

Accident Severity	Accidents Caused by Failure to Yield (Daylight)	Accidents Caused by Failure to Yield (Darkness)	Accidents Caused by Improper Turn (Daylight)	Accidents Caused by Improper Turn (Darkness)	TOTAL
Fatalities	0.11	0.06	0.04	0.02	**0.22**
Injuries	0.22	0.11	0.07	0.04	**0.44**
PDO	0.33	0.17	0.11	0.06	**0.67**
TOTAL	**0.67**	**0.33**	**0.22**	**0.11**	**1.33**

Assumptions and calculations for this table can be found in sheet "Intersection Valuatoin"

Current Cost of Accidents Expected to be Affected by Project Upgrades

Accident Severity	Accidents Caused by Failure to Yield (Daylight)	Accidents Caused by Failure to Yield (Darkness)	Accidents Caused by Improper Turn (Daylight)	Accidents Caused by Improper Turn (Darkness)	ANNUAL COST	20 Yr Cost, No Discount	20 Yr Cost, 7% Discount
Fatalities	$688,889	$344,444	$229,630	$114,815	**$1,377,778**	$27,555,555.56	
Injuries	$122,898	$61,449	$40,966	$20,483	**$245,796**	$4,915,911.11	
PDO	$1,095	$548	$365	$183	**$2,190**	$43,800.00	
TOTAL	**$812,882**	**$406,441**	**$270,961**	**$135,480**	**$1,625,763**	**$32,515,266.67**	

Percent Accidents Expected to be Reduced by Project Improvements

Accident Severity	Accidents Caused by Failure to Yield (Daylight)	Accidents Caused by Failure to Yield (Darkness)	Accidents Caused by Improper Turn (Daylight)	Accidents Caused by Improper Turn (Darkness)
Fatalities	5.5%	21.0%	10.8%	31.8%
Injuries	10.0%	29.0%	10.8%	39.8%
PDO	5.5%	21.0%	10.8%	31.8%

For explanation on reduction rates, see sheet "Crash Reduction Factors"

Annual Number of Pedestrian Accidents Occuring 2005-9 Along PM 43.75 to PM 43.15 (Indian Rd.

Accident Severity	Total Accidents 2006-9	Annual Accidents (total / 3)	Collison Factor	Time of Day
Fatalities	1	0.33	Other Violatio	Darkness
Injuries	1	0.33	Unknown	Dusk/Dawn
PDO	1	0.33	Improper Turn	Daylight
TOTAL	**3**	**1.00**		

Current Cost of Accidents Expected to be Affected by Project Upgrades

Accident Severity	Annual Accidents (total / 3)	ANNUAL COST	20 Yr Cost, No Discount	20 Yr Cost, 7% Discount
Fatalities	0.33	**$2,066,667**	$41,333,333.33	
Injuries	0.33	**$888,460**	$17,769,200.00	
PDO	0.33	**$1,095**	$21,900.00	
TOTAL	**1.00**	**$2,956,222**	**$59,124,433.33**	

Percent Accidents Expected to be Reduced by Project Improvements

Accident Severity	Percent Reduction Expected	Collison Factor	Time of Day
Fatalities	21.0%	Other Violation	Darkness
Injuries	17.0%	Unknown	Dusk/Dawn
PDO	17.0%	Improper Turn	Daylight

Collision Factors Expected to be Reduced by Upgrades in Non-Pedestrian-Related Accidents and Percent Reduction Expected

Factor	Expected to	Percent Red	Documentati	Notes
Influence Alcohol	No	0%		
Other Than Driver	No	0%		
Speeding	Yes	30%		
Improper Turn	Yes	30%		With speeds reduced due to traffic calming and increased awareness of road boundary due to colorized, unique shoulder treatments, it is less likely that vehicles will travel off the side of the road and/or be able to correct their error much quicker.
Failure to Yield	Yes	5%	**reduction d	With speeds reduced due to traffic calming, it can be expected that that a very small number of accidents will be avoided due to improved detection by oncoming cars of turning vehicles, detection of oncoming cars by turning vehicles, and the ability of turning vehicles to r
Other Violations	No			
Unknown	No			
Dark	Yes	50%		
Dusk / Dawn				

Annual Number of Accidents Expected After Project Upgrades

Accident Severity	Accidents Caused by Speeding (Daylight)	Accidents in Caused by Speeding (Darkness)	Accidents Caused by Improper Turn (Daylight)	Accidents in Caused by Improper Turn (Darkness)	TOTAL
Fatalities	0.05	0.03	0.05	0.03	**0.15**
Injuries	0.14	0.08	0.14	0.08	**0.44**
PDO	0.30	0.17	0.27	0.15	**0.90**
TOTAL	**0.49**	**0.28**	**0.45**	**0.26**	**1.48**

For explanation on reduction rates, see sheet "Crash Reduction Factors"

Expected Cost of Accidents Expected to be Affected by Project Upgrades

Accident Severity	Accidents Caused by Speeding (Daylight)	Accidents in Caused by Speeding (Darkness)	Accidents Caused by Improper Turn (Daylight)	Accidents in Caused by Improper Turn (Darkness)	ANNUAL COST	20 Yr Cost, No Discount	20 Yr Cost, 7% Discount
Fatalities	$310,705	$177,545	$279,470	$159,697	**$927,417**	$18,548,333.33	
Injuries	$79,185	$45,249	$74,786	$42,735	**$241,955**	$4,839,100.00	
PDO	$988	$564	$888	$508	**$2,948**	$58,965.75	
TOTAL	**$390,878**	**$223,359**	**$355,144**	**$202,940**	**$1,172,320**	**$23,446,399.08**	

See Injury Severity Assumption in sheet "Valuation Data"

Project Benefit

Annual	20 Yr Cost, No Discount	20 Yr Cost, 7% Discount
$140,818	**$2,816,368**	**$0**
$940,332	**$18,806,640**	**$0**

Annual Number of Accidents Expected After Project Upgrades

Accident Severity	Accidents Caused by Failure to Yield (Daylight)	Accidents Caused by Failure to Yield (Darkness)	Accidents Caused by Improper Turn (Daylight)	Accidents Caused by Improper Turn (Darkness)	TOTAL
Fatalities	0.11	0.04	0.03	0.01	**0.19**
Injuries	0.20	0.08	0.07	0.02	**0.37**
PDO	0.32	0.13	0.10	0.04	**0.58**
TOTAL	**0.62**	**0.25**	**0.20**	**0.07**	**1.15**

For explanation on reduction rates, see sheet "Crash Reduction Factors"

Expected Cost of Accidents Expected to be Affected by Project Upgrades

Accident Severity	Accidents Caused by Failure to Yield (Daylight)	Accidents Caused by Failure to Yield (Darkness)	Accidents Caused by Improper Turn (Daylight)	Accidents Caused by Improper Turn (Darkness)	ANNUAL COST	20 Yr Cost, No Discount	20 Yr Cost, 7% Discount
Fatalities	$651,000	$272,111	$204,944	$78,361	**$1,206,417**	$24,128,333.33	
Injuries	$110,608	$43,629	$36,562	$12,341	**$203,140**	$4,062,795.70	
PDO	$1,035	$433	$326	$125	**$1,918**	$38,352.38	
TOTAL	**$762,643**	**$316,172**	**$241,832**	**$90,827**	**$1,411,474**	**$28,229,481.41**	

See Injury Severity Assumption in sheet "Valuation Data"

Project Benefit

Annual	20 Yr Cost, No Discount	20 Yr Cost, 7% Discount
$214,289	**$4,285,785**	**$0**

Annual Number of Accidents Expected After Project Upgrades

Accident Severity	Annual Accidents Expected	Collison Factor	Time of Day
Fatalities	0.26	Other Violation	Darkness
Injuries	0.28	Unknown	Dusk/Dawn
PDO	0.28	Improper Turn	Daylight
TOTAL	**0.82**		

Accident Severity	Annual Cost	20 Yr Cost, No Discount	20 Yr Cost, 7% Discount
Fatalities	$1,632,667	$32,653,333.33	
Injuries	$737,422	$14,748,436.00	
PDO	$909	$18,177.00	
TOTAL	**$2,370,997**	**$47,419,946.33**	

Project Benefit

Annual	20 Yr Cost, No	20 Yr
$585,224	**$11,704,487**	**$0**

manuveur out of the path of an oncoming car once having turned.

Value of Injuries ($2011)[1]

AIS Level	Severity	Fraction of VSL	Unit value
AIS 1	Minor	0.003	$18,600
AIS 2	Moderate	0.047	$291,400
AIS 3	Serious	0.105	$651,000
AIS 4	Severe	0.266	$1,649,200
AIS 5	Critical	0.593	$3,676,600
AIS 6	Unsurvivable	1	$6,200,000

Property Damage Only (PDO) ($2011)[2]

Per Vehicle Crash	$3,285

**use with 3% or 7% discount rate

Source

[1]Treatment of the Value of Preventing Fatalities and Injuries in Preparing Economic Analyses -- 2011 Revision (2011). Http://ostpxweb.dot.gov/policy

[2]The Economic Impact of Motor Vehicle Crashes 2000, http://www.nhtsa.gov/DOT/NHTSA

Injury Severity Assumption

No data on injury severity is available, so conservative estimates were used.

	Minor	Moderate	Serious	Severe	Critical	raction of VS	Unit Value
Auto-only accidents	30%	30%	20%	20%	0%	0.089	$553,040
Ped-related accider	0%	30%	30%	20%	20%	0.430	$2,665,380

Smith River project

1.3 miles bike / ped safety improvements along US 101
2 sections, separated by 2.8 miles

Northern Section = 0.6 miles	PM 43.75	to	PM 43.15
	N Indian Rd		Mouth of Smith River
Southern Section = 0.7 miles	PM 40.2	to	PM 39.5
	South of Westbrook Ln.		South of Rowdy Creek Bridge

Factors common to study area (corridor and intersection, PM A5 (PM 40.2 to PM 39.5 and PM 43.75 to 43.15)

31%	improper turn	shoulder treatments	
18%	speeding	traffic calming efforts	
46%	night	lighting	(nighttime crashes statistically seems to be overrepresented in data --i.e., traffic

Crash Data 7/1/06 - 6/30/09[1]

Northern Section

PM 43.31 -- 43.80 -- Indian Rd. Intersectic	Total Accidents	Fatal	Injury	PDO
(Intersection at 43.56)	9	2	3	4

Primary Collision Factors				Type				Conditions	
Failure to Y	Improper Turn	Other Violations	Influence Alcohol	Broadside	**Auto-Ped**	Rear End	Head-On	Daylight	Dry Road
3	2	2	1	4	**3**	1	1	6	8

Actual total collistion rate for this segment is 2.8 times than statewide avg. total collision rate
Actual Fatal-Plus-Injury 3.4 times higher than statewide average F-P-I rate.

Pedestrian Accidents

1 -- Intersection	Injury	Improper Tur	daylight	
2 - South of intersection	FATAL	Other Violatic	After Dark	**no street light
3 - North of intersection	Injury	Unknown	Dusk/Dawn	

Southern Section

PM 39.46 to 40.34	Total Accidents	Fatal	Injury	PDO
	11	2	3	6

Primary Collision Factors				Type	
Improper T	Influence Alchoh	Other than Drive	Speeding	Hit Object	Rear End

Fatalities

~39.46 -- Southern end of town (Smith R)	Influence Alcohol	Rear End
~40.34 -- Northern end of town (SR)	Influence Alcohol	Hit Object

2008 ADT[2]	US 101	7300	peaks May to October (tourism)

Sources

[1]TASAS Collision Analysis Memorandum 8/10/10, Jeffrey Zimmerer, Dept. of Transportation,
[2]Final [Joint] Roadside Safety Audit/Value Analysis Study Report, D-1 US 101 Smith River Corridor Improvements, Del Norte County, PM 35.90 - 46.49
Federal Highway Administratoin, Task Order Number 184, March 2011

volumes and number of daylight hours; corridor rates 92nd percentile statewide based on nighttime crashes; also verified by the FHWA (fed hwy admin) RSA (road safety assessment) team observations for the study

TIGER Benefit-Cost Analysis (BCA) Examples

Snake Road Improvement

Seminole Tribe of Florida

BCA Example Contents

- BCA Summary in Project Narrative
- Benefit-Cost Analysis (Appendix A)

SEMINOLE TRIBE OF FLORIDA

Snake Road Segment 3-B Improvement Project

TIGER III GRANT APPLICATION

PROJECT NARRATIVE
OCTOBER 2011

This is a BCA-relevant excerpt from the full TIGER Application

C. Innovation

A conventional design-bid-build procurement will be used for Segment 3-B since the project has advanced to the point where design is completed. No particularly innovative strategies are anticipated for this project.

D. Partnership

This TIGER III Grant application is submitted solely by the Seminole Tribe of Florida. Efforts to date on the project have been undertaken in collaboration with federal, state, county entities, as well as the Miccosukee Tribe of Indians of Florida. The Segment 3-B project will be wholly managed by the Seminole Tribe using in-house staff and private contractors.

E. Results of Benefit-Cost Analysis

A benefit-cost analysis (BCA) was performed using the California Life-Cycle Benefit/Cost Analysis Model[7] developed by the California Department of Transportation (CALTRANS). This BCA was intended as a threshold level analysis to demonstrate the economic viability of the project. Adjustments were made to reflect Florida statewide crash data as well as project-specific geometric, traffic and crash data. The proposed project was analyzed against a baseline improvement that would mill and resurface each roadway segment, at 12-year intervals, during the evaluation period. Each project segment was analyzed individually and as a combined project for both 3-percent and 7-percent discount rates[8].

The analysis is summarized in the table below and shows that the Segment 3 project has a benefit-cost ratio (BCR) ranging from **5.7** to **8.7** against a baseline milling and resurfacing project. This result demonstrates that investment in the design, construction and maintenance of the proposed project will provide net positive benefits to the general public and is therefore a worthy expenditure of public funds. Also, an evaluation of the of the entire Snake Road Improvement project results in a BCR ranging from 2.1 to 3.1. These benefits include accident and travel time reduction, as well as vehicle operations and emissions cost savings over the twenty-year evaluation period. It also demonstrates independent utility for Segment 3 – the project can stand on its own from both an economic and construction perspective.

[7](Cal-B/C) Version 4.0, February 2009, modified for TIGER Grants.
[8] Discount rates are used to evaluate the time value of costs and benefits, as specified by grant instructions.

SEGMENT 3 IMPROVEMENT PROJECT
INVESTMENT ANALYSIS - SUMMARY RESULTS

DISCOUNT RATE OF 3%		ITEMIZED BENEFITS (mil. $ over 20-years)		ITEMIZED BENEFITS (over 20-years)	
		Travel Time Savings	12.9	Person-Hours of Time Saved	1,544,287
Life-Cycle Costs (mil. $)	7	Veh. Op. Cost Savings	3.7	Additional CO2 Emissions (tons)	(14,790.00)
Life Cycle Benefits (mil. $)	61.1	Accident Cost Savings	43.7	Additional CO2 Emissions (mil. $)	(0.50)
Net Present Value (mil. $)	54.1	Emission Cost Savings	0.7		
Benefit-Cost Ratio	**8.7**	TOTAL BENEFITS	61.1		

DISCOUNT RATE OF 7%		ITEMIZED BENEFITS (mil. $ over 20-years)		ITEMIZED BENEFITS (over 20-years)	
		Travel Time Savings	8.7	Person-Hours of Time Saved	(1,544,287)
Life-Cycle Costs (mil. $)	7.2	Veh. Op. Cost Savings	2.5	Additional CO2 Emissions (tons)	(14,790.00)
Life Cycle Benefits (mil. $)	41.1	Accident Cost Savings	29.4	Additional CO2 Emissions (mil. $)	(0.30)
Net Present Value (mil. $)	34	Emission Cost Savings	0.5		
Benefit-Cost Ratio	**5.7**	TOTAL BENEFITS	41.1		

Table 4 - Benefit/Cost Analysis

V. Project Readiness and NEPA

The Florida Department of Transportation, on behalf of Federal Highway Administration and in cooperation with the Seminole Tribe of Florida, Miccosukee Tribe of Indians of Florida and the Bureau of Indian Affairs completed a Project Development and Environmental (PD&E) Study. A Type II Categorical Exclusion was prepared by the FDOT and approved by the Federal Highway Administration on February 15, 2007. An Environmental Assessment for the relocation of right-of-way was prepared and approved by the BIA on May 16, 2007.

The purpose of the PD&E was to analyze, document and evaluate various project alternatives and gain approval for cost effective improvements to Snake Road. In consultation with BIA, the project proposed by the Seminole Tribe of Florida and the Miccosukee Tribe of Indians of Florida will enhance the safety of Snake Road, meet current design criteria and mitigate the environmental impacts according to the National Environmental Policy Act of 1969 (NEPA). The PD&E satisfies the requirements of NEPA and other federal regulations. The documentation that has been prepared qualifies the project for federal funding. With design underway and the NEPA process complete, *The Snake Road Improvement Project can begin construction quickly* upon receipt of funding. Funds will be spent steadily and expeditiously once construction starts.

1. Project Schedule

The tribe will begin preparation of procurement documents immediately upon award of a grant. The request-for-proposals will be issued shortly thereafter and the contracts awarded within four months. It is expected that these contracts would be underway by the summer of 2012. The proposed schedule summary is shown below (**Figure 10):**

A. Benefit-Cost Analysis Model

A benefit-cost analysis (BCA) was performed using the California Life-Cycle Benefit/Cost Analysis Model[1] developed by the California Department of Transportation (CALTRANS). This BCA was intended as a threshold level analysis to demonstrate the economic viability of the project. Adjustments were made to reflect Florida statewide crash data as well as project-specific geometric, traffic and crash data. The proposed project was analyzed against a baseline improvement that would mill and resurface each roadway segment, at 12-year intervals, during the twenty-year evaluation period. Each project segment was analyzed individually and as a combined project for both 3-percent and 7-percent discount rates[2].

The analysis is summarized in **Table 4**, presented in the project narrative, and shows that the Segment 3 project has a benefit-cost ratio (BCR) ranging from **5.7** to **8.7** against a baseline milling and resurfacing project. This result demonstrates that investment in the design, construction and maintenance of the proposed project will provide net positive benefits to the general public and is therefore a worthy expenditure of public funds. Also, an evaluation of the of the entire Snake Road Improvement project, including Segment 1, 2 and 3, results in a BCR ranging from 2.1 to 3.1. These benefits include accident and travel time reduction, as well as vehicle operations and emissions cost savings over the twenty-year evaluation period. It also demonstrates independent utility for Segment 3 – the project can stand on its own from both an economic and construction perspective.

Cal-B/C Model Set-up

All of the default values in the model were left unchanged. Inputs consisted of project specific length, traffic, cost and schedule data; project and statewide crash data; assumptions about the accident reductions expected from the project; and adjustment of the model base year from 2007 to 2011 by changes to the GDP deflator.

For the Segment 3 project adjustments to the "1) Project Information" tab included: selecting the general highway type for 2-way, 2-lane rural roads; selecting a length of peak-hour traffic at 5 hours; selecting the free-flow speed at 25 miles-per-hour; selecting the project length at 4.3 miles; selecting ADT of 3,140 for the beginning year of 2014 and 4340 for end year of 2034, based on a linear projection of the traffic forecast data; and setting truck traffic at 16% and traveling at a speed of 30 mph.

Actual 3-year accident data was entered as indicated in **Figure 1**, based on information compiled from the Florida Department of Transportation and the Seminole Police Department

[1](Cal-B/C) Version 4.0, February 2009, modified for TIGER Grants.
[2] Discount rates are used to evaluate the time value of costs and benefits, as specified by grant instructions.

SNAKE ROAD CRASH DATA
2004 - 2010

Years	# Years	Crashes	Crashes/Year	Fatalities	Injuries	Property Damage	Source
2004-2009	6	95	15.83		33.00	80.00	SPD
2005-2008	0	11		2	11	11	FDOT
2010	1	23	23		3	20	SPD
TOTALS	**7**	**129**	**18.43**	**2**	**47**	**111**	

3-YEAR ACCIDENT DATA (for Benefit Cost Analysis)

Total Accidents	55.29				
Fatal Accidents		1			
Injury Accidents			20.1		
Property Damage Accidents				47.57	

NOTES:

1. SPD = Seminole Police Department
2. FDOT = Florida Department of Transportation

Figure 1 – CRASH DATA

Figure 2 - CRASH DISTRIBUTION

for the years 2004 through 2010. The distribution of crashes is as shown in **Figure 2**. Segment 3 shows more crashes because of safety (design) issues and higher traffic volumes. Segment 1crashes appear primarily related to roadway alignment (design) issues.

The data differs somewhat from the crash record reflected in the Project Development & Environmental Study (years from January 1997 to July 2001), reflecting the general statewide trend towards a reduction in crash rates and crash severity over the last two decades (**Figure 3**).

Figure 3 - HISTORICAL CRASH DEATH RATES

Statewide average accident data was entered for the no-build condition based on information as shown on **Figure 4**. For the build condition it was assumed that a crash reduction of 50% would be achieved based on research presented in a report titled "Update of Florida Crash Reduction Factors and Countermeasures to Improve the Development of District Safety Improvement Projects", prepared by the Lehman Center for Transportation Research at Florida International University.

Snake Road Segment 3-B Improvement Project

County Crash and Fatality Rates per 100 Million Vehicle Miles Traveled

	Crashes					Fatalities					Alcohol-Related Fatalities				
	# of Crashes		Crash Rate			# of Fatalities		Fatality Rate			# of A/R Fatalities		Alcohol-Related Fatality Rate		
County	2008	2009	2008	2009	% Change	2008	2009	2008	2009	% Change	2008	2009	2008	2009	% Change
Osceola	2,810	2,795	86.9	87.7	1.0%	55	50	1.7	1.6	-7.7%	23	17	0.7	0.5	-25.0%
Palm Beach	13,831	13,398	111.2	108.8	-2.1%	198	151	1.6	1.2	-22.9%	79	62	0.6	0.5	-20.7%
Pasco	6,042	5,780	151.7	147.8	-2.6%	88	79	2.2	2.0	-8.6%	36	28	0.9	0.7	-20.8%
Pinellas	13,665	13,699	161.3	162.7	0.9%	114	104	1.3	1.2	-7.8%	51	45	0.6	0.5	-10.9%
Polk	6,446	5,980	105.5	99.8	-5.4%	133	94	2.2	1.6	-27.9%	38	33	0.6	0.6	-11.4%
Putnam	978	885	97.0	89.3	-8.0%	20	20	2.0	2.0	1.7%	10	11	1.0	1.1	11.9%
St. Johns	1,635	1,709	74.9	77.8	3.8%	39	26	1.8	1.2	-33.6%	20	12	0.9	0.5	-40.4%
St. Lucie	2,288	2,336	71.2	76.5	7.4%	33	38	1.0	1.2	21.2%	12	13	0.4	0.4	14.0%
Santa Rosa	1,186	1,363	60.7	68.5	12.9%	15	27	0.8	1.4	76.9%	8	9	0.4	0.5	10.6%
Sarasota	3,201	3,225	76.5	78.8	2.9%	42	40	1.0	1.0	-2.7%	19	18	0.5	0.4	-3.2%
Seminole	2,717	2,574	75.2	68.7	-8.7%	42	23	1.2	0.6	-47.2%	13	13	0.4	0.3	-3.6%
Sumter	729	672	58.1	54.7	-5.9%	17	21	1.4	1.7	26.1%	6	4	0.5	0.3	-32.0%
Suwannee	472	376	53.9	43.3	-19.7%	11	11	1.3	1.3	0.8%	1	6	0.1	0.7	504.7%
Taylor	294	293	72.6	72.8	0.2%	6	6	1.5	1.5	0.6%	3	2	0.7	0.5	-33.0%
Union	103	101	67.2	67.8	0.9%	5	6	3.3	4.0	23.5%	4	3	2.6	2.0	
Volusia	5,709	5,685	100.1	100.5	0.4%	109	94	1.9	1.7	-13.0%	49	32	0.9	0.6	-34.2%
Wakulla	263	277	67.3	69.1	2.6%	10	6	2.6	1.5	-41.5%	6	1	1.5	0.2	
Walton	602	587	51.6	52.6	1.9%	17	18	1.5	1.6	8.8%	9	8	0.8	0.7	-8.7%
Washington	204	192	35.1	33.9	-3.3%	12	6	2.1	1.1	-48.6%	4	0	0.7	-	-100.0%
Unknown		5													
TOTAL	243,342	235,778	122.6	120.0	-2.1%	2,983	2,563	1.5	1.3	-13.2%	1,169	1,004	0.6	0.5	-13.2%

Rate Calculation - Number of (crashes, fatalities, alcohol-related fatalities) multiplied by 100,000,000 divided by vehicle miles of travel

Statewide crash data used in analysis

Statewide fatality rate used in analysis

Crash rates assumed to be cut in half by construction of project. Estimates based on "Update of Florida crash reduction factors and countermeasures to improve the development of Strategic Safety Implementation Strategies", prepared by the Lehman Center for Transportation Research at Florida International University.

Figure 4 - STATEWIDE CRASH RATES

Project costs were entered as the net difference between the cost of the proposed project and the "baseline project" (**Figure 5**), as required by the model. For Segments 1 and 2 project support costs were spread over years one and two and construction over years three and four, reflecting the need to complete first design then construction. For Segment 3 project support and construction costs were spread over years one and two, reflecting the shovel-ready condition of the project. It was assumed that a baseline project would consist of milling and resurfacing the existing roadway segments on a 12-year interval, which is the typical cycle used by the Florida Department of Transportation (FDOT). The proposed project was assumed to have a pavement life of 20 years, again consistent with FDOT design standards[3] for new construction. Cost estimates for milling and re-surfacing were derived from the FDOT Long Range Estimating system which indicated a cost-per-mile of $381,215 as of February 2011. An additional 20% was included to cover project support costs. These costs were again added to the model for the no-build conditions for years 10 through 13 (spread over 2 years for project support and 2 years for construction). Annual routine maintenance costs were considered a wash between the build and no-build condition and were not included in the model.

[3] Flexible Pavement Design Manual, 2008, FDOT

TIGER III BCA ANALYSIS COSTS

SNAKE ROAD IMPROVEMENTS PROJECT

	TOTAL Seg 1	TOTAL Seg 2	TOTAL Seg 3	GRAND TOTAL
Design [1]	$3,237,138	$ 500,000	$ -	$ 3,737,138
Construction	$29,687,065	$ 7,639,188	$ 8,672,619	$ 45,998,872
CE&I [2]	$1,484,353	$ 381,959	$ 1,041,348	$ 2,907,661
ESDC [3]	$250,292	$ 38,196	$ 70,000	$ 358,488
Administration	$0		$ -	$ -
CM	$0		$ -	$ -
Contingency	$0		$ -	$ -
TOTALS	**$34,658,848**	**$ 8,559,343**	**$ 9,783,967**	**$ 53,002,158**

NOTES:
(1) Design for Segment 3 completed and not included.
(2) CE&I = Construction Engineering & Inspection
(3) ESDC = Engineering Services During Construction (Post-Design Services)

SNAKE ROAD IMPROVEMENT PROJECT			
PROJECT SUPPORT			
2012	$1,618,569	$251,602	$555,674
2013	$1,618,569	$251,602	$555,674
2014	$867,323	$210,078	$0
2015	$867,323	$210,078	$0
CONSTRUCTION			
2012			$4,336,310
2013			$4,336,310
2014	$14,843,533	$3,819,594	
2015	$14,843,533	$3,819,594	
TOTALS	$34,658,848	$8,562,547	$9,783,967

NO-BUILD (MILLING & RESURFACING)			
PROJECT SUPPORT			
2012	$331,680	$251,602	$163,922
2013	$331,680	$251,602	$163,922
2014			$0
2015			$0
CONSTRUCTION			
2012			$819,612
2013			$819,612
2014	$1,658,402	$1,258,009	$0
2015	$1,658,402	$1,258,009	
TOTALS	$3,648,484	$2,767,620	$1,967,068

SNAKE ROAD IMPROVEMENT PROJECT - INCREMENTAL COSTS FOR BCA			
PROJECT SUPPORT			
2012	$1,286,888	$0	$391,752
2013	$1,286,888	$0	$391,752
2014	$867,323	$210,078	$0
2015	$867,323	$210,078	$0
CONSTRUCTION			
2012	$0	$0	$3,516,698
2013	$0	$0	$3,516,698
2014	$13,185,131	$2,561,585	$0
2015	$13,185,131	$2,561,585	$0
TOTALS	**$30,678,683**	**$5,543,326**	**$7,816,899**

Figure 5 - BCA PROJECT COSTS

The model tab "Parameters" was adjusted to reflect the begin project year of 2011, a GDP deflator factor of 1.07 to reflect a change in model base year from 2007 to 2011, and discount rates of 3% and 7%. A GDP deflator adjustment factor of 1.78% per year for four years was used as indicated in **Figure 6** below. The model was similarly adjusted for project Segments 1 and 2 and the results reported separately for Segment 3 and for Segments 1 through 3 combined.

Historical GDP Deflators
for Baseline Countries/Regions (in percent) 1969-2010
Updated: 12/22/10
Source: World Bank, World Development Indicators, IMF International Financial Statistics, ERS Estimates, and ERS Baseline Regional Aggregations

Contact: Mathew Shane (202-694-5282, mshane@ers.usda.gov)

Note: White implies external sources
Aggregated by GDP weights

GDP Deflators (2005=100) and Annual Growth Rates (right hand side)

	Decade Averages					
	1970-79	1980-89	1990-99	2000-09	2001-06	2007-2010
World	6.33	5.23	3.53	2.88	2.83	2.96
World Less US						
North America	4.32	5.58	2.60	2.07	2.15	1.91
Canada	8.30	5.83	1.64	2.34	2.35	2.17
United States	4.01	5.56	2.69	2.01	2.13	1.78
World	6.33	5.23	3.53	2.88	2.83	2.96
Developed	6.35	5.12	2.31	1.64	1.68	1.57
Developing	7.92	4.15	5.44	4.27	4.18	4.55
Former Centrally Planned	2.58	7.50	320.39	16.92	16.22	11.63

Figure 6 - GDP DEFLATOR

B. User Benefits and Costs

The public - consisting primarily of tribal members but also a significant number of visitors - will realize numerous benefits after the project is constructed. The primary benefit in monetary terms will be in the form of accident cost savings, followed by travel time savings, vehicle operating cost savings and finally emission cost savings. These are quantified in the benefit-cost analysis (BCA) provided with this grant application and summarized in **Figure 7** below. These benefits are estimated for cars and trucks only based on the traffic forecast and accident rates. The Segment 3-B project is estimated to provide about 37% of Segment 3 total benefits based on relative construction costs. The relevant portions of the Cal-B/C model output are included as **Attachment A** for the Segment 3 project.

Additional user benefits are expected, but not quantified in the BCA, for pedestrians, bicyclists and all-terrain-vehicles (ATV) – primarily in the Segment 3 area which is where the bulk of the community resides. ATV's in particular are a widely used mode of travel in the

SEGMENT 3 IMPROVEMENT PROJECT
INVESTMENT ANALYSIS - SUMMARY RESULTS

DISCOUNT RATE OF 3%	
Life-Cycle Costs (mil. $)	7
Life Cycle Benefits (mil. $)	61.1
Net Present Value (mil. $)	54.1
Benefit-Cost Ratio	**8.7**

ITEMIZED BENEFITS (mil. $ over 20-years)	
Travel Time Savings	12.9
Veh. Op. Cost Savings	3.7
Accident Cost Savings	43.7
Emission Cost Savings	0.7
TOTAL BENEFITS	61.1

ITEMIZED BENEFITS (over 20-years)	
Person-Hours of Time Saved	1,544,287
Additional CO2 Emissions (tons)	(14,790.00)
Additional CO2 Emissions (mil. $)	(0.50)

DISCOUNT RATE OF 7%	
Life-Cycle Costs (mil. $)	7.2
Life Cycle Benefits (mil. $)	41.1
Net Present Value (mil. $)	34
Benefit-Cost Ratio	**5.7**

ITEMIZED BENEFITS (mil. $ over 20-years)	
Travel Time Savings	8.7
Veh. Op. Cost Savings	2.5
Accident Cost Savings	29.4
Emission Cost Savings	0.5
TOTAL BENEFITS	41.1

ITEMIZED BENEFITS (over 20-years)	
Person-Hours of Time Saved	(1,544,287)
Additional CO2 Emissions (tons)	(14,790.00)
Additional CO2 Emissions (mil. $)	(0.30)

Figure 7 - Segment 3 Benefit Cost Analysis Results

Segment 3 area. These are used by tribal members commuting from home to shopping and to community facilities. The benefits accrued for these modes of travel are expected to be derived from the enhanced livability provided by the planned improvements. Using an ATV volume of 5% of total traffic as a proxy for these modes, user benefits would be estimated at $2.8 million over 20-years (based on 5% of travel time and accident cost savings). Considering that a fair number of crashes involve ATV's this should be considered a conservative estimate.

Finally, the economic development potential provided by the project to existing and planned tribal businesses must be considered a very important user benefit in such an economically disadvantaged area. However, these benefits are difficult to quantify and have not been included in the BCA.

BCA results for the entire project (Segment 1, 2 and 3 combined) are listed in **Figure 8** below.

INVESTMENT ANALYSIS
Summary Results

DISCOUNT RATE OF 3%	SEGMENTS 1, 2 & 3 TOTALS
Life-Cycle Costs (mil. $)	47.2
Life Cycle Benefits (mil. $)	146.8
Net Present Value (mil. $)	99.7
Benefit-Cost Ratio	**3.1**
Rate of Return on Investment	
ITEMIZED BENEFITS (mil. $ over 20-years)	
Travel Time Savings	15
Veh. Op. Cost Savings	3.7
Accident Cost Savings	127.4
Emission Cost Savings	0.7
TOTAL BENEFITS	146.8

DISCOUNT RATE OF 7%	SEGMENTS 1, 2 & 3 TOTALS
Life-Cycle Costs (mil. $)	46.7
Life Cycle Benefits (mil. $)	96.8
Net Present Value (mil. $)	50.2
Benefit-Cost Ratio	**2.1**
Rate of Return on Investment	
ITEMIZED BENEFITS (mil. $ over 20-years)	
Travel Time Savings	10.1
Veh. Op. Cost Savings	2.5
Accident Cost Savings	83.7
Emission Cost Savings	0.5
TOTAL BENEFITS	96.8

Figure 8 - BCA Results for Segments 1, 2 & 3 Combined

California Department Of Transportation

California Life-Cycle Benefit/Cost Analysis Model (Cal-B/C) Version 4.0 Modified for TIGER Grants

Office of Transportation Economics
Division of Transportation Planning
February 2009

For questions and comments, please contact:

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SNAKE ROAD SEGMENT 3 BCA WITH 3% DISCOUNT RATE

District: STOF

PROJECT: SNAKE ROAD - SEGMENT 3 (WITH 3% DISCOUNT RATE)

EA:
PPNO:

1A PROJECT DATA

Type of Project		
Select project type from list	General Highway	
Project Location (enter 1 for So. Cal., 2 for No. Cal., or 3 for rural)	3	
Length of Construction Period	2	years
One- or Two-Way Data	2	enter 1 or 2
	Current	
Length of Peak Period(s) (up to 24 hrs)	5	hours

1B HIGHWAY DESIGN AND TRAFFIC DATA

Highway Design		No Build	Build
Roadway Type (Fwy, Exp, Conv Hwy)		C	C
Number of General Traffic Lanes		2	2
Number of HOV/HOT Lanes			
HOV Restriction (2 or 3)			
Exclusive ROW for Buses (y/n)		N	
Highway Free-Flow Speed		25	35
Ramp Design Speed (if aux. lane/off-ramp proj.)		35	35
Length (in miles)	Highway Segment	4.3	4.3
	Impacted Length	4.3	4.3

Average Daily Traffic			
	Current	3,140	
		No Build	Build
	Base (Year 1)	3,254	3,254
	Forecast (Year 20)	4,340	4,340
Average Hourly HOV/HOT Lane Traffic			0
Percent of Induced Trips in HOV (if HOT or 2-to-3 conv.)			100%
Percent Traffic in Weave			0.0%
Percent Trucks (include RVs, if applicable)		16%	16%
Truck Speed		30	

On-Ramp Volume	Peak	Non-Peak
Hourly Ramp Volume (if aux. lane/on-ramp proj.)	0	0
Metering Strategy (1, 2, 3, or D, if on-ramp proj.)		

Queue Formation (if queuing or grade crossing project)	Year 1	Year 20
Arrival Rate (in vehicles per hour)	0	0
Departure Rate (in vehicles per hour)	0	0

Pavement Condition (if pavement project)		No Build	Build
IRI (inches/mile)	Base (Year 1)		
	Forecast (Year 20)		

Average Vehicle Occupancy (AVO)		No Build	Build
General Traffic	Non-Peak	1.30	1.30
	Peak	1.15	1.15
High Occupancy Vehicle (if HOV/HOT lanes)		2.15	2.15

1C HIGHWAY ACCIDENT DATA

Actual 3-Year Accident Data (from Table B)	Count (No.)	Rate
Total Accidents (Tot)	55	3.74
Fatal Accidents (Fat)	1	0.068
Injury Accidents (Inj)	20	1.33
Property Damage Only (PDO) Accidents	35	2.34

Statewide Basic Average Accident Rate	No Build	Build
Rate Group		
Accident Rate (per million vehicle-miles)	1.20	0.60
Percent Fatal Accidents (Pct Fat)	1%	1%
Percent Injury Accidents (Pct Inj)	53%	27%

1D RAIL AND TRANSIT DATA

Annual Person-Trips		No Build	Build
	Base (Year 1)		
	Forecast (Year 20)		
Percent Trips during Peak Period		41%	
Percent New Trips from Parallel Highway			100%

Annual Vehicle-Miles		No Build	Build
	Base (Year 1)		
	Forecast (Year 20)		
Average Vehicles/Train (if rail project)			

Reduction in Transit Accidents	
Percent Reduction (if safety project)	

Average Transit Travel Time		No Build	Build
In-Vehicle	Non-Peak (in minutes)		0.0
	Peak (in minutes)		0.0
Out-of-Vehicle	Non-Peak (in minutes)	0.0	0.0
	Peak (in minutes)	0.0	0.0

Highway Grade Crossing	Current	Year 1	Year 20
Annual Number of Trains		0	
Avg. Gate Down Time (in min.)		0.0	

Transit Agency Costs (if TMS project)	No Build	Build
Annual Capital Expenditure		$0
Annual Ops. and Maintenance Expenditure		$0

Model should be run for both roads for intersection or bypass highway projects, and may be run twice for connectors. Press button below to prepare model to enter data for second road. After data are entered, results reflect total project benefits.

Prepare Model for Second Road

SNAKE ROAD SEGMENT 3 BCA WITH 3% DISCOUNT RATE

Enter all project costs (in today's dollars) in columns 1 to 7. Costs during construction should be entered in the first eight rows.
Project costs (including maintenance and operating costs) should be net of costs without project.

1E

PROJECT COSTS (enter costs in thousands of dollars)

Col. no.	(1)	(2)	(3)	(4)	(5)	(6)	(7)		
Year	DIRECT PROJECT COSTS					Mitigation	Transit Agency Cost Savings	TOTAL COSTS (in dollars)	
	INITIAL COSTS			SUBSEQUENT COSTS					
	Project Support	R / W	Construction	Maint./ Op.	Rehab.			Constant Dollars	Present Value
Construction Period									
1	$392		$3,517					$3,909,000	$3,909,000
2	392		3,517					3,909,000	3,795,146
3								0	0
4								0	0
5								0	0
6								0	0
7								0	0
8								0	0
Project Open									
1								$0	$0
2								0	0
3								0	0
4								0	0
5								0	0
6								0	0
7								0	0
8								0	0
9								0	0
10					(82			(82,000)	(59,239)
11					(82			(82,000)	(57,513)
12					(410			(410,000)	(279,190)
13					(410			(410,000)	(271,058)
14								0	0
15								0	0
16								0	0
17								0	0
18								0	0
19								0	0
20								0	0
Total	$784	$0	$7,034	$0	($984)	$0	$0	$6,834,000	$7,037,146

$$\text{Present Value} = \frac{\text{Future Value (in Constant Dollars)}}{(1 + \text{Real Discount Rate})^{\text{Year}}}$$

District: STOF

PROJECT: SNAKE ROAD - SEGMENT 3 (WITH 3% DISCOUNT RATE)

EA:
PPNO:

3

INVESTMENT ANALYSIS

SUMMARY RESULTS

Life-Cycle Costs (mil. $)	$7.0
Life-Cycle Benefits (mil. $)	$61.1
Net Present Value (mil. $)	$54.1
Benefit / Cost Ratio:	8.7
Rate of Return on Investment:	40.8%
Payback Period:	3 years

ITEMIZED BENEFITS (mil. $)	Average Annual	Total Over 20 Years
Travel Time Savings	$0.6	$12.9
Veh. Op. Cost Savings	$0.2	$3.7
Accident Cost Savings	$2.2	$43.7
Emission Cost Savings	$0.0	$0.7
TOTAL BENEFITS	$3.1	$61.1
Person-Hours of Time Saved	77,214	1,544,287
Additional CO_2 Emissions (tons)	-740	-14,790
Additional CO_2 Emissions (mil. $)	-$0.0	-$0.5

Should benefit-cost results include:

1) Induced Travel? (y/n)	Y	Default = Y
2) Vehicle Operating Costs? (y/n)	Y	Default = Y
3) Accident Costs? (y/n)	Y	Default = Y
4) Vehicle Emissions? (y/n) includes value for CO_2e	Y	Default = Y

SNAKE ROAD SEGMENT 3 BCA WITH 3% DISCOUNT RATE

A

NET PRESENT VALUE CALCULATION

Year	PRESENT VALUE OF USER BENEFITS				PRESENT VALUE OF USER BENEFITS (road 2)			
	Travel Time Savings	Vehicle Op. Cost Savings	Accident Reductions	Vehicle Emission Reductions	Travel Time Savings	Vehicle Op. Cost Savings	Accident Reductions	Vehicle Emission Reductions
Construction Period								
1								
2								
3								
4								
5								
6								
7								
8								
Project Open								
1	$734,053	$210,955	$2,483,038	$42,418				
2	$725,187	$208,407	$2,453,047	$42,411				
3	$716,215	$205,828	$2,422,696	$42,398				
4	$707,150	$203,223	$2,392,033	$42,379				
5	$698,005	$200,595	$2,361,100	$42,353				
6	$688,793	$197,948	$2,329,940	$42,323				
7	$679,526	$195,285	$2,298,593	$42,287				
8	$670,214	$192,609	$2,267,094	$30,921				
9	$660,869	$189,923	$2,235,481	$31,033				
10	$651,499	$187,230	$2,203,786	$31,141				
11	$642,114	$184,533	$2,172,041	$31,245				
12	$632,723	$181,834	$2,140,275	$31,346				
13	$623,335	$179,136	$2,108,518	$31,444				
14	$613,956	$176,441	$2,076,794	$31,539				
15	$604,596	$173,751	$2,045,130	$31,631				
16	$595,259	$171,068	$2,013,548	$31,720				
17	$585,954	$168,394	$1,982,072	$31,806				
18	$576,686	$165,730	$1,950,720	$31,889				
19	$567,460	$163,079	$1,919,514	$31,970				
20	$558,283	$160,441	$1,888,470	$32,048				
Total	$12,931,876	$3,716,410	$43,743,892	$706,301	$0	$0	$0	$0

1,544,287	Person-Hours of Time Saved		Person-Hours of Time Saved
(14,790)	Additional CO_2 Emissions (tons)		Additional CO_2 Emissions (tons)
($469,093)	Additional CO_2 Emissions ($ PV)		Additional CO_2 Emissions ($ PV)

SNAKE ROAD SEGMENT 3 BCA WITH 3% DISCOUNT RATE

PRESENT VALUE OF USER BENEFITS (road 3)				Present Value of Total User Benefits	Present Value of Total Project Costs	NET PRESENT VALUE
Travel Time Savings	Vehicle Op. Cost Savings	Accident Reductions	Vehicle Emission Reductions			
				$0	$3,909,000	($3,909,000)
				$0	$3,795,146	($3,795,146)
				$0	$0	$0
				$0	$0	$0
				$0	$0	$0
				$0	$0	$0
				$0	$0	$0
				$0	$0	$0
				$3,470,464	$0	$3,470,464
				$3,429,052	$0	$3,429,052
				$3,387,137	$0	$3,387,137
				$3,344,784	$0	$3,344,784
				$3,302,054	$0	$3,302,054
				$3,259,005	$0	$3,259,005
				$3,215,691	$0	$3,215,691
				$3,160,838	$0	$3,160,838
				$3,117,305	$0	$3,117,305
				$3,073,655	($59,239)	$3,132,894
				$3,029,933	($57,513)	$3,087,446
				$2,986,179	($279,190)	$3,265,369
				$2,942,433	($271,058)	$3,213,491
				$2,898,731	$0	$2,898,731
				$2,855,107	$0	$2,855,107
				$2,811,595	$0	$2,811,595
				$2,768,225	$0	$2,768,225
				$2,725,025	$0	$2,725,025
				$2,682,022	$0	$2,682,022
				$2,639,243	$0	$2,639,243
$0	$0	$0	$0	**$61,098,478**	**$7,037,146**	**$54,061,332**

	Person-Hours of Time Saved
	Additional CO_2 Emissions (tons)
	Additional CO_2 Emissions ($ PV)

B

INTERNAL RATE OF RETURN ON INVESTMENT AND PAYBACK PERIOD

Year	USER BENEFITS IN CONSTANT DOLLARS				USER BENEFITS IN CONSTANT DOLLARS (road 2)			
	Travel Time Savings	Vehicle Op. Cost Savings	Accident Reductions	Vehicle Emission Reductions	Travel Time Savings	Vehicle Op. Cost Savings	Accident Reductions	Vehicle Emission Reductions
Construction Period								
1								
2								
3								
4								
5								
6								
7								
8								
Project Open								
1	$778,757	$223,802	$2,634,255	$45,001				
2	$792,431	$227,732	$2,680,511	$46,344				
3	$806,106	$231,662	$2,726,766	$47,720				
4	$819,780	$235,591	$2,773,022	$49,129				
5	$833,455	$239,521	$2,819,277	$50,572				
6	$847,129	$243,451	$2,865,533	$52,052				
7	$860,803	$247,381	$2,911,789	$53,568				
8	$874,478	$251,311	$2,958,044	$40,345				
9	$888,152	$255,240	$3,004,300	$41,705				
10	$901,827	$259,170	$3,050,555	$43,106				
11	$915,501	$263,100	$3,096,811	$44,548				
12	$929,175	$267,030	$3,143,066	$46,033				
13	$942,850	$270,960	$3,189,322	$47,562				
14	$956,524	$274,889	$3,235,578	$49,137				
15	$970,199	$278,819	$3,281,833	$50,758				
16	$983,873	$282,749	$3,328,089	$52,428				
17	$997,547	$286,679	$3,374,344	$54,147				
18	$1,011,222	$290,609	$3,420,600	$55,918				
19	$1,024,896	$294,538	$3,466,855	$57,741				
20	$1,038,570	$298,468	$3,513,111	$59,619				
Total	$18,173,274	$5,222,702	$61,473,660	$987,431	$0	$0	$0	$0

SNAKE ROAD SEGMENT 3 BCA WITH 3% DISCOUNT RATE

USER BENEFITS IN CONSTANT DOLLARS (road 3)				Total User Benefits in Constant Dollars	Total Project Costs in Constant Dollars	ANNUAL RETURNS ON INVESTMENT	CUMULATIVE RETURNS AFTER PROJ OPENS
Travel Time Savings	Vehicle Op. Cost Savings	Accident Reductions	Vehicle Emission Reductions				
				$0	$3,909,000	($3,909,000)	
				$0	$3,909,000	($3,909,000)	
				$0	$0	$0	
				$0	$0	$0	
				$0	$0	$0	
				$0	$0	$0	
				$0	$0	$0	
				$0	$0	$0	
				$3,681,815	$0	$3,681,815	$3,681,815
				$3,747,018	$0	$3,747,018	$7,428,833
				$3,812,253	$0	$3,812,253	$11,241,086
				$3,877,522	$0	$3,877,522	$15,118,608
				$3,942,825	$0	$3,942,825	$19,061,433
				$4,008,165	$0	$4,008,165	$23,069,598
				$4,073,541	$0	$4,073,541	$27,143,138
				$4,124,177	$0	$4,124,177	$31,267,316
				$4,189,397	$0	$4,189,397	$35,456,713
				$4,254,658	($82,000)	$4,336,658	$39,793,371
				$4,319,960	($82,000)	$4,401,960	$44,195,331
				$4,385,305	($410,000)	$4,795,305	$48,990,635
				$4,450,693	($410,000)	$4,860,693	$53,851,329
				$4,516,128	$0	$4,516,128	$58,367,456
				$4,581,609	$0	$4,581,609	$62,949,065
				$4,647,138	$0	$4,647,138	$67,596,203
				$4,712,717	$0	$4,712,717	$72,308,921
				$4,778,348	$0	$4,778,348	$77,087,268
				$4,844,031	$0	$4,844,031	$81,931,299
				$4,909,769	$0	$4,909,769	$86,841,068
$0	$0	$0	$0	**$85,857,068**	**$6,834,000**	**$79,023,068**	

Total Construction Costs	**$7,818,000**

SNAKE ROAD SEGMENT 3 BCA WITH 3% DISCOUNT RATE

Years After Construction Begins	ANNUAL RETURNS ON INVESTMENT
1	($3,909,000)
2	($3,909,000)
3	$3,681,815
4	$3,747,018
5	$3,812,253
6	$3,877,522
7	$3,942,825
8	$4,008,165
9	$4,073,541
10	$4,124,177
11	$4,189,397
12	$4,336,658
13	$4,401,960
14	$4,795,305
15	$4,860,693
16	$4,516,128
17	$4,581,609
18	$4,647,138
19	$4,712,717
20	$4,778,348
21	$4,844,031
22	$4,909,769
23	$0
24	$0
25	$0
26	$0
27	$0
28	$0

Internal Rate of Return **40.81%**

The INTERNAL RATE OF RETURN (IRR) is the discount rate at which benefits and costs break even (are equal). For a project with an IRR greater than the Discount Rate, benefits are greater than costs, and the project has a positive economic value. The IRR allows projects with different costs, different benefit flows, and different time periods to be compared.

Payback Period **3 years**

The PAYBACK PERIOD is the number of years it takes for the net benefits (benefits minus costs) to equal, or payback, the initial construction costs. For a project with a Payback Period longer than the life-cycle of the project, initial construction costs are not recovered. The Payback Period varies inversely with the Benefit-Cost Ratio: shorter Payback Period yields higher Benefit-Cost.

SNAKE ROAD SEGMENT 3 BCA WITH 3% DISCOUNT RATE

Parameters

This page contains all economic values and rate tables.
To update economic values automatically, change "Economic Update Factor."

General Economic Parameters

Year of Current Dollars for Model	2011	
Economic Update Factor (Using GDP Deflator)	1.07	1
Real Discount Rate	3.0%	2
	Also use 7%	

Travel Time Parameters

	Value	Units	
Statewide Average Hourly Wage		$/hr	3
Transportation and Warehousing			
Average Hourly Wage		$/hr	3
Benefits and Costs		$/hr	4
Value of Time			
Automobile	$ 11.20	$/hr/per	5
Truck	$ 18.10	$/hr/veh	5
Auto & Truck Composite		$/hr/veh	6
Transit	$ 11.20	$/hr/per	5
Out-of-Vehicle Travel	2	times	5
Incident-Related Travel	1	times	7

Vehicle Operating Cost Parameters

Average Fuel Price			
Automobile (regular unleaded)		$/gal	8
Truck (diesel)		$/gal	8
Sales and Fuel Taxes			
State Sales Tax		%	9
Average Local Sales Tax		%	9
Federal Fuel Excise Tax (gasoline)		$/gal	9
Federal Fuel Excise Tax (diesel)		$/gal	9
State Fuel Excise Tax		$/gal	9
Fuel Cost Per Gallon (Exclude Taxes)			
Automobile	$ 3.46	$/gal	
Truck	$ 3.46	$/gal	
Non-Fuel Cost Per Mile			
Automobile	$ 0.321	$/mi	10
Truck	$ 0.447	$/mi	11, 12
Idling Speed for Op. Costs and Emissions	5	mph	

Accident Cost Parameters

Cost of a Fatality	$ 6,000,000	$/event	13
Cost of an Injury			
Level A (Severe)	$ 1,125,000	$/event	13
Level B (Moderate)	$ 93,000	$/event	13
Level C (Minor)	$ 12,000	$/event	13
Cost of Property Damage	$ 2,400	$/event	13
Cost of Highway Accident			
Fatal Accident	$ 7,300,000	$/accident	
Injury Accident	$ 140,100	$/accident	
PDO Accident	$ 7,800	$/accident	
Average Cost	$ 226,500	$/accident	
Statewide Highway Accident Rates			
Fatal Accident	0.009	per mil veh-mi	14
Injury Accident	0.31	per mil veh-mi	14
PDO Accident	0.65	per mil veh-mi	14
Non-Freeway	1.25	per mil veh-mi	14

Sources: 1) Office of Management and Budget (OMB), 2) Review of OMB and State Treasurer's Office data, 3) Bureau of Labor Statistics (BLS) QCEW, 4) BLS Employment Cost Inde, 5) USDOT Department Guidance, 6) California Department of Tranportation TSI and Traffic Operations, 7) IDAS model, 8) AAA Daily Fuel Gauge Report, 9) Transportation Funding in California, 10) AAA Your Driving Costs, 11) FHWA Office of Freight Management and Operations, 12) Zaniewski et al, 13) National Safety Council, 14) TASAS summary 2006

Highway Operations Parameters

	Value	Units	
Maximum V/C Ratio	1.56	-	15
Percent ADT in Peak Period	41.0%	%	
Percent ADT in Average Peak Hour	8.2%	%	
Annualization Factor	365	days/yr	

	Alpha	Beta	Capacity (vphpl)	Dep. Rate (vphpl)	
Freeway	0.20	10	2,000	1,800	15, 16
Expressway	0.20	10	2,000	1,800	15, 16
Conventional Highway	0.05	10	800	1,400	16
HOV Lanes	0.55	8	1,600		17

Non-HOV Lanes	Alpha	Beta	Capacity (vphpl)
No Build	0.05	10	800
Build	0.05	10	800

Sources: 15) Highway Capacity Manual, 16) NCHRP 387, 17) PeMS data

California Department Of Transportation

California Life-Cycle Benefit/Cost Analysis Model (Cal-B/C) Version 4.0 Modified for TIGER Grants

Office of Transportation Economics
Division of Transportation Planning
February 2009

For questions and comments, please contact:

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SNAKE ROAD SEGMENT 3 BCA WITH 7% DISCOUNT RATE

District: STOF

PROJECT: SNAKE ROAD - SEGMENT 3 (WITH 7% DISCOUNT RATE)

EA:
PPNO:

1A PROJECT DATA

Type of Project		
Select project type from list	General Highway	
Project Location (enter 1 for So. Cal., 2 for No. Cal., or 3 for rural)	3	
Length of Construction Period	2	years
One- or Two-Way Data	2	enter 1 or 2
	Current	
Length of Peak Period(s) (up to 24 hrs)	5	hours

1B HIGHWAY DESIGN AND TRAFFIC DATA

Highway Design		No Build	Build
Roadway Type (Fwy, Exp, Conv Hwy)		C	C
Number of General Traffic Lanes		2	2
Number of HOV/HOT Lanes			
HOV Restriction (2 or 3)			
Exclusive ROW for Buses (y/n)		N	
Highway Free-Flow Speed		25	35
Ramp Design Speed (if aux. lane/off-ramp proj.)		35	35
Length (in miles)	Highway Segment	4.3	4.3
	Impacted Length	4.3	4.3

Average Daily Traffic			
	Current	3,140	
		No Build	Build
	Base (Year 1)	3,254	3,254
	Forecast (Year 20)	4,340	4,340
Average Hourly HOV/HOT Lane Traffic			0
Percent of Induced Trips in HOV (if HOT or 2-to-3 conv.)			100%
Percent Traffic in Weave			0.0%
Percent Trucks (include RVs, if applicable)		16%	16%
Truck Speed		30	

On-Ramp Volume	Peak	Non-Peak
Hourly Ramp Volume (if aux. lane/on-ramp proj.)	0	0
Metering Strategy (1, 2, 3, or D, if on-ramp proj.)		

Queue Formation (if queuing or grade crossing project)	Year 1	Year 20
Arrival Rate (in vehicles per hour)	0	0
Departure Rate (in vehicles per hour)	0	0

Pavement Condition (if pavement project)		No Build	Build
IRI (inches/mile)	Base (Year 1)		
	Forecast (Year 20)		

Average Vehicle Occupancy (AVO)		No Build	Build
General Traffic	Non-Peak	1.30	1.30
	Peak	1.15	1.15
High Occupancy Vehicle (if HOV/HOT lanes)		2.15	2.15

1C HIGHWAY ACCIDENT DATA

Actual 3-Year Accident Data (from Table B)	Count (No.)	Rate
Total Accidents (Tot)	55	3.74
Fatal Accidents (Fat)	1	0.068
Injury Accidents (Inj)	20	1.33
Property Damage Only (PDO) Accidents	35	2.34

Statewide Basic Average Accident Rate	No Build	Build
Rate Group		
Accident Rate (per million vehicle-miles)	1.20	0.60
Percent Fatal Accidents (Pct Fat)	1%	1%
Percent Injury Accidents (Pct Inj)	53%	27%

1D RAIL AND TRANSIT DATA

Annual Person-Trips		No Build	Build
	Base (Year 1)		
	Forecast (Year 20)		
Percent Trips during Peak Period		41%	
Percent New Trips from Parallel Highway			100%

Annual Vehicle-Miles		No Build	Build
	Base (Year 1)		
	Forecast (Year 20)		
Average Vehicles/Train (if rail project)			

Reduction in Transit Accidents	
Percent Reduction (if safety project)	

Average Transit Travel Time		No Build	Build
In-Vehicle	Non-Peak (in minutes)		0.0
	Peak (in minutes)		0.0
Out-of-Vehicle	Non-Peak (in minutes)	0.0	0.0
	Peak (in minutes)	0.0	0.0

Highway Grade Crossing	Current	Year 1	Year 20
Annual Number of Trains		0	
Avg. Gate Down Time (in min.)		0.0	

Transit Agency Costs (if TMS project)	No Build	Build
Annual Capital Expenditure		$0
Annual Ops. and Maintenance Expenditure		$0

Model should be run for both roads for intersection or bypass highway projects, and may be run twice for connectors. Press button below to prepare model to enter data for second road. After data are entered, results reflect total project benefits.

Prepare Model for Second Road

SNAKE ROAD SEGMENT 3 BCA WITH 7% DISCOUNT RATE

Enter all project costs (in today's dollars) in columns 1 to 7. Costs during construction should be entered in the first eight rows.
Project costs (including maintenance and operating costs) should be net of costs without project.

1E

PROJECT COSTS (enter costs in thousands of dollars)

Col. no.	(1)	(2)	(3)	(4)	(5)	(6)	(7)		
Year	DIRECT PROJECT COSTS					Mitigation	Transit Agency Cost Savings	TOTAL COSTS (in dollars)	
	INITIAL COSTS			SUBSEQUENT COSTS					
	Project Support	R / W	Construction	Maint./ Op.	Rehab.			Constant Dollars	Present Value
Construction Period									
1	$392		$3,517					$3,909,000	$3,909,000
2	392		3,517					3,909,000	3,653,271
3								0	0
4								0	0
5								0	0
6								0	0
7								0	0
8								0	0
Project Open									
1								$0	$0
2								0	0
3								0	0
4								0	0
5								0	0
6								0	0
7								0	0
8								0	0
9								0	0
10					(82			(82,000)	(38,958)
11					(82			(82,000)	(36,409)
12					(410			(410,000)	(170,135)
13					(410			(410,000)	(159,005)
14								0	0
15								0	0
16								0	0
17								0	0
18								0	0
19								0	0
20								0	0
Total	$784	$0	$7,034	$0	($984)	$0	$0	$6,834,000	$7,157,764

$$\text{Present Value} = \frac{\text{Future Value (in Constant Dollars)}}{(1 + \text{Real Discount Rate})^{\text{Year}}}$$

SNAKE ROAD SEGMENT 3 BCA WITH 7% DISCOUNT RATE

District: STOF

PROJECT: SNAKE ROAD - SEGMENT 3 (WITH 7% DISCOUNT RATE)

EA:
PPNO:

3

INVESTMENT ANALYSIS

SUMMARY RESULTS

Life-Cycle Costs (mil. $)	$7.2
Life-Cycle Benefits (mil. $)	$41.1
Net Present Value (mil. $)	$34.0
Benefit / Cost Ratio:	5.7
Rate of Return on Investment:	40.8%
Payback Period:	3 years

ITEMIZED BENEFITS (mil. $)	Average Annual	Total Over 20 Years
Travel Time Savings	$0.4	$8.7
Veh. Op. Cost Savings	$0.1	$2.5
Accident Cost Savings	$1.5	$29.4
Emission Cost Savings	$0.0	$0.5
TOTAL BENEFITS	$2.1	$41.1
Person-Hours of Time Saved	77,214	1,544,287
Additional CO_2 Emissions (tons)	-740	-14,790
Additional CO_2 Emissions (mil. $)	-$0.0	-$0.3

Should benefit-cost results include:

1) Induced Travel? (y/n)	Y	Default = Y
2) Vehicle Operating Costs? (y/n)	Y	Default = Y
3) Accident Costs? (y/n)	Y	Default = Y
4) Vehicle Emissions? (y/n) includes value for CO_2e	Y	Default = Y

SNAKE ROAD SEGMENT 3 BCA WITH 7% DISCOUNT RATE

A

NET PRESENT VALUE CALCULATION

Year	PRESENT VALUE OF USER BENEFITS				PRESENT VALUE OF USER BENEFITS (road 2)			
	Travel Time Savings	Vehicle Op. Cost Savings	Accident Reductions	Vehicle Emission Reductions	Travel Time Savings	Vehicle Op. Cost Savings	Accident Reductions	Vehicle Emission Reductions
Construction Period								
1								
2								
3								
4								
5								
6								
7								
8								
Project Open								
1	$680,196	$195,477	$2,300,860	$39,306				
2	$646,860	$185,897	$2,188,095	$37,831				
3	$614,974	$176,734	$2,080,237	$36,405				
4	$584,492	$167,973	$1,977,126	$35,028				
5	$555,366	$159,603	$1,878,604	$33,698				
6	$527,549	$151,609	$1,784,510	$32,415				
7	$500,995	$143,978	$1,694,687	$31,177				
8	$475,658	$136,696	$1,608,980	$21,945				
9	$451,492	$129,751	$1,527,234	$21,201				
10	$428,451	$123,130	$1,449,297	$20,479				
11	$406,493	$116,820	$1,375,021	$19,780				
12	$385,575	$110,808	$1,304,261	$19,102				
13	$365,653	$105,083	$1,236,874	$18,445				
14	$346,688	$99,633	$1,172,722	$17,809				
15	$328,640	$94,446	$1,111,670	$17,193				
16	$311,469	$89,511	$1,053,588	$16,597				
17	$295,138	$84,818	$998,347	$16,020				
18	$279,611	$80,356	$945,824	$15,462				
19	$264,853	$76,114	$895,901	$14,921				
20	$250,828	$72,084	$848,462	$14,399				
Total	$8,700,983	$2,500,520	$29,432,301	$479,214	$0	$0	$0	$0

1,544,287	Person-Hours of Time Saved		Person-Hours of Time Saved
(14,790)	Additional CO_2 Emissions (tons)		Additional CO_2 Emissions (tons)
($306,486)	Additional CO_2 Emissions ($ PV)		Additional CO_2 Emissions ($ PV)

SNAKE ROAD SEGMENT 3 BCA WITH 7% DISCOUNT RATE

PRESENT VALUE OF USER BENEFITS (road 3)				Present Value of Total User Benefits	Present Value of Total Project Costs	NET PRESENT VALUE
Travel Time Savings	Vehicle Op. Cost Savings	Accident Reductions	Vehicle Emission Reductions			
				$0	$3,909,000	($3,909,000)
				$0	$3,653,271	($3,653,271)
				$0	$0	$0
				$0	$0	$0
				$0	$0	$0
				$0	$0	$0
				$0	$0	$0
				$0	$0	$0
				$3,215,840	$0	$3,215,840
				$3,058,683	$0	$3,058,683
				$2,908,350	$0	$2,908,350
				$2,764,620	$0	$2,764,620
				$2,627,271	$0	$2,627,271
				$2,496,083	$0	$2,496,083
				$2,370,838	$0	$2,370,838
				$2,243,279	$0	$2,243,279
				$2,129,677	$0	$2,129,677
				$2,021,357	($38,958)	$2,060,315
				$1,918,114	($36,409)	$1,954,523
				$1,819,746	($170,135)	$1,989,881
				$1,726,056	($159,005)	$1,885,061
				$1,636,853	$0	$1,636,853
				$1,551,949	$0	$1,551,949
				$1,471,165	$0	$1,471,165
				$1,394,323	$0	$1,394,323
				$1,321,253	$0	$1,321,253
				$1,251,790	$0	$1,251,790
				$1,185,773	$0	$1,185,773
$0	$0	$0	$0	**$41,113,018**	**$7,157,764**	**$33,955,254**

	Person-Hours of Time Saved
	Additional CO_2 Emissions (tons)
	Additional CO_2 Emissions ($ PV)

SNAKE ROAD SEGMENT 3 BCA WITH 7% DISCOUNT RATE

B

INTERNAL RATE OF RETURN ON INVESTMENT AND PAYBACK PERIOD

Year	USER BENEFITS IN CONSTANT DOLLARS				USER BENEFITS IN CONSTANT DOLLARS (road 2)			
	Travel Time Savings	Vehicle Op. Cost Savings	Accident Reductions	Vehicle Emission Reductions	Travel Time Savings	Vehicle Op. Cost Savings	Accident Reductions	Vehicle Emission Reductions
Construction Period								
1								
2								
3								
4								
5								
6								
7								
8								
Project Open								
1	$778,757	$223,802	$2,634,255	$45,001				
2	$792,431	$227,732	$2,680,511	$46,344				
3	$806,106	$231,662	$2,726,766	$47,720				
4	$819,780	$235,591	$2,773,022	$49,129				
5	$833,455	$239,521	$2,819,277	$50,572				
6	$847,129	$243,451	$2,865,533	$52,052				
7	$860,803	$247,381	$2,911,789	$53,568				
8	$874,478	$251,311	$2,958,044	$40,345				
9	$888,152	$255,240	$3,004,300	$41,705				
10	$901,827	$259,170	$3,050,555	$43,106				
11	$915,501	$263,100	$3,096,811	$44,548				
12	$929,175	$267,030	$3,143,066	$46,033				
13	$942,850	$270,960	$3,189,322	$47,562				
14	$956,524	$274,889	$3,235,578	$49,137				
15	$970,199	$278,819	$3,281,833	$50,758				
16	$983,873	$282,749	$3,328,089	$52,428				
17	$997,547	$286,679	$3,374,344	$54,147				
18	$1,011,222	$290,609	$3,420,600	$55,918				
19	$1,024,896	$294,538	$3,466,855	$57,741				
20	$1,038,570	$298,468	$3,513,111	$59,619				
Total	$18,173,274	$5,222,702	$61,473,660	$987,431	$0	$0	$0	$0

SNAKE ROAD SEGMENT 3 BCA WITH 7% DISCOUNT RATE

USER BENEFITS IN CONSTANT DOLLARS (road 3)				Total User Benefits in Constant Dollars	Total Project Costs in Constant Dollars	ANNUAL RETURNS ON INVESTMENT	CUMULATIVE RETURNS AFTER PROJ OPENS
Travel Time Savings	Vehicle Op. Cost Savings	Accident Reductions	Vehicle Emission Reductions				
				$0	$3,909,000	($3,909,000)	
				$0	$3,909,000	($3,909,000)	
				$0	$0	$0	
				$0	$0	$0	
				$0	$0	$0	
				$0	$0	$0	
				$0	$0	$0	
				$0	$0	$0	
				$3,681,815	$0	$3,681,815	$3,681,815
				$3,747,018	$0	$3,747,018	$7,428,833
				$3,812,253	$0	$3,812,253	$11,241,086
				$3,877,522	$0	$3,877,522	$15,118,608
				$3,942,825	$0	$3,942,825	$19,061,433
				$4,008,165	$0	$4,008,165	$23,069,598
				$4,073,541	$0	$4,073,541	$27,143,138
				$4,124,177	$0	$4,124,177	$31,267,316
				$4,189,397	$0	$4,189,397	$35,456,713
				$4,254,658	($82,000)	$4,336,658	$39,793,371
				$4,319,960	($82,000)	$4,401,960	$44,195,331
				$4,385,305	($410,000)	$4,795,305	$48,990,635
				$4,450,693	($410,000)	$4,860,693	$53,851,329
				$4,516,128	$0	$4,516,128	$58,367,456
				$4,581,609	$0	$4,581,609	$62,949,065
				$4,647,138	$0	$4,647,138	$67,596,203
				$4,712,717	$0	$4,712,717	$72,308,921
				$4,778,348	$0	$4,778,348	$77,087,268
				$4,844,031	$0	$4,844,031	$81,931,299
				$4,909,769	$0	$4,909,769	$86,841,068
$0	$0	$0	$0	**$85,857,068**	**$6,834,000**	**$79,023,068**	

Total Construction Costs	**$7,818,000**

SNAKE ROAD SEGMENT 3 BCA WITH 7% DISCOUNT RATE

Years After Construction Begins	ANNUAL RETURNS ON INVESTMENT
1	($3,909,000)
2	($3,909,000)
3	$3,681,815
4	$3,747,018
5	$3,812,253
6	$3,877,522
7	$3,942,825
8	$4,008,165
9	$4,073,541
10	$4,124,177
11	$4,189,397
12	$4,336,658
13	$4,401,960
14	$4,795,305
15	$4,860,693
16	$4,516,128
17	$4,581,609
18	$4,647,138
19	$4,712,717
20	$4,778,348
21	$4,844,031
22	$4,909,769
23	$0
24	$0
25	$0
26	$0
27	$0
28	$0

Internal Rate of Return **40.81%**

The INTERNAL RATE OF RETURN (IRR) is the discount rate at which benefits and costs break even (are equal). For a project with an IRR greater than the Discount Rate, benefits are greater than costs, and the project has a positive economic value. The IRR allows projects with different costs, different benefit flows, and different time periods to be compared.

Payback Period **3 years**

The PAYBACK PERIOD is the number of years it takes for the net benefits (benefits minus costs) to equal, or payback, the initial construction costs. For a project with a Payback Period longer than the life-cycle of the project, initial construction costs are not recovered. The Payback Period varies inversely with the Benefit-Cost Ratio: shorter Payback Period yields higher Benefit-Cost.

SNAKE ROAD SEGMENT 3 BCA WITH 7% DISCOUNT RATE

Parameters

This page contains all economic values and rate tables.
To update economic values automatically, change "Economic Update Factor."

General Economic Parameters

Year of Current Dollars for Model	2011	
Economic Update Factor (Using GDP Deflator)	1.07	1
Real Discount Rate	7.0%	2
	Also use 7%	

Travel Time Parameters

	Value	Units	
Statewide Average Hourly Wage		$/hr	3
Transportation and Warehousing			
Average Hourly Wage		$/hr	3
Benefits and Costs		$/hr	4
Value of Time			
Automobile	$ 11.20	$/hr/per	5
Truck	$ 18.10	$/hr/veh	5
Auto & Truck Composite		$/hr/veh	6
Transit	$ 11.20	$/hr/per	5
Out-of-Vehicle Travel	2	times	5
Incident-Related Travel	1	times	7

Vehicle Operating Cost Parameters

Average Fuel Price			
Automobile (regular unleaded)		$/gal	8
Truck (diesel)		$/gal	8
Sales and Fuel Taxes			
State Sales Tax		%	9
Average Local Sales Tax		%	9
Federal Fuel Excise Tax (gasoline)		$/gal	9
Federal Fuel Excise Tax (diesel)		$/gal	9
State Fuel Excise Tax		$/gal	9
Fuel Cost Per Gallon (Exclude Taxes)			
Automobile	$ 3.46	$/gal	
Truck	$ 3.46	$/gal	
Non-Fuel Cost Per Mile			
Automobile	$ 0.321	$/mi	10
Truck	$ 0.447	$/mi	11, 12
Idling Speed for Op. Costs and Emissions	5	mph	

Accident Cost Parameters

Cost of a Fatality	$ 6,000,000	$/event	13
Cost of an Injury			
Level A (Severe)	$ 1,125,000	$/event	13
Level B (Moderate)	$ 93,000	$/event	13
Level C (Minor)	$ 12,000	$/event	13
Cost of Property Damage	$ 2,400	$/event	13
Cost of Highway Accident			
Fatal Accident	$ 7,300,000	$/accident	
Injury Accident	$ 140,100	$/accident	
PDO Accident	$ 7,800	$/accident	
Average Cost	$ 226,500	$/accident	
Statewide Highway Accident Rates			
Fatal Accident	0.009	per mil veh-mi	14
Injury Accident	0.31	per mil veh-mi	14
PDO Accident	0.65	per mil veh-mi	14
Non-Freeway	1.25	per mil veh-mi	14

Sources: 1) Office of Management and Budget (OMB), 2) Review of OMB and State Treasurer's Office data, 3) Bureau of Labor Statistics (BLS) QCEW, 4) BLS Employment Cost Inde, 5) USDOT Department Guidance, 6) California Department of Tranportation TSI and Traffic Operations, 7) IDAS model, 8) AAA Daily Fuel Gauge Report, 9) Transportation Funding in California, 10) AAA Your Driving Costs, 11) FHWA Office of Freight Management and Operations, 12) Zaniewski et al, 13) National Safety Council, 14) TASAS summary 2006

Highway Operations Parameters

	Value	Units	
Maximum V/C Ratio	1.56	-	15
Percent ADT in Peak Period	41.0%	%	
Percent ADT in Average Peak Hour	8.2%	%	
Annualization Factor	365	days/yr	

	Alpha	Beta	Capacity (vphpl)	Dep. Rate (vphpl)	
Freeway	0.20	10	2,000	1,800	15, 16
Expressway	0.20	10	2,000	1,800	15, 16
Conventional Highway	0.05	10	800	1,400	16
HOV Lanes	0.55	8	1,600		17

Non-HOV Lanes	Alpha	Beta	Capacity (vphpl)
No Build	0.05	10	800
Build	0.05	10	800

Sources: 15) Highway Capacity Manual, 16) NCHRP 387, 17) PeMS data

TIGER Benefit-Cost Analysis (BCA) Examples

Chicago Blue Line Renewal and City Bike Share

Chicago Transit Authority

BCA Example Contents

- BCA Summary from Project Narrative
- BCA Calculations (Appendices A-H)
  (PDF version of original multi-tab Excel workbook included as appendix to Application – the name of each separate tab in the Excel workbook is found in the upper left-hand corner)

Blue Line O'Hare Branch Renewal; Chicago Bikeshare Program

This is a BCA-relevant excerpt from the full TIGER Application

(through Capital Bikeshare in Washington, DC) that it can generate enough revenue to sustain its operations. Based on population density, current biking levels, topography and climate, Chicago promises to be an even stronger market for bikesharing.

d. Partnership

CTA's transit service is coordinated with other local transit operators such as Pace and Metra through the mechanism of the RTA. The three service boards all work together to provide coordinated and cooperative transportation throughout the entire region. CTA's capital projects are a well-planned extension of the RTA's needs and the chosen projects are consistent with statewide planning goals. Local support is demonstrated by the availability of local match and letters of support for the project are included as attachments.

Chicago Bikeshare Program - CDOT, CTA and Metra are partnering to locate stations to complement existing land-uses and transportation services. In addition, CDOT will partner with large employers to provide discounted bikeshare memberships to employees.

e. Results of Benefit Cost-Analysis

When all costs and benefits have been monetized for the Blue Line renewal, the rehabilitation of the Damen and California Stations, and the implementation of the Chicago Bikeshare Program, the Net Present Value of the project is $30.8 million when discounted at 3% and $12.7 million when discounted at 7%. The project will generate benefits of $159.6 million and costs of $109.9 million prior to discounting. For the purposes of this analysis, the costs and benefits were laid out over 25 years to arrive at these amounts and estimates are thought to be conservative. Several of the selection criteria were addressed in compiling the BCA: State of Good Repair, Economic Competitiveness, Livability and Sustainability comprised elements where monetary values could be assigned and calculated. *(See Appendices B, C, and D).*

Detailed costs included the projected expenditures for the Blue Line track renewal and the rehabilitation of two elevated rail stations at Damen and California, the monetized time loss of the current slow zones on the Blue Line, current maintenance costs associated with keeping the Blue Line safe and reliable, the monetization of the ridership gain (since the average fare less the variable cost of one rail trip is negative, as ridership increases, the variable losses also increase), increased emissions from additional automobile traffic and ridership declines due to Blue Line slow zones and the eventual construction efforts, the original capital costs for the bicycle share facilities, the costs to the user for membership and use of the bicycle sharing facilities, and the cost of the operating subsidy due the City of Chicago for the implementation of the bicycle sharing program. Detailed benefits include the impact on ridership revenue, the monetized benefit of the travel time savings, the reduction in emissions from diverted automobile traffic, the monetized effect of the customer's perceived benefit of station improvements, savings in operating costs (money not spent due to the proposed project), advertising fees and user revenue for the bicycle sharing facilities, travel time and user cost savings due to membership in the bicycle sharing program, and the VOC emissions reductions due to increased usage of bicycles diverting traffic away from automobile usage.

Sensitivity testing was also used to evaluate the efficacy of this investment. CTA and CDOT evaluated the impact of higher/lower operating and capital expenditures and higher/lower monetized benefits. *(See Appendix E for Sensitivity analysis).*

The Chicago bikeshare program will generate benefits to users in the form of time savings, operating cost savings, environmental savings, and health and wellness savings. For the purposes of this analysis, CDOT has quantified the benefits of travel time savings, operating cost savings, and environmental savings. This project will generate a total of $58 million in monetary benefit in travel time and user fees and environmental savings over its 5-year useful life. Users of Chicago Bikeshare will save 661,000 hours over the 5-year period saving a total of $9.1 million. It will also save users approximately $43 million in operating expenses. Finally, it will remove a total of 3,447 metric tons of VOC from the atmosphere, saving $5.8 million. *(See Appendix CC).*

V. PROJECT READINESS and NEPA

Project Schedule and Right-of Way Design

The project is ready to start design immediately upon receipt of a TIGER Grant, and the funds will be steadily spent throughout construction, with the project being substantially completed by August, 2013. The CTA is currently conducting preliminary engineering for the right-of-way track work and stations on the Blue Line. These projects were developed based on engineering review of existing asset conditions and information on system elements not in a state of good repair. This project will build upon our extensive track renewal projects and will be consistent with CTA design guidelines and criteria. The proposed project is not anticipated to require right-of-way acquisition. The proposed project schedule, including pre-construction activities, final design approval, and construction duration is expected to meet the TIGER Discretionary Grant funds statutory deadline, by September 30, 2013.

Because this project is critical to CTA's state of good repair initiative, CTA has initiated pre-planning, such as project planning documents and programming activities. The preliminary project scope of work and cost estimates have been developed. The implementation of the proposed project consists of two concurrent phases, one being the track renewal design and construction path and the other is the station rehabilitation design and construction path. Once TIGER funding is awarded in January 2012, CTA is ready to implement the project. Pre-planning activities will be completed for both track renewal and station rehabilitation work by end of 2011.

The General Engineering Consultant (GEC) design task order for the track renewal phase is scheduled to start by mid-January 2012 and notice to proceed for the General Contractor Track Renewal will be issued by September 2012. The anticipated substantial completion date for the Track Renewal Phase is August 2013. The Station Rehabilitation design will begin in February 2012 and construction will begin in March 2013 through August 2013.

Milestone dates for the proposed project are shown below:

Blue Line Track Renewal & Station Rehabilitation
Bicycle Share Facilities

Benefit Category				2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
				Total	*Total*									
	Benefits													
	Overall													
Overall	Ridershp Return	$	518,569	$ 93,765	$ 339,820	$ 84,984	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
State of Good Repair	Travel Time Savings	$	37,871,137	$ -	$ 569,785	$ 482,061	$ 8,196,759	$ 8,445,784	$ 4,307,350	$ 4,393,497	$ 4,481,367	$ 2,285,497	$ 2,331,207	$ 2,377,831
Sustainability	Reduced Emissions	$	38,314,522	$ -	$ -	$ -	$ 2,400,342	$ 2,951,353	$ 3,010,381	$ 3,070,588	$ 3,132,000	$ 3,194,640	$ 3,258,533	$ 3,323,703
	Station Improvements													
Ec Competitiveness	Damen	$	1,460,103	$ -	$ 27,822	$ 475,280	$ 522,808	$ 287,545	$ 146,648	$ -	$ -	$ -	$ -	$ -
Ec Competitiveness	California	$	1,063,964	$ -	$ 21,692	$ 345,862	$ 380,448	$ 209,246	$ 106,716	$ -	$ -	$ -	$ -	$ -
Ec Competitiveness	Savings in Operating Costs	$	695,324	$ -	$ -	$ 16,513	$ 5,260	$ 5,418	$ 621,975	$ -	$ -	$ -	$ -	$ -
	Bicycle Facility													
Ec Competitiveness	Advertising Revenue	$	5,907,363	$ 704,340	$ 1,243,663	$ 1,280,973	$ 1,319,402	$ 1,358,984						
Ec Competitiveness	User Fees - Revenue	$	14,821,791	$ 1,552,813	$ 3,165,109	$ 3,297,521	$ 3,367,263	$ 3,439,084						
State of Good Repair	Travel Time Savings	$	8,531,749	$ 324,858	$ 1,638,949	$ 2,124,929	$ 2,188,677	$ 2,254,337						
Ec Competitiveness	User Cost Savings	$	40,224,442	$ 1,531,602	$ 7,727,113	$ 10,018,353	$ 10,318,904	$ 10,628,471						
Sustainibility	VOC Emissions Reduction	$	5,477,056	$ 265,060	$ 1,192,076	$ 1,401,403	$ 1,332,867	$ 1,285,650						
	Total Benefit (Monetized)	**$**	**154,886,021**	**$ 4,472,439**	**$ 15,926,028**	**$ 19,527,879**	**$ 30,032,731**	**$ 30,865,873**	**$ 8,193,068**	**$ 7,464,085**	**$ 7,613,367**	**$ 5,480,137**	**$ 5,589,740**	**$ 5,701,534**
	Cost													
	Project Costs - Track Renewal & Station Rehabilitation													
	Subtotal Track Renewal & Station Repair	$	51,392,925	$ 14,392,968	$ 31,328,644	$ 5,671,313	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
		$	-											
Travel Time Losses		$	13,161,152	$ 6,784,128	$ 6,377,025	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Maintenance		$	48,109	$ 15,565	$ 16,032	$ 16,513				$ -	$ -	$ -	$ -	$ -
Ridership Loss & Return		$	8,378,239	$ -	$ -	$ 43,389	$ 254,873	$ 313,380	$ 319,648	$ 326,041	$ 332,561	$ 339,213	$ 345,997	$ 352,917
Increased Emissions		$	4,481,961	$ 880,840	$ 3,201,657	$ 399,464	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
		$	-											
	Bicycle Facilities	$	-											
	User Costs	$	19,157,343	$ 1,552,813	$ 3,806,507	$ 4,387,523	$ 4,932,773	$ 4,477,727						
	Capital Cost	$	12,298,000	$ 12,298,000	$ -									
	Operating Subsidy (City of Chicago)	$	6,083,090	$ 3,348,880	$ 897,156	$ 687,968	$ 498,056	$ 651,029						
Total Costs		**$**	**115,000,819**	**$ 39,273,193**	**$ 45,627,021**	**$ 11,206,169**	**$ 5,685,702**	**$ 5,442,136**	**$ 319,648**	**$ 326,041**	**$ 332,561**	**$ 339,213**	**$ 345,997**	**$ 352,917**
Total Monetized Value Flow		**$**	**39,885,202**	**$ (34,800,754)**	**$ (29,700,993)**	**$ 8,321,710**	**$ 24,347,029**	**$ 25,423,737**	**$ 7,873,421**	**$ 7,138,044**	**$ 7,280,805**	**$ 5,140,924**	**$ 5,243,743**	**$ 5,348,618**
			NPV											
	NPV at 3% Discount Rate	$	23,229,915	$ (34,374,086)	$ (28,420,379)	$ 7,615,544	$ 21,632,020	$ 21,930,738	$ 6,593,866	$ 5,803,883	$ 5,747,535	$ 3,940,090	$ 3,901,837	$ 3,863,955
	NPV at 7% Discount Rate	$	6,957,649	$ (33,837,186)	$ (26,853,786)	$ 6,792,994	$ 18,574,232	$ 18,126,773	$ 5,246,393	$ 4,445,215	$ 4,237,495	$ 2,796,322	$ 2,665,653	$ 2,541,090

2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$ 3,390,177	$ 3,457,981	$ 3,527,141	$ 3,597,683										
$ -	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
$ -	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
$ -	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 8,694**	**$ 8,955**	**$ 9,224**	**$ 9,500**	**$ 9,785**
$ 3,390,177	**$ 3,457,981**	**$ 3,527,141**	**$ 3,597,683**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 8,694**	**$ 8,955**	**$ 9,224**	**$ 9,500**	**$ 9,785**
$ -	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$ -	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**					
$ 359,975	**$ 367,175**	**$ 374,518**	**$ 382,009**	**$ 389,649**	**$ 397,442**	**$ 405,391**	**$ 413,498**	**$ 421,768**	**$ 430,204**	**$ 438,808**	**$ 447,584**	**$ 456,536**	**$ 465,666**
$ -	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
$ 359,975	**$ 367,175**	**$ 374,518**	**$ 382,009**	**$ 389,649**	**$ 397,442**	**$ 405,391**	**$ 413,498**	**$ 421,768**	**$ 430,204**	**$ 438,808**	**$ 447,584**	**$ 456,536**	**$ 465,666**
$ 3,030,202	**$ 3,090,806**	**$ 3,152,622**	**$ 3,215,675**	**$ (389,649)**	**$ (397,442)**	**$ (405,391)**	**$ (413,498)**	**$ (421,768)**	**$ (421,510)**	**$ (429,853)**	**$ (438,360)**	**$ (447,035)**	**$ (455,881)**
$ 2,125,323	**$ 2,104,689**	**$ 2,084,255**	**$ 2,064,019**	**$ (242,816)**	**$ (240,459)**	**$ (238,124)**	**$ (235,812)**	**$ (233,523)**	**$ (421,510)**	**$ (429,853)**	**$ (438,360)**	**$ (447,035)**	**$ (455,881)**
$ 1,345,446	**$ 1,282,575**	**$ 1,222,641**	**$ 1,165,509**	**$ (131,988)**	**$ (125,820)**	**$ (119,940)**	**$ (114,336)**	**$ (108,993)**	**$ (421,510)**	**$ (429,853)**	**$ (438,360)**	**$ (447,035)**	**$ (455,881)**

Benefit/Cost Analysis - Benefits

Blue Line Track Renewal, Station Rehabilitation, & Bicycle Share Facilities
Timeframe: 2012 - 2036 (25 years)

	Benefits										
	Track Renewal and Station Rehabilitation					Bicycle Share Facilities					
Year	Ridership Return	Travel Time Savings	Reduced Emissions	Station Rehabilitation (Damen & California)	Operating Cost Savings	Advertising Revenue	User Fees - Revenue	Travel Time Savings	User Cost Savings	VOC Emissions Reduction	
2012	93,765	-	-	-	-	704,340	1,552,813	$ 324,858	$ 1,531,602	$ 265,060	
2013	339,820	569,785	-	49,514	-	1,243,663	3,165,109	$ 1,638,949	$ 7,727,113	$ 1,192,076	
2014	84,984	482,061	-	821,142	16,513	1,280,973	3,297,521	$ 2,124,929	$ 10,018,353	$ 1,401,403	
2015	-	8,196,759	2,400,342	903,256	5,260	1,319,402	3,367,263	$ 2,188,677	$ 10,318,904	$ 1,332,867	
2016	-	8,445,784	2,951,353	496,791	5,418	1,358,984	3,439,084	$ 2,254,337	$ 10,628,471	$ 1,285,650	
2017	-	4,307,350	3,010,381	253,363	621,975	-	-	$ -	$ -	$ -	
2018	-	4,393,497	3,070,588	-	-	-	-	$ -	$ -	$ -	
2019	-	4,481,367	3,132,000	-	-	-	-	$ -	$ -	$ -	
2020	-	2,285,497	3,194,640	-	-	-	-	$ -	$ -	$ -	
2021	-	2,331,207	3,258,533	-	-	-	-	$ -	$ -	$ -	
2022	-	2,377,831	3,323,703	-	-	-	-	$ -	$ -	$ -	
2023	-	-	3,390,177	-	-	-	-	$ -	$ -	$ -	
2024	-	-	3,457,981	-	-	-	-	$ -	$ -	$ -	
2025	-	-	3,527,141	-	-	-	-	$ -	$ -	$ -	
2026	-	-	3,597,683	-	-	-	-	$ -	$ -	$ -	
2027	-	-	-	-	-	-	-	$ -	$ -	$ -	
2028	-	-	-	-	-	-	-	$ -	$ -	$ -	
2029	-	-	-	-	-	-	-	$ -	$ -	$ -	
2030	-	-	-	-	-	-	-	$ -	$ -	$ -	
2031	-	-	-	-	-	-	-	$ -	$ -	$ -	
2032	-	-	-	-	8,694	-	-	$ -	$ -	$ -	
2033	-	-	-	-	8,955	-	-	$ -	$ -	$ -	
2034	-	-	-	-	9,224	-	-	$ -	$ -	$ -	
2035	-	-	-	-	9,500	-	-	$ -	$ -	$ -	
2036	-	-	-	-	9,785	-	-	$ -	$ -	$ -	
Total	**518,569**	**37,871,137**	**38,314,522**	**2,524,067**	**695,324**	**5,907,363**	**14,821,791**	**8,531,749**	**40,224,442**	**5,477,056**	**154,886,021**

Benefit/Cost Analysis - Costs

Blue Line Track Renewal, Station Rehabilitation, & Bicycle Share Facilities
Timeframe: 2012 - 2036 (25 years)

	Costs								
	Track Renewal and Station Rehabilitation					Bicycle Share Facilities			
Year	Project Costs	Travel Time Losses	Maintenance	Ridership Loss & Return	Increased Emissions	User Costs	Capital Cost	Operating Subsidy (City of Chicago)	
2012	14,392,968	6,784,128	15,565	-	880,840	1,552,813	12,298,000	$ 3,348,880	
2013	31,328,644	6,377,025	16,032	-	3,201,657	3,806,507	-	$ 897,156	
2014	5,671,313	-	16,513	43,389	399,464	4,387,523	-	$ 687,968	
2015	-	-	-	254,873	-	4,932,773	-	$ 498,056	
2016	-	-	-	313,380	-	4,477,727	-	$ 651,029	
2017	-	-	-	319,648	-	-	-	$ -	
2018	-	-	-	326,041	-	-	-	$ -	
2019	-	-	-	332,561	-	-	-	$ -	
2020	-	-	-	339,213	-	-	-	$ -	
2021	-	-	-	345,997	-	-	-	$ -	
2022	-	-	-	352,917	-	-	-	$ -	
2023	-	-	-	359,975	-	-	-	$ -	
2024	-	-	-	367,175	-	-	-	$ -	
2025	-	-	-	374,518	-	-	-	$ -	
2026	-	-	-	382,009	-	-	-	$ -	
2027	-	-	-	389,649	-	-	-	$ -	
2028	-	-	-	397,442	-	-	-	$ -	
2029	-	-	-	405,391	-	-	-	$ -	
2030	-	-	-	413,498	-	-	-	$ -	
2031	-	-	-	421,768	-	-	-	$ -	
2032	-	-	-	430,204	-	-	-	$ -	
2033	-	-	-	438,808	-	-	-	$ -	
2034	-	-	-	447,584	-	-	-	$ -	
2035	-	-	-	456,536	-	-	-	$ -	
2036	-	-	-	465,666	-	-	-	$ -	
Total	**51,392,925**	**13,161,152**	**48,109**	**8,378,239**	**4,481,961**	**19,157,343**	**12,298,000**	**6,083,090**	**115,000,819**

Appendix - A Ridership

Ridership - Blue Line O'Hare Actual Ridership
All months actual
September - December 2012 Projected at 8% Growth

2011		
Month	*Ridership*	*%* [1]
January	1,701,730	8.9%
February	1,631,511	5.2%
March	1,966,439	8.9%
April	1,885,121	5.0%
May	1,980,332	9.8%
June	2,093,637	8.9%
July	2,043,737	5.0%
August	2,179,960	9.9%
September[2]	2,118,742	8.0%
October	2,176,147	8.0%
November	1,988,189	8.0%
December	1,938,758	8.0%
Total 2011	23,704,303	7.8%

2010		
Month	*Ridership*	*%* [1]
January	1,562,130	-3.2%
February	1,551,240	0.0%
March	1,805,711	2.3%
April	1,794,838	3.4%
May	1,803,303	12.2%
June	1,922,690	12.0%
July	1,946,720	7.2%
August	1,983,108	14.9%
September	1,961,798	8.0%
October	2,014,951	6.6%
November	1,840,916	9.1%
December	1,795,146	10.7%
Total 2010	21,982,551	7.0%

2009		
Month	*Ridership*	*%* [1]
January	1,614,440	3.9%
February	1,551,560	0.1%
March	1,765,561	5.9%
April	1,735,146	-0.1%
May	1,607,767	-11.4%
June	1,716,104	-7.9%
July	1,815,777	-7.6%
August	1,726,558	-13.4%
September	1,817,057	-3.0%
October	1,889,687	-33.1%
November	1,687,636	93.0%
December	1,621,677	-3.1%
Total 2009	20,548,970	-3.9%

2008		
Month	*Ridership*	*%* [1]
January	1,554,430	-6.3%
February	1,550,062	5.0%
March	1,666,654	-3.0%
April	1,736,344	5.3%
May	1,814,678	-0.3%
June	1,863,641	2.9%
July	1,965,654	10.5%
August	1,993,238	12.0%
September	1,872,754	12.1%
October	2,824,248	51.5%
November	874,565	-47.1%
December	1,673,026	12.6%
Total 2008	21,389,294	5.0%

[1] *Percentage difference as compared to previous year same month*

[2] *September 2012 - December 2012 projected at 8% growth rate*

Appendix B - Project Cost

Blue Line Track Renewal and Station Rehabilitation (Damen and California)

Monthly Cash Flow

Activity ID	Activity Name	Totals	1-Sep-11	1-Oct-11	1-Nov-11	1-Dec-11	1-Jan-12	1-Feb-12	1-Mar-12	1-Apr-12	1-May-12	1-Jun-12	1-Jul-12	1-Aug-12	1-Sep-12
O'Hare Blue Line Renewal (Damen to Belmont)		**51,392,925**	**-**	**-**	**-**	**-**	**708,200**	**1,416,401**	**2,124,601**	**2,832,802**	**3,541,002**	**4,309,693**	**5,078,385**	**5,847,076**	**6,892,296**
Task 01	CTA Engineering, Construction, Safety, Administration, Utilities	**$1,451,778**	-	-	-	-						60,491	60,491	60,491	60,491
Task 02	CTA Forces	**$4,355,333**	-	-	-	-									207,397
Task 03	Direct Purchase Material	**$0**													
Task 04	Professional Services Contracts (PM, DoR, CM, Other)	**$7,258,888**	-	-	-	-	398,488	398,488	398,488	398,488	398,488	398,488	398,488	398,488	467,620
Task 04.01	Program Management Services - Design & Construction	**$1,451,778**	-	-	-	-	50,061	50,061	50,061	50,061	50,061	50,061	50,061	50,061	50,061
Task 04.02	Designer of Record Design & Construction Services	**$4,355,333**					348,427	348,427	348,427	348,427	348,427	348,427	348,427	348,427	348,427
Task 04.03	Construction Manager Services	**$1,451,778**	-												69,132
Task 05	Contract Construction	**$29,035,550**	-	-	-	-	-	-	-	-	-	-	-	-	-
Task 05.011	General Contractor Mobilization	**$1,742,133**												-	
Task 05.012	General Contractor Contract Construction	**$27,293,417**													
Task 06	Land Acquisition	**$0**													
Task 07	Salvage	**$0**													
Task 08	Project Contingency	**$8,710,665**	-	-	-	-	290,356	290,356	290,356	290,356	290,356	290,356	290,356	290,356	290,356
Task 09	CTA Inventory	**$0**													
Task 10	Travel	**$0**													
Task 11	Miscellaneous	**$0**													
Task 12	CTA Support Groups	**$580,711**					19,357	19,357	19,357	19,357	19,357	19,357	19,357	19,357	19,357
	Projected Monthly Cash Expenditure=		**$0**	**$0**	**$0**	**$0**	**$708,200**	**$708,200**	**$708,200**	**$708,200**	**$708,200**	**$768,691**	**$768,691**	**$768,691**	**$1,045,220**
							GEC NTP 1/4/2012								Construction NTP 9/8/2012
			$0	$0			$2,124,601			$2,185,092			$2,582,603		

NOTES:

1. Cash flow does not include "Bike Share"

2. GC Mobilization is 6% of Task 05

3. DoR- Assumed 80% for Design Phase and 20% for Construction Phase

1-Oct-12	1-Nov-12	1-Dec-12	1-Jan-13	1-Feb-13	1-Mar-13	1-Apr-13	1-May-13	1-Jun-13	1-Jul-13	1-Aug-13	1-Sep-13	1-Oct-13	1-Nov-13	1-Dec-13	1-Jan-14	1-Feb-14	1-Mar-14	1-Apr-14	1-May-14	1-Jun-14
9,244,116	**11,818,542**	**14,392,968**	**17,228,714**	**19,803,140**	**22,377,566**	**24,951,992**	**27,526,417**	**30,100,843**	**32,675,269**	**35,249,695**	**37,824,121**	**40,398,547**	**42,972,973**	**45,721,612**	**48,296,038**	**48,992,831**	**49,689,625**	**50,386,419**	**51,083,212**	**51,392,925**
60,491	60,491	60,491	60,491	60,491	60,491	60,491	60,491	60,491	60,491	60,491	60,491	60,491	60,491	60,491	60,491	60,491	60,491	60,491	60,491	
207,397	207,397	207,397	207,397	207,397	207,397	207,397	207,397	207,397	207,397	207,397	207,397	207,397	207,397	207,397	207,397	207,397	207,397	207,397	207,397	
467,620	177,265	177,265	177,265	177,265	177,265	177,265	177,265	177,265	177,265	177,265	177,265	177,265	177,265	177,265	177,265	119,194	119,194	119,194	119,194	-
50,061	50,061	50,061	50,061	50,061	50,061	50,061	50,061	50,061	50,061	50,061	50,061	50,061	50,061	50,061	50,061	50,061	50,061	50,061	50,061	
348,427	58,071	58,071	58,071	58,071	58,071	58,071	58,071	58,071	58,071	58,071	58,071	58,071	58,071	58,071	58,071					
69,132	69,132	69,132	69,132	69,132	69,132	69,132	69,132	69,132	69,132	69,132	69,132	69,132	69,132	69,132	69,132	69,132	69,132	69,132	69,132	
1,306,600	1,819,561	1,819,561	2,080,881	1,819,561	1,819,561	1,819,561	1,819,561	1,819,561	1,819,561	1,819,561	1,819,561	1,819,561	1,819,561	1,993,774	1,819,561	-	-	-	-	-
1,306,600			261,320										-	174,213						
-	1,819,561	1,819,561	1,819,561	1,819,561	1,819,561	1,819,561	1,819,561	1,819,561	1,819,561	1,819,561	1,819,561	1,819,561	1,819,561	1,819,561	1,819,561					
290,356	290,356	290,356	290,356	290,356	290,356	290,356	290,356	290,356	290,356	290,356	290,356	290,356	290,356	290,356	290,356	290,356	290,356	290,356	290,356	290,356
19,357	19,357	19,357	19,357	19,357	19,357	19,357	19,357	19,357	19,357	19,357	19,357	19,357	19,357	19,357	19,357	19,357	19,357	19,357	19,357	19,357
$2,351,820	**$2,574,426**	**$2,574,426**	**$2,835,746**	**$2,574,426**	**$2,574,426**	**$2,574,426**	**$2,574,426**	**$2,574,426**	**$2,574,426**	**$2,574,426**	**$2,574,426**	**$2,574,426**	**$2,574,426**	**$2,748,639**	**$2,574,426**	**$696,794**	**$696,794**	**$696,794**	**$696,794**	**$309,713**
													Construction Substantial Completion		Construction Punchlist Completion					Contract Closeout
$7,500,672			$7,984,598			$7,723,278			$7,723,278			$7,897,491	11/15/2013		$3,968,013			$1,703,300		

1-Jul-14	1-Aug-14	1-Sep-14	1-Oct-14	1-Nov-14	1-Dec-14	XXXXXXX	
51,392,925	**51,392,925**	**51,392,925**	**51,392,925**	**51,392,925**	**51,392,925**	XXXXXXX	
-	-	-	-	-	-	XXXXXXX	$1,451,778
-	-	-	-	-	-	XXXXXXX	$4,355,333
						XXXXXXX	$0
-	-	-	-	-	-	XXXXXXX	$7,258,888
						XXXXXXX	$1,451,778
-	-	-	-	-	-	XXXXXXX	$4,355,333
						XXXXXXX	$1,451,778
-	-	-	-	-	-	XXXXXXX	$29,035,550
						XXXXXXX	$1,742,133
						XXXXXXX	$27,293,417
-	-	-	-	-	-	XXXXXXX	$8,710,665
						XXXXXXX	$0
						XXXXXXX	$0
						XXXXXXX	$580,711
$0	**$0**	**$0**	**$0**	**$0**	**$0**	**XXXXXXX**	$51,392,925

$0 $0 $51,434,518

Appendix C - Projected Ridership

Blue Line O'Hare Projected Ridership
Impact of Track Renewal and Station Rehabilitation Construction
Timeframe: 2012 - 2036

Year	w/o Construction[1]	w/track renewal construction[2,3]	Difference	Station Repair Impact[4]	Total Projected Ridership	Total Ridership Difference
2012	25,600,647	25,271,774	(328,873)	(222,687)	25,049,086	(551,561)
2013	27,648,699	26,363,297	(1,285,402)	(713,539)	25,649,758	(1,998,941)
2014	28,201,673	28,472,361	270,688	(515,366)	27,956,994	(244,679)
2015	28,765,706	30,750,150	1,984,443	(485,192)	30,264,957	1,499,251
2016	29,341,020	31,365,153	2,024,132	(180,720)	31,184,433	1,843,412
2017	29,927,841	31,992,456	2,064,615	(184,334)	31,808,121	1,880,280
2018	30,526,398	32,632,305	2,105,907	(188,021)	32,444,284	1,917,886
2019	31,136,926	33,284,951	2,148,025	(191,781)	33,093,169	1,956,244
2020	31,759,664	33,950,650	2,190,986	(195,617)	33,755,033	1,995,369
2021	32,394,857	34,629,663	2,234,805	(199,529)	34,430,133	2,035,276
2022	33,042,755	35,322,256	2,279,502	(203,520)	35,118,736	2,075,982
2023	33,703,610	36,028,701	2,325,092	(207,590)	35,821,111	2,117,501
2024	34,377,682	36,749,275	2,371,593	(211,742)	36,537,533	2,159,851
2025	35,065,235	37,484,261	2,419,025	(215,977)	37,268,284	2,203,048
2026	35,766,540	38,233,946	2,467,406	(220,297)	38,013,649	2,247,109
2027	36,481,871	38,998,625	2,516,754	(224,702)	38,773,922	2,292,051
2028	37,211,508	39,778,597	2,567,089	(229,197)	39,549,401	2,337,892
2029	37,955,739	40,574,169	2,618,431	(233,780)	40,340,389	2,384,650
2030	38,714,853	41,385,653	2,670,799	(238,456)	41,147,197	2,432,343
2031	39,489,150	42,213,366	2,724,215	(243,225)	41,970,141	2,480,990
2032	40,278,933	43,057,633	2,778,700	(248,090)	42,809,543	2,530,610
2033	41,084,512	43,918,786	2,834,274	(253,051)	43,665,734	2,581,222
2034	41,906,202	44,797,161	2,890,959	(258,113)	44,539,049	2,632,847
2035	42,744,326	45,693,105	2,948,778	(263,275)	45,429,830	2,685,504
2036	43,599,213	46,606,967	3,007,754	(268,540)	46,338,427	2,739,214

Table 1 - Ridership Effects of Construction		
	Damen	California
Growth - steady state	8%	8%
Q1-Constr	-12%	-12%
Q2-Constr	-14%	-14%
Interim	-5%	-5%
Q3-Const	-3%	-3%
Q1-Post Const	0%	0%
Q2-Post Const	22%	22%
Q3-Post Const	24%	24%
Q4-Post Const	12%	12%
Q5-Post Const	11%	11%
New Normal (2015-2016)	10%	10%
Steady State (2017-2036)	2%	2%

[1] *Current Blue Line O'Hare Growth Rate (See Appendix A) applied at 8% for two years (2012-13)*

[2] *September 2012 - November 2013 Construction - 4% growth rate applied - see Appendix G - Explanation*

[3] *December 2013 - December 2015 - return to 8% growth, 2016-2036, 2% steady state growth applied*

[4] *See Table 1*

Appendix D - Travel Time Savings

Blue Line O'Hare

Impact of Track Renewal and Station Rehabilitation Construction

Timeframe: 2012 - 2036

Year	Total Ridership Projected	Total Ridership Difference	Minutes Lost/Saved[2]	Hours Lost/Saved	Travel Time Savings/Losses[1]
2012	25,049,086	(551,561)	(32,563,812)	(542,730)	$ (6,784,128)
2013	25,649,758	(1,998,941)	(27,874,753)	(464,579)	$ (5,807,240)
2014	27,956,994	(244,679)	2,313,892	38,565	$ 482,061
2015	30,264,957	1,499,251	39,344,445	655,741	$ 8,196,759
2016	31,184,433	1,843,412	40,539,762	675,663	$ 8,445,784
2017	31,808,121	1,880,280	20,675,279	344,588	$ 4,307,350
2018	32,444,284	1,917,886	21,088,784	351,480	$ 4,393,497
2019	33,093,169	1,956,244	21,510,560	358,509	$ 4,481,367
2020	33,755,033	1,995,369	10,970,386	182,840	$ 2,285,497
2021	34,430,133	2,035,276	11,189,793	186,497	$ 2,331,207
2022	35,118,736	2,075,982	11,413,589	190,226	$ 2,377,831
2023	35,821,111	2,117,501	-	-	$ -
2024	36,537,533	2,159,851	-	-	$ -
2025	37,268,284	2,203,048	-	-	$ -
2026	38,013,649	2,247,109	-	-	$ -
2027	38,773,922	2,292,051	-	-	$ -
2028	39,549,401	2,337,892	-	-	$ -
2029	40,340,389	2,384,650	-	-	$ -
2030	41,147,197	2,432,343	-	-	$ -
2031	41,970,141	2,480,990	-	-	$ -
2032	42,809,543	2,530,610	-	-	$ -
2033	43,665,734	2,581,222	-	-	$ -
2034	44,539,049	2,632,847	-	-	$ -
2035	45,429,830	2,685,504	-	-	$ -
2036	46,338,427	2,739,214	-	-	$ -

Assumptions - Travel Time Savings			
Value of Time Saved[1]	$ 12.50	per person hour	
Travel Time Saved[2]	1.30	minutes	1st 3 years (per trip)
	0.65	minutes	2nd 3 years (per trip)
	0.33	minutes	3rd 3 years (per trip)

1 *$12.50/hour - Revised Departmental Guidance on Valuation of Travel Time in Economic Analysis (http://ostpxweb.dot.gov/policy/reports/vot_guidance_092811.pdf)*

2 *2014-2016 - 1.3 minutes, 2017-2019 = .65 minutes, 2020-2022 = .325 minutes*

Appendix E - Fare Revenue Impact

Blue Line O'Hare Projected Ridership
Impact of Track Renewal and Station Rehabilitation Construction on Fare Revenue
Timeframe: 2012 - 2036

Year	Total Ridership Projected	Total Ridership Difference	Cost[1,2]	Benefit[1,2]
2012	25,049,086	(551,561)	-	93,765
2013	25,649,758	(1,998,941)	-	339,820
2014	27,956,994	(244,679)	(43,389)	84,984
2015	30,264,957	1,499,251	(254,873)	-
2016	31,184,433	1,843,412	(313,380)	-
2017	31,808,121	1,880,280	(319,648)	-
2018	32,444,284	1,917,886	(326,041)	-
2019	33,093,169	1,956,244	(332,561)	-
2020	33,755,033	1,995,369	(339,213)	-
2021	34,430,133	2,035,276	(345,997)	-
2022	35,118,736	2,075,982	(352,917)	-
2023	35,821,111	2,117,501	(359,975)	-
2024	36,537,533	2,159,851	(367,175)	-
2025	37,268,284	2,203,048	(374,518)	-
2026	38,013,649	2,247,109	(382,009)	-
2027	38,773,922	2,292,051	(389,649)	-
2028	39,549,401	2,337,892	(397,442)	-
2029	40,340,389	2,384,650	(405,391)	-
2030	41,147,197	2,432,343	(413,498)	-
2031	41,970,141	2,480,990	(421,768)	-
2032	42,809,543	2,530,610	(430,204)	-
2033	43,665,734	2,581,222	(438,808)	-
2034	44,539,049	2,632,847	(447,584)	-
2035	45,429,830	2,685,504	(456,536)	-
2036	46,338,427	2,739,214	(465,666)	-

[1] *Average Fare = $0.96, Average Cost per trip = $1.13, differential $0.17*

[2] *Since Cost > Avg Fare, a ridership increase = Cost to CTA and vice versa*

Appendix F - Emissions Reduction

Blue Line O'Hare
Impact of Track Renewal and Station Rehabilitation Construction on Emissions
Timeframe: 2012 - 2036

Year	Total Ridership Projected	Trips Gained/Saved[1]	# of trips diverted to/from auto[2]	# of trips diverted per day[3]	Trips - Assuming Round Trip[4]	# of cars impacted[5]	CO2 Emissions Use/Reduction (metric tons)[6]	Value of CO2 Emissions[7]
2012	25,049,086	(551,561)	(137,890)	(4,522)	(2,261)	(1,130)	(6,218)	$ (10,570,077)
2013	25,649,758	(1,998,941)	(499,735)	(16,436)	(8,218)	(4,109)	(22,600)	$ (38,419,890)
2014	27,956,994	(244,679)	(61,170)	(2,051)	(1,025)	(513)	(2,820)	$ (4,793,565)
2015	30,264,957	1,499,251	374,813	1,027	513	257	1,412	$ 2,400,342
2016	31,184,433	1,843,412	460,853	1,263	631	316	1,736	$ 2,951,353
2017	31,808,121	1,880,280	470,070	1,288	644	322	1,771	$ 3,010,381
2018	32,444,284	1,917,886	479,472	1,314	657	328	1,806	$ 3,070,588
2019	33,093,169	1,956,244	489,061	1,340	670	335	1,842	$ 3,132,000
2020	33,755,033	1,995,369	498,842	1,367	683	342	1,879	$ 3,194,640
2021	34,430,133	2,035,276	508,819	1,394	697	349	1,917	$ 3,258,533
2022	35,118,736	2,075,982	518,995	1,422	711	355	1,955	$ 3,323,703
2023	35,821,111	2,117,501	529,375	1,450	725	363	1,994	$ 3,390,177
2024	36,537,533	2,159,851	539,963	1,479	740	370	2,034	$ 3,457,981
2025	37,268,284	2,203,048	550,762	1,509	754	377	2,075	$ 3,527,141
2026	38,013,649	2,247,109	561,777	1,539	770	385	2,116	$ 3,597,683
2027	38,773,922	2,292,051	573,013	1,570	785	392	2,159	$ 3,669,637
2028	39,549,401	2,337,892	584,473	1,601	801	400	2,202	$ 3,743,030
2029	40,340,389	2,384,650	596,163	1,633	817	408	2,246	$ 3,817,890
2030	41,147,197	2,432,343	608,086	1,666	833	416	2,291	$ 3,894,248
2031	41,970,141	2,480,990	620,248	1,699	850	425	2,337	$ 3,972,133
2032	42,809,543	2,530,610	632,652	1,733	867	433	2,383	$ 4,051,576
2033	43,665,734	2,581,222	645,306	1,768	884	442	2,431	$ 4,132,607
2034	44,539,049	2,632,847	658,212	1,803	902	451	2,480	$ 4,215,260
2035	45,429,830	2,685,504	671,376	1,839	920	460	2,529	$ 4,299,565
2036	46,338,427	2,739,214	684,803	1,876	938	469	2,580	$ 4,385,556

Assumptions	
Percent of Rides to/from auto[2]	**25%**
Riders per car[5]	2
Metric Tons per car per year	5.5
Value of metric ton of CO_2[7]	$ 1,700.00

[1] *Ridership change due to track renewal and station rehab construction*

[2] *Number of trips saved diverted to/from automobile travel*

[3] *Diverted trips converted to a daily number. Yearly totals divided by 365, months by respective days per individual month*

[4] *Conversion to round trips = # of trips diverted divided by 2*

[5] *Assume two riders per car*

[6] *Each vehicle emits 5.5 metric tons of CO_2 per year*

[7] *Metric ton of CO_2 = $1,700.00*

Appendix G - Detail Explanation for BCA

Detail Explanations for BCA

Ridership

- Wherever ridership is used throughout the BCA, the following explains the base calculations and assumptions.
- Source

○ Blue Line O'Hare actual ridership totals used to project growth rate for section of track to be repaired. *See Appendix A - Hist Ridership*

○ Ridership grew at a 7% pace 2010 over 2009 and is currently growing at a 7.8% rate for 2011 over 2010.

- Baseline

○ For a baseline/status quo ridership, an 8% rate was used for 2 years and then a steady state growth rate of 2% was applied thereafter.

- During the track renewal phase of the project, ridership loss will be minimal

○ Work will be done with nightly single tracks (for 24 of the weeks) and weekend single tracks or line cuts. There will be a split between weekend single tracks and line cuts TBD at a later date. There will be no construction impact during rush periods. There may be some work under flaggers (slow order), such as limited contractor punch list and possible internal (force account) work.

○ An 8% growth rate was applied until construction commences (September, 2012). During construction, a slowing of the growth rate is applied at 4% through the end of construction (November, 2013).

○ Post construction ridership returns to the original growth rate (8%) for two years and then a steady state growth rate of 2% for all subsequent years (2016 – 2036)

- Station Repair

○ Due to a derailment on the Blue Line in July 2006, we have observed ridership impact for the Damen Station due to major reconstruction. We will use the observed ridership increase and decrease percentages when measuring the impact of the effect of a renovated station. The following table contains the percentage gains/losses in ridership due to a major station construction

Ridership Effects of Construction		
	Damen	California
Growth - steady state	8%	8%
Q1-Constr	-12%	-12%
Q2-Constr	-14%	-14%
Interim	-5%	-5%
Q3-Const	-3%	-3%
Q1-Post Const	0%	0%
Q2-Post Const	22%	22%
Q3-Post Const	24%	24%
Q4-Post Const	12%	12%
Q5-Post Const	11%	11%
Steady State	10%	10%
Steady State (50%)	2%	2%

Benefits

- Ridership Return

  - Only the ridership differential is used to gauge the incremental impact. Since our "profit" per trip is negative, when ridership is reduced, we actually see a benefit. The CTA's average fare for rail is approximately $0.96 while our variable cost is $1.13. Thus, $0.17 per trip is applied to each incremental trip. On the benefit side, a reduction in ridership, in essence, "saves" the CTA the ridership differential times $0.17. The $0.17 should not be applied to the entire Blue Line O'Hare ridership, only those rides that are the "effect" of the track renewal and station rehabilitation.
  - The reverse of the above is used on the "cost" side for ridership impact.
- State of Good Repair
  - Travel Time Savings
  - All riders on the Blue Line O'Hare section will benefit from the travel time savings of 1.3 minutes per trip which will be valued according to Table 4, in Revised Departmental Guidance on Valuation of Travel Time in Economic Analysis (*http://ostpxweb.dot.gov/policy/reports/vot_guidance_092811.pdf)*
- Used Local Travel Average (takes into account split between Personal and Business Travel) of $12.50 per person hour
- The calculation is # of rides * 1.3 minutes * $12.50
  - Travel time savings will continue for 5 years at 1.3 minutes per trip (2014-2018) and then for another 5 years at 0.65 minutes per trip (2019-2023)
  - Assumption for the cost side – Since 1.3 minutes will be saved after the construction efforts, currently, each rider is experiencing a 1.3 minute delay and so until construction is complete, each rider will "cost" the CTA, 1.3 minutes * $12.50.
  - Travel time impact calculated through 2019 at which time the 1.3 minute benefit is assumed to have run its course.
- Reduced Emissions
  - Effects of emissions reductions not calculated until construction starts (and some ridership diverted to auto travel) only capturing the incremental effects on ridership of the station rehabilitation
  - When ridership is decreasing due to station repairs, we will use the same rationale for calculations but in reverse. Decreasing ridership = diverting some of the lost riders to automobile traffic.
  - As ridership declines due to the track renewal construction and the rehabilitation of two stations, trips are lost and it is assumed that 1 out of every 4 trips (25%) is diverted to automobile travel (as ridership returns, 25% of riders will be diverted *from* auto travel).
  - The number of trips diverted to/from auto travel is then converted to a "per day" number and then divided by two to assume each ride is a round trip. Also assuming there are two passengers per vehicle, the calculation continues with a division by two. This represents the number of automobiles affected.
  - The number of automobiles affected is multiplied by 5.5 and then by 1,700 as each auto taken off/put on the road, emits 5.5 metric tons of CO2 each year at a cost of $1,700 per ton. This results in the CO2 emissions saved/increased.
- Economic Competitiveness
  - Station Repair
  - Ridership used in calculations - see the comments on ridership in the above section.
  - Please see study: Quantifying the Value of Transit Station and Access Improvements for Chicago's Rapid Transit System. (Note: See attached .pdf)
- As found in the above study, a modernized station will have the equivalent of a $0.23 perceived benefit to the traveler per trip. $0.23 will be applied for two years post construction, $0.115 (half) for the 3rd year, and $0.0575 (half again) for the 4th year as the effect of the "new" station wears off
  - Any ridership originating in the Damen and California stations will get the above treatment not the entire ridership of the Blue Line – O'Hare.
  - Savings in Operating Costs
  - On the stretch of track on the Blue Line between Damen and Belmont, crews are currently repairing the track on Saturday on about 5 occasions a year

- The team consists of one Roadmaster III (labor rate = $35.43/hr straight time) and six trackmen (labor rate = $37.33/hr straight time). This is a Saturday so the employees are being paid 1.5 times their hourly wage. This work will take one day (8 hours) for a total cost of $3,133 per day. Again, this would take place about 5 times a year for 5 years if the track renewal project not be carried out.
  - After the 5 years, a more comprehensive repair must be undertaken
- The team will consist of 12 trackmen ($37.33/hr), one Roadmaster II ($32.49/hr) and one Roadmaster III ($35.43/hr). This more extensive repair will take 6 months (130 working days), every weekday for the 14-person crew. This repair costs about $4,127 per day or $621,975 for the six-month period.

- This repair will last about 15 years at which point, the one-day/five times a year repair from above will have to commence again for five years. This will take place in 2017 and 2037.
  - Since the BCA assumes the track renewal project will be undertaken, these costs are "operating costs saved" and thus are put in the benefits section
- Also, these same amounts will be used on the Cost side for the time period until the construction starts (January 2012 to September 2012)

- Costs
  - The details of the actual costs of the track renewal and station rehabilitation project are found in Appendix – Trk Rnwl_Stn Rehab Cost Detail and total to $51,392,925.
  - Travel Time Losses
    - Addressed in the benefits section (i.e. reverse of travel time savings based on ridership increases and decreases).
  - Maintenance
    - The amounts are found on the benefit ledger as they will not be spent if the project is undertaken.
  - Ridership Loss/Gain
    - Addressed above
  - Increased Emissions
    - Addressed above.

Appendix H - Track Repair Details

Blue Line Maintenance Upkeep

One day consists of:
Saturday so OT rate applies

	# of emps	Hourly Rate	X 1.5	Daily Rate	Extended
Trackman	6	$ 37.33	$ 56.00	$ 447.96	$ 2,687.76
Roadmaster III	1	$ 35.43	$ 53.15	$ 425.20	$ 425.20
Total					**$ 3,113**

This will happen 5 times per year 5

After 5 years of this, they would need to do this…

	# of emps	Hourly Rate		Daily Rate	Daily Extended
Trackman	12	$ 37.33		$ 298.64	$ 3,583.68
Roadmaster II	1	$ 32.49		$ 259.94	$ 259.94
Roadmaster III	1	$ 35.43		$ 283.47	$ 283.47
Total					**$ 4,127**

For 6 months at straight time 130 Days

Input Multipliers

Wage Increase	3.0%		per year
Modernized Station Benefit	$ 0.23		1st two years
	$ 0.115		3rd year
	$ 0.0575		4th year
Value of Time Saved	$ 12.50		per person hour
Percent of rides from auto	25.0%		
Emmissions Output	Per Year	Per Month	
Carbon Dioxide	5.5	0.46	per car
Value of Metric Ton of CO2	$ 1,700.00		

TIGER Benefit-Cost Analysis (BCA) Examples

Kennebec Bridge Replacement

Main Department of Transportation

BCA Example Contents

- BCA Summary from Project Narrative
- BCA Narrative
- BCA Summary
- Life Cycle Cost Analysis (7% discount)
- Life Cycle Cost Analysis (3% discount)

TIGER 3 APPLICATION

RICHMOND – DRESDEN

MAINE KENNEBEC BRIDGE

Bridge Number 2506
Federal Project AC-BH-1267(400)X
Work ID Number 012674.00
TIGER 3 Pre-Application ID "DScott76093842"

Maine Department of Transportation
October 26, 2011

This is a BCA-relevant excerpt from the full TIGER Application

ors to exercise reasonable stewardship over both natural resources and transportation infrastructure through its commitment to addressing aquatic organism and wildlife habitat and passage in cooperation with natural resource agencies, while weighing all aspects of a proposed project. A relatively new measure may be explored in the construction of the foundations to mitigate noise impacts to aquatic wildlife, including salmon and sturgeon. The use of "bubble curtains", a relatively recent innovation, will be implemented during pile driving to attenuate conduction of sound vibrations through the water column.

6.1.5 Safety

An analysis of the recent crash history for the bridge and its approaches shows that there were three crashes in the 2008 - 2010 period. The cumulative critical rate factor was 0.95 and the percent of personal injury was 66.7. There were two non-incapacitating injury crashes and one property damage only crash. All three crashes occurred on the west approach segment located approximately 400 feet west of the bridge to the swing span. This segment is characterized by non-standard horizontal and vertical curves, non-standard superelevation, and inadequate sight distance on the western bridge approach, in addition to the narrowness of the bridge.

Additional crash history is available from the analysis contained in 2006 Feasibility Study. At that time crashes were examined for 2002 through 2004. Both analyses are consistent in the magnitude of injuries. A total of seven crashes occurred during that period. Of those crashes 71% occurred on the west approach segment. One occurred on the east approach segment. One crash occurred at the swing span section. The replacement bridge will correct these geometric deficiencies.

6.2 Job Creation and Near-Term Economic Activity

This project is expected to quickly create construction jobs and preserve local business employment. Utilizing the TIGER 3 FAQ's at the USDOT Application Resources website which states "After discussions with and various references from the White House Council of Economic Advisers, the USDOT estimates that there are 13,000 job-years created per $1 billion dollars of government investment (or $76,900 per job-year). Previous guidance had stated that every $92,000 of investment is equivalent to one job year." http://www.dot.gov/tiger/application-resources.html#FAQ

For this project, it is therefore assumed that every $76,900 of project construction value will create one (1) job-year. In accordance with the above guidance, this project will create 278 construction job-years ($21,400,000 / $76,900). If only the TIGER 3 portion of the proposed funding package is counted, then 140 job-years could be the calculated number. However, since Maine does not have an identified funding source to complete the project without this TIGER Grant, 278 job-years seems a better measure of the effect of a grant award.

6.3 Evaluation of Expected Project Costs and Benefits

The Benefit/Cost Analysis looks at the project from the standpoint of society as a whole, and accounts for the net benefits and net costs based on the criteria described in the TIGER Grant

NOFA. The analysis seeks to answer the question, "Is society better off with the project or without the project?" The analysis addresses travel time savings, vehicle operating costs, crash reduction, emission reduction, and livability enhancement.

The life cycle cost analysis indicates that the lowest cost alternative is the high profile replacement. Therefore, the benefit cost analysis focuses on that option, and compares the replacement to the "no build' scenario, which is the base case assumption. This assumes that the existing bridge would be closed to traffic. Existing and future traffic would be diverted to alternate routes, thereby increasing travel time and mileage. The benefits and crash reduction factors due to alignment and improved geometrics of the replacement bridge would be forgone. Replacing the bridge avoids these future costs. The benefits that accrue to society from the Maine Kennebec River Bridge can be estimated by the avoided costs that would occur without the proposed replacement. The life cycle cost analysis includes only bridge construction costs as compare to the alternatives. The benefit cost analysis, on the other hand, includes all costs including construction, preliminary engineering, construction engineering, and right-of-way, for a total of $24.9 million.

Summary of Benefits and Costs

The annual benefits and costs values were discounted at 3% and 7% over a 50 year time horizon. Three percent is the more appropriate rate for the analysis because the new bridge will have a very long life, and in addition, the alternate use of funds would be a public expenditure as opposed to a private investment. The full analysis can be found in the spreadsheet supplement to this application.[1] A summary of the results of this analysis (3% discount rate) are as follows.

- Total Benefits of $ 361.7 million
- Total Costs of $ 25.2 million
- Benefit-Cost ratio of 14.3

When discounted at 7%, the benefits and costs are as follows.

- Total Benefits of $ 193.7 million
- Total Costs of $ 25.0 million
- Benefit-Cost ratio of 7.7

It is estimated that travel cost savings alone due to avoided VMT amount to $280.5 million. On an annual basis these costs savings represent over ¾ of the total annual benefits. These user costs savings are the key driver of the benefit-cost ratio. Even if all other benefits were ignored the

[1] Benefit Cost Analysis
http://www.maine.gov/mdot/tiger3/documents/pdf/mkb/MKBBenefitCostAnalysis.pdf
Benefit Cost Analysis Narrative
http://www.maine.gov/mdot/tiger3/documents/pdf/mkb/MKBBenefitCostAnalysisNarrative.pdf
Benefit Cost Analysis – 3% Discount
http://www.maine.gov/mdot/tiger3/documents/pdf/mkb/MKBLifeCycleCostAnalysis3percentDiscount.pdf
Benefit Cost Analysis – 7% Discount
http://www.maine.gov/mdot/tiger3/documents/pdf/mkb/MKBLifeCycleCostAnalysis7percentDiscount.pdf

benefit cost ratio would be a minimum of 6.0 at the larger, 7% discount rate. It must be noted that the assumptions on the other key criteria have a small influence on these results.

6.4 Project Schedule

The project milestone dates are as follows:

Table 4: Project Milestones	
NEPA	September 2012
Design Complete	March 2013
Right-of-Way	March 2013
Obligate Funding	May 2013
Construction Complete	December 2015

The complete Critical Path Method schedule is provided here.
http://www.maine.gov/mdot/tiger3/documents/pdf/mkb/KMBConceptualSchedule.pdf

6.5 Environmental Approvals

The most sensitive wetlands are freshwater inter-tidal emergent wetlands (PEM) associated with the Kennebec River. These wetlands are dominated by wild rice and other mud plants. All resources to the tidal river outside of the emergent marsh are considered Riverine Unconsolidated Substrate (RUS) impacts. Additionally, there are forested wetlands (PFO) located easterly of Lincoln Road and Densmore Lane in Dresden. The only species that the area mapped as Essential Fishery Habitat under the Magnusson – Stevens Sustainable Fisheries Act is the Atlantic salmon.

Avoidance and minimization will occur throughout the design process. Restoration from removal of existing bridge piers is estimated to be approximately 2,000 sf. Compensatory mitigation in the form of in-lieu fee is anticipated for 20,000 sf of PFO, 1,300 sf of PEM, and 3,700 sf of RUS/EUS. Compensatory mitigation is anticipated for impacts to wetlands and waterbodies. Total in-lieu fee costs are anticipated to be approximately $125,000.

Permit levels for ACOE and DEP have been determined based on eight new in-water piers, rip rap scour protection and temporary impacts. For eight piers, it is expected that two would be within the PEM, and six within the RUS. Total PEM impacts are estimated to be 1,300 sf and RUS impacts are estimated to be 3,700 sf. Approach work for a new bridge is estimated to impact approximately 20,000 sf of PFO wetlands. DEP and ACOE permits are needed. The level of permitting is anticipated to be a DEP Permit by Rule and a CAT II for the ACOE

A U.S. Coast Guard Permit will be needed for construction over navigable water. Approval is anticipated by December 1, 2012.

6.3 Benefit Cost Analysis

Project Description

Constructed in 1931, the Maine Kennebec Bridge (MKB) carries State Route 197 over the Kennebec River. MKB consists of 10 spans with a total length of 1239 feet, and is classified as Structurally Deficient by the Federal Highway Administration (FHWA). Five of its spans are also Fracture Critical, meaning that failure of certain steel tension members could result in catastrophic failure. A Feasibility Study completed in 2006 analyzed several options and found that replacement in approximately 10 years would be the lowest life cycle cost solution. In accordance with the findings of that Study, the proposed project is complete replacement with a high level, fixed span bridge estimated at $24.9 million. This application requests $10.81 million in TIGER funds to supplement $1.64 million in existing Federal funds to pay for 50% of the project.

A benefit cost analysis was conducted on replacing the Maine Kennebec Bridge. The analysis looks at the project from the standpoint of society as a whole, and accounts for the net benefits and net costs based on the criteria described in the TIGER Grant NOFA. The analysis seeks to answer the question, "Is society better off with the project or without the project?" The analysis presented here addresses travel time savings, vehicle operating costs, crash reduction, emission reduction, and livability enhancement.

Base Case Assumption

The life cycle cost analysis indicates that the lowest cost alternative is the high profile replacement. Consequently, the benefit cost analysis focuses on that option, and compares the replacement to the "no build' scenario, which is the base case assumption. This assumes that the existing bridge would be closed to traffic. Existing and future traffic would be diverted to alternate routes, thereby increasing travel time, mileage, and increased accidents. The benefits and crash reduction factors due to alignment & engineering changes of a replacement bridge would be forgone. Replacing the bridge avoids these future costs. The benefits that accrue to society from the Maine Kennebec River Bridge can be estimated by the avoided costs that would occur without the Bridge. The life cycle cost analysis includes only bridge construction costs in order to compare with the alternatives. The benefit cost analysis, on the other hand, includes all costs including preliminary engineering, construction engineering, and right-of-way, for total cost of $24.9 million.

Summary of Benefits and Costs

The annual benefits and costs values were discounted at 3% and 7% over a 50 year time horizon. Three percent is the most appropriate rate for the analysis because bridge has a very long life, and in addition, the alternate use of funds would be a public expenditure as opposed to a private investment. The full analysis can be found in spreadsheet linked to this application.[1] A summary of the results of this analysis are as follows.

[1] Maine Kennebec Bridge Benefit Cost Analysis.xls

- Total Benefits of $ 361.7 million
- Total Costs of $ 25.2 million
- Benefit-Cost ratio of 14.3

When discounted at 7%, the benefits and costs are lower. A larger discount rate implies that time preference for future amounts are preferentially discounted more severely. The amounts are show below.

- Total Benefits of $ 193.7 million
- Total Costs of $ 25.0 million
- Benefit-Cost ratio of 7.7

It is estimated that travel cost savings alone due to avoided VMT amount to $280.5 million. On an annual basis these costs savings represent over ¾ of the total annual benefits. These user costs savings are the key driver of the benefit-cost ratio. Even if all other benefits were ignored the benefit cost ratio would be a minimum of 6.0 at the larger, 7% discount rate. It must be noted, therefore that the assumptions on the other key criteria have a small influence on these results.

Project Benefits

Travel Costs

The Maine Kennebec Bridge is an important crossing on the Kennebec River. The nearest alternative crossings are bridges at Bath, Gardiner, and Augusta, which are 16.4 miles, 9.3 miles and 17.3 miles away respectively. The average annual daily traffic is on the Bridge is 3,340 vehicles, with approximately six percent of that being trucks. If the Bridge were closed and taken out of service, travelers would be forced to use these alternate crossing and traffic would shift to accommodate the loss. The total increase in vehicle-miles-traveled is estimated a 9.3 million miles annually. This number was developed using MaineDOT's Statewide Travel Demand Model, a transportation analysis tool, based on the TRIPS modeling software that can be used to evaluate the impact of major changes in the highway network. The Model relies on population demographics, employment, and economic activity in order to forecast VMT. The Model can be used to evaluate the travel time and distance benefits of a major new bridge or highway facility and can also be used to evaluate the travel costs (disbenefits) of closing a major facility.

For this analysis the Model was run twice, once with the bridge in place and operating and once with the bridge lost or removed from service. The Model run with the bridge in place represents existing conditions. The Model run with the bridge removed represents conditions in which the loss of the bridge forces bridge users to alternate river-crossing routes that longer in distance and time between the start and end points of their trips. The nearest alternate locations for crossing the Kennebec River are at Bath, Gardiner, and Augusta. Subtracting the existing conditions Model results from the closed conditions results provides an estimate of the increases in user costs from closure of the bridge. The increases in travel distances and travel times that are avoided by replacing the bridge, rather than allowing the crossing to be lost, represent the benefits of a replacement bridge. The table below summarizes the calculations.

	User Costs Due to Bridge Closure		
	VMT	VHT	Cost
Per Vehicle Detoured	7.6	0.56	$ 8.66
Year-Round Total	9,284,981[2]	686,543	$ 10,903,033[3]

Note.
Costs per Vehicle-Mile-Traveled in $0.25based on AAA data. Hourly value of time is $12.50.

Vehicle Operating Costs

An increase in vehicle operating costs would result from the additional VMT created by closing the bridge. The total annual vehicle operating costs is estimated at $2.4 million and is included in the total user costs presented above. This is based on $0.25 per mile average that has derived from American Automobile Association operating costs data for passenger cars. These operating costs are avoided by bridge replacement. This does not include the amount from heavy truck traffic.

Operating costs avoided by a bridge would enhance economic competitiveness in the region served by the project. In addition, a decrease in delay would result, because the existing bridge traffic is reduced to one-lane operation when trucks are traversing the bridge. The narrow deck, and also low clearance at the sides, can cause oncoming traffic to either slow, move over, or stop entirely. This delay has not been included here. Similarly the few delays caused by traffic stoppage during vessel passage are not estimated.

This analysis does not estimate user costs of delay during construction, as it will be minimized by utilizing parallel bridge construction techniques. MaineDOT experience with parallel construction of the Norridgewock Bridge, and also on the Penobscot Narrows Bridge bears out this fact.

Safety

An analysis of the recent crash history shows that there were three crashes in the 2008-2010 period. The cumulative critical rate factor was 0.95 and the percent of personal injury was 66.7. There were two non-incapacitating injury crashes and one property damage only crash. All three crashes occurred on the west approach segment located approximately 400 feet west of the bridge to the swing span. This segment is characterized by non-standard horizontal and vertical curves, nonstandard superelevation, and inadequate sight distance on the western bridge approach in addition to the narrow bridge. The annual costs for these crashes are estimated at average value of $21,228 using the maximum Abbreviated Injury Scale (AIS) method[4].

Additional crash history is available from an analysis that was done previously for the 2006 bridge replacement feasibility study. At that time crashes were examined for 2002 through 2004. Both analyses are consistent in the magnitude of injuries. A total of 7 crashes occurred during that period. All of the crashes were property damage only, low speed collisions. Of those crashes

[2] Travel Cost Spreadsheet, assignment summary tab, cell G24
[3] Travel Cost Spreadsheet, assignment summary tab, cell I24.
[4] Crash Costs per AIS for Past Crashes.xls, cell K19

71% occurred on the west approach segment. One occurred on the east approach segment. One crash occurred at the swing span section. These rates and costs are discussed here only as a historical context. They are not included in the BCA, since the bridge approaches are assumed absent in the closure scenario.

If the bridge is closed, additional travel would presumably increase crashes on alternate routes in transportation network. To prepare an accurate estimate of crash costs, a specific crash rate was developed for all Maine rural major collectors, which would be the likely alternate routes. The table below lists these crash factors and the resulting injury costs using the KABCO injury scale.

Crash Costs due to Increased VMT			
VMT (Annual)	9,284,981[5]		
HMVM (Annual)	0.09284981[6]		
		Injury Values	Estimated Costs
Crashes[7]	16.89876305		
Fatalities	0.137613403	$4,000,000	$550,453.61
Incapacitating Injuries	0.633510223	$201,100	$127,398.91
Evident Injuries	2.478669818	$50,400	$124,924.96
Possible Injuries	3.35972131	$24,400	$81,977.20
Vehicles involved (1.6/crash event)	27.03802088	$2,200	$59,483.65
		Total Annual Crash Cost	**$944,238.32**

The KABCO estimates are converted to AIS levels using the table of values on Page 50310 of the NOFA. The resulting costs are shown below.

KABCO-AIS Conversion[8]						
		KABCO Estimates		AIS Level & Severity		
Crashes	16.89876305					
Fatalities	0.137613403	$4,000,000	$550,453.61	$6,200,000	6	$853,203.10
Incapacitating Injuries	0.633510223	$201,100	$127,398.91	$1,649,200	4	$1,044,785.06
Evident Injuries	2.478669818	$50,400	$124,924.96	$292,400	2	$724,763.05
Possible Injuries	3.35972131	$24,400	$81,977.20	$18,600	1	$62,490.82
Vehicles involved (1.6/crash event)	27.03802088	$2,200	$59,483.65	$3,285	PDO	$88,819.90
	Total Crash Costs		**$944,238.32**			**$2,774,061.93**

[5]Travel Cost Spreadsheet.xls, assignment summary tab, cell G24
[6]Major Collector Crash Rates & Injuries.xls, cell B25
[7]Major Collector Crash Rates & Injuries.xls, cell B24:B28
[8] Major Collector Crash Costs.xls, cells A24:G30

The table shows that the conversion to AIS nearly triples the estimated costs. The total annual safety costs for alternate routes are almost $2.8 million.

State of Good Repair

The existing bridge was built in 1931. It is 1239 feet long with ten spans. One span consists of a center bearing swing span. The deck is an open steel grid type. Due to the age of the bridge, ongoing maintenance and operations costs are significant. Estimated annual average M&O costs amount to $103,500 for personnel, repairs, and materials. If the bridge were closed these costs are avoided. In this BCA the annual M&O costs are added to user benefits since they are avoided costs to society if a new bridge is constructed.

The existing bridge has a swing span to allow for boat traffic. Navigability on this section of the Kennebec River is extremely important, especially for the U.S. Coast Guard icebreakers. The USCG vessels are utilized during most winters to prevent ice jams that can cause flooding in many upstream areas, if they are not cleared from the river channel. The existing bridge shows some damage from ice impacts. If the structure was not removed after closure, and the moveable section becomes inoperable, USGC vessels could not pass under it. This is not a realistic possibility, since Federal protection on navigable channels would probably require removal of the obstruction. Structure removal costs are only a guess. A ballpark estimate is would be approximately $5 million, based on estimated removal costs on other recent MaineDOT bridge replacement projects. This removal cost is not included in this analysis since it would occur in both the “no build” and build alternatives, therefore it becomes a wash.

Sustainability

The avoided air emissions are based on avoided VMT from closure of the bridge and the loss of this crossing location. The emission savings have been calculated for nitrogen oxides, volatile organics, and carbon dioxide. The calculations are based on factors that were applied to the avoided VMT resulting from closure of the bridge. Data is not available for sulfur dioxide or particulate emissions.

Air Quality Impact Analysis						
Increase in VMT						
Annual VMT	Emission Factors (g/mi)[1]			Emissions Increase (Metric Tons / Year)		
	VOC	NOx	CO2	VOC	NOx	CO2
9,284,981[9]	0.597[10]	0.962[11]	555.40[12]	6	9	5157
Increase in VHT through idling						
Annual VHT	Emission Factors (g/hour)[2]			Emissions Increase (Tons / Year)		
	VOC	NOx	CO2	VOC	NOx	CO2
686,543	10.669	4.282	1388.50	7	3	953
Total Emission Increases						
Annual VHT	Total Emission Increase (Metric Tons / Year)			Value of Emissions ($ / Metric Ton)		
	VOC	NOx	CO2	VOC	NOx	CO2
	13	12	6110	$1,700	$4,000	$22
NOTES						
[1]Composite emission factors for all vehicles types at 46 MPH.						

The social cost of carbon (SCC) has been estimated using values found in "Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866". The report states that, "… SCC increases over time because future emissions are expected to produce larger incremental damages as physical and economic systems become more stressed in response to greater climatic change." In conformity with this viewpoint, this analysis escalates the CO2 portion of the air emissions cost increases estimated on Table 5: "Changes in the Average Annual Growth Rates of SCC Estimates between 2010 and 2050" in the report. The net present value of air emissions costs is $6.5 million at 3% discount and $3.3 million at 7 % discount.

Livability

There are many dimensions of livability including choice in transportation options, community values, health benefits, and recreation values. This bridge project, by virtue of its nature and location can probably influence these factors. A shared use pedestrian and bicycle lane on the bridge would make walking and bicycling safer and more accessible. Some studies in the research literature have shown that increased walking and bicycling can be associated with environments that encourage pedestrian and bicycling features. At this bridge location, there are several factors, however, that limit pedestrian and bicycling in this area. One is that the bridge is located a distance away from nearest village center; another might be that the facility does not connect with another shared use pathway. In addition, the fact that Maine experiences severe winter weather probably limits walking & bicycling somewhat, especially on a rural bridge deck. It is not known what the induced demand will be for this river crossing.

[9]Travel Cost Spreadsheet.xls, assignment summary tab, cell G24
[10] Emissions Reduction- Richmond-Dresden Bridge.xls, cell B6
[11] Emissions Reduction- Richmond-Dresden Bridge.xls, cell B7
[12] Emissions Reduction- Richmond-Dresden Bridge.xls, cell B8

Nevertheless, an estimate of potential health and recreation benefits for pedestrian & bicyclists was developed, based on several assumptions. The analysis assumes that 2.1% of the population would use the shared use pathway a few times per year. It is assumed that 10% of the population participates in walking for recreation. Further assumptions are made on the portion of those who might choose a bridge route, depending on distance from the facility. The number of tourism crossings is also assumed. The total fitness and health benefit is estimated at around $7,500[13] per year. Other livability factors were not considered due to lack of a meaningful way to estimate them. Even if these estimates are off by a factor of 20, the benefit cost ratio would be changed by only 0.1.

Project Costs

Total Construction Costs

The life cycle cost analysis was updated from the analysis contained in the 2006 Feasibility Study[14]. The preferred alternative is the high profile replacement as shown in the LCCA. The life cycle cost analysis includes only bridge construction portion of total replacement costs, to preserve equal comparison of alternatives.

The benefit cost analysis, on the other hand, includes all costs including preliminary engineering, construction engineering, and right-of-way, for total cost of $24.9 million. Maintenance and operations costs for the high profile replacement bridge are considered negligible until the wearing surface is rehabilitated after 30 years, at a cost of $826,500.

[13] Value of Health Benefits.xls, cell I24

[14] Feasibility Study, Maine Kennebec Bridge, Bridge #2506, by MaineDOT and Erdman Anthony and Associates, July 2006, p.21

Benefit Cost Analysis

Project name: Maine Kennebec Bridge Replacement

Project Sponsor: MaineDOT

General description of benefits: Replacement of Maine Kennebec Bridge (Route 197, Bridge #2506) between the towns of Richmond and Dresden.

	Benefits									Costs			Discounted Benefits		Discounted Costs		Annual Net Benefits	
Year	Liveability [2.]	Travel Time & User Costs [3.]	Crash Costs [4.]	State of Good Repair [5.]	Air Emissions[6] Criteria Pollutants	Air Emissions[6] CO2	Total Air Emissions	Total Annual Benefits		Construction Costs [7.]	Annual Maintenance [7.]	Total Annual Costs	PV @ 3%	PV @ 7%	PV @ 3%	PV @ 7%	PV @ 3%	PV @ 7%
0										$24,900,000	$0	$24,900,000	$0	$0	$24,900,000	$24,900,000	($24,900,000)	($24,900,000)
1	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$135,031	$204,394	$13,992,549			$0	$0	$13,584,999	$13,077,149	$0	$0	$13,584,999	$13,077,149
2	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$137,867	$207,230	$13,995,385			$0	$0	$13,191,992	$12,224,111	$0	$0	$13,191,992	$12,224,111
3	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$140,762	$210,125	$13,998,280			$0	$0	$12,810,409	$11,426,766	$0	$0	$12,810,409	$11,426,766
4	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$143,718	$213,081	$14,001,236			$0	$0	$12,439,917	$10,681,476	$0	$0	$12,439,917	$10,681,476
5	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$146,736	$216,099	$14,004,254			$0	$0	$12,080,192	$9,984,840	$0	$0	$12,080,192	$9,984,840
6	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$149,817	$219,180	$14,007,335			$0	$0	$11,730,923	$9,333,679	$0	$0	$11,730,923	$9,333,679
7	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$152,964	$222,327	$14,010,482			$0	$0	$11,391,804	$8,725,024	$0	$0	$11,391,804	$8,725,024
8	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$156,176	$225,539	$14,013,694			$0	$0	$11,062,539	$8,156,097	$0	$0	$11,062,539	$8,156,097
9	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$159,455	$228,819	$14,016,973			$0	$0	$10,742,843	$7,624,305	$0	$0	$10,742,843	$7,624,305
10	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$162,963	$232,327	$14,020,481			$0	$0	$10,432,555	$7,127,302	$0	$0	$10,432,555	$7,127,302
11	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$166,549	$235,912	$14,024,067			$0	$0	$10,131,284	$6,662,733	$0	$0	$10,131,284	$6,662,733
12	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$170,213	$239,576	$14,027,731			$0	$0	$9,838,768	$6,228,480	$0	$0	$9,838,768	$6,228,480
13	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$173,957	$243,321	$14,031,475			$0	$0	$9,554,752	$5,822,563	$0	$0	$9,554,752	$5,822,563
14	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$177,785	$247,148	$14,035,303			$0	$0	$9,278,988	$5,443,132	$0	$0	$9,278,988	$5,443,132
15	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$181,696	$251,059	$14,039,214			$0	$0	$9,011,237	$5,088,457	$0	$0	$9,011,237	$5,088,457
16	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$185,693	$255,056	$14,043,211			$0	$0	$8,751,265	$4,756,921	$0	$0	$8,751,265	$4,756,921
17	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$189,778	$259,141	$14,047,296			$0	$0	$8,498,845	$4,447,014	$0	$0	$8,498,845	$4,447,014
18	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$193,953	$263,317	$14,051,471			$0	$0	$8,253,759	$4,157,323	$0	$0	$8,253,759	$4,157,323
19	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$198,220	$267,583	$14,055,738			$0	$0	$8,015,791	$3,886,529	$0	$0	$8,015,791	$3,886,529
20	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$201,788	$271,151	$14,059,306			$0	$0	$7,784,297	$3,633,192	$0	$0	$7,784,297	$3,633,192
21	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$205,421	$274,784	$14,062,939			$0	$0	$7,559,522	$3,396,384	$0	$0	$7,559,522	$3,396,384
22	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$209,118	$278,481	$14,066,636			$0	$0	$7,341,272	$3,175,025	$0	$0	$7,341,272	$3,175,025
23	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$212,882	$282,245	$14,070,400			$0	$0	$7,129,356	$2,968,107	$0	$0	$7,129,356	$2,968,107
24	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$216,714	$286,077	$14,074,232			$0	$0	$6,923,590	$2,774,687	$0	$0	$6,923,590	$2,774,687
25	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$220,615	$289,978	$14,078,133			$0	$0	$6,723,795	$2,593,884	$0	$0	$6,723,795	$2,593,884
26	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$224,586	$293,949	$14,082,104			$0	$0	$6,529,797	$2,424,875	$0	$0	$6,529,797	$2,424,875
27	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$228,629	$297,992	$14,086,147			$0	$0	$6,341,429	$2,266,889	$0	$0	$6,341,429	$2,266,889
28	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$232,744	$302,107	$14,090,262			$0	$0	$6,158,526	$2,119,207	$0	$0	$6,158,526	$2,119,207
29	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$236,933	$306,296	$14,094,451			$0	$0	$5,980,929	$1,981,156	$0	$0	$5,980,929	$1,981,156
30	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$240,250	$309,613	$14,097,768		$826,500	$0	$826,500	$5,808,094	$1,851,983	$340,507	$108,575	$5,467,587	$1,743,408
31	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$243,614	$312,977	$14,101,132			$0	$0	$5,640,271	$1,731,238	$0	$0	$5,640,271	$1,731,238
32	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$247,024	$316,388	$14,104,543			$0	$0	$5,477,316	$1,618,371	$0	$0	$5,477,316	$1,618,371
33	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$250,483	$319,846	$14,108,001			$0	$0	$5,319,087	$1,512,867	$0	$0	$5,319,087	$1,512,867
34	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$253,990	$323,353	$14,111,508			$0	$0	$5,165,445	$1,414,246	$0	$0	$5,165,445	$1,414,246
35	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$257,545	$326,909	$14,115,063			$0	$0	$5,016,259	$1,322,058	$0	$0	$5,016,259	$1,322,058
36	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$261,151	$330,514	$14,118,669			$0	$0	$4,871,399	$1,235,884	$0	$0	$4,871,399	$1,235,884
37	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$264,807	$334,170	$14,122,325			$0	$0	$4,730,738	$1,155,331	$0	$0	$4,730,738	$1,155,331
38	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$268,515	$337,878	$14,126,033			$0	$0	$4,594,155	$1,080,032	$0	$0	$4,594,155	$1,080,032
39	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$272,274	$341,637	$14,129,792			$0	$0	$4,461,532	$1,009,644	$0	$0	$4,461,532	$1,009,644
40	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$276,086	$345,449	$14,133,604			$0	$0	$4,332,753	$943,847	$0	$0	$4,332,753	$943,847
41	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$279,951	$349,314	$14,137,469			$0	$0	$4,207,707	$882,342	$0	$0	$4,207,707	$882,342
42	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$283,870	$353,233	$14,141,388			$0	$0	$4,086,285	$824,847	$0	$0	$4,086,285	$824,847
43	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$287,844	$357,207	$14,145,362			$0	$0	$3,968,381	$771,102	$0	$0	$3,968,381	$771,102
44	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$291,874	$361,237	$14,149,392			$0	$0	$3,853,895	$720,861	$0	$0	$3,853,895	$720,861
45	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$295,960	$365,323	$14,153,478			$0	$0	$3,742,726	$673,896	$0	$0	$3,742,726	$673,896
46	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$300,104	$369,467	$14,157,622			$0	$0	$3,634,779	$629,994	$0	$0	$3,634,779	$629,994
47	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$304,305	$373,668	$14,161,823			$0	$0	$3,529,959	$588,954	$0	$0	$3,529,959	$588,954
48	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$308,565	$377,929	$14,166,083			$0	$0	$3,428,175	$550,590	$0	$0	$3,428,175	$550,590
49	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$312,885	$382,248	$14,170,403			$0	$0	$3,329,340	$514,727	$0	$0	$3,329,340	$514,727
50	$7,560	$10,903,033	$2,774,062	$103,500	$69,363	$317,266	$386,629	$14,174,784			$0	$0	$3,233,369	$481,202	$0	$0	$3,233,369	$481,202
													Present Value Benefits		Present Value Costs		Present Value of Benefits	Total Net
	$194,517.02	$280,532,466.05	$71,375,958.80	$2,663,030.57	$1,784,695.65	$5,156,372.75	$6,941,068.40	$361,707,040.84	PV 3%				$361,707,041	$193,701,326	$25,240,507	$25,008,575	$336,466,534	$168,692,752
	$104,333.64	$150,469,992.27	$38,284,124.90	$1,428,377.24	$957,262.25	$2,457,236.12	$3,414,498.38	$193,701,326.43	PV 7%									
	Assumptions										Benefit/Cost Ratios		14.3	7.7				
1. Discount Rates	3%	7%																

2. Pedestrian & bicyclist benefit estimate.

3. Travel time & distance benefits based on the Maine Statewide Travel Demand Model. Travel time valued at $12.50 per VHT. Vehicle costs valued at $0.25 per AAA.

4. Crash costs were estimated using Statewide major collector average rates. Crash occurrences were converted to AIMS Levels and AIMS Value of injuries.

5. The existing bridge is a moveable span bridge. The annual O&M costs are estimated annual costs for personnel, equipment, repairs and materials.

6.Air emission factors were applied to VMT and estimated speeds to derive tons of emissions. Costs per ton were based on values in NOFA. *CO2 costs are escalated at 2% based on report referenced in NOFA, and are shown in a separate column.*

7. Annual maintenance is considered negligible for the replacement bridge.

Life Cycle Cost Analysis

50 Year Design Life

2011

Discount Rate			7%							
Design Year		**Description**	**Full Rehabilitation Alternative**	**Present Value**	**Partial Rehabilitation Alternative**	**Present Value**	**High Profile Replacement Alternative**	**Present Value**	**Low Profile Replacement Alternative**	**Present Value**
Year	0	Construction	$28,163,239	$28,163,239	$21,515,144	$21,515,144	$21,400,000	$21,400,000	$37,307,876	$37,307,876
Year	1	M & O of Movable Span	$103,500	$96,729	$103,500	$96,729	$0	$0	$103,500	$96,729
Year	2	"	$103,500	$90,401	$103,500	$90,401	$0	$0	$103,500	$90,401
Year	3	"	$103,500	$84,487	$103,500	$84,487	$0	$0	$103,500	$84,487
Year	4	"	$103,500	$78,960	$103,500	$78,960	$0	$0	$103,500	$78,960
Year	5	"	$103,500	$73,794	$103,500	$73,794	$0	$0	$103,500	$73,794
Year	6	"	$103,500	$68,966	$103,500	$68,966	$0	$0	$103,500	$68,966
Year	7	"	$103,500	$64,455	$103,500	$64,455	$0	$0	$103,500	$64,455
Year	8	"	$103,500	$60,238	$103,500	$60,238	$0	$0	$103,500	$60,238
Year	9	"	$103,500	$56,297	$103,500	$56,297	$0	$0	$103,500	$56,297
Year	10	"	$103,500	$52,614	$103,500	$52,614	$0	$0	$103,500	$52,614
Year	11	"	$103,500	$49,172	$103,500	$49,172	$0	$0	$103,500	$49,172
Year	12	"	$103,500	$45,955	$103,500	$45,955	$0	$0	$103,500	$45,955
Year	13	"	$103,500	$42,949	$103,500	$42,949	$0	$0	$103,500	$42,949
Year	14	"	$103,500	$40,139	$103,500	$40,139	$0	$0	$103,500	$40,139
Year	15	M & O of Movable Span	$103,500	$37,513	$103,500	$37,513	$0	$0	$103,500	$37,513
"	15	Deck Replacement	$2,601,900	$943,048	$2,601,900	$943,048	$0	$0	$0	$0
Year	16	M & O of Movable Span	$103,500	$35,059	$103,500	$35,059	$0	$0	$103,500	$35,059
Year	17	"	$103,500	$32,765	$103,500	$32,765	$0	$0	$103,500	$32,765
Year	18	"	$103,500	$30,622	$103,500	$30,622	$0	$0	$103,500	$30,622
Year	19	"	$103,500	$28,619	$103,500	$28,619	$0	$0	$103,500	$28,619
Year	20	"	$103,500	$26,746	$103,500	$26,746	$0	$0	$103,500	$26,746
Year	21	"	$103,500	$24,997	$103,500	$24,997	$0	$0	$103,500	$24,997
Year	22	"	$103,500	$23,361	$103,500	$23,361	$0	$0	$103,500	$23,361
Year	23	"	$103,500	$21,833	$103,500	$21,833	$0	$0	$103,500	$21,833
Year	24	"	$103,500	$20,405	$103,500	$20,405	$0	$0	$103,500	$20,405
Year	25	"	$103,500	$19,070	$103,500	$19,070	$0	$0	$103,500	$19,070
Year	26	"	$103,500	$17,822	$103,500	$17,822	$0	$0	$103,500	$17,822
Year	27	"	$103,500	$16,656	$103,500	$16,656	$0	$0	$103,500	$16,656
Year	28	"	$103,500	$15,567	$103,500	$15,567	$0	$0	$103,500	$15,567
Year	29	"	$103,500	$14,548	$103,500	$14,548	$0	$0	$103,500	$14,548
Year	30	M & O of Movable Span	$103,500	$13,596	$103,500	$13,596	$0	$0	$103,500	$13,596
"	30	Wearing Surface Rehabilitation	$0	$0	$0	$0	$826,500	$108,575	$732,555	$96,234
Year	31	M & O of Movable Span	$103,500	$12,707	$103,500	$12,707	$0	$0	$103,500	$12,707
Year	32	"	$103,500	$11,876	$103,500	$11,876	$0	$0	$103,500	$11,876
Year	33	"	$103,500	$11,099	$103,500	$11,099	$0	$0	$103,500	$11,099
Year	34	"	$103,500	$10,373	$103,500	$10,373	$0	$0	$103,500	$10,373
Year	35	"	$103,500	$9,694	$103,500	$9,694	$0	$0	$103,500	$9,694
Year	36	"	$103,500	$9,060	$103,500	$9,060	$0	$0	$103,500	$9,060
Year	37	"	$103,500	$8,467	$103,500	$8,467	$0	$0	$103,500	$8,467
Year	38	"	$103,500	$7,913	$103,500	$7,913	$0	$0	$103,500	$7,913
Year	39	"	$103,500	$7,396	$103,500	$7,396	$0	$0	$103,500	$7,396
Year	40	"	$103,500	$6,912	$103,500	$6,912	$0	$0	$103,500	$6,912
Year	41	"	$103,500	$6,460	$103,500	$6,460	$0	$0	$103,500	$6,460
Year	42	"	$103,500	$6,037	$103,500	$6,037	$0	$0	$103,500	$6,037
Year	43	"	$103,500	$5,642	$103,500	$5,642	$0	$0	$103,500	$5,642
Year	44	"	$103,500	$5,273	$103,500	$5,273	$0	$0	$103,500	$5,273
Year	45	M & O of Movable Span	$103,500	$4,928	$103,500	$4,928	$0	$0	$103,500	$4,928
"	45	Wearing Surface Rehabilitation	$390,285	$18,583	$390,285	$18,583	$0	$0	$0	$0
Year	46	M & O of Movable Span	$103,500	$4,606	$103,500	$4,606	$0	$0	$103,500	$4,606
Year	47	"	$103,500	$4,304	$103,500	$4,304	$0	$0	$103,500	$4,304
Year	48	"	$103,500	$4,023	$103,500	$4,023	$0	$0	$103,500	$4,023
Year	49	"	$103,500	$3,760	$103,500	$3,760	$0	$0	$103,500	$3,760
Year	50	"	$103,500	$3,514	$103,500	$3,514	$1	$0	$103,500	$3,514
			Net Present Value	$30,514,459		$23,905,152		$21,508,575		$38,832,487
			% Above Least Cost Alternative	42%		11%		-		81%

Life Cycle Cost Analysis

50 Year Design Life

2011

Discount Rate			3%							
Design Year		**Description**	**Full Rehabilitation Alternative**	**Present Value**	**Partial Rehabilitation Alternative**	**Present Value**	**High Profile Replacement Alternative**	**Present Value**	**Low Profile Replacement Alternative**	**Present Value**
Year	0	Construction	$23,278,223	$23,278,223	$17,783,264	$17,783,264	$21,400,000	$21,400,000	$30,836,690	$30,836,690
Year	1	M & O of Movable Span	$103,500	$100,485	$103,500	$100,485	$0	$0	$103,500	$100,485
Year	2	"	$103,500	$97,559	$103,500	$97,559	$0	$0	$103,500	$97,559
Year	3	"	$103,500	$94,717	$103,500	$94,717	$0	$0	$103,500	$94,717
Year	4	"	$103,500	$91,958	$103,500	$91,958	$0	$0	$103,500	$91,958
Year	5	"	$103,500	$89,280	$103,500	$89,280	$0	$0	$103,500	$89,280
Year	6	"	$103,500	$86,680	$103,500	$86,680	$0	$0	$103,500	$86,680
Year	7	"	$103,500	$84,155	$103,500	$84,155	$0	$0	$103,500	$84,155
Year	8	"	$103,500	$81,704	$103,500	$81,704	$0	$0	$103,500	$81,704
Year	9	"	$103,500	$79,324	$103,500	$79,324	$0	$0	$103,500	$79,324
Year	10	"	$103,500	$77,014	$103,500	$77,014	$0	$0	$103,500	$77,014
Year	11	"	$103,500	$74,771	$103,500	$74,771	$0	$0	$103,500	$74,771
Year	12	"	$103,500	$72,593	$103,500	$72,593	$0	$0	$103,500	$72,593
Year	13	"	$103,500	$70,478	$103,500	$70,478	$0	$0	$103,500	$70,478
Year	14	"	$103,500	$68,426	$103,500	$68,426	$0	$0	$103,500	$68,426
Year	15	M & O of Movable Span	$103,500	$66,433	$103,500	$66,433	$0	$0	$103,500	$66,433
"	15	Deck Replacement	$2,601,900	$1,670,061	$2,601,900	$1,670,061	$0	$0	$0	$0
Year	16	M & O of Movable Span	$103,500	$64,498	$103,500	$64,498	$0	$0	$103,500	$64,498
Year	17	"	$103,500	$62,619	$103,500	$62,619	$0	$0	$103,500	$62,619
Year	18	"	$103,500	$60,795	$103,500	$60,795	$0	$0	$103,500	$60,795
Year	19	"	$103,500	$59,025	$103,500	$59,025	$0	$0	$103,500	$59,025
Year	20	"	$103,500	$57,305	$103,500	$57,305	$0	$0	$103,500	$57,305
Year	21	"	$103,500	$55,636	$103,500	$55,636	$0	$0	$103,500	$55,636
Year	22	"	$103,500	$54,016	$103,500	$54,016	$0	$0	$103,500	$54,016
Year	23	"	$103,500	$52,443	$103,500	$52,443	$0	$0	$103,500	$52,443
Year	24	"	$103,500	$50,915	$103,500	$50,915	$0	$0	$103,500	$50,915
Year	25	"	$103,500	$49,432	$103,500	$49,432	$0	$0	$103,500	$49,432
Year	26	"	$103,500	$47,992	$103,500	$47,992	$0	$0	$103,500	$47,992
Year	27	"	$103,500	$46,595	$103,500	$46,595	$0	$0	$103,500	$46,595
Year	28	"	$103,500	$45,237	$103,500	$45,237	$0	$0	$103,500	$45,237
Year	29	"	$103,500	$43,920	$103,500	$43,920	$0	$0	$103,500	$43,920
Year	30	M & O of Movable Span	$103,500	$42,641	$103,500	$42,641	$0	$0	$103,500	$42,641
"	30	Wearing Surface Rehabilitation	$0	$0	$0	$0	$826,500	$340,507	$732,555	$301,803
Year	31	M & O of Movable Span	$103,500	$41,399	$103,500	$41,399	$0	$0	$103,500	$41,399
Year	32	"	$103,500	$40,193	$103,500	$40,193	$0	$0	$103,500	$40,193
Year	33	"	$103,500	$39,022	$103,500	$39,022	$0	$0	$103,500	$39,022
Year	34	"	$103,500	$37,886	$103,500	$37,886	$0	$0	$103,500	$37,886
Year	35	"	$103,500	$36,782	$103,500	$36,782	$0	$0	$103,500	$36,782
Year	36	"	$103,500	$35,711	$103,500	$35,711	$0	$0	$103,500	$35,711
Year	37	"	$103,500	$34,671	$103,500	$34,671	$0	$0	$103,500	$34,671
Year	38	"	$103,500	$33,661	$103,500	$33,661	$0	$0	$103,500	$33,661
Year	39	"	$103,500	$32,680	$103,500	$32,680	$0	$0	$103,500	$32,680
Year	40	"	$103,500	$31,729	$103,500	$31,729	$0	$0	$103,500	$31,729
Year	41	"	$103,500	$30,804	$103,500	$30,804	$0	$0	$103,500	$30,804
Year	42	"	$103,500	$29,907	$103,500	$29,907	$0	$0	$103,500	$29,907
Year	43	"	$103,500	$29,036	$103,500	$29,036	$0	$0	$103,500	$29,036
Year	44	"	$103,500	$28,190	$103,500	$28,190	$0	$0	$103,500	$28,190
Year	45	M & O of Movable Span	$103,500	$27,369	$103,500	$27,369	$0	$0	$103,500	$27,369
"	45	Wearing Surface Rehabilitation	$390,285	$103,206	$390,285	$103,206	$0	$0	$0	$0
Year	46	M & O of Movable Span	$103,500	$26,572	$103,500	$26,572	$0	$0	$103,500	$26,572
Year	47	"	$103,500	$25,798	$103,500	$25,798	$0	$0	$103,500	$25,798
Year	48	"	$103,500	$25,047	$103,500	$25,047	$0	$0	$103,500	$25,047
Year	49	"	$103,500	$24,317	$103,500	$24,317	$0	$0	$103,500	$24,317
Year	50	"	$103,500	$23,609	$103,500	$23,609	$1	$0	$103,500	$23,609
			Net Present Value	$27,485,971		$22,219,562		$21,740,507		$33,801,524
			% Above Least Cost Alternative	26%		2%		-		55%

TIGER Benefit-Cost Analysis (BCA) Examples

Oklahoma Freight Rail Upgrade

Oklahoma Department of Transportation

BCA Example Contents

- BCA Summary from Project Narrative
- BCA Technical Memo

2011 TRANSPORTATION INVESTMENT
GENERATING ECONOMIC RECOVERY (TIGER) III
DISCRETIONARY GRANT APPLICATION

OKLAHOMA

October 31, 2011

Name of Applicant: Oklahoma Department of Transportation
Address: 200 NE 21st Street, Oklahoma City, OK 73105

Primary Point of Contact
Name: Secretary Gary Ridley
Telephone Number: (405) 522-1800
Email Address: GRridley@ODOT.org

PROJECT TYPE:
Freight Rail

CFDA # 20.933
FY2011 National Infrastructure Investments

LOCATION:
Beckham, Custer and Washita Counties, Oklahoma

Oklahoma Congressional District 3 (U.S. Rep. Frank Lucas)

AREA: Rural

REQUESTED AMOUNT:
$6,756,580 (80% of total project)

TOTAL PROJECT COST:
$8,456,580

DUNS NUMBER:
824700074

CENTRAL CONTRACT REGISTRATION NUMBER:
339V2

PROJECT WEB ADDRESS:
http://www.okladot.state.ok.us/tiger/tiger_2011_sayre/index.htm

This is a BCA-relevant excerpt from the full TIGER Application

"New oil takeaway capacity opportunities increase the incentive to produce domestic crude oil supplies, thereby encouraging a reduced reliance on imports from unstable regions of the world."

—C. Michael Ming, Oklahoma Secretary of Energy

more efficiently exploiting existing energy fields and getting products to market faster than ever and at more reasonable rates when rail line densities are raised. Our specific project is not expected to result in any technological innovation, but it will result in the means to move the vast new crude oil production out of the production fields in more efficient methods. Due to the beneficial location of the proposed yard improvements, they can also be expanded over time as the production ramps up.

D. PARTNERSHIP

One of the greatest strengths of this project is that it brings together both the public and private sectors in numerous ways to create a positive result for both the State of Oklahoma and its citizenry. Oklahoma has a long and rich history when it comes to energy production, and we are now at the forefront of yet another new era for the energy sector.

The Governor's Office, the Oklahoma Energy Department, ODOT, SWODA (Southwest Oklahoma Developmental Authority), Beckham County, the City of Sayre, the City of Elk City, and the City of Clinton are all participating in the proposed project as financial contributors and/or providers of in-kind support and information to assure the success of this endeavor.

One issue that makes this project unique is the fact that the State of Oklahoma and Farmrail Corporation have been discussing this project not only with the surrounding communities and political entities, but we have also spoken with many of the businesses operating in the area to assure an accurate forecast of the expected market which has need of the infrastructure. These commitments serve to assure all parties that there is a true and serious need for the expansion and improvement of the transportation infrastructure in question. These communications have served to strengthen our understanding of the problem being addressed, and they have worked to guarantee a realistic solution that will address the needs both locally and regionally.

Mercuria Energy, Deeprock, Hampel Oil, Marquis Energy, Pacer Energy, Gavilon, Peninsula, and Chesapeake Energy are all either expanding existing facilities or stating firm commitment to establish brand-new operations in and around Sayre due to the expected rise in Anadarko Basin production. These operations all seek to utilize rail to move products directly to refining facilities in Texas, Louisiana, and even California, thus providing finished petroleum products to the United States market place and reducing our need for foreign oil.

Even the inbound market stands to expand, as shown by sand distributor Frac Tech which recently spent $800,000 to construct two spur tracks with capacity for 70 railcars on a 60-acre trackside parcel it purchased in Elk City. The entire multi-million-dollar facility, which began operations in 2011, was specifically designed for rail-to-truck transloading and includes silos for temporary storage of different grades of sand.

ODOT has also compiled an impressive list of support letters which can be viewed on our website, affirming broad-based and statewide push to secure this project funding. These support letters come from the City of Sayre, City of Elk City, SWODA, Hampel Oil, Representative Wright, Senator Ivester, Gavilon, Senator Schultz, Representative Walker, Mercuria, Marquis, Pacer, Oklahoma Energy Secretary Ming, and Oklahoma Transportation Secretary Ridley.

E. RESULTS OF BENEFIT-COST ANALYSIS

A formal benefit-cost analysis (BCA) was conducted for this project using best practices for BCA in transportation planning, and reflecting all TIGER III grant application guidelines. It is important to note that a formal BCA is not a comprehensive measure of a project's total economic impact, as many benefits cannot be readily quantified or occur under conditions of uncertainty.

However, to the maximum extent possible given available data, the formal BCA prepared in connection with this TIGER grant application reflects quantifiable economic benefits. It covers four of the five primary long-term impact areas identified in the TIGER III grant application guidelines:

- **State of Good Repair:** The majority of the project funds will be spent on rehabilitating the state-owned Sayre Yard, Elk City Yard, and 49 miles of track. The track between Sayre and Elk City is currently in poor condition (Excepted Track), which greatly restricts the speed and carrying capacity of this stretch of railroad. The Elk City to Clinton line is in better condition, but will need major maintenance work to safely handle the projected increase in crude oil-related shipments. In addition, the project is expected to result in the removal of 36.2 million miles of heavy truck travel from Oklahoma

highways each year, which should greatly reduce maintenance costs on roads such as I-40.

- **Economic Competitiveness:** This project will have an impressive impact on local, regional and national economic competitiveness by reducing rail shipping costs for oil shippers, farmers and industry, allowing them to improve their logistics practices and expand markets for both domestic and international shipments. This will improve the competitive position of local agricultural and business enterprises, while reducing our nation's dependence on foreign oil sources.
- **Environmental Sustainability:** the project will result in a major shift of freight movements to and from the Beckham County area, from trucks to rail. Rail is much more fuel efficient, and produces anywhere from 30% to as little as 8% of the emissions of trucks per ton-mile carried.
- **Safety:** By shifting freight movements of crude oil, a hazardous material, from rail to truck, this project will reduce the number of vehicle accidents and spills. Trucks transporting hazardous materials have nearly 16 times more hazmat releases than railroads[4]. Further, despite the increase in rail freight tons carried, improvements to track safety and crossing protection are expected to reduce rail accidents compared to the accident potential expected if the project is not built.

Given the caveats, the computed benefit-cost ratio for the Farmrail project is 56.8 using a seven percent discount rate. The BCA compares the capital construction costs and future rail maintenance costs to the quantifiable benefits of the project for 25 years following construction. After 25 years, the railroad will need to again be rehabilitated, so no residual project value was assumed past 2037.

The quantified project benefits are:

1. Rail maintenance cost savings
2. Reduced cost of oil shipments
3. Reduced pavement damage to highways
4. Emissions reductions
5. Safety benefits (reduced crashes)

Discount Rates

Federal TIGER guidance recommends that applicants discount future benefits and costs to 2011 present values using a real discount rate of seven percent to represent the opportunity cost of money in the private sector. TIGER guidance also allows for present value analysis using a three percent discount rate when the funds currently dedicated to the project would be other public expenditures. This is largely the case for this project, which is 9.5% privately funded. The BCA ratio at 30% is 87.3 to 1.0.

The project benefits are presented below using the more conservative seven percent discount rate to demonstrate that the project's long term benefits clearly outweigh the project's costs.

Cost Benefit Results

Exhibit 16 summarizes the cost and the quantifiable benefits of the project in terms of Present Value. Detailed analysis of costs and benefits, including data sources and methodology descriptions, are available on the project's support website (htttp://www.okladot.state.ok.us/tiger/tiger_2011_sayre/index.htm) in the BCA Technical Memo.

As shown in the table, the present value of the project's capital cost and maintenance costs for the 2013–2037 period are valued at $7.8 million. The benefits have an estimated present value of $445.2 million over the 25-year period, yielding the 56.8 BCA ratio.

Benefit Calculation Assumptions

The benefits of the project are derived by comparing Build conditions to No Build conditions. Under the No Build, rail traffic between Sayre and Clinton is limited due to poor track conditions. It is estimated that at most 105 carloads of oil per week could be shipped by Farmrail without the project. This is built on the assumption that five cars at a time take four hours to move from Sayre to Elk City (two hours at 10mph from Sayre to Elk City, and then

Exhibit 16: Benefit Cost Analysis Summary (in Thousands of 2011 $)

Category	Present Value at 7%
Construction Cost	**$7,840**
Evaluated Benefits	
Rail Maintenance Cost Savings	$220
Reduced Cost of Oil Shipments	$310,858
Reduced Damage to Roadway	$60,279
Emissions Savings	$27,447
Net Safety Benefits	$46,664
Total Evaluated Benefits	**$445,248**
Net Present Value	**$437,409**
BENEFIT/COST RATIO	**56.79**

4 nationalatlas.gov/articles/transportation/a_freightrr.html

another two hours for the locomotives to return to get more carloads of oil). At the end of a 12-hour workday, only 15 railcars of oil will have been moved.

With the project, the capacity is much greater. Farmrail estimates that practical capacity is a maximum of 560 railcars per week.

To ensure that the analysis did not project that more oil would be shipped by train than was actually being produced, the 200,000 barrel per day estimate from the State Energy Department for 2015 was broken roughly down into carloads. Railcars hold 30,000 gallons or about 700 barrels of oil. Daily production of 200,000 barrels would fill 285 railcars per day, or about 2,000 per week. The Anadarko field is large, and Sayre is centrally located within it, so it was estimated that only 30% of the oil would go to Sayre, with the remainder headed north to railheads in Kansas or south to railheads in the Texas panhandle. Thirty percent of 2,000 carloads is 600, indicating that there will be demand from producers to use all of Farmrail's 560 railcar/week capacity.

The 200,000 barrels per day production level will not be reached until 2015, so a gradual increase from today's 50 rail cars per week was assumed (**Exhibit 17**). To calculate the benefits of the project, the additional amount of oil that could be shipped with the project vs. without the project was calculated. This additional amount is assumed to move by truck to pipeline heads in central Oklahoma (Cushing) as it does today.

The benefits described in detail below were all derived from comparing the cost and impacts of moving the additional amount of oil (in the right-hand column of **Exhibit 17**) by truck and pipeline, to the costs and impacts of moving it by rail from Sayre to refineries on the Gulf Coast.

Exhibit 17: Weekly Crude Oil Railcars Shipped With and Without the Project

Year	No Build (without project)	Build (with project)	Difference*
2013 (2nd half)	105 cars	320 cars	215 cars (154,000 bbl)
2014	105 cars	410 cars	305 cars (218,000 bbl)
2015–2037	105 cars	560 cars	455 cars (325,000 bbl)

* While theoritical capacity of a rail tank car is 30,000 gallons, practical capacity is 27,300 gallons, to allow room for product expansion.

Reduced Cost of Oil Shipments

Reduced costs of shipping oil from Sayre to the refineries is a result of a number of factors:

1. Reduced costs to Farmrail of shipping the oil (reflected in a price reduction of $50 per carload
2. Reduced cost of tank car rental due to faster railcar turnaround times
3. The cost differential between truck-plus-pipeline shipping costs and rail shipping costs

The project, as described previously, will reduce Farmrail labor and fuel costs per carload. It will also make the operation profitable, as annual operating and maintenance costs will be divided by hundreds of cars per week instead of dozens. The exact cost is difficult to calculate, so it was assumed that reduced costs to Farmrail would be reflected in a $50 reduction in the current price to move a railcar from Sayre to Clinton.

Tank cars cost $1,000 a month to rent. One of the benefits of longer train lengths and faster train speeds is that the amount of time it takes a rail car to get from Sayre to a refinery (today, Farmrail's oil railcars get shipped to Lake Charles, Louisiana), will be reduced from an average of 22 days ($733) to 20 days "($667), a savings of $67 for each railcar shipped.

Using current truck and pipeline pricing, the cost is $9 per barrel from the Sayre area to the refineries on the Gulf Coast. Using current BNSF pricing the total trip cost of shipping by rail (from Sayre to Lake Charles, LA) is $6.51 per barrel without the project and would be $6.35 per barrel with the project.

The total cost reduction for shippers would be $30.2 million beginning in 2015. Present value for the 2013–2037 period is $310.9 million.

Reduced Pavement Damage to Highways

Between Sayre and the pipeline heads in Cushing is a 200-mile trip, largely along I-40. Crude oil tank trucks need to be driven back empty, leading to high costs, as a trucker's day consists of one 400-mile round trip to carry about 7,800 gallons of oil. With 3.8 trucks per railcar, this rail project is estimated to take over 36.2 million truck miles off of Oklahoma highways every year starting in 2015.

According to the "Addendum to the 1997 Federal Highway Cost Allocation Study Final Report'" FHWA, May 2000, it is estimated that heavy trucks do $0.167 dollars of damage (in 2011$) for every mile traveled on a rural interstate highway. Annual benefits beginning in 2015 are thus $6.1 million, yielding a present value over the life of the project of $60.3 million.

Emissions Reductions

The 36.2 million truck miles removed from the road each year would remove a substantial volume of pollutants from the air as well, an estimated 47,000 tons of CO, CO_2, NO_x, SO_x, volatile organic chemicals and

particulate matter (PM_{10}). Over the 25-year life of the project, total truck pollutant reductions are an estimated 1.1 million tons.

Project emissions impacts also have to account for increased rail emissions. While rail produces a fraction of the emissions per ton-mile as truck travel, the 200-mile Sayre-to-Cushing truck trip used in this analysis must be compared to a much longer 600-mile rail trip between Sayre and Lake Charles, LA. It is assumed that pipeline travel (the other part of the truck trip) produces a negligible level of emissions.

Rail miles traveled add up to 63.5 million railcar-miles per year, with a conservatively-estimated 22,000 tons of pollutants added to the environment.

The net emissions reduction is thus in the range of 25,000 tons per year. Using TIGER guidance to evaluate emissions reductions, the present value of the net emissions reductions over the life of the project is $27.4 million.

Safety Benefits

As with emissions, safety benefits were evaluated separately for rail and truck travel. The reduced truck miles traveled will have a direct impact on reducing highway crashes. Using state crash data from 2010, along with accident cost values provided in the TIGER guidance, the cost of crashes per million miles traveled is $129,540 in 2011 dollars.

Using the truck VMT removed from the roadway, the present value of the truck related safety benefits is $46.7 million.

True accident costs might be larger, as these trucks are filled with hazardous crude oil. This cost effect was not estimated for the BCA, except to the extent is included in the insurance component of the reduced shipping costs.

An attempt was made to calculate increased rail accidents expected from the substantial growth in rail freight expected to result from the project. Currently, the accident rate for Farmrail in this part of Oklahoma is very low – two accidents in the past six years, during which over 31,000 carloads were shipped, most on 25mph track. Both of these accidents were property damage only (no injuries or deaths) and fault was placed on automobile drivers.

Interestingly, though, while carload traffic is set to grow by leaps and bounds, train traffic will not grow much. Even in 2015, with an additional 455 rail cars shipped each week, at 40 cars per train is just twelve additional trains per week—not even two trains per day. Once the car are added to BNSF or other Class I trains, which are often 100 rail cars long, the increase is less than one additional train per day.

Further, because of the 5-car train limitation in the No Build, the number of trains on the Sayre to Elk City section of track would actually be 50% higher under the No Build. There is a speed differential that might increase the potential severity of accidents in the Build, but with the improved safety equipment at three of the grade crossings, as well as the substantial reduction in the number of trains per day on the Sayre to Elk City track, it was assumed that there would be no increase in rail accident costs resulting from the project.

Other Non-Quantifiable Costs and Benefits

There are a number of other project benefits as well as costs that could not be reasonably quantified for the benefit-cost analysis. Among these are:

- Benefits to other shippers. While the benefits of reduced Farmrail costs for crude oil shippers is accounted for in the BCA, the impact of this cost reduction for other shippers, such as the county's 1,000+ farms and other businesses was not. Freight transportation cost savings would improve the cost efficiency of all existing and future businesses, allowing them to be more competitive and make their products cheaper for a wider domestic or international market. Rail is already being used to ship oil extraction supplies into Beckham County, and could be used to ship oil drilling equipment and possibly wind turbine components, which are difficult to ship by truck.
- As noted above, the project is critical in making it possible to fully exploit the region's resources and maximize economic development potential for the region. The dampening effect of limiting rail traffic to 105 carloads per week, while the truck driver labor shortage and the limitations on pipeline capacity make non-rail transportation more difficult, could greatly reduce the potential number of jobs and other benefits that would be possible if the project was in place. These benefits are not just the jobs of those drilling and monitoring the wells, but the restaurants and grocery stores that serve these new employees, the teachers that educate their children, the builders who construct their homes, etc.
- As noted above, the true operating cost savings to Farmrail resulting from the project was difficult to calculate, as the Sayre to Clinton line is part of an integrated regional rail network. A rough cost estimate shows per-railcar cost savings of as much as $112 per carload shipped based on more efficient operations and higher traffic densities on their rail lines. In the BCA, $50 of this

savings is included in the benefit calculations, but other savings were not included. Once the Sayre to Elk City line goes from a net loss to profitable, Farmrail is committed to reducing their prices. Any remaining cost savings will be used to upgrade and otherwise support their other Farmrail routes, or possibly reduce prices further.

Public Benefits

While much of the value of this project will accrue to businesses involved in the oil extraction industries (shipping, drilling, fracking chemical suppliers) it should be stressed that the purely public benefits of this project greatly exceed the project costs on their own. As shown in **Exhibit 18**, the benefits of reduced pavement damage to public infrastructure, reduced emissions, and avoided accidents and chemical spills *each* exceed the project cost within four years of project completion. Taken together, the Present Value of these three benefit categories on their own provide a benefit cost ratio of 17.1 to 1.0 at a seven percent discount rate.

V. PROJECT READINESS AND NEPA

As discussed above, this project does not require additional environmental analysis, design, or permitting/approval. As shown in **Exhibit 19**, it offers a very quick completion schedule, nine months from ground-breaking to full build.

Exhibit 18: Year by Which the Value of Each Benefit Category Exceeds Total Project Construction Costs of $8.2 Million

Benefit Category	Year in which Benefit Exceeds Project Cost
Reduced Damage to Roadway	2015
Emissions Savings	2017
Net Safety Benefits	2015

Exhibit 19: Tiger III Grant Construction Schedule: Clinton (MP 580.0) to Sayre (MP 629.0)

Task	Dates	Cost ($)
1st Quarter: July 1 – September 30		
Order and distribute material	July 1 – September 30	-
Improve drainage	July 1 – September 1	200,000
Perform dirt work for yard track extension	July 1 – September 1	-
Install 35,000 ties	August 1 – September 30	2,100,000
Install 3ea yard switches	August 1 – August 30th	160,000
Rehab 12,000 feet of yard track	August 1 – September 30	1,800,000
Lay 22,300 tons of ballast	August 15 – September 30	289,900
Surface 10 miles of track	September 1 – September 30	52,800
Subtotal		**4,602,700**
2nd Quarter: October 1 – December 31		
Install 15,600 ties	October 1 – December 31	936,000
Relocate switch and complete yard track extension	October 1 – November 15	472,500
Lay 22,300 tons of ballast	October 1 – December 31	289,900
Upgrade 5280 feet of rail	October 1 – November 1	345,600
Surface 30 miles of track	October 1 – December 31	200,640
Upgrade Bridge 619.8	November 1 – December 1	100,000
Upgrade 3ea switches	November 1 – December 1	150,000
Rehab 16ea crossings	November 15 – December 31	320,000
Subtotal		**2,814,640**
3rd Quarter: January 1 – March 31		
Signalize three crossings	January 1 – January 31	450,000
Upgrade 4ea switches	January 1 – February 15	200,000
Lay 22,300 tons of ballast	January 1 – February 28	294,200
Surface 9 miles of track	January 1 – February 28	95,040
Miscellaneous clean up	January 1 – March 31	0
Subtotal		**1,039,240**
TOTAL		**8,456,580**

Oklahoma State-Owned "Rolling Pipeline" Development Project
Sayre, Oklahoma

TIGER III Grant Application
Benefit Cost Analysis Technical Memo

November 2, 2011

The formal benefit-cost analysis (BCA) was conducted for this project using best practices for BCA in transportation planning, and reflecting all TIGER III grant application guidelines. As noted in the application, it is important to note that a formal BCA is not a comprehensive measure of a project's total economic impact, as many benefits cannot be readily quantified or occur under conditions of uncertainty. This broader set of economic benefits and impacts on local and regional economic well-being and competitiveness are described in other sections of the application, particularly section IV.A.ii Economic Competitiveness.

To the maximum extent possible given available data, the formal BCA prepared in connection with this TIGER grant application reflects quantifiable economic benefits. It covers four of the five primary long-term impact areas identified in the TIGER grant application guidelines:

- State of Good Repair: specifically, reduced maintenance costs to the rail line as well as reduced wear and tear on pavement due to the relatively long-distance truck trips that will need to be made to carry oil out of the Anadarko Basin if the project is not built.
- Economic Competitiveness: specifically, the reduction of shipping costs for crude oil moving between the Anadarko Basin and refineries.
- Environmental Sustainability: the project will result in a major shift of freight movements to and from the Beckham County area, from trucks to rail. Rail is much more fuel efficient, and produces anywhere from 30% to as little as 8% of the emissions of trucks per ton-mile carried.
- Safety: Changes in projected truck and rail accidents resulting from the project.

Given the caveats, the computed benefit-cost ratio for the Farmrail project is 56.8 to 1.0 using a seven percent discount rate. The BCA compares the capital construction costs to the quantifiable benefits of the project for 25 years following construction. After 25 years, the railroad will need to again be rehabilitated, so no residual project value was assumed past 2037.

The quantified project benefits are:

1. Rail maintenance cost savings
2. Reduced pavement damage to highways
3. Reduced cost of oil shipments
4. Emissions reductions
5. Safety benefits (reduced crashes)

Discount Rates
Federal TIGER guidance recommends that applicants discount future benefits and costs to 2011 present values using a real discount rate of seven percent to represent the opportunity cost of money in the private sector[1]. TIGER guidance also allows for an alternate present value analysis using a three percent discount rate when the funds currently dedicated to the project would be other public expenditures. This is largely the case for this project, which is 9.5% privately funded. The BCA ratio at 3% is 87.3 to 1.0.

Cost Benefit Results
Table BCA-1 summarizes the cost and the quantifiable benefits of the project in terms of Present Value. As shown in the table, the present value of the project's capital cost is valued at $7.8 million. The benefits have an estimated present value of $445.2 million over the 25-year period, yielding the 56.8 BCA ratio.

Table BCA-1: Benefit Cost Analysis Summary
Figures in thousands of 2011$, discounted to 2011

Category	Present Value at 7%	Present Value at 3%
Construction Cost	**$7,840**	**$8,181**
Evaluated Benefits		
Rail Maintenance Cost Savings	$220	($320)
Reduced Damage to Roadway	$60,279	$96,182
Reduced Cost of Oil Shipments	$310,858	$498,623
Emissions Savings	$27,447	$44,532
Net Safety Benefits	$46,664	$74,458
Total Evaluated Benefits	**$445,248**	**$713,795**
NET PRESENT VALUE	**$437,409**	**$705,614**
BENEFIT/COST RATIO	**56.79**	**87.25**

Benefit Calculation Assumptions
The benefits of the project are derived by comparing conditions under a Build and No Build scenario. These two scenarios are defined as follows:

[1] Source: TIGER Notice of Funding Availability (Federal Register/Vol 76. No. 156, 8/12/2011): *Applicants should discount future benefits and costs to present values using a real discount rate (i.e., a discount rate that reflects the opportunity cost of money net of the rate of inflation) of 7 percent, following guidance provided by OMB in Circulars A–4 and A– 94 (http://www.whitehouse.gov/omb/ circulars_default/). Applicants may also provide an alternative analysis using a real discount rate of 3 percent. The latter approach should be used when the alternative use of funds currently dedicated to the project would be other public expenditures, rather than private investment.*

No Build
Under the No Build, rail traffic between Sayre and Clinton is limited due to poor track conditions. It is estimated that at most 105 carloads of oil per week could be shipped by Farmrail without the project. This is built on the assumption that five cars at a time take four hours to move from Sayre to Elk City (two hours at 10mph from Sayre to Elk City – a distance of 17 miles, and then another two hours for the locomotives to return to get more carloads of oil).

Because of crew costs and safety concerns on the poor quality track, trains are generally not run during nighttime hours. In an average 12-hour day, therefore, three roundtrips with five carloads of oil can be shipped. Fifteen per day times 7 is 105 railcars per year.

Build
With the project, the capacity is much greater. Farmrail estimates that practical capacity is a maximum of 560 railcars per week. Theoretical capacity is much higher, as there is technically no limit on the length of a rail car on Class 2 track. However, there are other constraints – meeting other customers' needs, return of empty oilcars, the number of engines needed to pull the train, etc.

Table BCA-2: Weekly Carload and Crude Oil Carrying Capacity Build vs. No Build

Year	No Build		Build		Difference	
	Maximum Carloads	Maximum Capacity (barrels)	Maximum Carloads	Maximum Capacity (barrels)	Added Carloads	Added Capacity (barrels)
2013 (2nd half)	105	68,250	320	208,000	215	139,750
2014	105	68,250	410	266,500	305	198,250
2015-2037	105	68,250	560	364,000	455	295,750

Note on Updated Railcar and Tanker Truck Capacity Calculations
Railcars that are designed to transport crude oil have a holding capacity of 30,000 gallons (714 barrels). Tanker trucks vary in size, but the typical truck used to transport crude oil in southwestern Oklahoma holds 7,800 gallons (185 barrels).

The grant application and the BCA were originally developed using these assumptions.

Shortly before the TIGER grant was due, staff from Farmrail reviewed the application and informed Oklahoma Department of Transportation (ODOT) staff that when transporting oil, room must be left in the vehicles (both railcar and truck) for product expansion and movement. The practical capacity of railcars is therefore 650 barrels and for tanker trucks it is 170 barrels.

The BCA was revised to reflect this new information, but in one or two instances the text of the grant application does not reflect this (specifically, references to the specific dollar per barrel cost of rail shipments, the oil demand calculations and some of the numbers in Exhibit 17.) The analysis itself (that is, the assessed benefits and the BCA ratio) as described in this memo and as presented in the text does include these changes and is correct.

Verification of Demand
The scenarios above assume that as much oil will be moved by rail as there is rail capacity available. To ensure that the analysis did not project that more oil would be shipped by Farmrail than was likely to be produced, a short analysis was performed as a check.

The Oklahoma State Department of Energy and Chesapeake Energy forecast that 200,000 barrels of crude oil per day will be produced from the Anadarko field by 2015[2]. Assuming 650 barrels per rail carload this is equivalent to 300 daily rail carloads, or about 2,150 carloads per week. The Anadarko field is large, and Sayre is centrally located within it, so it was estimated that only 30% of the oil would go to Sayre, with the remainder headed north to railheads in Kansas or south to railheads in the Texas panhandle.

Thirty percent of 2,150 carloads is 650, indicating that there will be demand from producers to use all of Farmrail's 560 railcar/week capacity. The 200,000 barrels per day production level will not be reached until 2015, so a gradual increase from today's 50 rail cars per week was assumed (as shown in **Table BCA-2**). After 2015, to be conservative, it is assumed that there will be no increase in oil production.

To calculate the benefits of the project, the additional amount of oil that would be shipped by rail with the project vs. without was calculated (right-most column). The various benefits of the project are largely calculated by assuming that the amount of oil that would NOT be moved by rail if the project were NOT built would instead be moved by truck to Cushing, Oklahoma (where there is a pipeline head).

As shown in **Table BCA-2**, in the No Build, there are 295,850 barrels of oil that would need to be shipped by truck from Sayre to Cushing, Oklahoma in 2015. The oil would then be shipped by pipeline to refineries on the Gulf Coast. In the Build, this same 295,850 barrels of oil is assumed to be shipped by rail from Sayre to Lake Charles, Louisiana via Farmrail and BNSF railroads. Lake Charles is currently a common crude oil destination from Sayre.

Rail Maintenance
Rail maintenance schedules were developed using data from Farmrail staff (**Table BCA-3**). The maintenance schedules for the two segments of rail are quite different. The western (Sayre to Elk City) segment is currently in very poor condition, so-called Excepted Track, and maintenance would actually be higher in the Build to account for the many hundreds of additional railcars being carried each week.

There is savings for the Elk City to Clinton (eastern) part of the improvement project, although the present value of the savings is negative when using the 3% discount rate. This segment of rail is currently classified as marginal Class 2 status, and it is due for major maintenance in 2017 if the project is not built in the near future. For six years after construction (and also after major maintenance, which is done in approximately ten year cycles if funding is available) annual maintenance costs are substantially lower.

[2] Source: September 22, 2011 e-mail from Jay Albert, Deputy Secretary of Energy, State of Oklahoma, referencing information from Chesapeake Energy.

TABLE BCA-3: Maintenance Cost Schedule for Rail

Year	Sayre to Elk City		Elk City to Clinton		SAVINGS
	NO BUILD	BUILD	NO BUILD	BUILD	(Extra Costs)
2013	$115,770		$364,800		$480,570
2014	$115,770	$193,800	$364,800	$255,360	$31,410
2015	$115,770	$193,800	$364,800	$273,600	$13,170
2016	$115,770	$193,800	$364,800	$291,840	$(5,070)
2017	$115,770	$193,800	$2,819,560	$310,080	$2,431,450
2018	$115,770	$193,800	$255,360	$328,320	$(150,990)
2019	$115,770	$193,800	$273,600	$346,560	$(150,990)
2020	$115,770	$193,800	$291,840	$364,800	$(150,990)
2021	$115,770	$193,800	$310,080	$364,800	$(132,750)
2022	$115,770	$193,800	$328,320	$364,800	$(114,510)
2023	$115,770	$1,497,891	$346,560	$ 2,819,560	$(3,855,121)
2024	$115,770	$135,660	$364,800	$255,360	$89,550
2025	$115,770	$145,350	$364,800	$273,600	$61,620
2026	$115,770	$155,040	$364,800	$291,840	$33,690
2027	$115,770	$164,730	$2,819,560	$310,080	$2,460,520
2027	$115,770	$174,420	$255,360	$328,320	$(131,610)
2028	$115,770	$184,110	$273,600	$346,560	$(141,300)
2029	$115,770	$193,800	$291,840	$364,800	$(150,990)
2030	$115,770	$193,800	$310,080	$364,800	$(132,750)
2031	$115,770	$193,800	$328,320	$364,800	$(114,510)
2032	$115,770	$1,497,891	$346,560	$ 2,819,560	$(3,855,121)
2033	$115,770	$135,660	$364,800	$255,360	$89,550
2034	$115,770	$145,350	$364,800	$273,600	$61,620
2035	$115,770	$155,040	$364,800	$291,840	$33,690
2036	$115,770	$164,730	$2,819,560	$310,080	$2,460,520
2037	$115,770	$174,420	$255,360	$328,320	$(131,610)
TOTAL	**$3,010,020**	**$7,055,893**	**$15,973,560**	**$12,898,640**	**-$970,953**

Overall, using a discount rate of 7%, the project results in a rather minimal maintenance savings of $220,000 over the life of the project. Using a three percent discount rate, the impact is a loss of $320,000. The difference is due to the seven percent discount rate placing a high value on the reduced maintenance cost of the eastern segment in 2017, while placing lower values on the maintenance cost savings in the out years.

Reduced Pavement Damage to Highways

The other side of assessing the "State of Good Repair" impacts is the reduced wear and tear on the roadways that is a result of removing trucks from the highway under the Build scenario.

Between Sayre and the pipeline heads in Cushing is a 200-mile trip, largely along I-40. Crude oil tank trucks need to be driven back empty, leading to high costs, as a trucker's day consists of one 400-mile round trip to carry one tanker truck of oil.

With 170 barrels of oil per truck[3], and 400 miles per truck trip (round trip), this rail project is estimated to take over 36.2 million truck miles off of Oklahoma highways every year starting in 2015:

> 2015 excess railcars = 455 x 650 barrels per railcar. Additional capacity is 295,750 barrels/week.
> An average truck holds 170 barrels, so (295,750/170) = 1,740 trucks per week.
> Multiplied by 52 weeks/year = 90,465 truck trips per year.
> Multiplied by 400 miles per trip = 36,186,000 additional truck miles annually in the No Build.

To evaluate the cost of truck pavement damage, the following data from FHWA (http://www.fhwa.dot.gov/policy/hcas/addendum.htm) was used. Although some of the miles between Sayre and Cushing are in urban areas, the figure for rural pavement damage was used, as most of the miles would be made on rural sections of I-40. The $0.127 per VMT cost figure from this source was provided in 2000 dollars. To update the cost to 2011 dollars the CPI was used, taking the factor from the BLS online inflation calculator[4]. The resulting cost figure was $0.167 per mile traveled in 2011$.

Table BCA-4: Source data for truck pavement damage.

Type of Truck	Per VMT Cost in 2000$
Autos/Rural Interstate	0
Autos/Urban Interstate	0.0001
40 kip 4-axle S.U. Truck/Rural Interstate	0.01
40 kip 4-axle S.U. Truck/Urban Interstate	0.031
60 kip 4-axle S.U. Truck/Rural Interstate	0.056
60 kip 4-axle S.U. Truck/Urban Interstate	0.181
60 kip 5-axle Comb/Rural Interstate	0.033
60 kip 5-axle Comb/Urban Interstate	0.105
80 kip 5-axle Comb/Rural Interstate	**0.127**
80 kip 5-axle Comb/Urban Interstate	0.409

Source: According to the "Addendum to the 1997 Federal Highway Cost Allocation Study final Report" FHWA, May 2000.

[3] Crude oil tanker trucks vary, although those most commonly used in the area have a theoretical capacity of 7,800 gallons. However, as with rail tanker cars, space must be left in the tank for product expansion and movement, and the typical capacity of a truck is 7,140 gallons, or about 170 barrels.
[4] http://www.bls.gov/data/inflation_calculator.htm

The annual value (in 2015) of $6.06 million was arrived at by multiplying 36.2 million miles per year by $0.167. Using a seven percent discount rate over the 2013-2037 analysis period, the total pavement benefits are valued at $60.3 million.

Reduced Cost of Oil Shipments

As noted in the application, reduced costs of shipping oil from Sayre to the refineries is a result of a number of factors:

1. Reduced costs to Farmrail of shipping the oil (reflected in a price reduction of $50 per carload)
2. Reduced cost of tank car rental due to faster railcar turnaround times
3. The cost differential between truck-plus-pipeline shipping costs and rail shipping costs

To calculate the per-barrel cost of shipping crude oil by rail, the following assumptions were used. Sources are listed below, with the resulting calculations presented in **Table BCA-5**.

- Farmrail's current price is $350 to bring a rail car to BNSF and back. This price would likely be lowered to $300 per carload if the project were built and if rail traffic on the line grows as projected. (Source: Farmrail)
- BNSF's current price to bring a railcar from Farmrail to Lake Charles Louisiana and back is $2,904, plus a $729 fuel surcharge. (Source: Farmrail)
- The cost to rent a rail tanker car is $1,000 a month ($33 per day) (Source: Farmrail)
- The turnaround time for a rail car (to travel from Sayre to a refinery and then return empty to be loaded with more oil) will be reduced by two days. Current estimates are 22 days without the project and 20 days with the project[5].

Table BCA-5: 2015 Rail Shipper Cost Savings Calculations

	No Build	Build
Farmrail Cost	$350.00	$300.00
BNSF Cost (with fuel surcharge)	$3,633.00	$3,633.00
Tank Car Cost	$ 733.33	$ 666.67
Total Cost per carload	$4,716.00	$4,600.00
Per barrel cost to ship by rail	$7.26	$7.08

These costs were then compared to the costs of shipping by truck and pipeline, using the following assumptions:

- Truck cost - $8 per barrel (the Oklahoma Department of Energy stated that current truck transportation costs are $6-$10 per barrel shipped)
- Pipeline cost -$1 per barrel (the Oklahoma Department of Energy stated that current pipeline costs are $1 to $2 per barrel. New-construction pipeline is forecast to cost $3 per barrel to bring oil to the gulf coast).

[5] With only 15 cars per day traveling between Sayre and Elk City in the No Build, it will take 2-3 days to put together a (cost efficient) 40-car train at Elk City to be brought to BNSF. In the Build scenario, 40 cars could be connected into a single train at Sayre, and head out for BNSF the same day.

The difference of $9.00 minus the rail costs per barrel (Build and No Build) shown in **Table BCA-5**, when multiplied by the "additional capacity" from **Table BCA-2**, leads to an annual savings of $30.2 million per year beginning in 2015. Present value for the 2013-2037 period is $310.9 million.

Emissions Reductions

The 36.2 million truck miles removed from the road each year would remove a substantial volume of pollutants from the air as well, an estimated 47,000 tons of CO, CO_2 , NO_x, SO_x, volatile organic chemicals and particulate matter (PM_{10}). Over the 25-year life of the project, total truck pollutant reductions are an estimated 1.1 million tons. The emissions were calculated using the California Life-Cycle Benefit-Cost Analysis Calculator (CAL B/C)[6] for trucks traveling 60 mph. Factors vary by year, and are presented in **Table BCA-6** (in grams per VMT).

Table BCA-6: Emissions Factors for Trucks Traveling 60 Miles per Hour

Year	Grams of pollutant emitted per VMT (source CAL B/C)					
	CO	CO_2	NO_X	PM_{10}	SO_X	VOC
2012	3.406324	1263.598	8.155018	0.337364	0.012174	0.641098
2013	3.207335	1265.537	7.499747	0.3178	0.012189	0.601309
2014	3.019971	1267.478	6.897128	0.299371	0.012204	0.563989
2015	2.843552	1269.423	6.34293	0.282011	0.012219	0.528985
2016	2.677439	1271.37	5.833264	0.265657	0.012234	0.496154
2017	2.52103	1273.32	5.36455	0.250252	0.012249	0.465361
2018	2.373758	1275.274	4.933498	0.23574	0.012264	0.436478
2019	2.235089	1277.23	4.537082	0.222069	0.012279	0.409389
2020	2.104521	1279.19	4.172519	0.209192	0.012294	0.38398
2021	1.98158	1281.152	3.837249	0.197061	0.012309	0.360149
2022	1.865822	1283.118	3.528919	0.185633	0.012324	0.337796
2023	1.756825	1285.086	3.245363	0.174868	0.012339	0.316831
2024	1.654196	1287.057	2.984592	0.164728	0.012355	0.297167
2025	1.557562	1289.032	2.744774	0.155175	0.01237	0.278724
2026	1.466573	1291.009	2.524226	0.146177	0.012385	0.261425
2027	1.3809	1292.99	2.3214	0.1377	0.0124	0.2452
2028	1.300231	1294.974	2.134871	0.129715	0.012415	0.229982
2029	1.224275	1296.96	1.96333	0.122193	0.01243	0.215708
2030	1.152756	1298.95	1.805573	0.115107	0.012446	0.20232
2031	1.085415	1300.943	1.660491	0.108432	0.012461	0.189764
2032	1.022008	1302.938	1.527068	0.102144	0.012476	0.177986
2033	0.962305	1304.937	1.404365	0.096221	0.012491	0.166939
2034	0.90609	1306.939	1.291522	0.090641	0.012507	0.156578
2035	0.853158	1308.944	1.187745	0.085385	0.012522	0.146861
2036	0.803319	1310.952	1.092308	0.080433	0.012537	0.137746
2037	0.756391	1312.963	1.004539	0.075769	0.012553	0.129197

[6] California Department of Transportation. (2009). California Life-cycle Benefit/Cost Analysis Model, Technical Supplement to User's Guide (Vol. 3). Sacramento: California Department of Transportation.

Values were assigned to the emissions levels using guidance from the TIGER website (http://www.dot.gov/tiger/application-resources.html).

Project emissions impacts also have to account for increased rail emissions. While rail produces a fraction of the emissions per ton-mile as truck travel, the 200-mile Sayre-to-Cushing truck trip used in this analysis must be compared to the much longer 600-mile rail trip between Sayre and Lake Charles, Louisiana. It is assumed that pipeline travel (the other part of the truck trip) produces a negligible level of emissions.

Data on rail emissions was limited, so the most conservative of the following sources was used to assume that rail emissions are 30% of truck emissions per ton-mile.

- Trucks emit 6 to 12 times more pollutants per ton-mile than RRs, and 3 times more NO_x and PM. (http://nationalatlas.gov/articles/transportation/a_freightrr.html)
- Rail produces 70% less CO_2 than trucks per ton-mile http://www.freightonrail.org.uk/FactsFigures-environmental.htm
- Moving freight by rail reduces greenhouse gas emissions by 75% http://www.aar.org/~/media/aar/Background-Papers/Freight-RR-Help-Reduce-Emissions.ashx

It was assumed that due to the efficiency of rail, the transport of empty railcars returning to Sayre would have very low emissions. Whatever emissions are produced from the return trip should be accounted for by the use of the most conservative of the above figures rather than the average.

Calculation of rail emissions required calculating the emissions that would be produced by the trucks that would be required to transport the oil between Sayre and Lake Charles Louisiana. For 2015, the 295,750 barrels of "additional capacity" would require 1,800 trucks per week, or 96,000 trucks per year. Multiplied by 600 miles yields 57.8 million truck miles traveled. Applying the emissions factors in **Table BCA-6** yields approximately 75,000 tons of emissions annually. Applying the assumed 30% emissions savings from rail travel, rail emissions would then be in the range of 22,000 tons per year.

Cumulative additional (Build vs. No Build) rail emissions over the 25-year analysis period are shown in **Table BCA-7**.

Table BCA-7: Rail Emissions Calculations (2013-2037 Totals) in Tons*

Pollutant	CO (metric tons)	CO_2 (long tons)	NO_X (metric tons)	PM_{10} (metric tons)	SO_X (metric tons)	VOC (metric tons)	TOTAL
Truck-equivalent	2,238	1,786,113	4,209	223	17	404	1,793,205
Rail	672	535,834	1,263	67	5	121	537,961

* All figures are in metric tons except for CO_2 which is in long tons.

The net emissions reduction (Truck minus Rail, or Build minus No Build) is thus in the range of 25,000 tons per year. Using TIGER guidance to evaluate emissions reductions, the total reduction over the total analysis period is presented in **Table BCA-8**. The present value of the net emissions reductions over the life of the project is $27.4 million. The net emissions savings is shown in **Table BCA-8**.

Table BCA-8: New Emissions Reductions (2013-2037 Totals)

Pollutant	CO	CO_2	NO_X	PM_{10}	SO_X	VOC	TOTAL
Truck Emissions (No Build) tons*	1,400	1,117,363	2,633	139	11	253	1,121,799
Rail Emissions (Build) tons*	672	535,834	1,263	67	5	121	537,961
Net Savings, tons*	729	581,529	1,370	73	5	132	583,838
Value per ton	*$ 0*	*varies*	*$ 4,370*	*$ 183,560*	*$ 17,482*	*$ 1,857*	
Value (in thousands of 2011$)	$ 0	$48,446	$5,989	$13,314	$96	$244	$68,089

* All pollutant emissions are in metric tons except for CO_2 which is in long tons.

Safety Benefits

As with emissions, safety benefits were evaluated separately for rail and truck travel.

Reduced Truck Accidents

The reduced truck miles traveled will have a direct impact on reducing highway crashes. Using state crash data from 2010, along with accident cost values provided in the TIGER guidance, the cost of crashes per million miles traveled is $129,540 in 2011 dollars, as shown in **Table BCA-9**.

The value for each crash type is derived from the Maximum Abbreviated Injury Scale (MAIS) scale using the KABCO-to-MAIS conversion table in the TIGER Notice of Funding Availability (NOFA). The MAIS values are also from the NOFA, which cites the original source as *Treatment of the Value of Preventing Fatalities and Injuries in Preparing Economic Analyses – 2011 Revisions (http://ostpxweb.dot.gov/policy)*.

Table BCA-9: Calculation of Safety Costs per Million Vehicle Miles Traveled (VMT)

	1 Non-injury	2 Possible Injury (minor injury)	3 Non-Incapacitating Injury	4 Incapacitating Injury	5 Fatal Injury	TOTAL
2010 crashes, statewide	44,746	12,354	9,134	2,957	616	**69,807**
2010 crash rate, statewide, (accidents per million VMT*)	0.94	0.26	0.19	0.06	0.01	**1.46**
Value of accident type	$5,129	$42,009	$81,036	$296,628	$6,200,000	
Cost of accidents per million VMT	$4,807	$10,870	$15,502	$18,371	$79,990	**$129,540**

* Total statewide VMT was 47.7 billion in 2010.

Source: Data on Oklahoma Accidents and VMT is from "2010 Oklahoma Crash Facts," Oklahoma Department of Public Safety, August 2011.

Using the truck VMT removed from the roadway, the annual savings for the analysis years is shown in **Table BCA-10**. The present value of the truck related safety benefits is calculated to be $46.7 million using a 7% discount rate.

As noted in the grant application, the true accident costs might be larger, as these trucks are filled with hazardous crude oil.

Rail Safety Impact

An attempt was made to calculate increased rail accidents expected from the substantial growth in rail freight volumes expected to result from the project. Currently, the accident rate for Farmrail, on all of its lines in this part of Oklahoma, is very low – two accidents in the past six years, during which over 31,000 carloads were shipped, mostly on 25mph track. Both of these accidents were property damage only (no injuries or deaths) and fault was placed on automobile drivers.

Because most rail-vehicle accidents occur on a per train basis (cars rarely hit the back or middle cars of a long train), the rail accident analysis looked at growth in train traffic, as opposed to railcar traffic.

Interestingly, while carload traffic is set to grow substantially with the project in place, train traffic will not grow much, and will actually decrease between Sayre and Elk City. For example, in 2015, with 560 rail cars shipped each week, at 40 cars per train, the rail traffic is just 14 trains per week—about two trains per day. Once the railcars are added to BNSF or other Class I trains, which are often 100 railcars long, the increase is less than one additional train per day.

In the No Build, the 105 railcars per week require 21 trains per week (three per day) between Sayre and Elk City. There is a speed differential that might increase the potential severity of accidents in the Build (25 mph vs. today's 10 mph train speed), but with the improved safety equipment at three of the grade crossings that are included in the project (in addition to the

reduced number of trains per day), it was assumed that overall there would be no increase in rail accident costs resulting from the project.

Table BCA-10: Calculation of Safety Benefits

Year	Truck VMT Removed from Roadway	Millions of Truck VMT	Value of Accident Reduction	Present Value DR = 3% in 2011 $	Present Value DR = 7% in 2011 $
2012	-	-	-	$0	$0
2013	8,549,412	8.5	$1,107,488	$1,043,914	$967,323
2014	24,256,471	24.3	$3,142,176	$2,875,536	$2,564,951
2015	36,185,882	36.2	$4,687,508	$4,164,790	$3,576,078
2016	36,185,882	36.2	$4,687,508	$4,043,486	$3,342,129
2017	36,185,882	36.2	$4,687,508	$3,925,714	$3,123,485
2018	36,185,882	36.2	$4,687,508	$3,811,373	$2,919,145
2019	36,185,882	36.2	$4,687,508	$3,700,362	$2,728,172
2020	36,185,882	36.2	$4,687,508	$3,592,585	$2,549,694
2021	36,185,882	36.2	$4,687,508	$3,487,946	$2,382,892
2022	36,185,882	36.2	$4,687,508	$3,386,356	$2,227,001
2023	36,185,882	36.2	$4,687,508	$3,287,724	$2,081,310
2024	36,185,882	36.2	$4,687,508	$3,191,965	$1,945,149
2025	36,185,882	36.2	$4,687,508	$3,098,995	$1,817,897
2026	36,185,882	36.2	$4,687,508	$3,008,733	$1,698,969
2027	36,185,882	36.2	$4,687,508	$2,921,100	$1,587,821
2028	36,185,882	36.2	$4,687,508	$2,836,020	$1,483,945
2029	36,185,882	36.2	$4,687,508	$2,753,417	$1,386,865
2030	36,185,882	36.2	$4,687,508	$2,673,220	$1,296,135
2031	36,185,882	36.2	$4,687,508	$2,595,360	$1,211,341
2032	36,185,882	36.2	$4,687,508	$2,519,767	$1,132,095
2033	36,185,882	36.2	$4,687,508	$2,446,375	$1,058,032
2034	36,185,882	36.2	$4,687,508	$2,375,122	$988,815
2035	36,185,882	36.2	$4,687,508	$2,305,943	$924,126
2036	36,185,882	36.2	$4,687,508	$2,238,780	$863,670
2037	36,185,882	36.2	$4,687,508	$2,173,573	$807,168
TOTAL	**865,081,176**	**865**	**$112,062,354**	**$74,458,157**	**$46,664,207**

Other Non-Quantifiable Costs and Benefits

There are a number of other project benefits as well as costs that could not be reasonably quantified for the benefit-cost analysis. Among these are:

- Benefits to other shippers. While the benefits of reduced Farmrail costs for crude oil shippers is accounted for in the BCA, the impact of this cost reduction for other shippers, such as the county's 1,000+ farms and other businesses was not. While existing agricultural shipping is minimal – a dozen or so railcars per year – there is likely to be massive growth in the shipment of fracking sands and other oil extraction supplies, based on the construction of a fracking sand intermodal facility at Elk City. Further, agricultural shipments may increase once rail transportation costs drop.

  Freight transportation cost savings would improve the cost efficiency of all existing and future businesses, allowing them to be more competitive and make their products cheaper for a wider domestic or international market. Rail is already being used to ship oil extraction supplies into Beckham County, and could be used to ship oil drilling equipment and possibly wind turbine components, which are difficult to ship by truck.

- As stressed in the grant application, the project is critical in making it possible to fully exploit the region's resources and maximize economic development potential for the region. The dampening effect of limiting rail traffic to 105 carloads per week, while the truck driver labor shortage and the limitations on pipeline capacity make non-rail transportation more difficult, could greatly reduce the potential number of jobs and other benefits that would be possible if the project were in place. These benefits are not just the jobs of those drilling and monitoring the wells, but jobs at restaurants and grocery stores that will serve these new employees, the teachers that educate their children, the builders who construct their homes, etc.

- The project, by increasing the number of cars that each train can pull (as well as increasing train speeds) will reduce Farmrail labor and fuel costs per carload. It will also enable the operation to become profitable, as annual operating and maintenance costs will be divided by hundreds of cars per week instead of about 50 today. The exact benefit is difficult to calculate, so in the above analysis it was assumed that reduced costs to Farmrail would be reflected in a $50 reduction in the current price to move a railcar from Sayre to Clinton. However, the true operating cost savings to Farmrail will exceed that $50 per carload assumption.

  The reason it is difficult to calculate is that the Sayre-to-Clinton line is part of an integrated regional rail network both within Farmrail Corporation (which operates state-owned rail lines), and with Grainbelt Corporation, which owns and operates more profitable lines in the area. Farmrail and Grainbelt are owned by the same holding company. A rough cost estimate showed cost savings of as much as $112 per rail car shipped on the network based on more efficient operations and higher traffic densities on their rail lines, but this figure was considered too unreliable to use in the BCA, and savings for just the Sayre-to-Clinton segment could not be isolated.

- The Sayre-to-Elk City segment of the rail system has been subsidized by other segments because of its very low usage. Once it becomes profitable, the revenues remaining after cost reductions will be used to improve maintenance on other Farmrail and Grainbelt lines. The portion of the revenue that is forwarded to ODOT (which owns the Sayre-to-

Clinton segment) will similarly be used to improve the condition of other rail lines in the state, thus strengthening the entire state rail network.

Public Benefits

As noted in the application, much of the value of this project will accrue to businesses involved in the oil extraction industries (shipping, drilling, fracking chemical suppliers). For this reason, a separate analysis was done to show that the purely public benefits of this project greatly exceed the project costs on their own.

The benefits of the reduced pavement damage to highways, reduced emissions, and avoided accidents each individually exceed the project cost within four years of project completion. Taken together, the Present Value of these three benefit categories on their own provide a benefit cost ratio of 17.1 to 1.0 at a seven percent discount rate.

The years shown in Exhibit 18 in the grant application were obtained by adding a cumulative total column of the benefits before present value calculations were applied. The year where this total exceeded the $8,456,580 undiscounted project cost was the year entered into the table. The 17.1 benefit cost ratio was calculated as per **Table BCA-8.**

This analysis was done to highlight the public benefits of this project, or perhaps better stated, to highlight the cost in pavement damage, air pollution and traveler safety should this project *not* be implemented.

Table BCA-11: PUBLIC SECTOR BCA

Category	Present Value at 7%	Present Value at 3%
Construction Cost	**$7,840**	**$8,181**
Evaluated Benefits		
Rail Maintenance Cost Savings		
Reduced Cost of Oil Shipments		
Reduced Damage to Roadway	$60,279	$96,182
Emissions Savings	$27,447	$44,532
Net Safety Benefits	$46,664	$74,458
Total Evaluated Benefits	**$134,390**	**$215,172**
NET PRESENT VALUE	**$126,550**	**$206,991**
BENEFIT/COST RATIO	**17.14**	**26.30**

TIGER Benefit-Cost Analysis (BCA) Examples

IMPaCT Philadelphia

City of Philadelphia

BCA Example Contents

- BCA Summary from Project Narrative
- Detailed Benefit/Cost Calculation Spreadsheet
  (Appendix D in original application)

TIGER III (2011) Discretionary Grant Application **October 31, 2011**

USDOT TIGER DOT.GOV

Application Supporting Materials

City of Philadelphia
Transit Signal Priority (TSP) Upgrades
Improving Mobility for Pedestrians, Cars and Transit (IMPaCT)

Office of the Mayor
CITY OF PHILADELPHIA
LIFE · LIBERTY · AND YOU™

SEPTA

pennsylvania
DEPARTMENT OF TRANSPORTATION

Federal Entity Identifier: stober63516
Funding Opportunity Number: DTOS59-11-RA-TIGER3

This is a BCA-relevant excerpt from the full TIGER Application

Exhibit 15 TIGER III Evaluation Criteria Narrative Matrix

Criteria		How the Project Satisfies Criteria
Primary	State of Good Repair	This project replaces outdated electro-mechanical traffic controllers with fully electronic 170 traffic controllers tied into the City's traffic operations center. These controllers allow City engineers to monitor both traffic flow and controller conditions thereby improving responsiveness when signal problems occur, and significantly reducing the field operations associated with managing and retiming the current controllers. The project will also upgrade ADA ramps at intersections to bring them into full compliancy.
	Economic Competitiveness	By improving travel time and reliability to on these corridors and to Central Philadelphia, the project will help improve the competitiveness of the single largest economy in Pennsylvania.
	Livability	By improving both the running time and reliability of transit through some of the City's most critical arterial corridors, the project will improve the quality of life for City residents, potentially improve property values and reinforce ongoing redevelopment efforts.
	Environmental Sustainability	By improving vehicle flow through these key corridors the project will reduce vehicle emissions and fuel consumption, and improve fuel economy for all public and private vehicles traveling on the corridors.
	Job Creation and Near-term Economic Activity	Immediately upon receipt of the grant, the City will begin concurrent design on all funded corridors. The City's experience and performance in delivering its TIGER I trail program will serve us well in delivering these projects in a timely manner.
Secondary	Innovation	This project uses existing and proven technology to improve transit vehicle operating speeds and to improve overall traffic flow. By improving surface transit speeds and running times, the City may reduce the need and demand for more costly fixed-guideway improvements.
	Partnership	This project represents a collaborative effort between the City of Philadelphia, SEPTA (transit agency), PennDOT and the DVRPC. The project maximizes the use of available technology to improve operating speeds for public transit vehicles, other vehicular traffic and potentially first responders.

QUALITATIVE PROJECT BENEFITS

Benefits associated with this project will be both qualitative and quantitative in nature. **Exhibit 16** presents a brief qualitative summary of how the project will satisfy TIGER III's strategic goals. The qualitative (and quantitative) analyses presented in this application are intentionally conservative and understated. Nevertheless, the project's nature and benefits align well with the strategic goals of the TIGER III program.

Exhibit 16 How the Project Aligns with TIGER III Strategic Goals (qualitative summary)

TIGER III Strategic Goals	How Project Satisfies Strategic Goal
1. Improved condition of existing transportation facilities and systems	Replace outdated electro-mechanical signal controllers with modern electronic 170 controllers tied to the City's traffic operations center. Upgrade ADA ramps to improve compliancy.
2. Improved economic competitiveness in the form of reduced travel time, less traffic congestion, improved trip reliability, fewer vehicle miles traveled, or lower vehicle operating costs	The direct project benefit is to reduce travel time and improve travel time reliability for both public transit passengers as well as private vehicular traffic. VMT is not expected to change as Philadelphia is a mature urban area but passenger hours traveled (PHT) are expected to be directly impacted by taking maximum advantage of ITS and TSP technologies to improve vehicle flow
3. Long-term growth in employment, production or other high-value economic activity	Unknown. Travel time savings are modest and, as such, impacts on long-term employment are expected to be modest as well since this project provides better but not new service to existing, well-developed areas of the City.
4. Improved livability of communities across the United States through expansion of transportation options, efficiency, and reliability	By reducing travel times and improving reliability of public transit service connections to Philadelphia's subway system, this project leverages existing investments in the City's heavy rail system and the City's traffic operations center.
5. Improved energy efficiency, reduced dependence on oil and reduced greenhouse gas emissions	Secondary (minimal) impacts. Improved signal coordination will improve fuel economy and reduce greenhouse gas emissions.
6. Reduced adverse impacts of transportation on the natural environment	Not applicable as the project will not add new facilities but improve the level-of-service of existing facilities.
7. Reduced number, rate and consequences of surface transportation-related crashes, injuries and fatalities	Minimal impacts. The installation of pedestrian signals which show remaining crossing "green" time for pedestrians should reduce the likelihood of crashes, especially those involving pedestrians, however the extent of such reductions are unknown.
8. Greater use of technology and innovative approaches to transportation funding and project delivery	By using fiber to connect fully electronic signal controllers and traffic cameras to the City's traffic operations center, signal timings can be easily modified to improve capacity and optimize vehicular flow along these corridors. By outfitting transit vehicles with proven technology and combining it with other "Transit First" strategies improves transit service to transit-reliant populations.
9. Greater collaboration with state and local governments, other public entities, private entities, nonprofit entities, or other nontraditional partners	The City will make TSP receivers available to emergency responders who can use the technology to improve emergency response times. The use of and funding for signal preemption will be decided by first responders and therefore is not included in this project. The Philadelphia Fire Department is currently evaluating the potential of TSP technology for fire department use.
10. Greater integration of transportation decision making with decision making by other public agencies with similar public service objectives	This project is the result of a fully collaborative effort between the City (MOTU and Streets Department), the regional transit agency (SEPTA), the DVRPC (local MPO) and the Pennsylvania Department of Transportation (PennDOT). SEPTA and PennDOT are partners helping to satisfy a 50% local capital funding match.
11. Any other benefits claimed in the project's benefit cost analysis	Not Applicable

BENEFIT / COST ANALYSIS (QUANTITATIVE BENEFITS)

While this project has many benefits that are difficult to quantify, its primary long-term benefits are to reduce travel time and improve reliability for both transit and auto users. Numerous FHWA and FTA studies have documented the significant benefits (for comparatively low costs) offered by integrated corridor timing programs and transit signal priority. As such, the benefit cost analysis focuses on those aspects of the project to demonstrate the project's merits. Modest secondary benefits are accounted for using Department of Energy ARRA calculation spreadsheets (for fuel consumption and CO2). While safety benefits should accrue as well, they are not accounted for in the benefit / cost analysis as it is unclear what the magnitude of those improvements might be.

Findings

In the short-term (meaning during the design and construction phases of the project), the project may have a slight negative impact on travel time due to roadway construction. However, this investment is also expected to generate approximately 4,200 staff months of labor. The net present value (NPV) of expected benefits from the project greatly exceed the project cost and are summarized as follows (**Exhibit 17**):

Exhibit 17 Summary of Net Present Value and Short-term Job Months of Employment Generated by the Project

Corridor	From	To	Net Present Value*[3]	Year NPV Becomes Positive	Short-term Job Months[4]
Castor Av	Bustleton	Roosevelt Bl	$5,845,909	2022	690.36
Oxford Av	Roosevelt Bl	Frankford Av	$696,025	2028	318.90
Woodland Av	40th St	Island	$19,804,672	2019	1,107.47
Bustleton Av	Frankford Av	County Line	$53,572,714	2018	2,057.00
Total Project	N/A	N/A	**$79,919,320**	**N/A**	**4,173.73**

The following section summarizes the parameters used in the net present value and short-term job months created estimates. It should be noted that both automobile and transit passenger counts used in the analysis are held constant for all years. This is because the corridors are fully-developed urban corridors that have not witnessed significant growth in counts for the past 10 years and because both automobile and transit travel times will benefit more or less equally from the signal upgrades (resulting in little net expected mode change).

[3] Benefit / cost ratio = (NPV+ Construction Cost) / Construction Cost or ($79,919,320+$32,000,000)/$32,000,000=3.497

[4] Informational item only, not included in B/C analyses

Key Parameters

Estimating the net present value of a proposed project involves a series of parameters that quantify benefits and convert their future value to their present day's worth. The goal of such an analysis is to understand whether a project's benefits to society generally exceed its costs both in the short-term and in the long-run. Because any number of parameters can change the outcome, parameters should be realistic, documented and tested so that decision-makers understand not only the benefits but where error or uncertainty could yield a very different result. **Exhibit 18** presents the general parameters used for to determine the net present value of all the corridor segments included in the benefit/cost analysis as well as their sources or underlying assumptions. These parameters are used consistently to evaluate all corridor segments.

Exhibit 18 Benefit/Cost Analysis General Parameters

Parameter Name	Value	Unit	Notes / Source
Project Life	20	Years	20-25 years expected but 20 for conservative estimate
Discount Rate	3.00%	Per annum	Public Rate per NOFA
Values Expressed in	2011	$	Per NOFA
Value of Time	$13.22	Per hour=(75% * median HH Inc. ($36,669) / 2080 hours) *(1+0.030)^ (2011-2009-1)	http://factfinder.census.gov/servlet/ACSSAFFFacts?_event=Search&geo_id=&_geoContext=&_street=&_county=Philadelphia+County&_cityTown=Philadelphia+County&_state=04000US42&_zip=&_lang=en&_sse=on&pctxt=fph&pgsl=010
Auto Annualization Factor	250	Days / year that benefits accrue	52 weeks * 5 days /week less 10 holidays
Transit Annualization Factor	250		
Jobs created	$7,667.00	Project Cost / value to yield job months	http://www.dot.gov/recovery/docs/090609jobestimates.htm
O&M Cost	$1,163.59	Per intersection (2011 $)	Best estimate based on City Engineer's total annual operating budget ($3,400,000) / 2,922 controllers maintained by the City.
Auto Travel Time Reduction	7.90%	of "Before" Total Travel Time (Operation)	DVRPC Philadelphia "Transit First" program post implementation evaluation (http://www.dvrpc.org/reports/08066.pdf), page 26.
Transit Travel Time Reduction	7.90%		
Auto Travel Time Increase (construction)	5.00%	of "Before" Total Travel Time (Construction)	Construction at intersection that interferes with operation will be ½ of the total construction time but mostly in off-peak hours
Transit Travel Time Increase (construction)	5.00%		
Travel Time Reliability (Auto)	6.00%	of Travel Time Reduction due to Project	http://www.internationaltransportforum.org/Proceedings/reliability/4-Delache.pdf slide 26
Travel Time Reliability (Transit)	6.00%		
Gasoline (All Grades)	$3.60	Per gallon	Median values from web survey conducted

Parameter Name	Value	Unit	Notes / Source
Diesel Fuel (All Grades)	$4.03		10/25/11 on http://www.automotive.com/gas-prices/33/pennsylvania/philadelphia/philadelphia/
CO2 (Greenhouse Gas)	$25.70 to $43.23	Per metric ton varies by year	http://www1.eere.energy.gov/buildings/appliance_standards/commercial/pdfs/sem_finalrule_appendix15a.pdf (table 4, 3% average / 0.91 (short to metric tons))

Detailed Assessment

Transmitted with this document is the detailed Benefit / Cost spreadsheet developed for this proposal. Detailed assessment of benefits and costs evaluated the project during construction (1 year) and post construction (20 years).

The primary spreadsheet is called **PhillyTIGERIIIBenefitCostAnalysis.xlsx** and is included as **Appendix D: Detailed Benefit / Cost Calculation Spreadsheet**. It is organized as follows:

- 1st Tab- ***KeyAssumptions***- This is where any of the assumptions used by all corridor segments in the analysis are input. Changing values modifies results across all segments.
- 2nd Tab- ***Castor-*** This is where the parameters from the ***KeyAssumptions*** are applied for the Castor segment of the Castor/Oxford Corridor as well as *corridor-specific parameters*. Parameters specific to the corridor are input in the first section of the tab including *Traffic Count (AADT)*, *Transit Ridership*, *Construction Cost, Intersections, Corridor Length, Auto Speed and Transit Speed*. Separate analyses are presented by year for each of the following:
    - No-build scenario (O&M cost only)
    - Construction Impacts (negative benefits)
    - Travel Time and Reliability Impacts
    - Air Quality Impacts
    - Fuel Savings Impacts

  The depreciated net present value (NPV) of all benefits and costs are calculated in the BENEFIT/COST Summary presented as the first table after the *Project Corridor Inputs.*

- 3rd Tab- ***Oxford-*** This tab is organized exactly as the Castor tab.
- 4th Tab- ***Woodland-*** This tab is organized exactly as the Castor tab.
- 5th Tab- ***Bustleton-*** This tab is organized exactly as the Castor tab.
- 6th Tab- ***AllCorridorSummary-*** This is where summary results from the analysis are presented in abbreviated form. Tables included on this tab include specific information (and totals) regarding each corridor:
    - *Summary Results* - NPV, Year NPV becomes positive, Short-term job months and full-time equivalent short-term jobs created during design/construction.
    - *Capital Funding Strategy*- financial contribution by funding entity

  - *Schedule Summary*- number of months for design and construction
  - *Year 2010 Population within ¼ mile of corridor*- broken down by race
  - *Existing Conditions (Automobile)*- corridor length, signals, AADT, current auto speed and current maintenance cost / year
  - *Existing Conditions (Public Transport)*- 2010 daily boardings, SEPTA routes serving corridor, peak period headway, current transit speed and reliability.
- 7th Tab- ***FuelPrices-*** This is where the sample of fuel prices are documented.

On the corridor segment-specific tabs, Air Quality benefits are manually input to cell F14 based on summary results from US Department of Energy (DOE) ARRA calculation spreadsheets. Fuel savings are also manually input from the same spreadsheets into cell F15 & F16. The DOE spreadsheets documenting the calculations for each corridor are:

- ***Castor-*** DOE_ARRABenefitsReportingCalculatorCastor.xlsm, *Transportation Report* tab Cell F18 (CO2), Cell D18 (Gasoline Gallons), Cell E18 (Diesel Gallons)
- ***Oxford-*** DOE_ARRABenefitsReportingCalculatorOxford.xlsm, *Transportation Report* tab Cell F18 (CO2), Cell D18 (Gasoline Gallons), Cell E18 (Diesel Gallons)
- ***Woodland-*** DOE_ARRABenefitsReportingCalculatorWoodland.xlsm, *Transportation Report* tab Cell F18 (CO2), Cell D18 (Gasoline Gallons), Cell E18 (Diesel Gallons)
- ***Bustleton-*** DOE_ARRABenefitsReportingCalculatorBustleton.xlsm, *Transportation Report* tab Cell F18 (CO2), Cell D18 (Gasoline Gallons), Cell E18 (Diesel Gallons)

Because the DOE spreadsheets did not calculate specific benefits for VOC, NOx, PM and SOx, these values have not been introduced to the benefit / cost analysis.

Risk and Uncertainty

Several factors were evaluated to determine how sensitive the benefit / cost analysis would be to uncertainty. Factors tested were limited to the factors contributing to the net present value of the project:

- Value of Time
- Value of Travel Time Reliability
- Discount Rate
- Travel Time Savings
- Fuel Costs
- Value / Metric Ton (all emissions)

Results of the risk / uncertainty tests are intended to be "worse case" and are provided in **Exhibit 19**. Most tests assume ½ of the documented expected (conservative) value. The test on the discount rate assumes the high end of the discount rate in the NOFA while Reliability and emissions are valued at 0 for the risk assessment as these parameters have the greatest degree of uncertainty. Yet, in all cases the B/C analysis results in a positive net present value ranging from $27 to $78 million after fully accounting for construction and maintenance cost. The net positive value resulting from the B/C analysis is robust to all assumptions underpinning it.

Exhibit 19 Uncertainty / Risk Assessment of Benefit / Cost Key Parameters

Parameter	Base Value	Risk Assessment (All Corridor Segments) Findings		
		Value Tested	Resulting NPV	Year NPV >$0
Value of Time	$13.22	$6.61	$27,348,180	2021 – 2035
Value of Reliability	6.00%	0.00%	$73,695,738	2018 – 2029
Discount Rate	3.00%	7.00%	$42,331,470	2019 – 2035
Travel Time Savings	7.90%	3.95%	$27,033,418	2022 – 2034
Fuel (Gas/Diesel)	$3.60/$4.03	$1.80/$2.00	$78,382,665	2018 – 2029
Value of CO2	$25.70-$45.23	$0.00	$79,837,512	2018 – 2028

CHANGES FROM PRE-APPLICATION

The only change in the final application from the pre-application is the Design Completion Date was extended (to 3/31/2013) to allow for a more thorough procurement process.

CONCLUSION

IMPaCT Philadelphia - Improving Mobility for Pedestrians, Cars and Transit improves traffic flow for both transit and non-transit vehicles alike in some of the most densely developed areas of the City. By upgrading electro-mechanical traffic signal controllers to fully-electronic 170 controllers, connecting them to the City's traffic operations center, providing transit signal priority to transit on several of the City's highest ridership corridors, and improving pedestrian conditions through the installation of countdown signals and through the upgrade of ADA ramps, this investment improves quality of life, improves livability, reduces emissions and reliance on petroleum, results in travel time savings and improves overall system reliability. Because the project has no negative environmental impacts and positively impacts disadvantaged populations in economically challenged communities, it is 100% consistent with the strategic goals of TIGER III.

The three corridors improved by this project (Castor/Oxford, Woodland and Bustleton) build on existing local, and documented experience coming from before/after studies. Quantitative benefit / cost assessment of the project using local/empirical data relating to travel time savings is therefore highly reliable. Nevertheless, in every "Worse Case" risk assessment performed, the project always maintains a positive net present value.

With a **50% local contribution**, federal dollars will be greatly leveraged to maximize long-term improvements and to provide **short-term job relief** over the 18 month project implementation schedule. To sum it up, the project has strong **IMPaCT**s on mobility, a quickly implementable schedule, strong local financial commitment from a variety of partners, and **documented positive benefits** to the region's transportation system consistent with the **short-term** and **long-term** goals driving the TIGER III discretionary grant program.

Additional background materials can be found on http://www.wgianalytics.com/tiger3phl.

APPENDIX D: DETAILED BENEFIT / COST CALCULATION SPREADSHEET

General Parameters			
Parameter Name	**Description**	**Value**	**Unit**
Project Life		20	Years
Discount Rate		**3.00%**	per annum
Values Expressed in		**2011**	$
Value of Time		**$13.22**	per hour (75% * median hh inc $36,669/2080 hours)*(1+0.030)^(2011-2009-1)
Annualization Factor	Auto	**250**	days/year that benefits accrue
Annualization Factor	Transit	**250**	days/year that benefits accrue

Environmental Factors			
Air Quality (2010 $)	CO2 (2010)	**$25.70**	per metric ton
Air Quality (2010 $)	CO2 (2015)	**$28.58**	per metric ton
Air Quality (2010 $)	CO2 (2020)	**$31.58**	per metric ton
Air Quality (2010 $)	CO2 (2025)	**$35.54**	per metric ton
Air Quality (2010 $)	CO2 (2030)	**$39.39**	per metric ton
Air Quality (2010 $)	CO2 (2035)	**$43.23**	per metric ton
Air Quality (2010 $)	VOC	**$1,857.64**	per metric ton
Air Quality (2010 $)	NOX	**$4,370.91**	per metric ton
Air Quality (2010 $)	PM	**$183,578.14**	per metric ton
Air Quality (2010 $)	SO2	**$17,483.63**	per metric ton

O&M Cost Per Intersection*		
Operating Budget	**$3,400,000**	City-wide
Signalized Intersections	**2,922**	City-wide
O&M Cost/Year	*$1,163.59*	per Intersection

**Note, O&M for electro-mechanical vs. fully electronic 170 fiber-connected controllers cost the same per City's traffic engineer Richard Montanez, P.E.*

Travel Time Savings			
Travel Time Reduction	Auto	**7.90%**	of "Before" Total Travel Time (Operation)
Travel Time Reduction	Transit	**7.90%**	of "Before" Total Travel Time (Operation)
Travel Time Increase	Auto	**5.00%**	of "Before" Total Travel Time (Construction)
Travel Time Increase	Transit	**5.00%**	of "Before" Total Travel Time (Construction)

Reliability			
Time Equivalent	Auto	**6.00%**	of Travel Time Savings
Time Equivalent	Transit	**6.00%**	of Travel Time Savings

Fuel			
Gasoline	Median All Grades	$3.60	per gallon
Diesel	Median	$4.03	per gallon

Short-term Jobs Created			
Jobs created	All	$7,667	per job month

PROJECT SUMMARY: Castor Av		Before/From	After/To	Delta	Unit
Corridor:	Castor Av	Bustleton	Roosevelt Bl		
Traffic Count:		12,000	12,000	-	AADT, Urban Environment, No Growth Observed
Transit Ridership:		4,558	4,558	-	Daily Passengers
Design Period:		1-Apr-12	30-Jun-13	455	Days
Design Cost:			$602,000		Year of Expenditure Dollars
Construction Period:		30-Jun-13	29-Dec-14	548	Days
Construction Cost:			$4,691,000	-$4,691,000	Year of Expenditure Dollars
Intersections:		23	23	-	Total Intersections
Corridor Length:		3.010	3.010	-	Linear Miles
Auto Speed:	Confirmed>>	19.477	21.016	1.539	Miles / Hour Confirmed by Speed Survey
Transit Speed:	Confirmed>>	12.00	12.948	0.948	Miles / Hour Confirmed by SEPTA
Transit Route(s):		Route 59			
CO2 Reductions:				33.398	Tons/Year (DOE_ARRABenefitsReportingCalculatorCastor.xlsm)
Gasoline Reductions:				11,497.354	Gallons/Year (DOE_ARRABenefitsReportingCalculatorCastor.xlsm)
Diesel Fuel Reductions:				474.503	Gallons/Year (DOE_ARRABenefitsReportingCalculatorCastor.xlsm)
Derived Statistics					
Short-term Jobs:			*690.36*		Months of US Labor
Auto Travel Time After Construction:		*9.272*	*8.594*	*(0.679)*	Minutes
Transit Travel Time After Construction:		*15.050*	*13.948*	*(1.102)*	Minutes
Auto Travel Time During Construction:		*9.272*	*9.736*	*0.464*	Minutes
Transit Travel Time During Construction:		*15.050*	*15.803*	*0.753*	Minutes

BENEFIT / COST SUMMARY: Castor Av

		Construction Phase		Operating Phase				Total			
Calendar Year	Project Year	Design / Construction Cost	Travel Time Benefits	O&M Cost	Travel Time Benefits	Fuel Benefits	Environmental Benefits	Undiscounted Net Benefits	Discounted @ 3.00% 2011 $	Running Total	
2012	-2	$0	$0	-$26,762	$0	$0	$0	-$26,762	-$25,983	-$25,983	2012
2013	-1	-$1,577,258	-$166,589	-$26,762	$0	$0	$0	-$1,770,609	-$1,668,969	-$1,694,952	2013
2014	0	-$3,113,742	-$328,871	-$26,762	$4,741	$267	$6	-$3,464,363	-$3,170,383	-$4,865,334	2014
2015	1	$0	$0	-$26,762	$769,043	$43,291	$954	$786,526	$698,818	-$4,166,516	2015
2016	2	$0	$0	-$26,762	$769,043	$43,291	$975	$786,546	$678,481	-$3,488,035	2016
2017	3	$0	$0	-$26,762	$769,043	$43,291	$995	$786,566	$658,737	-$2,829,298	2017
2018	4	$0	$0	-$26,762	$769,043	$43,291	$1,015	$786,586	$639,566	-$2,189,732	2018
2019	5	$0	$0	-$26,762	$769,043	$43,291	$1,035	$786,606	$620,954	-$1,568,778	2019
2020	6	$0	$0	-$26,762	$769,043	$43,291	$1,055	$786,626	$602,883	-$965,895	2020
2021	7	$0	$0	-$26,762	$769,043	$43,291	$1,081	$786,652	$585,343	-$380,551	2021
2022	8	$0	$0	-$26,762	$769,043	$43,291	$1,108	$786,679	$568,314	$187,762	0
2023	9	$0	$0	-$26,762	$769,043	$43,291	$1,134	$786,705	$551,779	$739,542	0
2024	10	$0	$0	-$26,762	$769,043	$43,291	$1,161	$786,732	$535,726	$1,275,268	0
2025	11	$0	$0	-$26,762	$769,043	$43,291	$1,187	$786,758	$520,140	$1,795,408	0
2026	12	$0	$0	-$26,762	$769,043	$43,291	$1,213	$786,784	$505,007	$2,300,414	0
2027	13	$0	$0	-$26,762	$769,043	$43,291	$1,238	$786,810	$490,314	$2,790,728	0
2028	14	$0	$0	-$26,762	$769,043	$43,291	$1,264	$786,835	$476,048	$3,266,776	0
2029	15	$0	$0	-$26,762	$769,043	$43,291	$1,290	$786,861	$462,198	$3,728,974	0
2030	16	$0	$0	-$26,762	$769,043	$43,291	$1,315	$786,887	$448,750	$4,177,725	0
2031	17	$0	$0	-$26,762	$769,043	$43,291	$1,341	$786,912	$435,694	$4,613,419	0
2032	18	$0	$0	-$26,762	$769,043	$43,291	$1,367	$786,938	$423,018	$5,036,437	0
2033	19	$0	$0	-$26,762	$769,043	$43,291	$1,392	$786,964	$410,710	$5,447,148	0
2034	20	$0	$0	-$26,762	$769,043	$43,291	$1,418	$786,989	$398,761	$5,845,909	0
							NET PRESENT VALUE		$5,845,909		

NO-BUILD SCENARIO: Castor Av									
		Construction Phase			Operating Phase			Total	
Calendar Year	Project Year	Construction Cost	Travel Time Benefits	Environmental Benefits	O&M Cost	Travel Time Benefits	Environmental Benefits	Undiscounted Net Benefits	Discounted @ 3.00% 2011 $
2012	-2	$0	$0	$0	-$26,762	$0	$0	-$26,762	-$25,983
2013	-1	$0	$0	$0	-$26,762	$0	$0	-$26,762	-$25,226
2014	0	$0	$0	$0	-$26,762	$0	$0	-$26,762	-$24,491
2015	1	$0	$0	$0	-$26,762	$0	$0	-$26,762	-$23,778
2016	2	$0	$0	$0	-$26,762	$0	$0	-$26,762	-$23,086
2017	3	$0	$0	$0	-$26,762	$0	$0	-$26,762	-$22,413
2018	4	$0	$0	$0	-$26,762	$0	$0	-$26,762	-$21,760
2019	5	$0	$0	$0	-$26,762	$0	$0	-$26,762	-$21,127
2020	6	$0	$0	$0	-$26,762	$0	$0	-$26,762	-$20,511
2021	7	$0	$0	$0	-$26,762	$0	$0	-$26,762	-$19,914
2022	8	$0	$0	$0	-$26,762	$0	$0	-$26,762	-$19,334
2023	9	$0	$0	$0	-$26,762	$0	$0	-$26,762	-$18,771
2024	10	$0	$0	$0	-$26,762	$0	$0	-$26,762	-$18,224
2025	11	$0	$0	$0	-$26,762	$0	$0	-$26,762	-$17,693
2026	12	$0	$0	$0	-$26,762	$0	$0	-$26,762	-$17,178
2027	13	$0	$0	$0	-$26,762	$0	$0	-$26,762	-$16,677
2028	14	$0	$0	$0	-$26,762	$0	$0	-$26,762	-$16,192
2029	15	$0	$0	$0	-$26,762	$0	$0	-$26,762	-$15,720
2030	16	$0	$0	$0	-$26,762	$0	$0	-$26,762	-$15,262
2031	17	$0	$0	$0	-$26,762	$0	$0	-$26,762	-$14,818
2032	18	$0	$0	$0	-$26,762	$0	$0	-$26,762	-$14,386
2033	19	$0	$0	$0	-$26,762	$0	$0	-$26,762	-$13,967
2034	20	$0	$0	$0	-$26,762	$0	$0	-$26,762	-$13,560
							NET PRESENT VALUE		-$440,072

CONSTRUCTION IMPACTS (Negative Benefits): Castor Av

		Private Impacts During Construction			Public Transport Impacts During Construction					
Calendar Year	Project Year	AADT	Travel Hour Impacts @ -0.46 minutes / vehicle * days / 60	Value of Travel Time @ $13.22 / hour	Public Transit Ridership	Travel Time Impacts @ -0.75 minutes / rider * days /60	Value of Travel Time @ $13.22 / hour	Construction Cost	Design Cost	Undiscounted Total Cost
2012	-2	12,000	-	$0	4,558	-	$0	$0	$363,122	$0
2013	-1	12,000	7,794	$103,055	4,558	4,805	$63,534	$1,577,258	$238,878	$1,743,846
2014	0	12,000	15,387	$203,446	4,558	9,486	$125,425	$3,113,742	$0	$3,442,614
2015	1	12,000	-	$0	4,558	-	$0	$0	$0	$0
2016	2	12,000	-	$0	4,558	-	$0	$0	$0	$0
2017	3	12,000	-	$0	4,558	-	$0	$0	$0	$0
2018	4	12,000	-	$0	4,558	-	$0	$0	$0	$0
2019	5	12,000	-	$0	4,558	-	$0	$0	$0	$0
2020	6	12,000	-	$0	4,558	-	$0	$0	$0	$0
2021	7	12,000	-	$0	4,558	-	$0	$0	$0	$0
2022	8	12,000	-	$0	4,558	-	$0	$0	$0	$0
2023	9	12,000	-	$0	4,558	-	$0	$0	$0	$0
2024	10	12,000	-	$0	4,558	-	$0	$0	$0	$0
2025	11	12,000	-	$0	4,558	-	$0	$0	$0	$0
2026	12	12,000	-	$0	4,558	-	$0	$0	$0	$0
2027	13	12,000	-	$0	4,558	-	$0	$0	$0	$0
2028	14	12,000	-	$0	4,558	-	$0	$0	$0	$0
2029	15	12,000	-	$0	4,558	-	$0	$0	$0	$0
2030	16	12,000	-	$0	4,558	-	$0	$0	$0	$0
2031	17	12,000	-	$0	4,558	-	$0	$0	$0	$0
2032	18	12,000	-	$0	4,558	-	$0	$0	$0	$0
2033	19	12,000	-	$0	4,558	-	$0	$0	$0	$0
2034	20	12,000	-	$0	4,558	-	$0	$0	$0	$0

Cost Allocation	Design	Construction
Fractional Years	1.25	1.50
Year Start	2012	2013
Month Start	4	6
Day Start	1	30
Year End	2013	2014
Month End	6	12
Day End	30	29
Fraction 1st Year	75%	50%
Fraction Last Year	49%	99%
Remaining for Middle	-	-
Cost Year 1	$363,122	$1,577,258
Cost Year 2	$238,878	$3,113,742
Total Cost	$602,000	$4,691,000

TRAVEL TIME AND RELIABILITY BENEFITS: Castor Av											
		Private Vehicle			Public Transport			Reliability		Total	
Calendar Year	Project Year	Effected AADT	Travel Time Savings @ 0.68 minutes /vehicle *250 days * Fraction of Year	Travel Time Savings (hours)	Effected Passengers	Travel Time Savings @ 1.10 minutes /passenger *250 days * Fraction of Year	Travel Time Savings (hours)	Private Vehicle (travel time savings hours * 6.00%)	Public Transport (travel time savings hours * 6.00%)	Total Time Savings (hours)	Undiscounted Value of Time @ $13.22/ hour
2012	-2	-	-	-	-	-	-	-	-	-	$0
2013	-1	-	-	-	-	-	-	-	-	-	$0
2014	0	12,000	12,555	209	4,558	7,740	129	13	8	359	$4,741
2015	1	12,000	2,036,679	33,945	4,558	1,255,615	20,927	2,037	1,256	58,164	$769,043
2016	2	12,000	2,036,679	33,945	4,558	1,255,615	20,927	2,037	1,256	58,164	$769,043
2017	3	12,000	2,036,679	33,945	4,558	1,255,615	20,927	2,037	1,256	58,164	$769,043
2018	4	12,000	2,036,679	33,945	4,558	1,255,615	20,927	2,037	1,256	58,164	$769,043
2019	5	12,000	2,036,679	33,945	4,558	1,255,615	20,927	2,037	1,256	58,164	$769,043
2020	6	12,000	2,036,679	33,945	4,558	1,255,615	20,927	2,037	1,256	58,164	$769,043
2021	7	12,000	2,036,679	33,945	4,558	1,255,615	20,927	2,037	1,256	58,164	$769,043
2022	8	12,000	2,036,679	33,945	4,558	1,255,615	20,927	2,037	1,256	58,164	$769,043
2023	9	12,000	2,036,679	33,945	4,558	1,255,615	20,927	2,037	1,256	58,164	$769,043
2024	10	12,000	2,036,679	33,945	4,558	1,255,615	20,927	2,037	1,256	58,164	$769,043
2025	11	12,000	2,036,679	33,945	4,558	1,255,615	20,927	2,037	1,256	58,164	$769,043
2026	12	12,000	2,036,679	33,945	4,558	1,255,615	20,927	2,037	1,256	58,164	$769,043
2027	13	12,000	2,036,679	33,945	4,558	1,255,615	20,927	2,037	1,256	58,164	$769,043
2028	14	12,000	2,036,679	33,945	4,558	1,255,615	20,927	2,037	1,256	58,164	$769,043
2029	15	12,000	2,036,679	33,945	4,558	1,255,615	20,927	2,037	1,256	58,164	$769,043
2030	16	12,000	2,036,679	33,945	4,558	1,255,615	20,927	2,037	1,256	58,164	$769,043
2031	17	12,000	2,036,679	33,945	4,558	1,255,615	20,927	2,037	1,256	58,164	$769,043
2032	18	12,000	2,036,679	33,945	4,558	1,255,615	20,927	2,037	1,256	58,164	$769,043
2033	19	12,000	2,036,679	33,945	4,558	1,255,615	20,927	2,037	1,256	58,164	$769,043
2034	20	12,000	2,036,679	33,945	4,558	1,255,615	20,927	2,037	1,256	58,164	$769,043

AIR QUALITY BENEFITS: Castor Av													
		Metric Ton Reductions*					Value Per Metric Ton * Metric Tons						Total
Calendar Year	Project Year	Carbon dioxide (CO2)*	Volatile Organic Compounds (VOCs)	Nitrogen oxides (NOx)	Particulate matter (PM)	Sulfur dioxide (SOx)	Carbon dioxide Rate / metric ton	Carbon dioxide Cost	Volatile Organic Compounds (VOCs) @ $1,858 per metric ton	Nitrogen oxides (NOx) @ $4,371 per metric ton	Particulate matter (PM) @ $183,578 per metric ton	Sulfur dioxide (SOx) @ $17,484 per metric ton	Undiscounted Net Benefits
2012	-2	-	-	-	-	-	$26.85	$0	$0	$0	$0	$0	$0
2013	-1	-	-	-	-	-	$27.43	$0	$0	$0	$0	$0	$0
2014	0	0.21	-	-	-	-	$28.00	$6	$0	$0	$0	$0	$6
2015	1	33.40	-	-	-	-	$28.58	$954	$0	$0	$0	$0	$954
2016	2	33.40	-	-	-	-	$29.18	$975	$0	$0	$0	$0	$975
2017	3	33.40	-	-	-	-	$29.78	$995	$0	$0	$0	$0	$995
2018	4	33.40	-	-	-	-	$30.38	$1,015	$0	$0	$0	$0	$1,015
2019	5	33.40	-	-	-	-	$30.98	$1,035	$0	$0	$0	$0	$1,035
2020	6	33.40	-	-	-	-	$31.58	$1,055	$0	$0	$0	$0	$1,055
2021	7	33.40	-	-	-	-	$32.37	$1,081	$0	$0	$0	$0	$1,081
2022	8	33.40	-	-	-	-	$33.17	$1,108	$0	$0	$0	$0	$1,108
2023	9	33.40	-	-	-	-	$33.96	$1,134	$0	$0	$0	$0	$1,134
2024	10	33.40	-	-	-	-	$34.75	$1,161	$0	$0	$0	$0	$1,161
2025	11	33.40	-	-	-	-	$35.54	$1,187	$0	$0	$0	$0	$1,187
2026	12	33.40	-	-	-	-	$36.31	$1,213	$0	$0	$0	$0	$1,213
2027	13	33.40	-	-	-	-	$37.08	$1,238	$0	$0	$0	$0	$1,238
2028	14	33.40	-	-	-	-	$37.85	$1,264	$0	$0	$0	$0	$1,264
2029	15	33.40	-	-	-	-	$38.62	$1,290	$0	$0	$0	$0	$1,290
2030	16	33.40	-	-	-	-	$39.39	$1,315	$0	$0	$0	$0	$1,315
2031	17	33.40	-	-	-	-	$40.15	$1,341	$0	$0	$0	$0	$1,341
2032	18	33.40	-	-	-	-	$40.92	$1,367	$0	$0	$0	$0	$1,367
2033	19	33.40	-	-	-	-	$41.69	$1,392	$0	$0	$0	$0	$1,392
2034	20	33.40	-	-	-	-	$42.46	$1,418	$0	$0	$0	$0	$1,418
												TOTAL	**$23,543**

* Source: DOE Spreadsheet

FUEL BENEFITS: Castor Av						
		Fuel Savings Prorated After Construction				
Calendar Year	Project Year	Gasoline Gallons*	Gasoline Value @ $3.60 per gallon	Diesel Gallons*	Diesel Value @ $4.03 per gallon	Undiscounted Total Fuel Savings
2012	-2	-	$0.00	-	$0.00	$0.00
2013	-1	-	$0.00	-	$0.00	$0.00
2014	0	70.87	$255.08	2.93	$11.78	$266.86
2015	1	11,497.35	$41,378.98	474.50	$1,911.77	$43,290.75
2016	2	11,497.35	$41,378.98	474.50	$1,911.77	$43,290.75
2017	3	11,497.35	$41,378.98	474.50	$1,911.77	$43,290.75
2018	4	11,497.35	$41,378.98	474.50	$1,911.77	$43,290.75
2019	5	11,497.35	$41,378.98	474.50	$1,911.77	$43,290.75
2020	6	11,497.35	$41,378.98	474.50	$1,911.77	$43,290.75
2021	7	11,497.35	$41,378.98	474.50	$1,911.77	$43,290.75
2022	8	11,497.35	$41,378.98	474.50	$1,911.77	$43,290.75
2023	9	11,497.35	$41,378.98	474.50	$1,911.77	$43,290.75
2024	10	11,497.35	$41,378.98	474.50	$1,911.77	$43,290.75
2025	11	11,497.35	$41,378.98	474.50	$1,911.77	$43,290.75
2026	12	11,497.35	$41,378.98	474.50	$1,911.77	$43,290.75
2027	13	11,497.35	$41,378.98	474.50	$1,911.77	$43,290.75
2028	14	11,497.35	$41,378.98	474.50	$1,911.77	$43,290.75
2029	15	11,497.35	$41,378.98	474.50	$1,911.77	$43,290.75
2030	16	11,497.35	$41,378.98	474.50	$1,911.77	$43,290.75
2031	17	11,497.35	$41,378.98	474.50	$1,911.77	$43,290.75
2032	18	11,497.35	$41,378.98	474.50	$1,911.77	$43,290.75
2033	19	11,497.35	$41,378.98	474.50	$1,911.77	$43,290.75
2034	20	11,497.35	$41,378.98	474.50	$1,911.77	$43,290.75

* Source: DOE Spreadsheet

PROJECT SUMMARY: Oxford Av		Before/From	After/To	Delta	Unit
Corridor:	Oxford Av	Roosevelt Bl	Frankford Av		
Traffic Count:		7,300	7,300	-	AADT, Urban Environment, No Growth Observed
Transit Ridership:		4,558	4,558	-	Daily Passengers
Design Period:		1-Apr-12	1-Jul-13	456	Days
Design Cost:			$278,000		Year of Expenditure Dollars
Construction Period:		1-Jul-13	30-Dec-14	548	Days
Construction Cost:			$2,167,000	-$2,167,000	Year of Expenditure Dollars
Intersections:		8	8	-	Total Intersections
Corridor Length:		1.050	1.050	-	Linear Miles
Auto Speed:	Confirmed>>	19.477	21.016	1.539	Miles / Hour Confirmed by Speed Survey
Transit Speed:	Confirmed>>	12.00	12.948	0.948	Miles / Hour Confirmed by SEPTA
Transit Route(s):		Route 59			
CO2 Reductions:				11.313	Tons/Year (DOE_ARRABenefitsReportingCalculatorOxford.xlsm)
Gasoline Reductions:				3,894.265	Gallons/Year (DOE_ARRABenefitsReportingCalculatorOxford.xlsm)
Diesel Fuel Reductions:				160.812	Gallons/Year (DOE_ARRABenefitsReportingCalculatorOxford.xlsm)
Derived Statistics					
Short-term Jobs:			*318.90*		Months of US Labor
Auto Travel Time:		*3.235*	*2.998*	*(0.237)*	Minutes
Transit Travel Time:		*5.250*	*4.866*	*(0.384)*	Minutes
Auto Travel Time During Construction:		*3.235*	*3.396*	*0.162*	Minutes
Transit Travel Time During Construction:		*5.250*	*5.513*	*0.263*	Minutes

BENEFIT / COST SUMMARY: Oxford Av

		Construction Phase		Operating Phase				Total			
Calendar Year	Project Year	Design / Construction Cost	Travel Time Benefits	O&M Cost	Travel Time Benefits	Fuel Benefits	Environmental Benefits	Undiscounted Net Benefits	Discounted @ 3.00% 2011 $	Running Total	
2012	-2	$0	$0	-$9,309	$0	$0	$0	-$9,309	-$9,038	-$9,038	2012
2013	-1	-$724,646	-$43,793	-$9,309	$0	$0	$0	-$777,748	-$733,102	-$742,139	2013
2014	0	-$1,442,354	-$87,166	-$9,309	$696	$50	$1	-$1,538,081	-$1,407,562	-$2,149,701	2014
2015	1	$0	$0	-$9,309	$203,269	$14,663	$323	$208,947	$185,647	-$1,964,054	2015
2016	2	$0	$0	-$9,309	$203,269	$14,663	$330	$208,954	$180,245	-$1,783,809	2016
2017	3	$0	$0	-$9,309	$203,269	$14,663	$337	$208,961	$175,001	-$1,608,808	2017
2018	4	$0	$0	-$9,309	$203,269	$14,663	$344	$208,967	$169,910	-$1,438,898	2018
2019	5	$0	$0	-$9,309	$203,269	$14,663	$350	$208,974	$164,966	-$1,273,932	2019
2020	6	$0	$0	-$9,309	$203,269	$14,663	$357	$208,981	$160,167	-$1,113,766	2020
2021	7	$0	$0	-$9,309	$203,269	$14,663	$366	$208,990	$155,508	-$958,257	2021
2022	8	$0	$0	-$9,309	$203,269	$14,663	$375	$208,999	$150,985	-$807,272	2022
2023	9	$0	$0	-$9,309	$203,269	$14,663	$384	$209,008	$146,594	-$660,678	2023
2024	10	$0	$0	-$9,309	$203,269	$14,663	$393	$209,017	$142,330	-$518,348	2024
2025	11	$0	$0	-$9,309	$203,269	$14,663	$402	$209,026	$138,191	-$380,157	2025
2026	12	$0	$0	-$9,309	$203,269	$14,663	$411	$209,034	$134,171	-$245,986	2026
2027	13	$0	$0	-$9,309	$203,269	$14,663	$420	$209,043	$130,269	-$115,717	2027
2028	14	$0	$0	-$9,309	$203,269	$14,663	$428	$209,052	$126,480	$10,763	0
2029	15	$0	$0	-$9,309	$203,269	$14,663	$437	$209,061	$122,801	$133,564	0
2030	16	$0	$0	-$9,309	$203,269	$14,663	$446	$209,069	$119,229	$252,793	0
2031	17	$0	$0	-$9,309	$203,269	$14,663	$454	$209,078	$115,761	$368,554	0
2032	18	$0	$0	-$9,309	$203,269	$14,663	$463	$209,087	$112,394	$480,949	0
2033	19	$0	$0	-$9,309	$203,269	$14,663	$472	$209,095	$109,125	$590,074	0
2034	20	$0	$0	-$9,309	$203,269	$14,663	$480	$209,104	$105,951	$696,025	0
							NET PRESENT VALUE		$696,025		

NO-BUILD SCENARIO: Oxford Av									
		Construction Phase			Operating Phase			Total	
Calendar Year	Project Year	Construction Cost	Travel Time Benefits	Environmental Benefits	O&M Cost	Travel Time Benefits	Environmental Benefits	Undiscounted Net Benefits	Discounted @ 3.00% 2011 $
2012	-2	$0	$0	$0	-$9,309	$0	$0	-$9,309	-$9,038
2013	-1	$0	$0	$0	-$9,309	$0	$0	-$9,309	-$8,774
2014	0	$0	$0	$0	-$9,309	$0	$0	-$9,309	-$8,519
2015	1	$0	$0	$0	-$9,309	$0	$0	-$9,309	-$8,271
2016	2	$0	$0	$0	-$9,309	$0	$0	-$9,309	-$8,030
2017	3	$0	$0	$0	-$9,309	$0	$0	-$9,309	-$7,796
2018	4	$0	$0	$0	-$9,309	$0	$0	-$9,309	-$7,569
2019	5	$0	$0	$0	-$9,309	$0	$0	-$9,309	-$7,348
2020	6	$0	$0	$0	-$9,309	$0	$0	-$9,309	-$7,134
2021	7	$0	$0	$0	-$9,309	$0	$0	-$9,309	-$6,927
2022	8	$0	$0	$0	-$9,309	$0	$0	-$9,309	-$6,725
2023	9	$0	$0	$0	-$9,309	$0	$0	-$9,309	-$6,529
2024	10	$0	$0	$0	-$9,309	$0	$0	-$9,309	-$6,339
2025	11	$0	$0	$0	-$9,309	$0	$0	-$9,309	-$6,154
2026	12	$0	$0	$0	-$9,309	$0	$0	-$9,309	-$5,975
2027	13	$0	$0	$0	-$9,309	$0	$0	-$9,309	-$5,801
2028	14	$0	$0	$0	-$9,309	$0	$0	-$9,309	-$5,632
2029	15	$0	$0	$0	-$9,309	$0	$0	-$9,309	-$5,468
2030	16	$0	$0	$0	-$9,309	$0	$0	-$9,309	-$5,309
2031	17	$0	$0	$0	-$9,309	$0	$0	-$9,309	-$5,154
2032	18	$0	$0	$0	-$9,309	$0	$0	-$9,309	-$5,004
2033	19	$0	$0	$0	-$9,309	$0	$0	-$9,309	-$4,858
2034	20	$0	$0	$0	-$9,309	$0	$0	-$9,309	-$4,717
							NET PRESENT VALUE		-$153,068

CONSTRUCTION IMPACTS (Negative Benefits): Oxford Av

		Private Impacts During Construction			Public Transport Impacts During Construction					
Calendar Year	Project Year	AADT	Travel Hour Impacts @ -0.16 minutes / vehicle * days / 60	Value of Travel Time @ $13.22 / hour	Public Transit Ridership	Travel Time Impacts @ -0.26 minutes / rider * days /60	Value of Travel Time @ $13.22 / hour	Construction Cost	Design Cost	Undiscounted Total Cost
2012	-2	7,300	-	$0	4,558	-	$0	$0	$167,319	$0
2013	-1	7,300	1,645	$21,750	4,558	1,667	$22,042	$724,646	$110,681	$768,439
2014	0	7,300	3,274	$43,292	4,558	3,318	$43,873	$1,442,354	$0	$1,529,519
2015	1	7,300	-	$0	4,558	-	$0	$0	$0	$0
2016	2	7,300	-	$0	4,558	-	$0	$0	$0	$0
2017	3	7,300	-	$0	4,558	-	$0	$0	$0	$0
2018	4	7,300	-	$0	4,558	-	$0	$0	$0	$0
2019	5	7,300	-	$0	4,558	-	$0	$0	$0	$0
2020	6	7,300	-	$0	4,558	-	$0	$0	$0	$0
2021	7	7,300	-	$0	4,558	-	$0	$0	$0	$0
2022	8	7,300	-	$0	4,558	-	$0	$0	$0	$0
2023	9	7,300	-	$0	4,558	-	$0	$0	$0	$0
2024	10	7,300	-	$0	4,558	-	$0	$0	$0	$0
2025	11	7,300	-	$0	4,558	-	$0	$0	$0	$0
2026	12	7,300	-	$0	4,558	-	$0	$0	$0	$0
2027	13	7,300	-	$0	4,558	-	$0	$0	$0	$0
2028	14	7,300	-	$0	4,558	-	$0	$0	$0	$0
2029	15	7,300	-	$0	4,558	-	$0	$0	$0	$0
2030	16	7,300	-	$0	4,558	-	$0	$0	$0	$0
2031	17	7,300	-	$0	4,558	-	$0	$0	$0	$0
2032	18	7,300	-	$0	4,558	-	$0	$0	$0	$0
2033	19	7,300	-	$0	4,558	-	$0	$0	$0	$0
2034	20	7,300	-	$0	4,558	-	$0	$0	$0	$0

Cost Allocation	Design	Construction
Fractional Years	1.25	1.50
Year Start	2012	2013
Month Start	4	7
Day Start	1	1
Year End	2013	2014
Month End	7	12
Day End	1	30
Fraction 1st Year	75%	50%
Fraction Last Yea	50%	100%
Remaining for Mi	-	-
Cost Year 1	$167,319	$724,646
Cost Year 2	$110,681	$1,442,354
Total Cost	$278,000	$2,167,000

TRAVEL TIME AND RELIABILITY BENEFITS: Oxford Av											
		Private Vehicle			Public Transport			Reliability		Total	
Calendar Year	Project Year	Effected AADT	Travel Time Savings @ 0.24 minutes /vehicle *250 days * Fraction of Year	Travel Time Savings (hours)	Effected Passengers	Travel Time Savings @ 0.38 minutes /passenger *250 days * Fraction of Year	Travel Time Savings (hours)	Private Vehicle (travel time savings hours * 6.00%)	Public Transport (travel time savings hours * 6.00%)	Total Time Savings (hours)	Undiscounted Value of Time @ $13.22/ hour
2012	-2	-	-	-	-	-	-	-	-	-	$0
2013	-1	-	-	-	-	-	-	-	-	-	$0
2014	0	7,300	1,480	25	4,558	1,500	25	1	2	53	$696
2015	1	7,300	432,202	7,203	4,558	438,005	7,300	432	438	15,374	$203,269
2016	2	7,300	432,202	7,203	4,558	438,005	7,300	432	438	15,374	$203,269
2017	3	7,300	432,202	7,203	4,558	438,005	7,300	432	438	15,374	$203,269
2018	4	7,300	432,202	7,203	4,558	438,005	7,300	432	438	15,374	$203,269
2019	5	7,300	432,202	7,203	4,558	438,005	7,300	432	438	15,374	$203,269
2020	6	7,300	432,202	7,203	4,558	438,005	7,300	432	438	15,374	$203,269
2021	7	7,300	432,202	7,203	4,558	438,005	7,300	432	438	15,374	$203,269
2022	8	7,300	432,202	7,203	4,558	438,005	7,300	432	438	15,374	$203,269
2023	9	7,300	432,202	7,203	4,558	438,005	7,300	432	438	15,374	$203,269
2024	10	7,300	432,202	7,203	4,558	438,005	7,300	432	438	15,374	$203,269
2025	11	7,300	432,202	7,203	4,558	438,005	7,300	432	438	15,374	$203,269
2026	12	7,300	432,202	7,203	4,558	438,005	7,300	432	438	15,374	$203,269
2027	13	7,300	432,202	7,203	4,558	438,005	7,300	432	438	15,374	$203,269
2028	14	7,300	432,202	7,203	4,558	438,005	7,300	432	438	15,374	$203,269
2029	15	7,300	432,202	7,203	4,558	438,005	7,300	432	438	15,374	$203,269
2030	16	7,300	432,202	7,203	4,558	438,005	7,300	432	438	15,374	$203,269
2031	17	7,300	432,202	7,203	4,558	438,005	7,300	432	438	15,374	$203,269
2032	18	7,300	432,202	7,203	4,558	438,005	7,300	432	438	15,374	$203,269
2033	19	7,300	432,202	7,203	4,558	438,005	7,300	432	438	15,374	$203,269
2034	20	7,300	432,202	7,203	4,558	438,005	7,300	432	438	15,374	$203,269

AIR QUALITY BENEFITS: Oxford Av													
		Metric Ton Reductions*					Value Per Metric Ton * Metric Tons						Total
Calendar Year	Project Year	Carbon dioxide (CO2)*	Volatile Organic Compounds (VOCs)	Nitrogen oxides (NOx)	Particulate matter (PM)	Sulfur dioxide (SOx)	Carbon dioxide Rate / metric ton	Carbon dioxide Cost	Volatile Organic Compounds (VOCs) @ $1,858 per metric ton	Nitrogen oxides (NOx) @ $4,371 per metric ton	Particulate matter (PM) @ $183,578 per metric ton	Sulfur dioxide (SOx) @ $17,484 per metric ton	Undiscounted Net Benefits
2012	-2	-	-	-	-	-	$26.85	$0	$0	$0	$0	$0	$0
2013	-1	-	-	-	-	-	$27.43	$0	$0	$0	$0	$0	$0
2014	0	0.04	-	-	-	-	$28.00	$1	$0	$0	$0	$0	$1
2015	1	11.31	-	-	-	-	$28.58	$323	$0	$0	$0	$0	$323
2016	2	11.31	-	-	-	-	$29.18	$330	$0	$0	$0	$0	$330
2017	3	11.31	-	-	-	-	$29.78	$337	$0	$0	$0	$0	$337
2018	4	11.31	-	-	-	-	$30.38	$344	$0	$0	$0	$0	$344
2019	5	11.31	-	-	-	-	$30.98	$350	$0	$0	$0	$0	$350
2020	6	11.31	-	-	-	-	$31.58	$357	$0	$0	$0	$0	$357
2021	7	11.31	-	-	-	-	$32.37	$366	$0	$0	$0	$0	$366
2022	8	11.31	-	-	-	-	$33.17	$375	$0	$0	$0	$0	$375
2023	9	11.31	-	-	-	-	$33.96	$384	$0	$0	$0	$0	$384
2024	10	11.31	-	-	-	-	$34.75	$393	$0	$0	$0	$0	$393
2025	11	11.31	-	-	-	-	$35.54	$402	$0	$0	$0	$0	$402
2026	12	11.31	-	-	-	-	$36.31	$411	$0	$0	$0	$0	$411
2027	13	11.31	-	-	-	-	$37.08	$420	$0	$0	$0	$0	$420
2028	14	11.31	-	-	-	-	$37.85	$428	$0	$0	$0	$0	$428
2029	15	11.31	-	-	-	-	$38.62	$437	$0	$0	$0	$0	$437
2030	16	11.31	-	-	-	-	$39.39	$446	$0	$0	$0	$0	$446
2031	17	11.31	-	-	-	-	$40.15	$454	$0	$0	$0	$0	$454
2032	18	11.31	-	-	-	-	$40.92	$463	$0	$0	$0	$0	$463
2033	19	11.31	-	-	-	-	$41.69	$472	$0	$0	$0	$0	$472
2034	20	11.31	-	-	-	-	$42.46	$480	$0	$0	$0	$0	$480
												TOTAL	**$7,974**

* Source: DOE Spreadsheet

FUEL BENEFITS: Oxford Av						
		Fuel Savings Prorated After Construction				
Calendar Year	Project Year	Gasoline Gallons*	Gasoline Value @ $3.60 per gallon	Diesel Gallons*	Diesel Value @ $4.03 per gallon	Undiscounted Total Fuel Savings
2012	-2	-	$0.00	-	$0.00	$0.00
2013	-1	-	$0.00	-	$0.00	$0.00
2014	0	13.34	$48.00	0.55	$2.22	$50.22
2015	1	3,894.27	$14,015.46	160.81	$647.91	$14,663.37
2016	2	3,894.27	$14,015.46	160.81	$647.91	$14,663.37
2017	3	3,894.27	$14,015.46	160.81	$647.91	$14,663.37
2018	4	3,894.27	$14,015.46	160.81	$647.91	$14,663.37
2019	5	3,894.27	$14,015.46	160.81	$647.91	$14,663.37
2020	6	3,894.27	$14,015.46	160.81	$647.91	$14,663.37
2021	7	3,894.27	$14,015.46	160.81	$647.91	$14,663.37
2022	8	3,894.27	$14,015.46	160.81	$647.91	$14,663.37
2023	9	3,894.27	$14,015.46	160.81	$647.91	$14,663.37
2024	10	3,894.27	$14,015.46	160.81	$647.91	$14,663.37
2025	11	3,894.27	$14,015.46	160.81	$647.91	$14,663.37
2026	12	3,894.27	$14,015.46	160.81	$647.91	$14,663.37
2027	13	3,894.27	$14,015.46	160.81	$647.91	$14,663.37
2028	14	3,894.27	$14,015.46	160.81	$647.91	$14,663.37
2029	15	3,894.27	$14,015.46	160.81	$647.91	$14,663.37
2030	16	3,894.27	$14,015.46	160.81	$647.91	$14,663.37
2031	17	3,894.27	$14,015.46	160.81	$647.91	$14,663.37
2032	18	3,894.27	$14,015.46	160.81	$647.91	$14,663.37
2033	19	3,894.27	$14,015.46	160.81	$647.91	$14,663.37
2034	20	3,894.27	$14,015.46	160.81	$647.91	$14,663.37

* Source: DOE Spreadsheet

PROJECT SUMMARY: Woodland Av		Before/From	After/To	Delta	Unit
Corridor:	Woodland Av	40th St	Island		
Traffic Count:		10,000	10,000	-	AADT, Urban Environment, No Growth Observed
Transit Ridership:		16,072	16,332	260	Daily Passengers
Design Period:		1-Apr-12	1-Jul-13	456	Days
Design Cost:			$965,000		Year of Expenditure Dollars
Construction Period:		1-Jul-13	30-Dec-14	548	Days
Construction Cost:			$7,526,000	-$7,526,000	Year of Expenditure Dollars
Intersections:		29	29	-	Total Intersections
Corridor Length:		3.400	3.400	-	Linear Miles
Auto Speed:	Confirmed>>	13.710	14.793	1.083	Miles / Hour Confirmed by Speed Survey
Transit Speed:	Confirmed>>	10.10	10.898	0.798	Miles / Hour Confirmed by SEPTA
Transit Route(s):		Route 11			
CO2 Reductions:				36.645	Tons/Year (DOE_ARRABenefitsReportingCalculatorWoodland.xlsm)
Gasoline Reductions:				12,610.002	Gallons/Year (DOE_ARRABenefitsReportingCalculatorWoodland.xlsm)
Diesel Fuel Reductions:				522.095	Gallons/Year (DOE_ARRABenefitsReportingCalculatorWoodland.xlsm)
Derived Statistics					
Short-term Jobs:			*1,107.47*		Months of US Labor
Auto Travel Time:		*14.880*	*13.790*	*(1.089)*	Minutes
Transit Travel Time:		*20.198*	*18.719*	*(1.479)*	Minutes
Auto Travel Time During Construction:		*14.880*	*15.624*	*0.744*	Minutes
Transit Travel Time During Construction:		*20.198*	*21.208*	*1.010*	Minutes

BENEFIT / COST SUMMARY: Woodland Av

		Construction Phase		Operating Phase				Total			
Calendar Year	Project Year	Design / Construction Cost	Travel Time Benefits	O&M Cost	Travel Time Benefits	Fuel Benefits	Environmental Benefits	Undiscounted Net Benefits	Discounted @ 3.00% 2011 $	Running Total	
2012	-2	$0	$0	-$33,744	$0	$0	$0	-$33,744	-$32,761	-$32,761	2012
2013	-1	-$2,516,700	-$440,920	-$33,744	$0	$0	$0	-$2,991,364	-$2,819,647	-$2,852,408	2013
2014	0	-$5,009,300	-$877,618	-$33,744	$7,014	$163	$4	-$5,913,482	-$5,411,673	-$8,264,082	2014
2015	1	$0	$0	-$33,744	$2,046,598	$47,487	$1,047	$2,061,388	$1,831,517	-$6,432,565	2015
2016	2	$0	$0	-$33,744	$2,046,598	$47,487	$1,069	$2,061,410	$1,778,191	-$4,654,375	2016
2017	3	$0	$0	-$33,744	$2,046,598	$47,487	$1,091	$2,061,432	$1,726,417	-$2,927,957	2017
2018	4	$0	$0	-$33,744	$2,046,598	$47,487	$1,113	$2,061,454	$1,676,151	-$1,251,807	2018
2019	5	$0	$0	-$33,744	$2,046,598	$47,487	$1,135	$2,061,476	$1,627,348	$375,542	0
2020	6	$0	$0	-$33,744	$2,046,598	$47,487	$1,157	$2,061,498	$1,579,967	$1,955,508	0
2021	7	$0	$0	-$33,744	$2,046,598	$47,487	$1,186	$2,061,527	$1,533,970	$3,489,478	0
2022	8	$0	$0	-$33,744	$2,046,598	$47,487	$1,215	$2,061,556	$1,489,312	$4,978,791	0
2023	9	$0	$0	-$33,744	$2,046,598	$47,487	$1,244	$2,061,585	$1,445,954	$6,424,745	0
2024	10	$0	$0	-$33,744	$2,046,598	$47,487	$1,273	$2,061,614	$1,403,859	$7,828,604	0
2025	11	$0	$0	-$33,744	$2,046,598	$47,487	$1,303	$2,061,643	$1,362,989	$9,191,593	0
2026	12	$0	$0	-$33,744	$2,046,598	$47,487	$1,331	$2,061,672	$1,323,309	$10,514,902	0
2027	13	$0	$0	-$33,744	$2,046,598	$47,487	$1,359	$2,061,700	$1,284,783	$11,799,685	0
2028	14	$0	$0	-$33,744	$2,046,598	$47,487	$1,387	$2,061,728	$1,247,379	$13,047,064	0
2029	15	$0	$0	-$33,744	$2,046,598	$47,487	$1,415	$2,061,756	$1,211,064	$14,258,129	0
2030	16	$0	$0	-$33,744	$2,046,598	$47,487	$1,443	$2,061,784	$1,175,807	$15,433,935	0
2031	17	$0	$0	-$33,744	$2,046,598	$47,487	$1,471	$2,061,812	$1,141,576	$16,575,511	0
2032	18	$0	$0	-$33,744	$2,046,598	$47,487	$1,500	$2,061,841	$1,108,341	$17,683,852	0
2033	19	$0	$0	-$33,744	$2,046,598	$47,487	$1,528	$2,061,869	$1,076,074	$18,759,926	0
2034	20	$0	$0	-$33,744	$2,046,598	$47,487	$1,556	$2,061,897	$1,044,746	$19,804,672	0
							NET PRESENT VALUE		$19,804,672		

NO-BUILD SCENARIO: Woodland Av									
		Construction Phase			Operating Phase			Total	
Calendar Year	Project Year	Construction Cost	Travel Time Benefits	Environmental Benefits	O&M Cost	Travel Time Benefits	Environmental Benefits	Undiscounted Net Benefits	Discounted @ 3.00% 2011 $
2012	-2	$0	$0	$0	-$33,744	$0	$0	-$33,744	-$32,761
2013	-1	$0	$0	$0	-$33,744	$0	$0	-$33,744	-$31,807
2014	0	$0	$0	$0	-$33,744	$0	$0	-$33,744	-$30,881
2015	1	$0	$0	$0	-$33,744	$0	$0	-$33,744	-$29,981
2016	2	$0	$0	$0	-$33,744	$0	$0	-$33,744	-$29,108
2017	3	$0	$0	$0	-$33,744	$0	$0	-$33,744	-$28,260
2018	4	$0	$0	$0	-$33,744	$0	$0	-$33,744	-$27,437
2019	5	$0	$0	$0	-$33,744	$0	$0	-$33,744	-$26,638
2020	6	$0	$0	$0	-$33,744	$0	$0	-$33,744	-$25,862
2021	7	$0	$0	$0	-$33,744	$0	$0	-$33,744	-$25,109
2022	8	$0	$0	$0	-$33,744	$0	$0	-$33,744	-$24,377
2023	9	$0	$0	$0	-$33,744	$0	$0	-$33,744	-$23,667
2024	10	$0	$0	$0	-$33,744	$0	$0	-$33,744	-$22,978
2025	11	$0	$0	$0	-$33,744	$0	$0	-$33,744	-$22,309
2026	12	$0	$0	$0	-$33,744	$0	$0	-$33,744	-$21,659
2027	13	$0	$0	$0	-$33,744	$0	$0	-$33,744	-$21,028
2028	14	$0	$0	$0	-$33,744	$0	$0	-$33,744	-$20,416
2029	15	$0	$0	$0	-$33,744	$0	$0	-$33,744	-$19,821
2030	16	$0	$0	$0	-$33,744	$0	$0	-$33,744	-$19,244
2031	17	$0	$0	$0	-$33,744	$0	$0	-$33,744	-$18,683
2032	18	$0	$0	$0	-$33,744	$0	$0	-$33,744	-$18,139
2033	19	$0	$0	$0	-$33,744	$0	$0	-$33,744	-$17,611
2034	20	$0	$0	$0	-$33,744	$0	$0	-$33,744	-$17,098
							NET PRESENT VALUE		-$554,873

CONSTRUCTION IMPACTS (Negative Benefits): Woodland Av

		Private Impacts During Construction			Public Transport Impacts During Construction					
Calendar Year	Project Year	AADT	Travel Hour Impacts @ -0.74 minutes / vehicle * days / 60	Value of Travel Time @ $13.22 / hour	Public Transit Ridership	Travel Time Impacts @ -1.01 minutes / rider * days /60	Value of Travel Time @ $13.22 / hour	Construction Cost	Design Cost	Undiscounted Total Cost
2012	-2	10,000	-	$0	16,332	-	$0	$0	$580,802	$0
2013	-1	10,000	10,366	$137,062	16,332	22,981	$303,858	$2,516,700	$384,198	$2,957,620
2014	0	10,000	20,633	$272,811	16,332	45,742	$604,807	$5,009,300	$0	$5,886,918
2015	1	10,000	-	$0	16,332	-	$0	$0	$0	$0
2016	2	10,000	-	$0	16,332	-	$0	$0	$0	$0
2017	3	10,000	-	$0	16,332	-	$0	$0	$0	$0
2018	4	10,000	-	$0	16,332	-	$0	$0	$0	$0
2019	5	10,000	-	$0	16,332	-	$0	$0	$0	$0
2020	6	10,000	-	$0	16,332	-	$0	$0	$0	$0
2021	7	10,000	-	$0	16,332	-	$0	$0	$0	$0
2022	8	10,000	-	$0	16,332	-	$0	$0	$0	$0
2023	9	10,000	-	$0	16,332	-	$0	$0	$0	$0
2024	10	10,000	-	$0	16,332	-	$0	$0	$0	$0
2025	11	10,000	-	$0	16,332	-	$0	$0	$0	$0
2026	12	10,000	-	$0	16,332	-	$0	$0	$0	$0
2027	13	10,000	-	$0	16,332	-	$0	$0	$0	$0
2028	14	10,000	-	$0	16,332	-	$0	$0	$0	$0
2029	15	10,000	-	$0	16,332	-	$0	$0	$0	$0
2030	16	10,000	-	$0	16,332	-	$0	$0	$0	$0
2031	17	10,000	-	$0	16,332	-	$0	$0	$0	$0
2032	18	10,000	-	$0	16,332	-	$0	$0	$0	$0
2033	19	10,000	-	$0	16,332	-	$0	$0	$0	$0
2034	20	10,000	-	$0	16,332	-	$0	$0	$0	$0

Cost Allocation	Design	Construction
Fractional Years	1.25	1.50
Year Start	2012	2013
Month Start	4	7
Day Start	1	1
Year End	2013	2014
Month End	7	12
Day End	1	30
Fraction 1st Year	75%	50%
Fraction Last Yea	50%	100%
Remaining for Mi	-	-
Cost Year 1	$580,802	$2,516,700
Cost Year 2	$384,198	$5,009,300
Total Cost	$965,000	$7,526,000

TRAVEL TIME AND RELIABILITY BENEFITS: Woodland Av											
		Private Vehicle			Public Transport			Reliability		Total	
Calendar Year	Project Year	Effected AADT	Travel Time Savings @ 1.09 minutes /vehicle *250 days * Fraction of Year	Travel Time Savings (hours)	Effected Passengers	Travel Time Savings @ 1.48 minutes /passenger *250 days * Fraction of Year	Travel Time Savings (hours)	Private Vehicle (travel time savings hours * 6.00%)	Public Transport (travel time savings hours * 6.00%)	Total Time Savings (hours)	Undiscounted Value of Time @ $13.22/ hour
2012	-2	-	-	-	-	-	-	-	-	-	$0
2013	-1	-	-	-	-	-	-	-	-	-	$0
2014	0	10,000	9,327	155	16,332	20,678	345	9	21	530	$7,014
2015	1	10,000	2,723,569	45,393	16,332	6,038,010	100,633	2,724	6,038	154,787	$2,046,598
2016	2	10,000	2,723,569	45,393	16,332	6,038,010	100,633	2,724	6,038	154,787	$2,046,598
2017	3	10,000	2,723,569	45,393	16,332	6,038,010	100,633	2,724	6,038	154,787	$2,046,598
2018	4	10,000	2,723,569	45,393	16,332	6,038,010	100,633	2,724	6,038	154,787	$2,046,598
2019	5	10,000	2,723,569	45,393	16,332	6,038,010	100,633	2,724	6,038	154,787	$2,046,598
2020	6	10,000	2,723,569	45,393	16,332	6,038,010	100,633	2,724	6,038	154,787	$2,046,598
2021	7	10,000	2,723,569	45,393	16,332	6,038,010	100,633	2,724	6,038	154,787	$2,046,598
2022	8	10,000	2,723,569	45,393	16,332	6,038,010	100,633	2,724	6,038	154,787	$2,046,598
2023	9	10,000	2,723,569	45,393	16,332	6,038,010	100,633	2,724	6,038	154,787	$2,046,598
2024	10	10,000	2,723,569	45,393	16,332	6,038,010	100,633	2,724	6,038	154,787	$2,046,598
2025	11	10,000	2,723,569	45,393	16,332	6,038,010	100,633	2,724	6,038	154,787	$2,046,598
2026	12	10,000	2,723,569	45,393	16,332	6,038,010	100,633	2,724	6,038	154,787	$2,046,598
2027	13	10,000	2,723,569	45,393	16,332	6,038,010	100,633	2,724	6,038	154,787	$2,046,598
2028	14	10,000	2,723,569	45,393	16,332	6,038,010	100,633	2,724	6,038	154,787	$2,046,598
2029	15	10,000	2,723,569	45,393	16,332	6,038,010	100,633	2,724	6,038	154,787	$2,046,598
2030	16	10,000	2,723,569	45,393	16,332	6,038,010	100,633	2,724	6,038	154,787	$2,046,598
2031	17	10,000	2,723,569	45,393	16,332	6,038,010	100,633	2,724	6,038	154,787	$2,046,598
2032	18	10,000	2,723,569	45,393	16,332	6,038,010	100,633	2,724	6,038	154,787	$2,046,598
2033	19	10,000	2,723,569	45,393	16,332	6,038,010	100,633	2,724	6,038	154,787	$2,046,598
2034	20	10,000	2,723,569	45,393	16,332	6,038,010	100,633	2,724	6,038	154,787	$2,046,598

AIR QUALITY BENEFITS: Woodland Av													
		Metric Ton Reductions*					Value Per Metric Ton * Metric Tons						Total
Calendar Year	Project Year	Carbon dioxide (CO2)*	Volatile Organic Compounds (VOCs)	Nitrogen oxides (NOx)	Particulate matter (PM)	Sulfur dioxide (SOx)	Carbon dioxide Rate / metric ton	Carbon dioxide Cost	Volatile Organic Compounds (VOCs) @ $1,858 per metric ton	Nitrogen oxides (NOx) @ $4,371 per metric ton	Particulate matter (PM) @ $183,578 per metric ton	Sulfur dioxide (SOx) @ $17,484 per metric ton	Undiscounted Net Benefits
2012	-2	-	-	-	-	-	$26.85	$0	$0	$0	$0	$0	$0
2013	-1	-	-	-	-	-	$27.43	$0	$0	$0	$0	$0	$0
2014	0	0.13	-	-	-	-	$28.00	$4	$0	$0	$0	$0	$4
2015	1	36.65	-	-	-	-	$28.58	$1,047	$0	$0	$0	$0	$1,047
2016	2	36.65	-	-	-	-	$29.18	$1,069	$0	$0	$0	$0	$1,069
2017	3	36.65	-	-	-	-	$29.78	$1,091	$0	$0	$0	$0	$1,091
2018	4	36.65	-	-	-	-	$30.38	$1,113	$0	$0	$0	$0	$1,113
2019	5	36.65	-	-	-	-	$30.98	$1,135	$0	$0	$0	$0	$1,135
2020	6	36.65	-	-	-	-	$31.58	$1,157	$0	$0	$0	$0	$1,157
2021	7	36.65	-	-	-	-	$32.37	$1,186	$0	$0	$0	$0	$1,186
2022	8	36.65	-	-	-	-	$33.17	$1,215	$0	$0	$0	$0	$1,215
2023	9	36.65	-	-	-	-	$33.96	$1,244	$0	$0	$0	$0	$1,244
2024	10	36.65	-	-	-	-	$34.75	$1,273	$0	$0	$0	$0	$1,273
2025	11	36.65	-	-	-	-	$35.54	$1,303	$0	$0	$0	$0	$1,303
2026	12	36.65	-	-	-	-	$36.31	$1,331	$0	$0	$0	$0	$1,331
2027	13	36.65	-	-	-	-	$37.08	$1,359	$0	$0	$0	$0	$1,359
2028	14	36.65	-	-	-	-	$37.85	$1,387	$0	$0	$0	$0	$1,387
2029	15	36.65	-	-	-	-	$38.62	$1,415	$0	$0	$0	$0	$1,415
2030	16	36.65	-	-	-	-	$39.39	$1,443	$0	$0	$0	$0	$1,443
2031	17	36.65	-	-	-	-	$40.15	$1,471	$0	$0	$0	$0	$1,471
2032	18	36.65	-	-	-	-	$40.92	$1,500	$0	$0	$0	$0	$1,500
2033	19	36.65	-	-	-	-	$41.69	$1,528	$0	$0	$0	$0	$1,528
2034	20	36.65	-	-	-	-	$42.46	$1,556	$0	$0	$0	$0	$1,556
												TOTAL	**$25,829**

* Source: DOE Spreadsheet

FUEL BENEFITS: Woodland Av						
		Fuel Savings Prorated After Construction				
Calendar Year	Project Year	Gasoline Gallons*	Gasoline Value @ $3.60 per gallon	Diesel Gallons*	Diesel Value @ $4.03 per gallon	Undiscounted Total Fuel Savings
2012	-2	-	$0.00	-	$0.00	$0.00
2013	-1	-	$0.00	-	$0.00	$0.00
2014	0	43.18	$155.42	1.79	$7.20	$162.63
2015	1	12,610.00	$45,383.40	522.10	$2,103.52	$47,486.92
2016	2	12,610.00	$45,383.40	522.10	$2,103.52	$47,486.92
2017	3	12,610.00	$45,383.40	522.10	$2,103.52	$47,486.92
2018	4	12,610.00	$45,383.40	522.10	$2,103.52	$47,486.92
2019	5	12,610.00	$45,383.40	522.10	$2,103.52	$47,486.92
2020	6	12,610.00	$45,383.40	522.10	$2,103.52	$47,486.92
2021	7	12,610.00	$45,383.40	522.10	$2,103.52	$47,486.92
2022	8	12,610.00	$45,383.40	522.10	$2,103.52	$47,486.92
2023	9	12,610.00	$45,383.40	522.10	$2,103.52	$47,486.92
2024	10	12,610.00	$45,383.40	522.10	$2,103.52	$47,486.92
2025	11	12,610.00	$45,383.40	522.10	$2,103.52	$47,486.92
2026	12	12,610.00	$45,383.40	522.10	$2,103.52	$47,486.92
2027	13	12,610.00	$45,383.40	522.10	$2,103.52	$47,486.92
2028	14	12,610.00	$45,383.40	522.10	$2,103.52	$47,486.92
2029	15	12,610.00	$45,383.40	522.10	$2,103.52	$47,486.92
2030	16	12,610.00	$45,383.40	522.10	$2,103.52	$47,486.92
2031	17	12,610.00	$45,383.40	522.10	$2,103.52	$47,486.92
2032	18	12,610.00	$45,383.40	522.10	$2,103.52	$47,486.92
2033	19	12,610.00	$45,383.40	522.10	$2,103.52	$47,486.92
2034	20	12,610.00	$45,383.40	522.10	$2,103.52	$47,486.92

* Source: DOE Spreadsheet

PROJECT SUMMARY: Bustleton Av		Before/From	After/To	Delta	Unit
Corridor:	Bustleton Av	Frankford Av	County Line		
Traffic Count:		33,000	33,000	-	AADT, Urban Environment, No Growth Observed
Transit Ridership:		9,543	9,543	-	Daily Passengers
Design Period:		1-Apr-12	1-Jul-13	456	Days
Design Cost:			$1,793,000		Year of Expenditure Dollars
Construction Period:		1-Jul-13	30-Dec-14	548	Days
Construction Cost:			$13,978,000	-$13,978,000	Year of Expenditure Dollars
Intersections:		53	53	-	Total Intersections
Corridor Length:		8.610	8.610	-	Linear Miles
Auto Speed:	Confirmed>>	20.600	22.227	1.627	Miles / Hour Confirmed by Speed Survey
Transit Speed:	Confirmed>>	13.90	14.998	1.098	Miles / Hour Confirmed by SEPTA
Transit Route(s):		Route 58			
CO2 Reductions:				92.718	Tons/Year (DOE_ARRABenefitsReportingCalculatorBustleton.xlsm)
Gasoline Reductions:				31,932.975	Gallons/Year (DOE_ARRABenefitsReportingCalculatorBustleton.xlsm)
Diesel Fuel Reductions:				1,313.073	Gallons/Year (DOE_ARRABenefitsReportingCalculatorBustleton.xlsm)
Derived Statistics					
Short-term Jobs:			*2,057.00*		Months of US Labor
Auto Travel Time:		*25.078*	*23.242*	*(1.836)*	Minutes
Transit Travel Time:		*37.165*	*34.444*	*(2.721)*	Minutes
Auto Travel Time During Construction:		*25.078*	*26.332*	*1.254*	Minutes
Transit Travel Time During Construction:		*37.165*	*39.024*	*1.858*	Minutes

BENEFIT / COST SUMMARY: Bustleton Av

		Construction Phase		Operating Phase				Total			
Calendar Year	Project Year	Design / Construction Cost	Travel Time Benefits	O&M Cost	Travel Time Benefits	Fuel Benefits	Environmental Benefits	Undiscounted Net Benefits	Discounted @ 3.00% 2011 $	Running Total	
2012	-2	$0	$0	-$61,670	$0	$0	$0	-$61,670	-$59,874	-$59,874	2012
2013	-1	-$4,674,253	-$1,088,996	-$61,670	$0	$0	$0	-$5,824,919	-$5,490,545	-$5,550,419	2013
2014	0	-$9,303,747	-$2,167,563	-$61,670	$17,317	$412	$9	-$11,515,242	-$10,538,078	-$16,088,497	2014
2015	1	$0	$0	-$61,670	$5,054,759	$120,217	$2,650	$5,115,956	$4,545,461	-$11,543,036	2015
2016	2	$0	$0	-$61,670	$5,054,759	$120,217	$2,705	$5,116,012	$4,413,116	-$7,129,920	2016
2017	3	$0	$0	-$61,670	$5,054,759	$120,217	$2,761	$5,116,067	$4,284,626	-$2,845,294	2017
2018	4	$0	$0	-$61,670	$5,054,759	$120,217	$2,817	$5,116,123	$4,159,876	$1,314,582	0
2019	5	$0	$0	-$61,670	$5,054,759	$120,217	$2,872	$5,116,179	$4,038,759	$5,353,341	0
2020	6	$0	$0	-$61,670	$5,054,759	$120,217	$2,928	$5,116,234	$3,921,167	$9,274,508	0
2021	7	$0	$0	-$61,670	$5,054,759	$120,217	$3,002	$5,116,308	$3,807,013	$13,081,522	0
2022	8	$0	$0	-$61,670	$5,054,759	$120,217	$3,075	$5,116,381	$3,696,183	$16,777,704	0
2023	9	$0	$0	-$61,670	$5,054,759	$120,217	$3,149	$5,116,455	$3,588,578	$20,366,283	0
2024	10	$0	$0	-$61,670	$5,054,759	$120,217	$3,222	$5,116,528	$3,484,107	$23,850,389	0
2025	11	$0	$0	-$61,670	$5,054,759	$120,217	$3,296	$5,116,602	$3,382,676	$27,233,066	0
2026	12	$0	$0	-$61,670	$5,054,759	$120,217	$3,367	$5,116,673	$3,284,198	$30,517,263	0
2027	13	$0	$0	-$61,670	$5,054,759	$120,217	$3,438	$5,116,744	$3,188,586	$33,705,849	0
2028	14	$0	$0	-$61,670	$5,054,759	$120,217	$3,509	$5,116,815	$3,095,757	$36,801,606	0
2029	15	$0	$0	-$61,670	$5,054,759	$120,217	$3,581	$5,116,887	$3,005,632	$39,807,238	0
2030	16	$0	$0	-$61,670	$5,054,759	$120,217	$3,652	$5,116,958	$2,918,130	$42,725,368	0
2031	17	$0	$0	-$61,670	$5,054,759	$120,217	$3,723	$5,117,029	$2,833,175	$45,558,543	0
2032	18	$0	$0	-$61,670	$5,054,759	$120,217	$3,794	$5,117,100	$2,750,694	$48,309,236	0
2033	19	$0	$0	-$61,670	$5,054,759	$120,217	$3,866	$5,117,172	$2,670,613	$50,979,850	0
2034	20	$0	$0	-$61,670	$5,054,759	$120,217	$3,937	$5,117,243	$2,592,865	$53,572,714	0
							NET PRESENT VALUE		$53,572,714		

NO-BUILD SCENARIO: Bustleton Av									
		Construction Phase			Operating Phase			Total	
Calendar Year	Project Year	Construction Cost	Travel Time Benefits	Environmental Benefits	O&M Cost	Travel Time Benefits	Environmental Benefits	Undiscounted Net Benefits	Discounted @ 3.00% 2011 $
2012	-2	$0	$0	$0	-$61,670	$0	$0	-$61,670	-$59,874
2013	-1	$0	$0	$0	-$61,670	$0	$0	-$61,670	-$58,130
2014	0	$0	$0	$0	-$61,670	$0	$0	-$61,670	-$56,437
2015	1	$0	$0	$0	-$61,670	$0	$0	-$61,670	-$54,793
2016	2	$0	$0	$0	-$61,670	$0	$0	-$61,670	-$53,197
2017	3	$0	$0	$0	-$61,670	$0	$0	-$61,670	-$51,648
2018	4	$0	$0	$0	-$61,670	$0	$0	-$61,670	-$50,143
2019	5	$0	$0	$0	-$61,670	$0	$0	-$61,670	-$48,683
2020	6	$0	$0	$0	-$61,670	$0	$0	-$61,670	-$47,265
2021	7	$0	$0	$0	-$61,670	$0	$0	-$61,670	-$45,888
2022	8	$0	$0	$0	-$61,670	$0	$0	-$61,670	-$44,552
2023	9	$0	$0	$0	-$61,670	$0	$0	-$61,670	-$43,254
2024	10	$0	$0	$0	-$61,670	$0	$0	-$61,670	-$41,994
2025	11	$0	$0	$0	-$61,670	$0	$0	-$61,670	-$40,771
2026	12	$0	$0	$0	-$61,670	$0	$0	-$61,670	-$39,584
2027	13	$0	$0	$0	-$61,670	$0	$0	-$61,670	-$38,431
2028	14	$0	$0	$0	-$61,670	$0	$0	-$61,670	-$37,311
2029	15	$0	$0	$0	-$61,670	$0	$0	-$61,670	-$36,225
2030	16	$0	$0	$0	-$61,670	$0	$0	-$61,670	-$35,170
2031	17	$0	$0	$0	-$61,670	$0	$0	-$61,670	-$34,145
2032	18	$0	$0	$0	-$61,670	$0	$0	-$61,670	-$33,151
2033	19	$0	$0	$0	-$61,670	$0	$0	-$61,670	-$32,185
2034	20	$0	$0	$0	-$61,670	$0	$0	-$61,670	-$31,248
							NET PRESENT VALUE		-$1,014,079

CONSTRUCTION IMPACTS (Negative Benefits): Bustleton Av

		Private Impacts During Construction			Public Transport Impacts During Construction					
Calendar Year	Project Year	AADT	Travel Hour Impacts @ -1.25 minutes / vehicle * days / 60	Value of Travel Time @ $13.22 / hour	Public Transit Ridership	Travel Time Impacts @ -1.86 minutes / rider * days /60	Value of Travel Time @ $13.22 / hour	Construction Cost	Design Cost	Undiscounted Total Cost
2012	-2	33,000	-	$0	9,543	-	$0	$0	$1,079,148	$0
2013	-1	33,000	57,654	$762,297	9,543	24,709	$326,699	$4,674,253	$713,852	$5,763,249
2014	0	33,000	114,755	$1,517,294	9,543	49,181	$650,269	$9,303,747	$0	$11,471,310
2015	1	33,000	-	$0	9,543	-	$0	$0	$0	$0
2016	2	33,000	-	$0	9,543	-	$0	$0	$0	$0
2017	3	33,000	-	$0	9,543	-	$0	$0	$0	$0
2018	4	33,000	-	$0	9,543	-	$0	$0	$0	$0
2019	5	33,000	-	$0	9,543	-	$0	$0	$0	$0
2020	6	33,000	-	$0	9,543	-	$0	$0	$0	$0
2021	7	33,000	-	$0	9,543	-	$0	$0	$0	$0
2022	8	33,000	-	$0	9,543	-	$0	$0	$0	$0
2023	9	33,000	-	$0	9,543	-	$0	$0	$0	$0
2024	10	33,000	-	$0	9,543	-	$0	$0	$0	$0
2025	11	33,000	-	$0	9,543	-	$0	$0	$0	$0
2026	12	33,000	-	$0	9,543	-	$0	$0	$0	$0
2027	13	33,000	-	$0	9,543	-	$0	$0	$0	$0
2028	14	33,000	-	$0	9,543	-	$0	$0	$0	$0
2029	15	33,000	-	$0	9,543	-	$0	$0	$0	$0
2030	16	33,000	-	$0	9,543	-	$0	$0	$0	$0
2031	17	33,000	-	$0	9,543	-	$0	$0	$0	$0
2032	18	33,000	-	$0	9,543	-	$0	$0	$0	$0
2033	19	33,000	-	$0	9,543	-	$0	$0	$0	$0
2034	20	33,000	-	$0	9,543	-	$0	$0	$0	$0

Cost Allocation	Design	Construction
Fractional Years	1.25	1.50
Year Start	2012	2013
Month Start	4	7
Day Start	1	1
Year End	2013	2014
Month End	7	12
Day End	1	30
Fraction 1st Year	75%	50%
Fraction Last Year	50%	100%
Remaining for Mi	-	-
Cost Year 1	$1,079,148	$4,674,253
Cost Year 2	$713,852	$9,303,747
Total Cost	$1,793,000	$13,978,000

TRAVEL TIME AND RELIABILITY BENEFITS: Bustleton Av											
		Private Vehicle			Public Transport			Reliability		Total	
Calendar Year	Project Year	Effected AADT	Travel Time Savings @ 1.84 minutes /vehicle *250 days * Fraction of Year	Travel Time Savings (hours)	Effected Passengers	Travel Time Savings @ 2.72 minutes /passenger *250 days * Fraction of Year	Travel Time Savings (hours)	Private Vehicle (travel time savings hours * 6.00%)	Public Transport (travel time savings hours * 6.00%)	Total Time Savings (hours)	Undiscounted Value of Time @ $13.22/ hour
2012	-2	-	-	-	-	-	-	-	-	-	$0
2013	-1	-	-	-	-	-	-	-	-	-	$0
2014	0	33,000	51,876	865	9,543	22,232	371	52	22	1,310	$17,317
2015	1	33,000	15,147,703	252,462	9,543	6,491,875	108,198	15,148	6,492	382,299	$5,054,759
2016	2	33,000	15,147,703	252,462	9,543	6,491,875	108,198	15,148	6,492	382,299	$5,054,759
2017	3	33,000	15,147,703	252,462	9,543	6,491,875	108,198	15,148	6,492	382,299	$5,054,759
2018	4	33,000	15,147,703	252,462	9,543	6,491,875	108,198	15,148	6,492	382,299	$5,054,759
2019	5	33,000	15,147,703	252,462	9,543	6,491,875	108,198	15,148	6,492	382,299	$5,054,759
2020	6	33,000	15,147,703	252,462	9,543	6,491,875	108,198	15,148	6,492	382,299	$5,054,759
2021	7	33,000	15,147,703	252,462	9,543	6,491,875	108,198	15,148	6,492	382,299	$5,054,759
2022	8	33,000	15,147,703	252,462	9,543	6,491,875	108,198	15,148	6,492	382,299	$5,054,759
2023	9	33,000	15,147,703	252,462	9,543	6,491,875	108,198	15,148	6,492	382,299	$5,054,759
2024	10	33,000	15,147,703	252,462	9,543	6,491,875	108,198	15,148	6,492	382,299	$5,054,759
2025	11	33,000	15,147,703	252,462	9,543	6,491,875	108,198	15,148	6,492	382,299	$5,054,759
2026	12	33,000	15,147,703	252,462	9,543	6,491,875	108,198	15,148	6,492	382,299	$5,054,759
2027	13	33,000	15,147,703	252,462	9,543	6,491,875	108,198	15,148	6,492	382,299	$5,054,759
2028	14	33,000	15,147,703	252,462	9,543	6,491,875	108,198	15,148	6,492	382,299	$5,054,759
2029	15	33,000	15,147,703	252,462	9,543	6,491,875	108,198	15,148	6,492	382,299	$5,054,759
2030	16	33,000	15,147,703	252,462	9,543	6,491,875	108,198	15,148	6,492	382,299	$5,054,759
2031	17	33,000	15,147,703	252,462	9,543	6,491,875	108,198	15,148	6,492	382,299	$5,054,759
2032	18	33,000	15,147,703	252,462	9,543	6,491,875	108,198	15,148	6,492	382,299	$5,054,759
2033	19	33,000	15,147,703	252,462	9,543	6,491,875	108,198	15,148	6,492	382,299	$5,054,759
2034	20	33,000	15,147,703	252,462	9,543	6,491,875	108,198	15,148	6,492	382,299	$5,054,759

AIR QUALITY BENEFITS: Bustleton Av													
		Metric Ton Reductions*					Value Per Metric Ton * Metric Tons						Total
Calendar Year	Project Year	Carbon dioxide (CO2)*	Volatile Organic Compounds (VOCs)	Nitrogen oxides (NOx)	Particulate matter (PM)	Sulfur dioxide (SOx)	Carbon dioxide Rate / metric ton	Carbon dioxide Cost	Volatile Organic Compounds (VOCs) @ $1,858 per metric ton	Nitrogen oxides (NOx) @ $4,371 per metric ton	Particulate matter (PM) @ $183,578 per metric ton	Sulfur dioxide (SOx) @ $17,484 per metric ton	Undiscounted Net Benefits
2012	-2	-	-	-	-	-	$26.85	$0	$0	$0	$0	$0	$0
2013	-1	-	-	-	-	-	$27.43	$0	$0	$0	$0	$0	$0
2014	0	0.32	-	-	-	-	$28.00	$9	$0	$0	$0	$0	$9
2015	1	92.72	-	-	-	-	$28.58	$2,650	$0	$0	$0	$0	$2,650
2016	2	92.72	-	-	-	-	$29.18	$2,705	$0	$0	$0	$0	$2,705
2017	3	92.72	-	-	-	-	$29.78	$2,761	$0	$0	$0	$0	$2,761
2018	4	92.72	-	-	-	-	$30.38	$2,817	$0	$0	$0	$0	$2,817
2019	5	92.72	-	-	-	-	$30.98	$2,872	$0	$0	$0	$0	$2,872
2020	6	92.72	-	-	-	-	$31.58	$2,928	$0	$0	$0	$0	$2,928
2021	7	92.72	-	-	-	-	$32.37	$3,002	$0	$0	$0	$0	$3,002
2022	8	92.72	-	-	-	-	$33.17	$3,075	$0	$0	$0	$0	$3,075
2023	9	92.72	-	-	-	-	$33.96	$3,149	$0	$0	$0	$0	$3,149
2024	10	92.72	-	-	-	-	$34.75	$3,222	$0	$0	$0	$0	$3,222
2025	11	92.72	-	-	-	-	$35.54	$3,296	$0	$0	$0	$0	$3,296
2026	12	92.72	-	-	-	-	$36.31	$3,367	$0	$0	$0	$0	$3,367
2027	13	92.72	-	-	-	-	$37.08	$3,438	$0	$0	$0	$0	$3,438
2028	14	92.72	-	-	-	-	$37.85	$3,509	$0	$0	$0	$0	$3,509
2029	15	92.72	-	-	-	-	$38.62	$3,581	$0	$0	$0	$0	$3,581
2030	16	92.72	-	-	-	-	$39.39	$3,652	$0	$0	$0	$0	$3,652
2031	17	92.72	-	-	-	-	$40.15	$3,723	$0	$0	$0	$0	$3,723
2032	18	92.72	-	-	-	-	$40.92	$3,794	$0	$0	$0	$0	$3,794
2033	19	92.72	-	-	-	-	$41.69	$3,866	$0	$0	$0	$0	$3,866
2034	20	92.72	-	-	-	-	$42.46	$3,937	$0	$0	$0	$0	$3,937
												TOTAL	**$65,352**

* Source: DOE Spreadsheet

FUEL BENEFITS: Bustleton Av						
		Fuel Savings Prorated After Construction				
Calendar Year	Project Year	Gasoline Gallons*	Gasoline Value @ $3.60 per gallon	Diesel Gallons*	Diesel Value @ $4.03 per gallon	Undiscounted Total Fuel Savings
2012	-2	-	$0.00	-	$0.00	$0.00
2013	-1	-	$0.00	-	$0.00	$0.00
2014	0	109.36	$393.58	4.50	$18.12	$411.70
2015	1	31,932.97	$114,926.78	1,313.07	$5,290.37	$120,217.15
2016	2	31,932.97	$114,926.78	1,313.07	$5,290.37	$120,217.15
2017	3	31,932.97	$114,926.78	1,313.07	$5,290.37	$120,217.15
2018	4	31,932.97	$114,926.78	1,313.07	$5,290.37	$120,217.15
2019	5	31,932.97	$114,926.78	1,313.07	$5,290.37	$120,217.15
2020	6	31,932.97	$114,926.78	1,313.07	$5,290.37	$120,217.15
2021	7	31,932.97	$114,926.78	1,313.07	$5,290.37	$120,217.15
2022	8	31,932.97	$114,926.78	1,313.07	$5,290.37	$120,217.15
2023	9	31,932.97	$114,926.78	1,313.07	$5,290.37	$120,217.15
2024	10	31,932.97	$114,926.78	1,313.07	$5,290.37	$120,217.15
2025	11	31,932.97	$114,926.78	1,313.07	$5,290.37	$120,217.15
2026	12	31,932.97	$114,926.78	1,313.07	$5,290.37	$120,217.15
2027	13	31,932.97	$114,926.78	1,313.07	$5,290.37	$120,217.15
2028	14	31,932.97	$114,926.78	1,313.07	$5,290.37	$120,217.15
2029	15	31,932.97	$114,926.78	1,313.07	$5,290.37	$120,217.15
2030	16	31,932.97	$114,926.78	1,313.07	$5,290.37	$120,217.15
2031	17	31,932.97	$114,926.78	1,313.07	$5,290.37	$120,217.15
2032	18	31,932.97	$114,926.78	1,313.07	$5,290.37	$120,217.15
2033	19	31,932.97	$114,926.78	1,313.07	$5,290.37	$120,217.15
2034	20	31,932.97	$114,926.78	1,313.07	$5,290.37	$120,217.15

* Source: DOE Spreadsheet

SUMMARY RESULTS FOR ALL CORRIDORS

Corridor	From	To	Net Present Value	Year NPV is Positive	Short-term Job Months	No-Build NPV (Maintenance Cost)
Castor Av	Bustleton	Roosevelt Bl	$ 5,845,909	2022	690.36	$ (440,072)
Oxford Av	Roosevelt Bl	Frankford Av	$ 696,025	2028	318.90	$ (153,068)
Woodland Av	40th St	Island	$ 19,804,672	2019	1,107.47	$ (554,873)
Bustleton Av	Frankford Av	County Line	$ 53,572,714	2018	2,057.00	$ (1,014,079)
Total Project			**$ 79,919,320**		**4,173.73**	**$ (2,162,093)**

CAPITAL FUNDING STRATEGY SUMMARY

Corridor	From	To	City of Philadelphia	SEPTA	PennDOT	TIGER III/USDOT	Total
Castor Av	Bustleton	Roosevelt Bl	$586,375.00	$293,187.50	$1,465,937.50	$2,345,500.00	$4,691,000
Oxford Av	Roosevelt Bl	Frankford Av	$270,875.00	$135,437.50	$677,187.50	$1,083,500.00	$2,167,000
Woodland Av	40th St	Island	$940,750.00	$470,375.00	$2,351,875.00	$3,763,000.00	$7,526,000
Bustleton Av	Frankford Av	County Line	$1,747,250.00	$873,625.00	$4,368,125.00	$6,989,000.00	$13,978,000
Total Project			**$3,545,250.00**	**$1,772,625.00**	**$8,863,125.00**	**$14,181,000.00**	**$28,362,000**

SCHEDULE SUMMARY FOR ALL CORRIDORS					
Corridor	**From**	**To**	**Design Months**	**Construction Months**	**Description**
Castor Av	Bustleton	Roosevelt Bl	15.00	18.00	Castor Av (Bustleton to Roosevelt Bl)
Oxford Av	Roosevelt Bl	Frankford Av	15.00	18.00	Oxford Av (Roosevelt Bl to Frankford Av)
Woodland Av	40th St	Island	15.00	18.00	Woodland Av (40th St to Island)
Bustleton Av	Frankford Av	County Line	15.00	18.00	Bustleton Av (Frankford Av to County Line)
Total Project			**15.00**	**18.00**	

Population within 1/4 Mile of Corridor (Census 2010)						
Corridor	**Total**	**White 1 Race**	**Black 1 Race**	**Latin Any Race**	**Other**	**% Non-White**
Castor Av	47,544	21,241	13,622	8,507	12,436	55.3%
Oxford Av	21,345	5,544	11,413	4,967	4,269	74.0%
Woodland Av	37,765	9,191	22,228	1,361	6,236	75.7%
Bustleton Av	71,239	42,963	11,776	8,494	16,308	39.7%
Total Project	**177,893**	**78,939**	**59,039**	**23,329**	**39,249**	**55.6%**

Existing Conditions- Automobile					
Corridor	**Length (mi)**	**Intersections**	**Average Annual Daily Traffic (AADT)**	**Auto Speed (mph)**	**Maintenance Cost**
Castor Av	3.01	23	12,000	19.48	$26,762
Oxford Av	1.05	8	7,300	19.48	$9,309
Woodland Av	3.40	29	10,000	13.71	$33,744
Bustleton Av	8.61	53	33,000	20.60	$61,670
Total Project	**16.07**	**113**	**62,300**	**19.15**	**$127,210**

Existing Conditions- Public Transport					
Corridor	**2010 Daily Boardings**	**Route(s)**	**Peak Headway (mode)**	**Transit Speed (mph)**	**On-time Reliability**
Castor Av	4,558	Route 59	10 Minutes (Bus)	12.00	92%
Oxford Av	4,558	Route 59	10 Minutes (Bus)	12.00	92%
Woodland Av	16,072	Route 11	6 Minutes (Trolley)	10.10	69%
Bustleton Av	9,543	Route 58	8 Minutes (Bus)	13.90	84%
Total Project	**30,173**	**3 Routes**	**6 to 10 Minutes**	**11.59**	**77%**

TIGER Benefit-Cost Analysis (BCA) Examples

Boundary Street Redevelopment
City of Beaufort, South Carolina

BCA Example Contents

- BCA Summary from Project Narrative
- BCA Narrative
- BCA Model
  (PDF version of original multi-tab Excel workbook included as appendix to Application – the name of each separate tab in the Excel workbook is found in the upper left-hand corner)

Boundary Street Redevelopment District: TIGER III Grant Application*

*Rural Area Application	
Total Project Cost	$30,393,700
Local Match	$9,233,848
Requested TIGER III Funding	**$21,159,852**

Submitted by the City of Beaufort, SC and Beaufort County to the United States Department of Transportation

DUNS# 047446984
October 31, 2011

This is a BCA-relevant excerpt from the full TIGER Application

benefit-cost

Using conservative figures the Boundary Street Redevelopment District proposal will net $4.51 in benefits for every $1.00 in costs.

The Boundary Street Redevelopment District will impact the City of Beaufort, Beaufort County, and the surrounding communities by facilitating more safe, efficient and attractive travel through the U.S. 21 Corridor, while also increasing land values and revitalizing a currently underutilized corridor. This Benefit-Cost Analysis was prepared by the City of Beaufort Office of Civic Investment and The Lawrence Group.

Figure 12.1 - Boundary Street Redevelopment District Boundaries

Current Infrastructure Baseline

At present, Boundary Street is a five-lane suburban arterial road with 12-foot travel lanes and is predominately lined with aging, highway-oriented strip retail. It is part of the US Highway 21 corridor which stretches from US 17 (near I-95) on the western edge of Beaufort County to its termination on Hunting Island.

In 2007, the route had approximately 36,000 vehicles per day (VPD). This is projected to grow to approximately 47,900 vehicles per day by 2030.

The baseline assumption is that Phase I of the Boundary Street redevelopment project will be funded by the voter-approved Beaufort County One Percent (1%) Transportation Sales and Use Tax and will not utilize any TIGER III funds. Phase I includes the following elements: the realignment of the Robert Smalls Parkway/ Boundary Street intersection; intersection and roadway improvements to facilitate redevelopment of the Beaufort Plaza site, Hogarth Street, and Pickpocket Plantation

Boundary Street Redevelopment District Costs					
Projects	Right-of-Way Acquisition	Construction	Engineering/ Permitting	Contingency	Total
Retrofit of Suburbia					
Beaufort Plaza	-	$811,000	$81,500	$81,000	$973,500
Complete Streets					
Multiway Boulevard	$3,750,000	$11,500,000	$655,000	$1,150,000	$17,055,000
Improved Mobility Options					
Trailhead Park	$175,000	$685,000	$71,500	$690,000	$1,000,000
Multi-Use Path	$300,000	$575,000	$62,500	$57,500	$995,000
Enhanced Connectivity					
Parallel Street	$1,150,700	$6,900,000	$853,000	$690,000	$9,593,700
Neil Road	$0	$625,000	$89,000	$62,500	$776,500
Total					$30,393,700
Local Match					$9,233,848
Requested TIGER III Funding					**$21,159,852**

Drive; and the addition of a planted median to the segment from Robert Smalls Parkway to Hogarth Street. Additional funding for the completion of the project is now unlikely in the next decade due to diminished sales tax revenues based on projections by the Beaufort County Finance Department.

Project Justification and Economic Benefits

Requested TIGER III funding will enable the completion of the entire transportation implementation strategy of the adopted Boundary Street Master Plan as adopted in 2007. The completion of the entire transportation strategy of the Boundary Street Master Plan will serve to facilitate a safer, more attractive, and economically thriving corridor to serve the needs of residents throughout the region. The proposed improvements will dramatically decrease accidents in the area with the installation of a median and the reduction of driveways, increase landscaping to provide heat island reduction and stormwater impacts, and provide transportation choices through a fine grained network of streets. In addition to the numerous safety and multi-modal transportation benefits, it is expected that private investment and reinvestment will be facilitated by accelerating the implementation of the public infrastructure improvements so as to provide a more attractive frontage and remove uncertainty about future impacts of construction activity.

A further description of the Benefit-Cost Analysis can be found in the attached Model and Narrative documents.

Benefit-Cost Analysis				
Project Year	Actual Year	Initial Costs	Total Benefits Undiscounted (with O+M included)	Benefits Discounted 7%
1	2012	$9,233,848	$(52,246)	$(48,828)
2	2013	$21,159,852	$3,119,348	$2,915,279
3	2014		$8,428,135	$7,876,761
4	2015		$9,172,736	$8,572,650
5	2016		$8,867,403	$8,287,292
6	2017		$9,092,175	$8,497,360
7	2018		$6,090,377	$5,691,941
8	2019		$6,322,000	$5,908,411
9	2020		$6,557,049	$6,128,083
10	2021		$6,795,526	$6,350,959
11	2022		$6,706,372	$6,267,638
12	2023		$7,282,757	$6,806,315
13	2024		$7,531,511	$7,038,795
14	2025		$8,310,371	$7,766,702
15	2026		$8,039,297	$7,513,362
16	2027		$8,298,329	$7,755,447
17	2028		$8,560,786	$8,000,735
18	2029		$8,826,669	$8,249,224
19	2030		$9,345,171	$8,733,805
20	2031		$9,442,520	$8,824,785
Total		$30,393,700	$146,736,286	$137,136,715
Net Present Value - 7%				4.51
Net Present Value - 3%				4.69

Benefits By Selection Criteria	Total Discounted Benefits over 20-Year Period
Livability	
Increase in Bike/Pedestrian Use due to improvements.	$3,860,342
Auto Savings for Residents (based on 20% reduction of VMT and compact development)	$47,654,057
Improved Property Values from Accessibility and New Infrastructure (Based on Walkability and Transportation Improvements)	$12,074,752
Improved Access for Disadvantaged Communities	Qualitative
Economic Competitiveness	
Travel Time Savings (Includes Construction Delay Time)	$2,525,220
Buried Power Lines O+M Savings	$259,268
Jobs Created - through additional $ spent in local economy	Qualitative
Servicing savings by Increase in Density for Government	$13,442,243
Jobs Created - In addition due to Bike-Ped Facilities	$47,923
Economic Development in Land opportunities	Qualitative
Safety	
Reduction in accidents based on addition of median (2003, TRB) in future phases	$53,138,799
State of Good Repair	
Median - Maintenance and Repair Savings	$750,748
Sustainability	
Street Trees Benefits (Maintenance Included)	$386,116
Emission Reduction (from compact development)	$2,868,682
Park - Value Plus Maintenance and Carbon Reduction	$57,327
Total Discounted Value	$137,136,715

BOUNDARY STREET REDEVELOPMENT DISTRICT
TIGER III GRANT APPLICATION
BENEFIT-COST ANALYSIS

Applicant: City of Beaufort, SC
DUNS# 047446984
Rural Area Application

The Boundary Street Redevelopment District will impact the City of Beaufort, Beaufort County, and the surrounding communities by facilitating more safe, efficient and attractive travel through the U.S. 21 Corridor, while also increasing land values and revitalizing a currently underutilized corridor. This Benefit-Cost Analysis was prepared by the City of Beaufort Office of Civic Investment and The Lawrence Group.

Current Infrastructure Baseline

At present, Boundary Street is a five-lane suburban arterial road with 12-foot travel lanes and is predominated lined with aging, highway-oriented strip retail. It is part of the US Highway 21 corridor which stretches from US 17 (near I-95) on the western edge of Beaufort County to its termination on Hunting Island.

In 2007, the route had approximately 36,000 vehicles per day (VPD). This is projected to grow to approximately 47,900 vehicles per day by 2030.

The baseline assumption is that Phase I of the Boundary Street redevelopment project will be funded by the voter-approved Beaufort County One Percent (1%) Transportation Sales and Use Tax and will not utilize any TIGER III funds. Phase I include the following elements: the realignment of the Robert Smalls Parkway/Boundary Street intersection; intersection and roadway improvements to facilitate redevelopment of the Beaufort Plaza site, Hogarth Street, and Pickpocket Plantation Drive; and the addition of a planted median to the segment from Robert Smalls Parkway to Hogarth Street. Additional funding for the completion of the project is now unlikely in the next decade due to diminished sales tax revenues based on projections by the Beaufort County Finance Department.

Proposed Project Description

Requested TIGER III funding will enable the completion of the entire transportation implementation strategy of the adopted Boundary Street Master Plan as adopted in 2007. Additional funding will permit the construction of the following project components:

- Conversion of the present suburban, five-lane arterial Boundary Street to a "complete street" with narrower travel lanes, planted medians, underground utilities, frontage slip lane for private property access and convenience parking, street trees between the curb and the sidewalk, a sidewalk on the north side of the street, and a multi-use path for bicycling and pedestrians on the south side of Boundary Street;
- Improvement of the streetscape of Neil Road with the addition of sidewalks, underground utilities and street trees;
- Conversion of Beaufort Plaza, an aging suburban strip center with a superblock configuration, to a network of walkable streets that include sidewalks, street trees, and underground utilities and the construction of a new street connection to Pickpocket Plantation to encourage the redevelopment of the site as an urban, mixed-use development; and
- Construction of a one-acre trailhead park at the intersection of the planned and funded rail-trail with Robert Small Parkway to provide open space for recreation and stormwater management and a visible gateway for the 1.5 mile greenway connecting large neighborhoods, shopping areas, the US Marine Corps Air Station-Beaufort, and the downtowns of two communities (Beaufort and Port Royal).

The estimates in the Benefit-Cost Analysis attempt to quantify these improvements in addition to the Phase 1 improvements already allocated.

Project Justification and Economic Benefits

The completion of the entire transportation strategy of the Boundary Street Master Plan will serve to facilitate a safer, more attractive, and economically thriving corridor to serve the needs of residents throughout the region. The proposed improvements will dramatically decrease accidents in the area with the installation of a median and the reduction of driveways, increase landscaping to provide heat island reduction and stormwater impacts, and provide transportation choices through a fine grained network of streets. In addition to the numerous safety and multi-modal transportation benefits, it is expected that private investment and reinvestment will be facilitated by accelerating the implementation of the public infrastructure improvements so as to provide a more attractive frontage and remove uncertainty about future impacts of construction activity.

PROJECT COSTS

Total project costs were compiled by the City of Beaufort Office of Civic Investment using construction estimates by Thomas and Hutton, 2011 and Kimley-Horn and Associates, 2008.

Total Estimated Project Costs: $30,393,700

BENEFITS

LIVABILITY:

Increase in Bike/Pedestrian Use Due to Improvements – Net Estimated Benefits: $3,860,342

Using an analysis by the Victoria Transportation Policy Institute (Litman, 2011), we estimated the benefits for bicyclists and pedestrians as a result of the proposed improvements. The figures used are estimates based on the share of users from the Average Daily Traffic and the Vehicle Miles Traveled for the years 2012-2031. In addition we assumed an increase in the number of potential activity centers in the Boundary Street Redevelopment District that would be attractive to bicyclists and pedestrians and an increase the percentage share of cyclists and pedestrians likely to use a new route. Based on the research we made careful and conservative estimates that included the following qualifiers: types of facilities provided (e.g., sidewalk, multi-use path); the average number of days a year considered "bikeable" in Beaufort; and the values of pollution, emission, health care, and lifestyle benefits.

Land Use Changes from Improvements and Code – Net Estimated Benefits: $47,654,057

According to a recent Urban Land Institute Study (Brandes et al, 2010), an average 20% reduction in vehicles miles traveled (VMT) can be attributed to complete, compact, and connected development. As a part of the Boundary Street Redevelopment District, the City adopted a form-based code in 2008 that requires compact, walkable design of all new development and major expansions/improvements within the project area. A number of developments have already been constructed/altered to meet these standards while numerous others are pending the completion of the public infrastructure identified in this project. At a minimum, this provides immediate savings in automobile costs associated with automobile travel. Assuming a reasonable level of new development and site retrofits for the 20 year analysis period, the average per capital VMT for the State of South Carolina, and the present and future population in the redevelopment districts, we estimate a VMT savings of approximately 85 million miles.

Improved Property Values from Accessibility and New Infrastructure – Net Estimated Benefits: $12,074,752

According to a study commissioned by the Robert Wood Johnson Foundation-Active Living Research (Ewing and Shoup, 2010), complete, compact, and connected communities increase land values, on average, approximately 5-12%. This additional property value is a one-time realized value. This value increase was correlated to similar increases in comparable developments in the Beaufort. The value of a walkable network with new infrastructure for the purposes of this analysis was confirmed to average 7%.

Improved Access for Disadvantaged Communities – Net Estimated Benefits: Qualitative

While it is very difficult to apply a dollar value for improved transportation equity in the project area, it is clear that improved choice will provide an improvement in the overall quality of life for the area's residents. While the median household income for the entire census tract is approximately $30,000/year, historically, the specifically block groups defined by this project area are amongst the very poorest in the City. The median household income for Beaufort County is $56,590 (US Census Bureau, 2010).

ECONOMIC COMPETITIVENESS

Travel Time Savings – Net Estimated Benefits: $2,525,220

Improving the intersections and operations of the Boundary Street corridor create time savings for travelers during both the morning and afternoon peak hours. Using the 2008 Feasibility Study (Kimley-Horn and Associates, 2008) and the projected 2030 growth, a total time saved calculation could be approximated for through traffic. The average car/truck ratio and valuation of time based on median income was used in this analysis.

It is anticipated that there will be only standard driving delays in the construction zone. We assume that during peak construction periods, one lane in one direction may be closed accounting for a total travel time increase of approximately 35% during the 18 month construction period. This accrues a total increase in travel time through the 1.3 mile corridor of approximately 30 seconds. (Based on a preliminary traffic management plan by Thomas and Hutton, Project Design Engineer)

Buried Power Lines (O+M) – Net Estimated Benefits: $259,268

There are minimal operations and maintenance costs associated with buried of existing overhead utilities (Virginia State Corporation Commission, 2005). However, that same study noted savings in the range of $7,000-70,000 per mile/year for tree trimming costs near overhead power lines based on the amount and type of trees. For the purposes of this analysis we conservatively estimate a savings of $10,000/mile of tree trimming per year.

There are other qualitative values associated with the burial of overhead utility lines that are difficult to quantify yet have significant aesthetic benefits to the quality of life for the entire community. In addition, the presence of utilities in protected conduit provides a more consistent service delivery during storm events. The City of Beaufort is located in an area that averages one hurricane (within 60 miles) every 2.5 years therefore strengthening the value and potential cost savings of underground utilities.

Local Government Infrastructure Savings – Net Estimated Benefits: $13,442,243

Compact, walkable development directly results in efficiency of public services by reducing the additional resources consumed by sprawl. In a study completed by the Victoria Transport Policy Institute (Litman, 2010) the cost to service a lot with a density of 1 unit/acre is estimated at $5,052/year per unit. Correspondingly, to service a density of 2.67 units/acre is estimated at $3,669/year per unit. In Beaufort more compact development is expected to provide a cost savings in infrastructure (e.g., roads, utilities) and governmental services (e.g., schools, public safety). These savings can then be used on other projects in the

region, thus improving the economic competitiveness of the region. The sum total of the infrastructure calculation is based on the efficiency of resources for the study area.

Jobs Created through Additional Income Spent in the Economy – Net Estimated Benefits: Qualitative

Transportation costs per household are a reduction in disposable income. According to the 2010 Driving Survey (AAA, 2011), it costs an average of 58.5 cents per mile. By reducing the VMT of the households in the study area by 20 percent, these transportation costs can be reinvested into the local and national economy, corresponding to new jobs and greater economic competitiveness. If only 75% of these savings are invested into the national economy there is a direct creation of over 3,340 jobs through 2031 based on the calculation of income and multipliers used by the US Department of Commerce.

Jobs Created by Bicycle and Pedestrian Facilities – Net Estimated Benefits: $47,923

A recent report published by Smart Growth America titled, "Recent Lessons from the Stimulus: Transportation Funding and Job Creation" (Smart Growth America, 2011) concluded that transportation infrastructure projects that included bicycle and pedestrian facilities (e.g., sidewalks, multi-use paths, dedicated bicycle lanes) created more jobs per million dollars spent than road only projects. By applying these values to the Boundary Street Redevelopment District and the median income of Beaufort County it is estimated that this will result in an additional $47,000 in direct jobs to the Beaufort economy. If indirect jobs are included in this calculation, approximately 9 additional indirect jobs would be created through the calculation. The direct jobs result in the monetary benefit included in this analysis.

Economic Development in Corridor through Private Investment – Net Estimated Benefits: Qualitative

The net benefits in economic development as a result of this project have been calculated elsewhere in this analysis however it is important to note it collectively here to underscore the importance of this element. A safer and more attractive project area will improve the retailing environment, create opportunities for higher taxable higher density housing, and provide a more attractive environment to office and service industries to create quality jobs in the City of Beaufort. In addition to the immediate project area this project recognizes the potential community spillover effect that can occur when the most unattractive part of the community ir radically transformed. Because this the economy of the area is driven largely by the local military bases and retirees, the quality and attractiveness of the area will have a direct correlation to its competitiveness in the overall marketplace, particularly as the Beaufort region looks to attract new and expanding jobs to the community.

SAFETY

Reduction in Accidents at Unsignalized Intersections and Driveways – Net Estimated Benefits: $53,138,799

According to the Transportation Research Board Access Management Manual (TRB, 2003), adding a median to a road that previously had a continuous two-way left-turn lane can reduce the crash rate about 37% and the injury rate about 48%. These reduction percentages were applied to the thorough traffic accidents reported from 2005-2007 (Kimley-Horn and Associates, 2008). Values were then established according to the injury rates and projected over the twenty year term of the study. A conservative estimate was made by holding values at the 2011 traffic volumes.

STATE OF GOOD REPAIR

Maintenance and Repair Savings – Net Estimated Benefits: $750,748

A Florida Department of Transportation Study published in 2006 (US DOT-FHA, 2006) discovered that a median generally saved 40% per year on maintenance over a 20 year life span. This savings is realized by applying the average maintenance cost per mile of SCDOT roadway and equals approximately $4,300/year. Repaving Boundary Street at its current pavement width would cost, based on estimates, approximately $537,000 every 10 years. By narrowing the lanes and adding a median to the center lane this cost is reduced to $337,623. Over the life of the project this cost would be incurred only one time following initial construction.

SUSTAINABILITY

Street Trees Maintenance and Benefits – Net Estimated Benefits: $386,116

The Boundary Street Redevelopment District will add, at a minimum, 220 street trees to the study area on Neil Road, Beaufort Plaza, and Boundary Street. Each tree provides aesthetic, energy, air quality, CO2, and stormwater benefits that can be quantified. In a study completed by the Journal of Arboriculture (McPherson, 2003) ten species of street trees were analyzed for their cost of maintenance and benefits. These species were compared with the South Carolina Department of Transportation Street Tree Selection Guide and the climate of Beaufort, South Carolina to identify two shared tree species, the Gingko Tree and Chinese Pistache. From this the benefits and costs were averaged for an approximate value. Maintenance cost for the trees are also included in this analysis.

Emission Reduction Based on Travel Time Savings – Net Estimated Benefits: $2,868,682

Through transportation investments in the Boundary Street Redevelopment District a reduction of VMT is expected in the study area by providing connectivity and a network of walkable streets. Based on current population and growth projections it is estimated that in a 20-year life cycle over 85 million VMT will be reduced. This dramatic reduction in emission has a significant, quantifiable environmental impact.

Beaufort Rail Trail Trailhead Park Benefits – Net Estimated Benefits: $57,327

Connecting users in other parts of the region to employment centers through the multi-use path and trailhead not only benefits the environment through a reduction of VMT, it also creates an opportunity for a trailhead park that increases land values for the surrounding parcels and helps the environment. This analysis factors both park maintenance and value added to the surround area.

BENEFIT-COST RATIO

Total Benefits:	**$137,136,715**
Total Cost:	**$ 30,393,750**
Net Benefits	**$106,742,965**
	NPV 7%: 4.51:1
	NPV 3%: 4.69:1

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Cost, Maintenance, and Benefits			Project Year												
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
			1	2	3	4	5	6	7	8	9	10	11	12	13
Livability															
1 - Increase in Bike/Pedestrian Use due to improvements.			$ -	$ 99,472	$ 201,576	$ 204,208	$ 206,840	$ 209,472	$ 212,105	$ 214,737	$ 217,369	$ 220,001	$ 222,634	$ 225,266	$ 227,898
2 - Auto Savings for Residents (based on 20% reduction of VMT and compact development)			$ -	$ 807,697	$ 1,723,321	$ 1,833,955	$ 1,947,294	$ 2,063,340	$ 2,182,091	$ 2,303,548	$ 2,427,711	$ 2,554,580	$ 2,684,155	$ 2,816,436	$ 2,951,423
3 - Improved Property Values from Accessibility and New Infrastructure (Based on Walkability and Transportation Improvements)			$ -	$ -	$ 3,229,996	$ 3,229,996	$ 3,229,996	$ 3,229,996	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Improved Access for Disadvantaged Communities - Qualitative															
Economic Competitiveness															
4 - Travel Time Savings (Includes Construction Delay Time)			$ (52,246)	$ (94,658)	$ (72,912)	$ (50,609)	$ (27,749)	$ (4,330)	$ 19,645	$ 44,179	$ 69,270	$ 94,918	$ 121,124	$ 147,888	$ 175,209
5 -Buried Power Lines O+M Savings			$ -	$ 7,498	$ 14,996	$ 14,996	$ 14,996	$ 14,996	$ 14,996	$ 14,996	$ 14,996	$ 14,996	$ 14,996	$ 14,996	$ 14,996
6 - Jobs Created - through additional $ spent in local economy -Qualitative															
7 - Servicing savings by Increase in Density for Government			$ -	$ 75,701	$ 151,402	$ 227,103	$ 302,804	$ 378,505	$ 454,206	$ 529,907	$ 605,608	$ 681,309	$ 757,011	$ 832,712	$ 908,413
8 -Jobs Created - Additional to TIGER created jobs due to Bike-Ped Facilities				$ 51,278											
Economic Development in Land opportunities - Qualitative															
Safety															
9 - Reduction in accidents based on addition of median (2003, TRB) in future phases			$ -	$ 1,536,717	$ 3,073,433	$ 3,073,433	$ 3,073,433	$ 3,073,433	$ 3,073,433	$ 3,073,433	$ 3,073,433	$ 3,073,433	$ 3,073,433	$ 3,073,433	$ 3,073,433
State of Repair															
10 - Median - Maintenance and Repair Savings			$ -	$ 2,189	$ 4,378	$ 531,058	$ 4,378	$ 4,378	$ 4,378	$ 4,378	$ 4,378	$ 4,378	$ (326,678)	$ 4,378	$ 4,378
Sustainability															
11 - Street Trees Benefits (Maintenance Included)			$ -	$ 11,166	$ 22,332	$ 22,332	$ 22,332	$ 22,332	$ 22,332	$ 22,332	$ 22,332	$ 22,332	$ 22,332	$ 22,332	$ 22,332
12 - Emission Reduction (from compact development)			$ -	$ 48,674	$ 103,838	$ 110,489	$ 117,303	$ 124,278	$ 131,415	$ 138,715	$ 146,176	$ 153,802	$ 161,590	$ 169,541	$ 177,654
13 - Park - Value Plus Maintenance and Carbon Reduction			$ -	$ 573,615	$ (24,225)	$ (24,225)	$ (24,225)	$ (24,225)	$ (24,225)	$ (24,225)	$ (24,225)	$ (24,225)	$ (24,225)	$ (24,225)	$ (24,225)
Initial Investment			$ (9,233,848)	$ (21,159,852)											
Initial Investment +Benefit (No Discount)	**$ 30,393,700**		**$ (9,286,094)**	**$ (18,040,504)**	**$ 8,428,135**	**$ 9,172,736**	**$ 8,867,403**	**$ 9,092,175**	**$ 6,090,377**	**$ 6,322,000**	**$ 6,557,049**	**$ 6,795,526**	**$ 6,706,372**	**$ 7,282,757**	**$ 7,531,511**
Benefits Only (No Discount)			**$ (52,246)**	**$ 3,119,348**	**$ 8,428,135**	**$ 9,172,736**	**$ 8,867,403**	**$ 9,092,175**	**$ 6,090,377**	**$ 6,322,000**	**$ 6,557,049**	**$ 6,795,526**	**$ 6,706,372**	**$ 7,282,757**	**$ 7,531,511**
			-												
Benefits Only - 3%			($50,724.44)	$3,028,493.24	$8,182,654.99	$8,905,568.85	$8,609,128.97	$8,827,354.57	$5,912,987.20	$6,137,864.21	$6,366,066.97	$6,597,597.86	$6,511,041.17	$7,070,637.71	$7,312,146.72
Benefits Only - 7%			($48,828.20)	$2,915,278.54	$7,876,761.34	$8,572,650.39	$8,287,292.37	$8,497,360.01	$5,691,940.95	$5,908,411.35	$6,128,083.15	$6,350,958.69	$6,267,637.76	$6,806,314.80	$7,038,795.44

2025	2026	2027	2028	2029	2030	2031	Total (Not Discounted)	Total Selection Criteria Pre-Discount	Total (Discounted-7%)	Total Selection Criteria (Discounted - 7%)
14	15	16	17	18	19	20			NPV (7%)	
								$68,040,391		$ 63,589,151
$ 230,530	$ 233,162	$ 235,795	$ 238,427	$ 241,059	$ 243,691	$ 246,324	$ 4,130,566		$ 3,860,342	
$ 3,089,116	$ 3,229,515	$ 3,372,620	$ 3,518,431	$ 3,666,947	$ 3,818,170	$ 3,999,488	$ 50,989,841		$ 47,654,057	
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 12,919,985		$ 12,074,752	
								$17,362,602		$ 16,274,654
$ 203,088	$ 231,525	$ 260,519	$ 290,070	$ 320,179	$ 600,038	$ 426,838	$ 2,701,986		$ 2,525,220	
$ 14,996	$ 14,996	$ 14,996	$ 14,996	$ 14,996	$ 14,996	$ 14,996	$ 277,417		$ 259,268	
$ 984,114	$ 1,059,815	$ 1,135,516	$ 1,211,217	$ 1,286,918	$ 1,362,619	$ 1,438,320	$ 14,383,200		$ 13,442,243	
							$ 51,278		$ 47,923	
								$56,858,515		$ 53,138,799
$ 3,073,433	$ 3,073,433	$ 3,073,433	$ 3,073,433	$ 3,073,433	$ 3,073,433	$ 3,073,433	$ 56,858,515		$ 53,138,799	
								$ 803,301		$ 750,748
$ 531,058	$ 4,378	$ 4,378	$ 4,378	$ 4,378	$ 4,378	$ 4,378	$ 803,301		$ 750,748	
								$ 3,543,974		$ 3,312,125
$ 22,332	$ 22,332	$ 22,332	$ 22,332	$ 22,332	$ 22,332	$ 22,332	$ 413,144		$ 386,116	
$ 185,929	$ 194,366	$ 202,966	$ 211,728	$ 220,652	$ 229,739	$ 240,636	$ 3,069,489		$ 2,868,682	
$ (24,225)	$ (24,225)	$ (24,225)	$ (24,225)	$ (24,225)	$ (24,225)	$ (24,225)	$ 61,340		$ 57,327	
							$ (31,000,000)		$ 137,065,477	
$ 8,310,371	**$ 8,039,297**	**$ 8,298,329**	**$ 8,560,786**	**$ 8,826,669**	**$ 9,345,171**	**$ 9,442,520**				
$ 8,310,371	**$ 8,039,297**	**$ 8,298,329**	**$ 8,560,786**	**$ 8,826,669**	**$ 9,345,171**	**$ 9,442,520**	**$ 146,736,286**			
							$ 262,396,346			
$8,068,321.62	$7,805,142.66	$8,056,629.62	$8,311,442.72	$8,569,581.99	$9,072,981.52	$9,167,495.03			$142,462,413.18	
$7,766,702.12	$7,513,361.63	$7,755,447.21	$8,000,734.58	$8,249,223.79	$8,733,804.64	$8,824,784.93			$137,136,715.49	
								B:C Ratio (3%)	**4.69**	
								B:C Ratio (7%)	**4.51**	

								Improved Walking and Cycling Conditions		Increased Walking and Cycling Activity		Typical Values - Reduced Motor Vehicle Travel					
	Average Daily Traffic (ADT)	**AADT = ADT * .93**	**Activity Centers + Adjustment Factor**	**VR = AADT * (A+C)**	**Annual Auto Trips Reduced**	**Daily Miles Saved**	**Yearly Miles Saved = Daily VR * Days on Bicycling (average rainfall- 94 days per year)**	**User Benefits - .25 (per Miles)**	**Option Value - Servicing Lower Income=.035**	**Fitness and Health - walking (50%) - .5**	**Fitness and Health - Cycling (50%) - .2**	**Reduced Motor Vehicle Travel = .225**	**Avoided Chaffeuring driver's time = .58**	**Congestion reduction = .06**	**Reduced barrier effect = .01**	**Roadway Cost Savings = .042**	**Parking Cost Savings = .36**
							271										
2007	36,000	33480	0.0044	147	35772	331	89823	$22,456	$3,144	$22,456	$8,982	20210	52098	5389	898	3773	32336
2008	36,517	33961	0.0044	149	35772	336	91114	$22,779	$3,189	$22,779	$9,111	20501	52846	5467	911	3827	32801
2009	37,035	34442	0.0044	152	35772	341	92405	$23,101	$3,234	$23,101	$9,241	20791	53595	5544	924	3881	33266
2010	37,552	34924	0.0044	154	35772	346	93696	$23,424	$3,279	$23,424	$9,370	21082	54344	5622	937	3935	33731
2011	38,070	35405	0.0044	156	35772	351	94987	$23,747	$3,325	$23,747	$9,499	21372	55093	5699	950	3989	34195
2012	38,587	35886	0.0044	158	35772	355	96278	$24,070	$3,370	$24,070	$9,628	21663	55841	5777	963	4044	34660
2013	39,104	36367	0.0044	160	35772	360	97569	$24,392	$3,415	$24,392	$9,757	21953	56590	5854	976	4098	35125
2014	39,622	36848	0.0044	162	35772	365	98860	$24,715	$3,460	$24,715	$9,886	22244	57339	5932	989	4152	35590
2015	40,139	37329	0.0044	164	35772	370	100151	$25,038	$3,505	$25,038	$10,015	22534	58088	6009	1002	4206	36054
2016	40,657	37811	0.0044	166	35772	374	101442	$25,360	$3,550	$25,360	$10,144	22824	58836	6087	1014	4261	36519
2017	41,174	38292	0.0044	168	35772	379	102733	$25,683	$3,596	$25,683	$10,273	23115	59585	6164	1027	4315	36984
2018	41,691	38773	0.0044	171	35772	384	104024	$26,006	$3,641	$26,006	$10,402	23405	60334	6241	1040	4369	37449
2019	42,209	39254	0.0044	173	35772	389	105315	$26,329	$3,686	$26,329	$10,531	23696	61083	6319	1053	4423	37913
2020	42,726	39735	0.0044	175	35772	393	106606	$26,651	$3,731	$26,651	$10,661	23986	61831	6396	1066	4477	38378
2021	43,243	40216	0.0044	177	35772	398	107897	$26,974	$3,776	$26,974	$10,790	24277	62580	6474	1079	4532	38843
2022	43,761	40698	0.0044	179	35772	403	109188	$27,297	$3,822	$27,297	$10,919	24567	63329	6551	1092	4586	39308
2023	44,278	41179	0.0044	181	35772	408	110479	$27,620	$3,867	$27,620	$11,048	24858	64078	6629	1105	4640	39772
2024	44,796	41660	0.0044	183	35772	412	111769	$27,942	$3,912	$27,942	$11,177	25148	64826	6706	1118	4694	40237
2025	45,313	42141	0.0044	185	35772	417	113060	$28,265	$3,957	$28,265	$11,306	25439	65575	6784	1131	4749	40702
2026	45,830	42622	0.0044	188	35772	422	114351	$28,588	$4,002	$28,588	$11,435	25729	66324	6861	1144	4803	41166
2027	46,348	43103	0.0044	190	35772	427	115642	$28,911	$4,047	$28,911	$11,564	26020	67073	6939	1156	4857	41631
2028	46,865	43585	0.0044	192	35772	431	116933	$29,233	$4,093	$29,233	$11,693	26310	67821	7016	1169	4911	42096
2029	47,383	44066	0.0044	194	35772	436	118224	$29,556	$4,138	$29,556	$11,822	26600	68570	7093	1182	4965	42561
2030	47,900	44547	0.0044	196	35772	441	119515	$29,879	$4,183	$29,879	$11,952	26891	69319	7171	1195	5020	43025
2031	48,417	45028	0.0044	198	35772	446	120806	$30,202	$4,228	$30,202	$12,081	27181	70068	7248	1208	5074	43490
							2170843	$542,711	$75,980	$542,711	$217,084	488440	1259089	130251	21708	91175	781503
	11,900																
	517																

Assumptions

**Based on Maricopa County CMAQ, Bike and Pedestrian Calculations for VMT.

**The Study Area has 7 or more activity centers for the full credit within 1/4 mile. This includes Beaufort County Government Center, City Hall of Beaufort, the Municipal Judicial Center, the Piggly Wiggly and Bi-Lo Grocery stores, K-Mart, Beaufort Town Center, and Beaufort Plaza. Also located nearby are several restaurants, the only local movie theatre, and numerous other attractions.

**Benefits based on *Evaluating Non-Motorized Transport Benefits and Costs* , Litman, 2010.

		More Walkable and Bikeable Community					
Energy Conservation = .03	**Pollution Reductions = .044**	**Reduced pavement = .002**	**Increased Accessibility = .051**	**Total**			
2695	3952	180	4581				
2733	4009	182	4647				
2772	4066	185	4713				
2811	4123	187	4779				
2850	4179	190	4844				
2888	4236	193	4910				
2927	4293	195	4976	99472	**Only 1/2 year benefits		
2966	4350	198	5042	201576			
3005	4407	200	5108	204208			
3043	4463	203	5174	206840			
3082	4520	205	5239	209472			
3121	4577	208	5305	212105			
3159	4634	211	5371	214737			
3198	4691	213	5437	217369			
3237	4747	216	5503	220001			
3276	4804	218	5569	222634			
3314	4861	221	5634	225266			
3353	4918	224	5700	227898			
3392	4975	226	5766	230530			
3431	5031	229	5832	233162			
3469	5088	231	5898	235795			
3508	5145	234	5964	238427			
3547	5202	236	6029	241059			
3585	5259	239	6095	243691			
3624	5315	242	6161	246324			
65125	95517	4342	110713	4130566			

	VMT per Capita (South Carolina)	Population in Study Area	Vehicles Miles Traveled in Study Area (Total) -No Improvement	Vehicles Miles Traveled - 5% Improvement	Reduced VMT by 20%	Difference VMT Saved (annually)	Vehicle Trips per household (Used in Emissions Calculations)	Auto Trips Reduced - Daily(5%) (Used in Emissions Calculations)	AutoTrips Reduced - Daily(20%) (Used in Emissions Calculations)	Auto Trips Reduced (per day) (Used in Emissions Calculations)	Annual Auto Trips ReducedVR (annual)	VMT (5%) Reduced	VMT (20%) Reduced	VMT -TIGER III	ROG Factor (pounds/year)
2002	11,514	1,183	13,621,062				2068								((AutoTripsReduced*1.02)+(AnnualAutoVMTReduced*0.273))/454
2003	11,514	1,183	13,621,062				867.0859539								
2004	11,514	1,183	13,621,062		Vehicles Per Day	Trips per Day per Capita	2.375577956								
2005	11,514	1,183	13,621,062			Total Vehicles per Day	2,810	141	562	422	153,864	681,053	2,724,212	2,043,159	
2006	11,514	1,183	13,621,062			Total Vehicles per Day (20%)	2,810	141	562	422	153,864	681,053	2,724,212	2,043,159	
2007	11,514	1,183	13,621,062				2,810	141	562	422	153,864	681,053	2,724,212	2,043,159	
2008	11,734	1,183	13,881,565			Total Vehicles per Day (5%)	2,810	141	562	422	153,864	694,078	2,776,313	2,082,235	
2009	11,954	1,183	14,142,073			VR	2,810	141	562	422	153,864	707,104	2,828,415	2,121,311	
2010	12,175	1,183	14,402,582			VMT	2,810	141	562	422	153,864	720,129	2,880,516	2,160,387	
2011	12,395	1,183	14,663,090				2,810	141	562	422	153,864	733,155	2,932,618	2,199,464	
2012	12,615	1,247	15,730,961	14,944,413	12,584,769	2,359,644	2,962	148	592	444	162,188	786,548	3,146,192	2,359,644	1,783
2013	12,835	1,311	16,827,020	15,985,669	13,461,616	2,524,053	3,114	156	623	467	170,512	841,351	3,365,404	2,524,053	1,901
2014	13,055	1,375	17,951,265	17,053,701	14,361,012	2,692,690	3,266	163	653	490	178,836	897,563	3,590,253	2,692,690	2,021
2015	13,276	1,439	19,103,697	18,148,512	15,282,957	2,865,555	3,418	171	684	513	187,161	955,185	3,820,739	2,865,555	2,144
2016	13,496	1,503	20,284,316	19,270,100	16,227,452	3,042,647	3,570	179	714	536	195,485	1,014,216	4,056,863	3,042,647	2,269
2017	13,716	1,567	21,493,121	20,418,465	17,194,497	3,223,968	3,723	186	745	558	203,809	1,074,656	4,298,624	3,223,968	2,397
2018	13,936	1,631	22,730,114	21,593,608	18,184,091	3,409,517	3,875	194	775	581	212,133	1,136,506	4,546,023	3,409,517	2,527
2019	14,157	1,695	23,995,293	22,795,529	19,196,235	3,599,294	4,027	201	805	604	220,457	1,199,765	4,799,059	3,599,294	2,660
2020	14,377	1,759	25,288,660	24,024,227	20,230,928	3,793,299	4,179	209	836	627	228,781	1,264,433	5,057,732	3,793,299	2,795
2021	14,597	1,823	26,610,213	25,279,702	21,288,170	3,991,532	4,331	217	866	650	237,105	1,330,511	5,322,043	3,991,532	2,933
2022	14,817	1,887	27,959,953	26,561,955	22,367,962	4,193,993	4,483	224	897	672	245,429	1,397,998	5,591,991	4,193,993	3,073
2023	15,037	1,951	29,337,880	27,870,986	23,470,304	4,400,682	4,635	232	927	695	253,753	1,466,894	5,867,576	4,400,682	3,216
2024	15,258	2,015	30,743,994	29,206,794	24,595,195	4,611,599	4,787	239	957	718	262,077	1,537,200	6,148,799	4,611,599	3,362
2025	15,478	2,079	32,178,295	30,569,380	25,742,636	4,826,744	4,939	247	988	741	270,401	1,608,915	6,435,659	4,826,744	3,510
2026	15,698	2,143	33,640,782	31,958,743	26,912,626	5,046,117	5,091	255	1,018	764	278,725	1,682,039	6,728,156	5,046,117	3,661
2027	15,918	2,207	35,131,457	33,374,884	28,105,166	5,269,719	5,243	262	1,049	786	287,049	1,756,573	7,026,291	5,269,719	3,814
2028	16,138	2,271	36,650,318	34,817,802	29,320,255	5,497,548	5,395	270	1,079	809	295,373	1,832,516	7,330,064	5,497,548	3,969
2029	16,359	2,335	38,197,367	36,287,498	30,557,893	5,729,605	5,547	277	1,109	832	303,697	1,909,868	7,639,473	5,729,605	4,128
2030	16,579	2,399	39,772,602	37,783,972	31,818,081	5,965,890	5,699	285	1,140	855	312,021	1,988,630	7,954,520	5,965,890	4,288
2031	16,799	2,480	41,661,336	39,578,270	33,329,069	6,249,200	5,891	295	1,178	884	322,556	2,083,067	8,332,267	6,249,200	4,482
						83,293,297								83,293,296.53	

*** Per Capita VMT is based on RITA and Bureau of Transportation Statistics 2002 estimates. http://www.bts.gov/publications/state_transportation_statistics/summary/html/table_05_03.html

No growth is projected for a conservative estimate.

***Growth Rate is based on epa.gov, 2007-2030 projections. http://www.epa.gov/ttn/naaqs/ozone/areas/vmt/vmtscgf.htm

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220.21

496.0167715

ROG Factor (per long ton)	ROG Cost	NOX Factor	NOX Factor (per long ton)	Cost	PM Factor	PM Factor (Per long ton)	Cost	CO2 Factor	CO2 Factor (per metric ton)	Rate	Cost	Total Cost of Emissions for VMT Savings	AAA cost per mile (South Carolina Driving Costs)	75% Reinvestment back to local		Not Quantifiable Applying Job Creation Multiplier
	1700/Ton	((AutoTripsReduced*0.461)+(Annual AutoVMTReduced *0.321))/454		4000.00/Ton	((AutoTripsReduced*0.016)+(AnnualAutoVMTReduced*0.22))/454		168000/ton	((AutoTripsReduced*8.747)+(AnnualAutoVMTReduced*3.325))/454								
										21.4						
										21.4						
										21.4						
										21.4						
										21.88						
0.80	$ 1,353	1,833	0.82	$3,273	1,149	0.51	$ 86,187	20,406	9.25	22.36	$ 207		$ -			
0.85	$ 1,443	1,958	0.87	$3,496	1,229	0.55	$ 92,184	21,771	9.87	22.84	$ 226	$ 48,674	$ 807,697	$ 605,773		$ 1,284,238.14
0.90	$ 1,534	2,085	0.93	$3,724	1,311	0.59	$ 98,335	23,166	10.51	23.32	$ 245	$ 103,838	$ 1,723,321	$ 1,292,491		$ 2,740,081.05
0.96	$ 1,627	2,216	0.99	$3,957	1,395	0.62	$ 104,639	24,593	11.15	23.8	$ 265	$ 110,489	$ 1,833,955	$ 1,375,466		$ 2,915,988.26
1.01	$ 1,722	2,350	1.05	$4,196	1,481	0.66	$ 111,097	26,050	11.81	24.3	$ 287	$ 117,303	$ 1,947,294	$ 1,460,471		$ 3,096,197.92
1.07	$ 1,819	2,486	1.11	$4,440	1,569	0.70	$ 117,709	27,538	12.49	24.8	$ 310	$ 124,278	$ 2,063,340	$ 1,547,505		$ 3,280,710.03
1.13	$ 1,918	2,626	1.17	$4,689	1,660	0.74	$ 124,475	29,058	13.18	25.3	$ 333	$ 131,415	$ 2,182,091	$ 1,636,568		$ 3,469,524.58
1.19	$ 2,018	2,769	1.24	$4,944	1,752	0.78	$ 131,394	30,608	13.88	25.8	$ 358	$ 138,715	$ 2,303,548	$ 1,727,661		$ 3,662,641.58
1.25	$ 2,121	2,914	1.30	$5,204	1,846	0.82	$ 138,467	32,189	14.60	26.3	$ 384	$ 146,176	$ 2,427,711	$ 1,820,783		$ 3,860,061.02
1.31	$ 2,226	3,063	1.37	$5,470	1,943	0.87	$ 145,693	33,801	15.33	26.96	$ 413	$ 153,802	$ 2,554,580	$ 1,915,935		$ 4,061,782.91
1.37	$ 2,332	3,215	1.44	$5,740	2,041	0.91	$ 153,074	35,444	16.07	27.62	$ 444	$ 161,590	$ 2,684,155	$ 2,013,117		$ 4,267,807.24
1.44	$ 2,441	3,369	1.50	$6,016	2,141	0.96	$ 160,607	37,119	16.83	28.28	$ 476	$ 169,541	$ 2,816,436	$ 2,112,327		$ 4,478,134.02
1.50	$ 2,551	3,527	1.57	$6,298	2,244	1.00	$ 168,295	38,824	17.61	28.94	$ 510	$ 177,654	$ 2,951,423	$ 2,213,568		$ 4,692,763.24
1.57	$ 2,664	3,687	1.65	$6,584	2,348	1.05	$ 176,136	40,560	18.39	29.6	$ 544	$ 185,929	$ 3,089,116	$ 2,316,837		$ 4,911,694.91
1.63	$ 2,778	3,851	1.72	$6,877	2,455	1.10	$ 184,131	42,327	19.20	30.24	$ 580	$ 194,366	$ 3,229,515	$ 2,422,136		$ 5,134,929.02
1.70	$ 2,894	4,017	1.79	$7,174	2,564	1.14	$ 192,279	44,125	20.01	30.88	$ 618	$ 202,966	$ 3,372,620	$ 2,529,465		$ 5,362,465.58
1.77	$ 3,012	4,187	1.87	$7,477	2,674	1.19	$ 200,581	45,954	20.84	31.52	$ 657	$ 211,728	$ 3,518,431	$ 2,638,823		$ 5,594,304.59
1.84	$ 3,133	4,359	1.95	$7,785	2,787	1.24	$ 209,037	47,814	21.68	32.16	$ 697	$ 220,652	$ 3,666,947	$ 2,750,210		$ 5,830,446.04
1.91	$ 3,255	4,535	2.02	$8,098	2,902	1.30	$ 217,647	49,704	22.54	32.8	$ 739	$ 229,739	$ 3,818,170	$ 2,863,627		$ 6,070,889.93
2.00	$ 3,402	4,746	2.12	$8,475	3,040	1.36	$ 227,971	51,982	23.57	33.44	$ 788	$ 240,636	$ 3,999,488	$ 2,999,616		$ 6,359,186.40
	$ 46,243			$ 113,918.53			$ 3,039,939					$ 3,069,489	$ 50,989,841	$ 38,242,380		$ 81,073,846.46

Not Quantifiable Jobs Created Through Spending	Not Quantifiable Monetary Value of New Jobs
52.91	$ 1,453,666.13
112.89	$ 3,101,576.65
120.14	$ 3,300,691.09
127.56	$ 3,504,675.60
135.17	$ 3,713,530.17
142.94	$ 3,927,254.79
150.90	$ 4,145,849.48
159.03	$ 4,369,314.24
167.35	$ 4,597,649.05
175.83	$ 4,830,853.93
184.50	$ 5,068,928.86
193.34	$ 5,311,873.86
202.36	$ 5,559,688.93
211.56	$ 5,812,374.05
220.93	$ 6,069,929.23
230.49	$ 6,332,354.48
240.21	$ 6,599,649.79
250.12	$ 6,871,815.16
262.00	$ 7,198,146.23
3,340.24	

SitusAddre	ResSquareF	ComSquareF	MinYearBui	MaxYearBui	Bldgs	Land	Improvements	Appraised	Capped	Assessed	Exemption	Taxable	LegalDescr
1813 LOVEJOY ST	640		1947	1947	1	$ 63,000	$ 43,149	$ 106,149	$ 42,290	$ 1,700	$ -	$ 1,700	LT 14 HIGGINSONVILLE
1817 NATIONAL ST	672		1949	1949	1	$ 42,210	$ 46,410	$ 88,620	$ 41,145	$ 1,650	$ -	$ 1,650	
1802 MORRIS ST	720		1957	1957	1	$ 63,000	$ 50,908	$ 113,908	$ 56,835	$ 2,280	$ 2,000	$ 280	LOT 3 HIGGINSVILLE S/D SEE NOTEM
1806 NATIONAL ST	888		1948	1948	1	$ 63,000	$ 60,952	$ 123,952	$ 54,432	$ 2,180	$ -	$ 2,180	LOT 5 HIGGINSVILLE S/D
2003 LAFAYETTE ST	900		1950	1950	1	$ 385,000	$ 62,102	$ 447,102	$ 275,302	$ 11,010	$ -	$ 11,010	WILLS 80-3 L544
1801 MORRIS ST	912		1975	1975	1	$ 63,000	$ 58,477	$ 121,477	$ 53,429	$ 2,140	$ -	$ 2,140	LT 4 ON MORRIS ST HIGGINSONVILLE S/D *SEE NOTEM
	920		1950	1950	1	$ 63,000	$ 55,514	$ 118,514	$ 43,262	$ 1,730	$ -	$ 1,730	LOT 10 HIGGINSONVILLE S/D *SPLIT 9/83 1LT 1/187A
1813 PARK AVE	949		1956	1956	1	$ 75,600	$ 70,629	$ 146,229	$ 67,098	$ 2,690	$ 2,000	$ 690	LOT 6 #BKO655 PLAT IN DB973 P1713
1805 PALMETTO ST	960		1900	1900	1	$ 63,000	$ 63,165	$ 126,165	$ 58,978	$ 2,360	$ -	$ 2,360	
1801 NATIONAL ST	975		1980	1980	1	$ 63,000	$ 73,252	$ 136,252	$ 64,395	$ 2,580	$ -	$ 2,580	
1506 SYCAMORE ST	992		1987	1987	1	$ 150,000	$ 65,004	$ 215,004	$ 144,744	$ 5,790	$ 2,000	$ 3,790	LOT 2A HRS MILTON PARKER JR S/D PB 33 P 224
1906 DARBY DR	1000		1960	1960	1	$ 69,300	$ 60,673	$ 129,973	$ 68,104	$ 4,090	$ -	$ 4,090	LOT 8 BFT EST 1906 DARBY DR
2209 NATIONAL ST	1000		1959	1959	1	$ 63,000	$ 71,455	$ 134,455	$ 56,217	$ 2,250	$ -	$ 2,250	LOT 44 BEAUFORT EST 11-27-1978 DB02731712 J003
1905 DARBY DR	1000		1958	1958	1	$ 332,500	$ 72,418	$ 404,918	$ 162,771	$ 6,510	$ 2,000	$ 4,510	LOT 4 BFT EST DB01190250
1809 PARK AVE	1000		1958	1958	1	$ 69,300	$ 70,918	$ 140,218	$ 65,300	$ 2,620	$ -	$ 2,620	LOT 59 BEAUFORT ESTS S/D
1808 PARK AVE	1000		1958	1958	1	$ 69,300	$ 76,351	$ 145,651	$ 70,812	$ 2,840	$ -	$ 2,840	LOT 50 BFT ESTATES *BROWN PATRICIA; KENDRISON STEPHANIE
2002 PARK AVE	1000		1958	1958	1	$ 69,300	$ 66,058	$ 135,358	$ 58,098	$ 2,330	$ -	$ 2,330	LOT 21 BFT EST
1513 SYCAMORE ST	1000		1958	1958	1	$ 69,300	$ 76,215	$ 145,515	$ 77,096	$ 3,090	$ 2,000	$ 1,090	LOT 22 BFT EST 06-12-1979 DB02822063 K071
1503 ALEXANDER DR	1000		1958	1958	1	$ 63,000	$ 67,694	$ 130,694	$ 65,244	$ 2,610	$ 2,000	$ 610	LOT 25 BFT EST 7-30-64 DB01240157
1502 ALEXANDER DR	1000		1958	1958	1	$ 63,000	$ 71,448	$ 134,448	$ 65,721	$ 2,630	$ 2,000	$ 2,630	LOT 24 BFT EST 9-1-70 DB01770112
1800 PARK AVE	1000		1958	1958	1	$ 69,300	$ 69,884	$ 139,184	$ 58,843	$ 2,350	$ -	$ 2,350	LOT 54 BEAUFORT ESTS
1810 PARK AVE	1000		1958	1958	1	$ 69,300	$ 77,910	$ 147,210	$ 67,601	$ 2,710	$ -	$ 2,710	LOT 49 BFT EST
1911 OCONNELL ST	1000		1958	1958	1	$ 61,727	$ 61,753	$ 123,480	$ 123,480	$ 4,940	$ -	$ 4,940	LOT 31 BFT EST 1911 OCONNELL ST
1905 OCONNELL ST	1000		1958	1958	1	$ 69,300	$ 67,789	$ 137,089	$ 65,027	$ 2,610	$ -	$ 2,610	LOT 34 BEAUFORT ESTATES S/D *DEED OF DISTRIB 04890146 PLAT IN DB880 P
1912 OCONNELL ST	1000		1958	1958	1	$ 63,000	$ 69,460	$ 132,460	$ 62,407	$ 2,500	$ 2,000	$ 500	LOT 43 BFT ESTATES
1801 PARK AVE	1000		1958	1958	1	$ 69,300	$ 67,449	$ 136,749	$ 59,189	$ 2,370	$ -	$ 2,370	LOT 55 BEAUFORT ESTS S/D PLAT IN DB714 P2500 PB10 P78
1901 PARK AVE	1000		1958	1958	1	$ 75,600	$ 69,598	$ 145,198	$ 64,248	$ 2,570	$ -	$ 2,570	16 BFT EST DB02051277
1509 SYCAMORE ST	1000		1958	1958	1	$ 63,000	$ 67,789	$ 130,789	$ 65,097	$ 2,610	$ -	$ 2,610	LOT 30 BFT EST 3-15-62 DB01100260
1910 OCONNELL ST	1000		1958	1958	1	$ 36,569	$ 88,431	$ 125,000	$ 125,000	$ 5,000	$ -	$ 5,000	LOT 42 BEAUFORT ESTATES
2205 NATIONAL ST	1000		1958	1958	1	$ 63,000	$ 82,138	$ 145,138	$ 69,689	$ 2,790	$ 2,000	$ 790	46 BFT EST DB00980169 *R/W ABANDONMENT IN DB2042/802
2207 NATIONAL ST	1008		1994	1994	1	$ 63,000	$ 86,710	$ 149,710	$ 75,389	$ 3,020	$ -	$ 3,020	LOT 45 BEAUFORT ESTS
1512 SYCAMORE ST	1016		1987	1987	1	$ 150,000	$ 100,595	$ 250,595	$ 129,158	$ 5,170	$ -	$ 5,170	LOT 3 BLK B HRS MILTON PARKER JR S/D PB33 P224 PLAT IN DB898 PG1000
1811 NATIONAL ST	1040		1960	1960	1	$ 63,000	$ 63,427	$ 126,427	$ 59,383	$ 2,380	$ 2,000	$ 380	NATIONAL ST DB02410811
1606 PALMETTO ST	1066		1983	1983	1	$ 63,000	$ 87,682	$ 150,682	$ 82,342	$ 3,300	$ -	$ 3,300	LOT 26 BEAUFORT ESTATES S/D PLAT IN DB756 PG835 PLAT IN DB940 PG421
1916 BAGGETT ST	1073		1978	1978	1	$ 106,090	$ 68,530	$ 174,620	$ 128,560	$ 5,150	$ -	$ 5,150	
1804 PHILLIPS ST	1092		1999	1999	1	$ 63,000	$ 102,566	$ 165,566	$ 89,622	$ 3,590	$ -	$ 3,590	LOT 5 HUGGINSONVILLE S/D PLAT IN DB1198 P1841
1802 PHILLIPS ST	1092		1999	1999	1	$ 63,000	$ 103,673	$ 166,673	$ 95,697	$ 3,830	$ -	$ 3,830	LOT 3 HIGGONSVILLE S/D PLAT IN DB1165 P613
1809 NATIONAL ST	1092		1999	1999	1	$ 63,000	$ 98,211	$ 161,211	$ 87,057	$ 3,480	$ -	$ 3,480	LOT 10 PB67 P17
2208 NATIONAL ST	1092		1999	1999	1	$ 63,000	$ 99,425	$ 162,425	$ 88,100	$ 3,530	$ -	$ 3,530	LOT 25 HIGGONSVILLE S/D PLAT AT DB1144 P524
2210 NATIONAL ST	1092		1999	1999	1	$ 63,000	$ 101,233	$ 164,233	$ 89,569	$ 3,580	$ -	$ 3,580	LOT 27 HIGGONSVILLE S/D *SPLIT 2/00 0.20 AC 1/283
2000 PARK AVE	1125		1987	1987	1	$ 69,300	$ 116,479	$ 185,779	$ 103,895	$ 4,150	$ -	$ 4,150	LOT 20 BFT EST
1904 OCONNELL ST	1131		1979	1979	1	$ 63,000	$ 90,398	$ 153,398	$ 77,456	$ 3,100	$ 2,000	$ 1,100	LOT 39 BEAUFORT ESTS 04-06-1979 DB02791279 K028
1806 PHILLIPS ST	1132		1954	1954	1	$ 25,220	$ 57,780	$ 83,000	$ 83,000	$ 3,320	$ 2,000	$ 1,320	LOT 7 HIGGINSONVILLE S/D
2309 LAFAYETTE ST	1152		1974	1974	1	$ 63,000	$ 68,853	$ 131,853	$ 60,530	$ 2,420	$ 2,000	$ 420	NATIONAL ST 2-11-70 DB170P234
1601 SYCAMORE ST	1161		2001	2001	1	$ 69,300	$ 104,672	$ 173,972	$ 99,125	$ 3,970	$ -	$ 3,970	LOT 12 BFT EST PB 10 P 78 REV PB33P186 CB 6 BOX 200 9/89 SPLIT 3/93 0.06 A
1912 DARBY DR	1203		1986	1986	1	$ 69,300	$ 96,866	$ 166,166	$ 166,166	$ 6,640	$ -	$ 6,640	LOT 11 BFT EST PB 10 P 78 REVISED PB 33 P 186
1814 OCONNELL ST	1223		1986	1986	1	$ 63,000	$ 98,830	$ 161,830	$ 84,972	$ 3,400	$ -	$ 3,400	LOT 13 OCONNELL ST HIGGINSONVILLE *SPLIT 10/86 1/103 1 LOT
1922 BAGGETT ST	1242		1957	1957	1	$ 105,946	$ 76,333	$ 182,279	$ 103,926	$ 4,160	$ 2,000	$ 2,160	*T ACCT 88 TO CORRECT VALUE
2214 NATIONAL ST	1247		1953	1953	1	$ 69,300	$ 73,054	$ 142,354	$ 66,419	$ 2,660	$ 2,000	$ 660	LOT 31 E 1/2 LOT 33 HIGGINSVILLE
1804 OCONNELL ST	1280		1962	1962	1	$ 63,000	$ 43,399	$ 106,399	$ 106,399	$ 4,260	$ -	$ 4,260	LOT 5 O CONNELL *SEE NOTEM

1903 DARBY DR	1291		1958	1958	1	$ 332,500	$ 98,604	$ 431,104	$ 184,736	$ 7,390	$ 2,000	$ 5,390	LOT 5 BFT EST
2201 LAFAYETTE ST	1360		1969	1969	1	$ 63,000	$ 83,514	$ 146,514	$ 67,789	$ 2,710	$ -	$ 2,710	LOT NO 1 HIGGINSVILLE
1808 NATIONAL ST	1367		1900	1900	1	$ 63,000	$ 73,328	$ 136,328	$ 44,706	$ 1,790	$ 1,790	$ -	LOT 7 HIGGINSVILLE S/D *SPLIT 1/89 1 LOT 1/142
1813 NATIONAL ST	1386		1969	1969	1	$ 63,000	$ 100,434	$ 163,434	$ 77,517	$ 3,100	$ 2,000	$ 1,100	LOT 14 HIGGINSONVILLE 10-25-67 DB01480278
1805 PARK AVE	1396		1958	1958	1	$ 69,300	$ 76,386	$ 145,686	$ 70,369	$ 2,820	$ 2,000	$ 820	LOT 57 BFT EST 9-23-75 DB02321712
1803 PARK AVE	1412		1958	1958	1	$ 69,300	$ 98,639	$ 167,939	$ 84,691	$ 3,390	$ 2,000	$ 1,390	LOT 56 WILLS M194 L175
2215 NATIONAL ST	1420		1953	1953	1	$ 63,000	$ 101,493	$ 164,493	$ 63,095	$ 2,520	$ -	$ 2,520	LOT 34 HIGGINSVILLE PLAT DEED BK 12 PG 1
1503 SYCAMORE ST	1458		2003	2003	1	$ 63,000	$ 133,340	$ 196,340	$ 117,581	$ 4,700	$ -	$ 4,700	LOT 35 HIGGONSVILLE S/D PB12 PG1 PLAT IN DB897 PG2037
1814 LOVEJOY ST	1458		1982	1982	1	$ 259,412	$ 96,340	$ 355,752	$ 175,491	$ 7,020	$ 2,000	$ 5,020	LOTS 13 14 HIGGINSVILLE S/D PLAT IN DB350 P1513 PB43 P119 *SEE NOTEM S
1914 BAGGETT ST	1470		1963	1963	1	$ 106,090	$ 67,884	$ 173,974	$ 95,530	$ 3,820	$ 2,000	$ 1,820	
1909 OCONNELL ST	1478		1982	1982	1	$ 69,300	$ 113,367	$ 182,667	$ 96,060	$ 3,850	$ 3,850	$ -	BFT EST LOT 32 DB03070487 L749
1604 PALMETTO ST	1498		1977	1977	1	$ 63,000	$ 118,833	$ 181,833	$ 98,731	$ 3,950	$ -	$ 3,950	LOT 27 BFT EST 2-1-74 DB02171750
1812 PARK AVE	1571		1958	1958	1	$ 69,300	$ 109,272	$ 178,572	$ 75,672	$ 3,030	$ -	$ 3,030	LOT 6 BLK F BEAUFORT EST S/D PLAT IN DB920 P734
2205 LAFAYETTE ST	1612		1962	1962	1	$ 63,000	$ 97,461	$ 160,461	$ 66,309	$ 2,650	$ 2,000	$ 650	LOT 2 HIGGINSVILLE
2401 LAFAYETTE ST	1748		1975	1975	1	$ 63,000	$ 140,068	$ 203,068	$ 97,224	$ 3,890	$ 2,000	$ 1,890	LOT 1 HIGGONSVILLE 12-15-65 DB01330278
1502 PALMETTO ST	1756		1966	1966	1	$ 63,000	$ 124,677	$ 187,677	$ 89,091	$ 3,560	$ -	$ 3,560	LOT 37 BFT ESTATES 4-26-74 DB02200160
1803 MORRIS ST	1784		1954	1954	1	$ 63,000	$ 102,040	$ 165,040	$ 85,138	$ 3,410	$ 2,000	$ 1,410	MORRIS ST *NAME CHANGE BY MARRIAGE *LICENSE FILE IN ASS OFFICE
1899 DARBY DR	1844		1952	1952	1	$ 455,000	$ 138,671	$ 593,671	$ 335,140	$ 13,400	$ -	$ 13,400	POR LOT 34 & 47 SEC 31 1N1W
	1845		1955	1955	1	$ 63,000	$ 81,678	$ 144,678	$ 97,320	$ 3,890	$ -	$ 3,890	LOT 21 BLK A TRASK S/D ANNEX INTO THE CITY 4-16-92 ANNEXATION ORIDINA
2205 MORRIS ST	1847		1900	1900	1	$ 63,000	$ 101,772	$ 164,772	$ 68,394	$ 2,740	$ -	$ 2,740	LOT 30 HIGGINSVILLE S/D
2203 NATIONAL ST	1854		1958	1958	1	$ 63,000	$ 121,694	$ 184,694	$ 105,349	$ 4,220	$ -	$ 4,220	LOT 47 BEAUFORT EST BEAUFORT EST
1907 DARBY DR	2016		1958	1958	1	$ 332,500	$ 146,328	$ 478,828	$ 215,367	$ 8,610	$ 2,000	$ 6,610	LOT 3 BFT ESTATES 12-5-75 DB02330355
1908 DARBY DR	2182		1958	1958	1	$ 69,300	$ 139,808	$ 209,108	$ 100,549	$ 4,020	$ 2,000	$ 2,020	LOT 9 BFT EST 05-09-1978 DB02631624 *SPLIT 7/98 0.32 AC 1/282 UNCONSOL
1519 PALMETTO ST	2232		1968	1968	1	$ 75,600	$ 164,032	$ 239,632	$ 126,393	$ 5,060	$ 2,000	$ 3,060	LTS 15 17 PALME O CONNELL ST 2-16-68 DB01510204 ADDR CHG BY MORTG C
1815 NATIONAL ST	2337		1970	1970	1	$ 63,000	$ 154,950	$ 217,950	$ 109,940	$ 4,400	$ -	$ 4,400	LOT 16 HIGGINSONVILLE *T ACCT 85 INCORRECT RATIO
1600 SYCAMORE ST	2673		1930	1930	1	$ 150,000	$ 154,180	$ 304,180	$ 171,135	$ 6,850	$ -	$ 6,850	LOT 5 HRS MILTON PARKER JR PLAT IN DB845 P2671 PORTION LOT 4 PB 33 PG
2203 MORRIS ST	564		1962	1962	1	$ 63,000	$ 43,042	$ 106,042	$ 42,927	$ 2,580	$ -	$ 2,580	MORRIS S/LOT 24 HIGGINSVILLE
2213 NATIONAL ST	649		1953	1953	1	$ 63,000	$ 45,434	$ 108,434	$ 44,220	$ 2,650	$ -	$ 2,650	LOT 32 HIGGINSVILLE PLAT DEED BK 12 PG 1
	690		1953	1953	1	$ 63,000	$ 28,000	$ 91,000	$ 50,758	$ 3,050	$ -	$ 3,050	LOT 8-A POLK VILLAGE ORDINANCE# O-50-01
2217 NATIONAL ST	713		1953	1953	1	$ 63,000	$ 48,897	$ 111,897	$ 47,470	$ 2,850	$ -	$ 2,850	LOT 36 HIGGINSVILLE PLAT DEED BK 12 PG 1 8-26-77 DB02530822
	713		1952	1952	1	$ 63,000	$ 33,748	$ 96,748	$ 58,799	$ 3,530	$ -	$ 3,530	LOT 4A POLK VILLAGE *ANNEX INTO THE CITY BY ORDINANCE#O-28-07
	713		1951	1951	1	$ 63,000	$ 30,248	$ 93,248	$ 58,188	$ 3,490	$ -	$ 3,490	LOT 2 BB N M POLK S/D POLK VILLAGE PB40 P86 CB 6 PG 200 9/89 ORDINANC
	713		1951	1951	1	$ 63,000	$ 30,248	$ 93,248	$ 93,248	$ 3,730	$ -	$ 3,730	LOT 4BB POLK VILLAGE ORDINANCE# O-39-01
	713		1951	1951	1	$ 63,000	$ 30,248	$ 93,248	$ 58,188	$ 3,490	$ -	$ 3,490	#BKN461 ORDINANCE# O-39-01
2305 LAFAYETTE ST	718		1925	1925	1	$ 63,000	$ 46,414	$ 109,414	$ 36,315	$ 2,170	$ -	$ 2,170	POR LOTS 1 3 HIGGINSVILLE S/D 6/10 MERGE FROM 1/108A PER OWNER'S REC
	768		1951	1951	1	$ 63,000	$ 34,330	$ 97,330	$ 63,031	$ 3,780	$ -	$ 3,780	POLK CENTER 5 BB #BKN461 ORDINANCE# O-39-01
1410 PALMETTO ST	770		1955	1955	1	$ 69,300	$ 46,709	$ 116,009	$ 38,711	$ 2,320	$ -	$ 2,320	N 1/2 LOT 19, 21, 23 HIGGINSVILLE *DEATH CERT. FILE IN ASS. FILE
1920 BAGGETT ST	793		1965	1965	1	$ 106,090	$ 38,114	$ 144,204	$ 64,857	$ 3,890	$ -	$ 3,890	LOT 2B NEW BLDGS LOTS DB00750465
1912 BAGGETT ST	811		1955	1965	1	$ 106,090	$ 40,033	$ 146,123	$ 66,982	$ 4,020	$ -	$ 4,020	
1918 BAGGETT ST	851		1955	1965	1	$ 106,090	$ 44,517	$ 150,607	$ 72,753	$ 4,360	$ -	$ 4,360	LOT 3 B DB02061773
1808 MORRIS ST	912		1962	1962	1	$ 63,000	$ 77,223	$ 140,223	$ 75,871	$ 4,550	$ -	$ 4,550	LOT 13 MORRIS ST
1906 BAGGETT ST	936		1955	1965	1	$ 84,201	$ 44,213	$ 128,414	$ 69,414	$ 4,170	$ -	$ 4,170	LOT 11-B B 12 13 NEW BLDGS 5-7-71 DB01840028 1/07 0.01 AC ADDED TO 3,
	943		1951	1951	1	$ 63,000	$ 39,336	$ 102,336	$ 68,362	$ 4,100	$ -	$ 4,100	LOT 1-B N /M POLK S/D JR#58512 4/86 ORDINANCE# O-39-01
2405 LAFAYETTE ST	963		1950	1950	1	$ 63,000	$ 63,653	$ 126,653	$ 55,659	$ 3,340	$ -	$ 3,340	
	988		1956	1956	1	$ 63,000	$ 40,136	$ 103,136	$ 73,985	$ 4,440	$ -	$ 4,440	LOT 4-C #BKN461 ORDINANCE# O-39-01
1900 DARBY DR	1000		1959	1959	1	$ 69,300	$ 88,267	$ 157,567	$ 157,567	$ 6,300	$ -	$ 6,300	LOT 15 BFT EST
1906 OCONNELL ST	1000		1959	1959	1	$ 63,000	$ 67,879	$ 130,879	$ 60,036	$ 3,600	$ -	$ 3,600	LOT 40 BFT ESTATES
1909 DARBY DR	1000		1958	1958	1	$ 315,000	$ 77,119	$ 392,119	$ 169,850	$ 10,190	$ 10,190	$ -	LOT 2 BFT EST
1811 PARK AVE	1000		1958	1958	1	$ 69,300	$ 70,129	$ 139,429	$ 67,250	$ 4,040	$ -	$ 4,040	LOT 60 BEAUFORT ESTATE PLAT ATT 912/1073, 1078, 1083
1807 PARK AVE	1000		1958	1958	1	$ 69,300	$ 73,263	$ 142,563	$ 66,590	$ 4,000	$ -	$ 4,000	LOT 58 1807 PARK AVE
1802 PARK AVE	1000		1958	1958	1	$ 69,300	$ 59,781	$ 129,081	$ 60,362	$ 3,620	$ -	$ 3,620	LOT 53 BEAUFORT EST 1802 PARK AVE

1804 PARK AVE	1000		1958	1958	1	$ 69,300	$ 62,970	$ 132,270	$ 62,206	$ 3,730	$ -	$ 3,730	LOT 52 BFT EST 4-16-74 DB02191655
1907 OCONNELL ST	1000		1958	1958	1	$ 69,300	$ 67,789	$ 137,089	$ 65,027	$ 3,900	$ -	$ 3,900	LOT 33 BFT EST 1907 OCONNELL ST
1900 PARK AVE	1000		1958	1958	1	$ 69,300	$ 83,504	$ 152,804	$ 75,943	$ 4,560	$ -	$ 4,560	LOT 17 BFT EST 10-26-70
1902 PARK AVE	1000		1958	1958	1	$ 69,300	$ 72,005	$ 141,305	$ 70,980	$ 4,260	$ -	$ 4,260	LOT 18 BEAUFORT ESTATES S/D PB10 P78 PLAT IN DB251 P256 PLAT ATT DB22
1904 PARK AVE	1000		1958	1958	1	$ 69,300	$ 71,235	$ 140,535	$ 71,286	$ 4,280	$ -	$ 4,280	LOT 19 BFT ESTATES 4-15-77 DB02490063
1510 SYCAMORE ST	1011		1987	1987	1	$ 150,000	$ 96,828	$ 246,828	$ 145,219	$ 8,710	$ -	$ 8,710	LOT 3A HRS MILTON PARKER JR S/D PB 33 P 224
1508 SYCAMORE ST	1025		1987	1987	1	$ 150,000	$ 117,565	$ 267,565	$ 202,189	$ 12,130	$ -	$ 12,130	LOT 2B HRS MILTON PARKER JR S/D PB 33 P 224
1809 OCONNELL ST	1032		2003	2003	1	$ 94,500	$ 100,055	$ 194,555	$ 95,985	$ 5,760	$ -	$ 5,760	LOT 12 W1/2 LOT 10 HIGGINSVILLE 03-29-1978 DB02611640 I157
1403 SYCAMORE ST	1037		1900	1900	1	$ 69,300	$ 65,783	$ 135,083	$ 67,086	$ 4,030	$ -	$ 4,030	LTS 35 W1/2 33 HIGGINSONVILLE
1500 SYCAMORE ST	1050		1950	1950	1	$ 150,000	$ 107,189	$ 257,189	$ 140,438	$ 8,430	$ -	$ 8,430	1900 SYCAMORE STREET PB29B54 #BKN1022
1811 OCONNELL ST	1056		1989	1989	1	$ 63,000	$ 88,310	$ 151,310	$ 74,653	$ 4,480	$ -	$ 4,480	LOT 14 HIGGINSONVILLE
1504 SYCAMORE ST	1056		1988	1988	1	$ 150,000	$ 101,669	$ 251,669	$ 182,356	$ 10,940	$ -	$ 10,940	LOT 1B HRS MILTON PARKER JR S/D PB 33 P 224
1902 OCONNELL ST	1057		1977	1977	1	$ 63,000	$ 82,196	$ 145,196	$ 71,502	$ 4,290	$ -	$ 4,290	LOT 38 BEAUFORT ESTS 10-19-1977 DB02550807 I150
2501 LAFAYETTE ST	1064		1953	1953	1	$ 63,000	$ 61,547	$ 124,547	$ 62,850	$ 3,770	$ 2,000	$ 3,770	
1502 SYCAMORE ST	1072		1988	1988	1	$ 150,000	$ 99,695	$ 249,695	$ 172,944	$ 10,370	$ 10,370	$ -	LOT 1A HRS MILTON PARKER JR S/D 46 PB 33 P 224
	1081		1960	1960	1	$ 90,479	$ 56,370	$ 146,849	$ 85,983	$ 5,160	$ -	$ 5,160	PB55 P93
1812 PHILLIPS ST	1092		1999	1999	1	$ 63,000	$ 98,211	$ 161,211	$ 87,057	$ 3,480	$ -	$ 3,480	LOT 13 HIGGINSVILLE * *SPLIT 11/83 1 LOT 1/66 *T ACCT 83 *T ACCT 84 CORRE
1815 LOVEJOY ST	1092		1999	1999	1	$ 31,072	$ 88,928	$ 120,000	$ 120,000	$ 7,200	$ -	$ 7,200	LOT 16 LOVEJOY PLAT IN DB1205 P992
1514 SYCAMORE ST	1157		1985	1985	1	$ 150,000	$ 105,353	$ 255,353	$ 150,645	$ 9,040	$ -	$ 9,040	LOT 4 HRS MILTON PARKER S/D PB 33 P 224
	1168		1955	1955	1	$ 211,272	$ 73,630	$ 284,902	$ 240,542	$ 14,430	$ -	$ 14,430	
1910 DARBY DR	1204		1986	1986	1	$ 75,600	$ 94,066	$ 169,666	$ 91,323	$ 5,480	$ 5,480	$ -	LOT 10 BFT EST PB 10 P 78 REVISED PB 33 P 186
1905 PARK AVE	1240		1958	1958	1	$ 69,300	$ 87,774	$ 157,074	$ 74,663	$ 2,990	$ -	$ 2,990	LOT 14 BFT EST DB01680284
1500 ALEXANDER DR	1240		1958	1958	2	$ 63,000	$ 87,138	$ 150,138	$ 69,690	$ 4,180	$ -	$ 4,180	LOT 29 BFT EST PLAT IN DB726PG666
	1242		1957	1957	1	$ 187,660	$ -	$ 187,660	$ 187,660	$ 11,260	$ -	$ 11,260	LOT 14 WOODLAWN
1800 OCONNELL ST	1266		1996	1996	1	$ 25,068	$ 108,932	$ 134,000	$ 134,000	$ 5,360	$ -	$ 5,360	
	1277		1946	1955	2	$ 1,254,701	$ 73,930	$ 1,328,631	$ 105,625	$ 4,230	$ -	$ 1,300	RESIDENCE AT 6% SUBJ TO ROLL BACK TAX LIEN TIMBERLAND PB55 P55 P93 S
2209 MORRIS ST	1296		1991	1991	1	$ 63,000	$ 98,187	$ 161,187	$ 84,942	$ 5,100	$ 5,100	$ -	
1908 BAGGETT ST	1316		1952	1965	1	$ 88,517	$ 56,649	$ 145,166	$ 84,436	$ 5,070	$ -	$ 5,070	LOT 10 POR LOT 11 BLK B HARVEY DB02900353 K431 1/07 0.01 AC ADDED FM
1902 DARBY DR	1320		1958	1958	1	$ 75,600	$ 99,426	$ 175,026	$ 91,464	$ 5,490	$ -	$ 5,490	LOT 7 BEAUFORT ESTATES PLAT IN DB866 PG2542
1511 SYCAMORE ST	1356		1958	1958	1	$ 38,377	$ 86,623	$ 125,000	$ 125,000	$ 7,500	$ -	$ 7,500	LOT 23 BFT EST #BKN851
	1370		1955	1955	1	$ 66,000	$ 79,550	$ 145,550	$ 145,550	$ 8,730	$ 8,730	$ -	LOT 13 WOODLAWN *ANNEX INTO THE CITY BY ORDINANCE#O-05-07
1601 PALMETTO ST	1404		1983	1983	1	$ 63,000	$ 79,337	$ 142,337	$ 62,591	$ 3,760	$ -	$ 3,760	LOT 18 OCONNELL ST PB98 P80
1901 DARBY DR	1450		1958	1958	1	$ 350,000	$ 105,942	$ 455,942	$ 186,422	$ 11,190	$ 11,190	$ -	LOT 6 BEAUFORT EST **FRED WASHINGTON DOCTOR KATHERINE P MOUZON
	1462		1932	1932	1	$ 613,000	$ -	$ 613,000	$ 544,740	$ 28,500	$ -	$ 20,150	PLAT W/DEED 0.02 AC TO US21R/W **SEE 6499265 FOR 95 TAXES** JR# 3711
1806 PARK AVE	1464		1958	1958	1	$ 69,300	$ 83,918	$ 153,218	$ 73,399	$ 4,400	$ -	$ 4,400	LOT 51 BFT EST 01-21-1978 DB02590254
2207 MORRIS ST	1477		1900	1900	1	$ 63,000	$ 105,541	$ 168,541	$ 58,995	$ 3,540	$ -	$ 3,540	LOT 32 DB01020121 ADR IS 2207 RESI WAS REMODEL
1806 MORRIS ST	1528		1966	1966	1	$ 63,000	$ 118,112	$ 181,112	$ 89,528	$ 5,370	$ 2,000	$ 5,370	LOT 11 HIGGINSVILLE T ACCOUNT 1982
2201 NATIONAL ST	1617		1958	1958	1	$ 63,000	$ 123,674	$ 186,674	$ 101,084	$ 6,070	$ -	$ 6,070	LOT 48 BFT EST
2001 LAFAYETTE ST	1958		1950	1950	1	$ 490,000	$ 139,539	$ 629,539	$ 318,486	$ 19,110	$ -	$ 19,110	POR LOT 47 SEC 31 1N1W PB44 P208 PB50 P17 *SPLIT 12/92 1.23 AC 1/276 SP
1303 SYCAMORE ST	2023		1934	1957	2	$ 277,974	$ 120,110	$ 398,084	$ 125,416	$ 7,520	$ -	$ 7,520	LOTS 35 36 HIGGINSONVILLE S/D
1810 MORRIS ST	2038		1976	1976	1	$ 63,000	$ 138,028	$ 201,028	$ 104,483	$ 6,270	$ -	$ 6,270	LOT 15 HIGGINSONVILLE JR#57307 01/86
		374	2007	2007	1	$ 389,838	$ -	$ 389,838	$ 389,838	$ 23,390	$ -	$ 23,390	PARCEL 2 PB32 P211 PB40 P54 JR#76785 6/89
1802 BOUNDARY ST		676	1986	1986	1	$ 384,160	$ 133,407	$ 517,567	$ 214,407	$ 12,870	$ -	$ 12,870	CAR WASH..*SEE NOTEM... *SPLIT 4/82 1 LOT 3/27D PB41 P41
1807 OCONNELL ST		700	1900	1900	1	$ 63,000	$ 12,850	$ 75,850	$ 40,004	$ 2,400	$ 2,400	$ -	W 1/2 LOT 8 HIGGINSVILLE 8-30-61 DB108 P72 CHURCH BUILDING
		1176	1986	1986	1	$ 168,460	$ 80,220	$ 248,680	$ 248,680	$ 14,920	$ -	$ 14,920	CHINATOWN RESTAURANT POR LOTS 1, 2, 1A NM POLK SUB *SPLIT 2/84 26A/
		1296	1956	1956	1	$ 214,766	$ 40,577	$ 255,343	$ 156,665	$ 9,400	$ -	$ 9,400	LOT #3 PORT ROYAL ISL
		1310	1958	1958	1	$ 878,028	$ 42,354	$ 920,382	$ 445,741	$ 26,740	$ -	$ 26,740	VETS OFFICE JR53133 PB46 P138 SEW EASEMENT .08 AC 10/07 ACREAGE CHGD
1803 NATIONAL ST		1428	1992	1992	1	$ 63,000	$ 64,123	$ 127,123	$ 87,582	$ 5,260	$ 5,260	$ -	
		1440	1956	1956	1	$ 268,457	$ 51,247	$ 319,704	$ 161,403	$ 9,680	$ -	$ 9,680	OFFICE 0.01 AC TO US 21 R/W
		1500	1988	1988	1	$ 203,793	$ 115,480	$ 319,273	$ 319,273	$ 19,160	$ -	$ 19,160	PENZOIL TRACT PB42 P89 PB70 P134 DB622 P427 12-2-92
111 RIBAUT RD		1620	1969	1969	1	$ 161,367	$ 62,334	$ 223,701	$ 143,359	$ 8,600	$ -	$ 8,600	N 1/2 LOTS 1 2 3 E

1908 BOUNDARY ST		1737	1946	1946	1	$ 163,759	$ 82,282	$ 246,041	$ 193,470	$ 11,610	$ -	$ 11,610	RESTAURANT & CHECK CASHING OFC LOTS 3 & 4 BLK D TACCT88 CORRECT VAL
		1828	1978	1978	1	$ 449,505	$ 129,891	$ 579,396	$ 451,628	$ 27,100	$ -	$ 27,100	
		1953	1997	1997	1	$ 228,214	$ 202,326	$ 430,540	$ 356,799	$ 21,400	$ -	$ 21,400	PARCEL B-1 PB54 P161 PB59 P11 -
1816 BOUNDARY ST		1960	1946	1946	1	$ 362,653	$ 5,413	$ 368,066	$ 286,580	$ 17,190	$ -	$ 17,190	CHRISTENSEN REALTY & SURVEYING PORTIONS OF LTS 6,7,& PAR A,B PLAT IN D
		1980	1973	1973	1	$ 157,870	$ 23,472	$ 181,342	$ 131,055	$ 7,860	$ -	$ 7,860	CAR CARE CLINIC
1905 BAGGETT ST		1980	1969	1969	1	$ 141,604	$ 6,444	$ 148,048	$ 74,534	$ 4,480	$ -	$ 4,480	PB41 P41
2200 MORRIS ST		1998	1989	1989	1	$ 63,000	$ 80,222	$ 143,222	$ 121,686	$ 7,300	$ 7,300	$ -	LOT 23 MORRIS ST 11-16-71
		2010	1983	1983	1	$ 1,149,586	$ 189,887	$ 1,339,473	$ 1,261,353	$ 75,680	$ -	$ 75,680	WENDYS #BKO614
		2320	1951	1951	1	$ 239,658	$ 75,385	$ 315,043	$ 212,246	$ 12,740	$ -	$ 12,740	PB98 P56 "ABC LIQUOR STORE" 0.03 AC TO US 21 R/W
		2337	1978	1978	1	$ 279,946	$ 201,595	$ 481,541	$ 481,541	$ 28,900	$ -	$ 28,900	LOT 4 W1/2 LT3 POLK VILLAGE 0.01 AC TO US 21 R/W
		2346	1974	1974	1	$ 480,000	$ 165,770	$ 645,770	$ 230,780	$ 13,840	$ -	$ 13,840	0.02 AC TO US 21 R/W "PIZZA HUT"
2201 MORRIS ST		2482	1900	1900	1	$ 42,210	$ 67,351	$ 109,561	$ 91,186	$ 5,470	$ 5,470	$ -	CHURCH BUILDING MORRIS STREET DB14 P488
		2501	1981	1981	1	$ 358,052	$ 350,976	$ 709,028	$ 626,430	$ 37,580	$ -	$ 37,580	FORMERLY BANK NOW USED CAR LOT 0.03 AC TO US 21 R/W PB42 P92 PB66 F
		2511	1997	1997	1	$ 302,113	$ 283,155	$ 585,268	$ 585,268	$ 35,120	$ -	$ 35,120	LOT 8 PORT ROYAL ISLAND
		2550	1981	1981	1	$ 313,200	$ 88,720	$ 401,920	$ 212,621	$ 12,750	$ -	$ 12,750	0.02 AC TO US 21 R/W PB55 P77
		2602	1988	1988	1	$ 556,625	$ 210,063	$ 766,688	$ 737,710	$ 44,270	$ -	$ 44,270	*SPLIT 10/87 1.46 AC 26/170 *SPLIT 10/87 .59AC 26/171 PB35 PG 35 PB120 P7
		2637	1992	1992	1	$ 315,822	$ 306,419	$ 622,241	$ 368,836	$ 22,130	$ -	$ 22,130	LOT 8 1/2 7 POLK VILLAGE 0.22 AC TO US 21 R/W
		2755	1992	1992	1	$ 331,701	$ 235,154	$ 566,855	$ 566,855	$ 34,010	$ -	$ 34,010	LOT 1 PB35 PG35
		2775	1980	1980	1	$ 574,992	$ 429,484	$ 1,004,476	$ 835,789	$ 50,150	$ -	$ 50,150	OUTPARCEL A JEAN RIBAUT SQUARE "NATIONSBANK/ATM/DRIVE-THRU" PB98
		2800	1991	1991	1	$ 544,217	$ 100,224	$ 644,441	$ 636,212	$ 38,170	$ -	$ 38,170	LOT 4 NEIL TRASK FARM PLAT ATTACHED DB1523P80
		2821	1985	1985	1	$ 523,894	$ 200,766	$ 724,660	$ 724,660	$ 43,480	$ -	$ 43,480	TACO BELL PB70 P134 Q
		2948	1969	1969	1	$ 335,000	$ 103,000	$ 438,000	$ 438,000	$ 26,280	$ -	$ 26,280	OFFICE HWY 170 PB 34 P 118 *T ACCT 83 CORRECT VALUE
1817 BOUNDARY ST		3168	1999	1999	2	$ 268,265	$ 270,277	$ 538,542	$ 399,028	$ 23,940	$ -	$ 23,940	LOTS 16 18 HIGGINSVILLE SUB PB43 P119 OFFICE BLDGS 1815, 1815-A, 1817 B
		3217	1983	1983	1	$ 570,494	$ 330,105	$ 900,599	$ 820,377	$ 49,220	$ -	$ 49,220	BURGER KING RESTAURANT STORE #3929 PB42 P91 PB66 P71 PB75 P144 ESMT
		3520	1968	1968	1	$ 311,799	$ 41,973	$ 353,772	$ 353,772	$ 21,230	$ -	$ 21,230	FRONTING HWY 234 NORTH OF C&W RAILROAD CROSSING EAST SIDE OF ROAD
		3612	1980	1980	1	$ 273,343	$ 204,163	$ 477,506	$ 477,506	$ 28,650	$ -	$ 28,650	LOT 5 POR LOT 4 5A POLK VILLAGE PB 30 P 196 0.01 AC TO US 21 R/W
1305 PALMETTO ST		3796	1976	1976	2	$ 126,000	$ 75,282	$ 201,282	$ 185,637	$ 11,140	$ 11,140	$ -	LOTS 17 18 HIGGINSONV'LL
1804 MORRIS ST		3888	1976	1976	2	$ 189,000	$ 73,326	$ 262,326	$ 221,249	$ 13,280	$ 13,280	$ -	LOTS 5-7-9 MORRIS ST 11-16-71 DB01940327
		3920	1959	1959	1	$ 268,725	$ 135,174	$ 403,899	$ 241,788	$ 14,510	$ -	$ 14,510	0.02 AC TO US 21 R/W PB39 P186
		4000	2001	2001	1	$ 241,852	$ 308,131	$ 549,983	$ 384,727	$ 23,080	$ -	$ 23,080	UNIT A STATE FARM/UNIT B SIGNS NOW 54 P61 PB83 P147
		4000	1986	1986	1	$ 218,309	$ 152,122	$ 370,431	$ 229,540	$ 13,780	$ -	$ 13,780	TRACTS C & D BEAUFORT PLAZA PB42 P89 (BEHR'S)
		4000	1986	1986	1	$ 218,309	$ 152,122	$ 370,431	$ 229,540	$ 13,780	$ -	$ 13,780	TRACTS C & D BEAUFORT PLAZA PB42 P89 (BEHR'S)
		4038	1975	1975	1	$ 781,149	$ 396,710	$ 1,177,859	$ 1,025,529	$ 61,540	$ -	$ 61,540	
		4096	1988	1988	1	$ 302,113	$ 269,122	$ 571,235	$ 440,133	$ 26,410	$ 26,410	$ -	LOT 9 #BKN272
		4110	2003	2003	1	$ 765,489	$ 674,749	$ 1,440,238	$ 1,319,901	$ 79,190	$ -	$ 79,190	LOTS 18-20 WOODLAWN S/D PB91 P146 "CHICK-FIL-A"
		4234	1998	1998	1	$ 100,382	$ -	$ 100,382	$ 100,382	$ 6,020	$ -	$ 6,020	E 1/2 LOT 15 & 16
		4398	1955	1983	2	$ 1,158,189	$ 421,128	$ 1,579,317	$ 1,378,162	$ 82,690	$ -	$ 82,690	LOTS 9 10 11 10A 11A 12A POLK VIL 0.08 AC TO US 21
		4704	1984	1984	1	$ 371,776	$ 255,773	$ 371,776	$ 296,099	$ 17,770	$ -	$ 17,770	PARCEL B /PB31 P187 PB92 P177
		4800	1994	1994	1	$ 271,893	$ 239,057	$ 510,950	$ 380,305	$ 22,820	$ -	$ 22,820	OUTPARCEL D -BLOCKBUSTER VIDEO PB42 P89 PB70 P134
1822 BOUNDARY ST		4881	1950	1954	2	$ 165,149	$ 24,034	$ 189,183	$ 163,070	$ 9,780	$ -	$ 9,780	LOT 1 POR LOT 2 PAR A PB21 P74 TUCKER DRY CLEANERS FKA PREMIERE DRY C
		4986	1995	1995	1	$ 745,258	$ 536,965	$ 1,282,223	$ 866,318	$ 51,980	$ -	$ 51,980	PAR A POR OF PICKPOCKET PLANT PB52 P106 PB54 P9 APPLEBEES
		5154	1980	1980	1	$ 551,998	$ 291,548	$ 843,546	$ 814,550	$ 48,870	$ -	$ 48,870	GOLDEN CORRAL: SUBLEASED TO LA HACIENDA RESTAURANTE MEXICA PB28P
		5520	1968	1968	4	$ 240,000	$ 152,728	$ 392,728	$ 361,491	$ 21,690	$ -	$ 21,690	LTS 1C 2C 3C N M POLK S/D CBK 4 P194 PB40 P80 *T ACCT 1981 CB 6 PG 200 9/
		5700	1976	1976	1	$ 317,779	$ 148,978	$ 466,757	$ 466,757	$ 28,010	$ -	$ 28,010	0.02 AC TO US 21 R/W
		5809	1957	2003	2	$ 1,089,000	$ 861,447	$ 1,950,447	$ 1,950,447	$ 117,030	$ -	$ 117,030	0.07 AC TO US 21 R/W PB87 PG133
		6132	2003	2003	1	$ 407,266	$ 698,374	$ 1,105,640	$ 1,105,640	$ 66,340	$ -	$ 66,340	OUTPARCEL B JEAN RIBAUT SQUARE (OUTBACK STEAKHOUSE) PB98 P57
1012 UNION ST		6328	1984	1984	1	$ 230,949	$ 180,436	$ 411,385	$ 411,385	$ 24,690	$ -	$ 24,690	LTS 5E 6E NEW BLDGS YORKSHIRE TOWNHOUSES
1811 BOUNDARY ST		6655	1947	1963	4	$ 504,043	$ 84,284	$ 588,327	$ 417,026	$ 25,020	$ -	$ 25,020	LOTS 9-12 CASUAL COTTAGE & APARTMENTS 8 APTS + 2 RETAIL BLDGS
2206 MORRIS ST		6700	1976	1976	3	$ 252,000	$ 130,346	$ 382,346	$ 347,088	$ 20,820	$ 20,820	$ -	LOTS 27-29-31-33 MORRIS ST 11/03 0.02 AC ADDED FM 1/180 PB95 P84
		6732	1985	1985	1	$ 649,224	$ 226,970	$ 876,194	$ 876,194	$ 52,570	$ -	$ 52,570	BEAUFORT PLAZA ANNEX PB42 P90 PB66 P70 SEWER ESMT IN PB92 P65
		6900	1900	1969	2	$ 303,774	$ 116,799	$ 420,573	$ 375,758	$ 22,550	$ -	$ 22,550	

		6994	1939	1981	4	$ 672,569	$ 196,874	$ 869,443	$ 533,771	$ 32,030	$ -	$ 32,030	PB9 P65 PB109 P59
		7000	1988	1988	1	$ 451,866	$ 281,535	$ 733,401	$ 581,472	$ 34,890	$ -	$ 34,890	- PLAT ATT TO DEED T ACCT 1986 ROLL BACK TAX
		7356	1970	1970	1	$ 465,932	$ 238,889	$ 704,821	$ 704,821	$ 42,290	$ -	$ 42,290	BFT PLAZA PB70 P134
		8058	2002	2002	1	$ 594,663	$ 1,325,767	$ 1,920,430	$ 1,920,430	$ 115,230	$ -	$ 115,230	*T ACCT 89 BLDG ONLY TAXES FOR 1988 PB70 P134
		8380	1970	1970	1	$ 623,537	$ 187,728	$ 811,265	$ 616,285	$ 36,970	$ 36,970	$ -	0.02 AC TO US 21 R/W CHURCH BUILDING
		8855	1964	1964	7	$ 420,000	$ 220,416	$ 640,416	$ 479,332	$ 28,750	$ -	$ 28,750	POR LOT 49 SEC 36 1N2W PB40 P79 CB 6 PG 200 9/89
115 RIBAUT RD		8975	1880	1970	2	$ 293,481	$ 156,286	$ 449,767	$ 281,554	$ 16,900	$ -	$ 16,900	S 1/2 LT 1 2 3 LT 4E NEW BLDG LOTS #BKN1156 DISCOUNT FURNITURE
1806 BOUNDARY ST		9966	1967	1999	3	$ 482,625	$ 278,786	$ 761,411	$ 430,244	$ 25,820	$ -	$ 25,820	PB41 P41
		9998	1968	1968	1	$ 620,000	$ 202,000	$ 822,000	$ 822,000	$ 49,320	$ -	$ 49,320	0.03 AC TO US 21 R/W ATLANTIC MOTEL PB62 P200 *T ACCT 88 LEFT OFF
1910 BAGGETT ST		10099	1955	1955	1	$ 250,971	$ 211,908	$ 462,879	$ 377,775	$ 22,670	$ -	$ 22,670	WHSE BAGGETT ST PLAT IN DB1179 P1805
		14392	1986	1986	1	$ 447,022	$ 581,516	$ 1,028,538	$ 1,028,538	$ 61,710	$ -	$ 61,710	POR LT 1A LTS 2A 3A N M POLK S/D PB51 P133 *T ACCT 87 TO CORRECT VALUE
		14397	1975	2008	1	$ 370,466	$ 1,155,181	$ 1,525,647	$ 1,525,647	$ 91,540	$ -	$ 91,540	W 1/2 OF LOTS 15 16 17 WOOD LAWN S/D 0.01 AC TO US 21
1909 BAGGETT ST		16400	1946	1987	3	$ 588,060	$ 238,032	$ 826,092	$ 688,095	$ 41,280	$ -	$ 41,280	STORES LAUNDROMAT BOUNDARY ST
		16800	2009	2009	1	$ 453,142	$ 183,410	$ 636,552	$ 97,408	$ 5,840	$ 5,840	$ -	MASTER 1600 BURNSIDE AT BEAUFORT TOWN CENTER HPR PARCEL B BEAUFO
		20000	1988	1988	1	$ 686,000	$ 412,000	$ 1,098,000	$ 1,098,000	$ 65,880	$ -	$ 65,880	LOT 2 PB35 PG35
1000 HAMAR ST		20458	1959	1980	4	$ 483,345	$ 189,001	$ 672,346	$ 672,346	$ 40,340	$ 40,340	$ -	POR LOTS 1&2 NEW BLDG LOTS ASSESSED BY SCTC 607 00101
1900 BOUNDARY ST		21550	1968	1968	1	$ 1,034,210	$ 699,092	$ 1,733,302	$ 1,730,604	$ 103,840	$ -	$ 103,840	PIGGLY WIGGLY SUPERMARKET LOTS 5-15 BLK D .02 SC TO US 21 R/W 5/00 AC
		25974	1989	1989	13	$ 1,096,666	$ 1,042,886	$ 2,139,552	$ 1,184,917	$ 71,090	$ 71,090	$ -	*T ACCT 86 INCORRECT OWNER *7/81 SPLIT 3.5 AC 1/271 2/82 SPLIT 13.5 AC 1
		29402	1975	2002	2	$ 1,035,605	$ 1,737,130	$ 2,772,735	$ 2,425,084	$ 145,500	$ -	$ 145,500	PLAZA THEATRES TRACTS 1 & 2 PB42 P89 PB70 P134 PB73 P45 *SPLIT 2/92 0.
		32289	2007	2007	1	$ 1,334,375	$ 3,181,868	$ 4,516,243	$ 3,927,449	$ 235,640	$ -	$ 235,640	PARCEL D ONE BFT TOWN CENTER FKA "MARSH GARDENS" PB76 P185 DB025
		38148	2007	2007	1	$ 511,236	$ 2,809,061	$ 3,320,297	$ 3,320,297	$ 199,210	$ -	$ 199,210	LOTS 6 7 8 9 10 GREENLAWN S/D PB113 P170 BURNSIDE BLDG MERGED FRO
		38409	1997	1997	1	$ 918,656	$ 3,403,533	$ 4,322,189	$ 2,970,392	$ 178,220	$ -	$ 178,220	#NAME?
		39296	1975	1975	1	$ 795,846	$ 1,530,751	$ 2,326,597	$ 2,326,597	$ 139,600	$ -	$ 139,600	PARCEL A "COMFORT INN" PB33 P80 PB50 P4 PB74 P182 *3/06 LOT LINE REVIS
		48288	1999	2008	4	$ 1,631,340	$ 5,245,669	$ 6,877,009	$ 4,575,819	$ 274,550	$ -	$ 274,550	PARCEL A POR OF TRACT A PB65 P129 PB111 P120 -
		50576	1992	1992	1	$ 1,693,786	$ 1,922,967	$ 3,616,753	$ 3,126,011	$ 187,560	$ -	$ 187,560	TRACT B PB42 P89 PB70 P134 *MRG'D BLDG FR #5397359 8/2000 *SPLIT 2/92
		61352	1988	2003	2	$ 913,000	$ 2,687,000	$ 3,600,000	$ 3,600,000	$ 216,000	$ -	$ 216,000	PARCELS A & B COUNTRY INN & SUITES/BEST INN *SEE NOTEM FOR DEMO PE
2001 BOUNDARY ST		61954	1982	1982	2	$ 1,597,857	$ 3,339,204	$ 4,937,061	$ 4,600,000	$ 276,000	$ -	$ 276,000	POR LOT 61 & 52 SEC 31 1N1W INN AT TOWN CENTER 11/07 UPDATE ACREAG
		65185	1969	1997	2	$ 2,818,352	$ 2,338,162	$ 5,156,514	$ 3,621,111	$ 217,270	$ -	$ 217,270	TRACT A PB42P89 SHOPPING CENTE *HEILIG MEYERS, POST OFFICE *BIG LOTS,
		87884	1954	2007	2	$ 1,435,000	$ 7,565,000	$ 9,000,000	$ 9,000,000	$ 540,000	$ -	$ 540,000	PARCEL B "SCOTTISH INN" PB50 P4 *3/06 LOT LINE REVISED BY PB110 P109 SP
		94533	1978	1978	1	$ 2,665,094	$ 2,484,223	$ 5,149,317	$ 4,934,956	$ 296,100	$ -	$ 296,100	JEAN RIBAUT COMMUNITY SH CENTR BLDG & PARKING LEASED TO KMART PB
		142618	2008	2008	1	$ 995,210	$ 8,909,083	$ 9,904,293	$ 9,904,293	$ 594,250	$ -	$ 594,250	PAR B POR PAR 9 MARSH GARDENS PB108 P56 PB118 P56
		143887	2007	2007	5	$ 3,956,662	$ 7,051,575	#########	$ 9,481,867	$ 568,910	$ -	$ 568,910	JEAN RIBAUT COMMUNITY SH CENTR BI-LO/BELK-SIMPSON W/ PARKING POR
1620 SYCAMORE ST			0	0	0	$ 350,000	$ -	$ 350,000	$ 69,000	$ 4,140	$ -	$ 4,140	COR SYCAMORE & DARBY DRIVE LOT IS HAS ZERO EASEMENT
			0	0	0	$ 332,500	$ -	$ 332,500	$ 69,000	$ 4,140	$ -	$ 4,140	LOT 1 BFT ESTATES
			0	0	0	$ 227,500	$ -	$ 227,500	$ 29,095	$ 1,750	$ -	$ 1,750	POR OF LOT 47 SEC 31 1N1W PB44 P208 PB50 P17 1/95 0.08 AC DEDUCTED 1/
			0	0	0	$ 150,000	$ -	$ 150,000	$ 69,000	$ 4,140	$ -	$ 4,140	POR LOT 5 MILTON PARKER EST PLAT IN DB845 P2671 PLAT ATTACHED DB220
			0	0	0	$ 79,283	$ -	$ 79,283	$ 23,000	$ 1,380	$ -	$ 1,380	LOT 9 C R RENTZ S/D PB10 P84 PLAT IN DB252 P32 *ANNEX BY ORDINANCE#O
1909 PARK AVE			0	0	0	$ 500	$ -	$ 500	$ 500	$ 30	$ 30	$ -	LIFT STATION PARK AVE @ SYCAMORE STREET PB44 P122
			0	0	0	$ 61,699	$ -	$ 61,699	$ 23,000	$ 1,380	$ -	$ 1,380	LOT 12 C R RENTZ PB98 P57 *SEE NOTEM ANNEX BY ORDINANCE#O-05-05
			0	0	0	$ 63,000	$ -	$ 63,000	$ 18,975	$ 1,140	$ -	$ 1,140	
			0	0	0	$ 82,215	$ -	$ 82,215	$ 23,000	$ 1,380	$ -	$ 1,380	LOT 2 GREENLAWN S/D A/K/A CARSON R RENTS S/D PB10 P84 PLAT IN DB2060
			0	0	0	$ 69,300	$ -	$ 69,300	$ 24,150	$ 970	$ -	$ 970	LOT 13 BFT EST *7/98 UNCONSOLIDATION REQUEST BY OWNER 9-18-97
			0	0	0	$ 500	$ -	$ 500	$ 500	$ 30	$ -	$ 30	LOT 16 GREENLAWN PARK S/D *SEE NOTEM SCREEN ORDINANCE# O-29-01 PB
			0	0	0	$ 110,459	$ -	$ 110,459	$ 110,459	$ 6,630	$ -	$ 6,630	LOT 4 POR PAR C BEAUFORT TOWN CENTER PB118 P7
			0	0	0	$ 131,544	$ -	$ 131,544	$ 131,544	$ 7,890	$ -	$ 7,890	LOT 5 POR PAR C BEAUFORT TOWN CENTER PB118 P7
			0	0	0		$ -	$ -	$ -	$ -	$ -	$ -	MASTER CAROLINA COVE NEW SOUTH FOREST INDUST'S PB29P120 #BK0583
1603 PALMETTO ST			0	0	0	$ 63,000	$ -	$ 63,000	$ 18,975	$ 1,140	$ -	$ 1,140	*SEE NOTEM
			0	0	0	$ 63,000	$ -	$ 63,000	$ 18,975	$ 1,140	$ -	$ 1,140	LOT 7 O CONNELL DB01180224
			0	0	0	$ 70,490	$ -	$ 70,490	$ 23,000	$ 1,380	$ -	$ 1,380	LOT 12 GREENLAWN S/D PB10 P46 PLAT IN DB2060 P764 *SEE NOTEM ANNEX
1501 ALEXANDER DR			0	0	0	$ 63,000	$ -	$ 63,000	$ 24,150	$ 970	$ -	$ 970	LOT 28 BFT EST DB01320077
			0	0	0	$ 67,563	$ -	$ 67,563	$ 23,000	$ 1,380	$ -	$ 1,380	LOT 13 GREENLAWN S/D PLAT IN DB941 PG131 PB98 P57 *SEE NOTEM ANNEX

			0	0	0	$ 111,667	$ -	$ 111,667	$ 23,000	$ 1,380	$ -	$ 1,380	LOT 15 GREENLAWN S/D PB10 P46 PLAT IN DB2060 P764 *SEE NOTEM ANNEX
			0	0	0	$ 1,509,590	$ -	$ 1,509,590	$ 807,185	$ 48,430	$ -	$ 48,430	PARCEL C BEAUFORT TOWN CENTER FKA 500 FT N OF SYCAMORE ST ON HWY
			0	0	0	$ 63,000	$ -	$ 63,000	$ 18,975	$ 1,140	$ -	$ 1,140	LOT 16 OCONNEL ST PB98 P79
			0	0	0	$ 119,016	$ -	$ 119,016	$ 23,000	$ 1,380	$ -	$ 1,380	LOT 14 GREENLAWN S/D PB10 P46 PLAT IN DB2060 P764 *SEE NOTEM ANNEX
			0	0	0	$ 500	$ -	$ 500	$ 500	$ 30	$ -	$ 30	LOT 1 POR PAR C BEAUFORT TOWN CENTER PB118 P7
			0	0	0	$ 500	$ -	$ 500	$ 500	$ 30	$ -	$ 30	LOT 2 POR PAR C BEAUFORT TOWN CENTER PB118 P7
			0	0	0	$ 500	$ -	$ 500	$ 500	$ 30	$ -	$ 30	LOT 3 POR PAR C BEAUFORT TOWN CENTER PB118 P7
			0	0	0	$ 21,420	$ -	$ 21,420	$ 12,075	$ 720	$ -	$ 720	*SEE NOTEM
1803 OCONNELL ST			0	0	0	$ 94,500	$ -	$ 94,500	$ 28,463	$ 1,710	$ -	$ 1,710	LOT 4 1/2 LOT 6 HIGGINSVILLE PARCELS 73 74 SEE NOTEM
			0	0	0	$ 44,091	$ -	$ 44,091	$ 23,000	$ 1,380	$ -	$ 1,380	LOT 17 GREENLAWN S/D PB10 P46 PLAT IN DB2060 P776 *SEE NOTEM ANNEX
			0	0	0	$ 64,628	$ -	$ 64,628	$ 23,000	$ 1,380	$ -	$ 1,380	LOT 22 GREEN LAWN *SEE NOTEM ANNEX BY ORDINANCE#O-05-05 LOT LINE F
1810 OCONNELL ST			0	0	0	$ 63,000	$ -	$ 63,000	$ 18,975	$ 1,140	$ -	$ 1,140	LOT 11 OCONNELL ST HIGGINSONVILLE
			0	0	0	$ 76,357	$ -	$ 76,357	$ 23,000	$ 1,380	$ -	$ 1,380	LOT 20 GREENLAWNPB78 P89 PB98 P57ORDINANCE O-29-01*SEE NOTEMLOT
1812 NATIONAL ST			0	0	0	$ 315,000	$ -	$ 315,000	$ 96,600	$ 5,800	$ 5,800	$ -	PARCELS 136 THRU 140 LOTS 9 11 13 15 17
			0	0	0	$ 1,400	$ -	$ 1,400	$ 1,400	$ 80	$ -	$ 80	OPEN SPACE/R/W BEAUFORT TOWNCENTER FKA PARKER PROPERTY*T ACCT 8
			0	0	0	$ 448,003	$ -	$ 448,003	$ 337,756	$ 20,270	$ -	$ 20,270	PARCEL A PB55 P93
			0	0	0	$ 67,563	$ -	$ 67,563	$ 23,000	$ 1,380	$ -	$ 1,380	LOT 5 GREENLAWN S/D PB10 P46 PLAT IN DB2060 P764 *SEE NOTEM ANNEX
			0	0	0	$ 63,000	$ -	$ 63,000	$ 18,975	$ 1,140	$ -	$ 1,140	LOT 9 O CONNELL DB01180224
			0	0	0	$ 63,000	$ -	$ 63,000	$ 18,975	$ 1,140	$ -	$ 1,140	LOT 3 HIGGINSVILLE
			0	0	0	$ 67,563	$ -	$ 67,563	$ 23,000	$ 1,380	$ -	$ 1,380	LOT 3 GREENLAWN S/D PB10 P46 PLAT IN DB2060 P764 *SEE NOTEM ANNEX
1807 MORRIS ST			0	0	0	$ 315,000	$ -	$ 315,000	$ 96,600	$ 5,800	$ 5,800	$ -	PARCELS 147 THRU 151
1807 MORRIS ST			0	0	0	$ 315,000	$ -	$ 315,000	$ 96,600	$ 5,800	$ 5,800	$ -	PARCELS 147 THRU 151
1807 MORRIS ST			0	0	0	$ 315,000	$ -	$ 315,000	$ 96,600	$ 5,800	$ 5,800	$ -	PARCELS 147 THRU 151
			0	0	0	$ 64,628	$ -	$ 64,628	$ 23,000	$ 1,380	$ -	$ 1,380	LOT 21 GREENLAWN PARK S/D PLAT IN DB785 PG1185 PLAT IN DB898 PG796 *
			0	0	0	$ 130,010	$ -	$ 130,010	$ 115,000	$ 6,900	$ -	$ 6,900	
			0	0	0	$ 67,563	$ -	$ 67,563	$ 23,000	$ 1,380	$ -	$ 1,380	LOT 4 GREENLAWN S/D PB10 P46 PLAT IN DB2060 P764 *SEE NOTEM ANNEX
			0	0	0	$ 66,000	$ -	$ 66,000	$ 66,000	$ 3,960	$ 3,960	$ -	LOT 1-K N M POLK S/D *ANNEX INTO CITY BY ORDINANCE #0-49-98
			0	0	0	$ 116,330	$ 120,000	$ 236,330	$ 194,350	$ 11,660	$ -	$ 11,660	LOT 6-A POLK VILLAGE ANNEX INTO CITY 5-12-92 ORDINANCE #0-11-92
			0	0	0	$ 827,372	$ -	$ 827,372	$ 440,519	$ 26,430	$ -	$ 26,430	PARCEL A BEAUFORT TOWN CENTER PB93 P12 4/08 LOT LINE REV PB115 P138
1807 MORRIS ST			0	0	0	$ 315,000	$ -	$ 315,000	$ 96,600	$ 5,800	$ 5,800	$ -	PARCELS 147 THRU 151
			0	0	0	$ 91,003	$ -	$ 91,003	$ 23,000	$ 1,380	$ -	$ 1,380	LOT 25 GREENLAWN S/D PB10 P46 PLAT IN DB2060 P764 *SEE NOTEM ANNEX
1807 MORRIS ST			0	0	0	$ 315,000	$ -	$ 315,000	$ 96,600	$ 5,800	$ 5,800	$ -	PARCELS 147 THRU 151
1817 MORRIS ST			0	0	0	$ 63,000	$ -	$ 63,000	$ 18,975	$ 1,140	$ 1,140	$ -	
			0	0	0	$ 63,000	$ -	$ 63,000	$ 18,975	$ 1,140	$ -	$ 1,140	LOT 34
			0	0	0	$ 500	$ -	$ 500	$ 500	$ 30	$ 30	$ -	CEMETARY 0.07 AC TO US 21 R/W
			0	0	0	$ 500	$ -	$ 500	$ 500	$ 30	$ 30	$ -	
			0	0	0	$ 302,343	$ 120,000	$ 422,343	$ 210,264	$ 12,620	$ -	$ 12,620	LOT 6 E 1/2 7 POLK VILLAGE 0.22 AC TO US 21 R/W PLAT IN DB117 P194
			0	0	0	$ 500	$ -	$ 500	$ 500	$ 30	$ 30	$ -	PLAT IN ASSESSORS` FILE
			0	0	0	$ 277,894	$ -	$ 277,894	$ 277,894	$ 16,670	$ -	$ 16,670	E 1/2 LOT 17 POR 16 0.03 AC TO US 21 R/W *SEE NOTEM
			0	0	0	$ 395,233	$ -	$ 395,233	$ 72,450	$ 4,350	$ -	$ 4,350	LTS 18 20 22 HIGGINSONVILLE COR LOVEJOY & PALMETTO
			0	0	0	$ 63,000	$ -	$ 63,000	$ 24,150	$ 1,450	$ -	$ 1,450	
1905 LOVEJOY ST			0	0	0	$ 146,618	$ -	$ 146,618	$ 24,150	$ 1,450	$ -	$ 1,450	LT 24 HIGGINSONVILLE *SEE NOTEM RE DEMOL PMT
1911 LOVEJOY ST			0	0	0	$ 131,144	$ -	$ 131,144	$ 24,150	$ 1,450	$ 1,450	$ -	LOT 30 LOVEJOY 11/03 0.02 AC ADDED TO 1/163 PB95 P84
			0	0	0	$ 317,601	$ -	$ 317,601	$ 115,000	$ 6,900	$ 6,900	$ -	S POR LOT 1 NEIL TRASK S/D PLAT FILE WITH JR#118767
			0	0	0	$ 525	$ -	$ 525	$ 525	$ 30	$ -	$ 30	COMMON AREA RD R/W PB54 P161 -
			0	0	0	$ 63,000	$ -	$ 63,000	$ 24,150	$ 1,450	$ 1,450	$ -	LOT 25 MORRIS ST
			0	0	0	$ 395,070	$ 11,730	$ 406,800	$ 284,211	$ 17,050	$ -	$ 17,050	LOT 6 POLK S/D DB02311818
			0	0	0	$ 258,954	$ -	$ 258,954	$ 224,825	$ 13,490	$ 13,490	$ -	COOLER RESIDENCE
1907 LOVEJOY ST			0	0	0	$ 146,882	$ -	$ 146,882	$ 24,150	$ 1,450	$ 1,450	$ -	LT 26 HIGGINSONVILLE
			0	0	0	$ 500	$ -	$ 500	$ 500	$ 30	$ 30	$ -	PARCEL A -
			0	0	0	$ 252,000	$ -	$ 252,000	$ 96,600	$ 5,800	$ 5,800	$ -	PARCELS 188 THUR 191

1811 LOVEJOY ST			0	0	0	$ 63,000	$ -	$ 63,000	$ 24,150	$ 1,450	$ -	$ 1,450	LOT 12 HIGGINSONVILLE S/D #BKO879
			0	0	0	$ 129,916	$ -	$ 129,916	$ 115,000	$ 6,900	$ -	$ 6,900	LOT 17 HUGGINSVILLE S/D PB43 P119
1901 BOUNDARY ST			0	0	0	$ 278,197	$ -	$ 278,197	$ 172,500	$ 10,350	$ 10,350	$ -	
1905 BOUNDARY ST			0	0	0	$ 269,465	$ -	$ 269,465	$ 207,000	$ 12,420	$ 12,420	$ -	PART OF TRACT C PB92 P92 *BLDG DESTROYED 2004
			0	0	0	$ 500	$ -	$ 500	$ 500	$ 30	$ 30	$ -	PARK N SIDE BOUNDARY STREET @ RIBAUT ROAD 0.04 ACRES TO US21 RIGHT-
1907 BOUNDARY ST			0	0	0	$ 535,024	$ -	$ 535,024	$ 483,000	$ 28,980	$ 28,980	$ -	TRACT B .03 AC TO US HWY 21 RW PB92 P92 *BLDG DEMOLISHED 2004
1909 BOUNDARY ST			0	0	0	$ 148,342	$ -	$ 148,342	$ 115,000	$ 6,900	$ 6,900	$ -	DB247 P2013 PB92 P92 *BLDG DEMOLISHED 2004
			0	0	0	$ 900	$ -	$ 900	$ 900	$ 50	$ 50	$ -	CEMETERY - N SIDE OF BOUNDARY STREET, W SIDE OF MAGNOLIA
			0	0	0	$ 38,500	$ -	$ 38,500	$ 38,500	$ 2,310	$ -	$ 2,310	LOT 15 HIGGINSVILLE S/D PB43 P119 *SEE NOTEM SCREEN
1911 BOUNDARY ST			0	0	0	$ 101,248	$ -	$ 101,248	$ 101,248	$ 6,070	$ 6,070	$ -	PB92 P92 *BLDG DEMOLISHED 2004
1101 UNION ST			0	0	0	$ 247,080	$ -	$ 247,080	$ 79,350	$ 4,760	$ -	$ 4,760	LOTS 4 5 6 BLK C NEW BLDGS *PLAT ATTACHED DB2023PG294
1913 BAGGETT ST			0	0	0	$ 79,419	$ -	$ 79,419	$ 26,450	$ 1,590	$ -	$ 1,590	LOT 7C NEW BLDG *PLAT ATTACHED DB2023PG294
			0	0	0	$ 1,241,730	$ -	$ 1,241,730	$ 419,750	$ 25,190	$ -	$ 25,190	FUTURE DEVELOPMENT TRACT PB42 P89 PB70 P134
			0	0	0	$ 1,806,667	$ -	$ 1,806,667	$ 645,325	$ 25,820	$ -	$ 50	PAR B POR TRACT A PB65 PG129 PB84 PG51 *SUBJ TO ROLL BACK TAX LIEN *T
			0	0	0	$ 1,806,667	$ -	$ 1,806,667	$ 645,325	$ 25,820	$ -	$ 50	PAR B POR TRACT A PB65 PG129 PB84 PG51 *SUBJ TO ROLL BACK TAX LIEN *T
			0	0	0	$ 500	$ -	$ 500	$ 500	$ 30	$ 30	$ -	15' ESMT POR LOT 47 SEC 31 1N1W PB50 P17 1/95 0.08 AC ADDED 1/276
			0	0	0	$ 1,241,475	$ -	$ 1,241,475	$ 909,995	$ 54,600	$ -	$ 54,600	POR OF RIBAUT SQ PAR D PB31 P203 PB47 P121 PB82 PG154 *1/07 ACCT REST
			0	0	0	$ 85,141	$ -	$ 85,141	$ 23,000	$ 1,380	$ -	$ 1,380	LOT 4 GREENLAWN *PLAT ATTACHED DB1709PG1304 PB98 P57 *SEE NOTEM
			0	0	0	$ 1,356,001	$ -	$ 1,356,001	$ 962,205	$ 57,730	$ -	$ 57,730	ROSENTHAL TRACT 0.03 AC TO US 21 R/W AC CHANGED BY PLAT PB40 P17
			0	0	0	$ 63,000	$ -	$ 63,000	$ 18,975	$ 1,140	$ -	$ 1,140	LOT 9 HIGGINSONVILLE
			0	0	0	$ 63,000	$ -	$ 63,000	$ 18,975	$ 1,140	$ -	$ 1,140	LOT 11 HIGGINSVILLE #BKO535 *T ACCT 83
			0	0	0	$ 73,424	$ -	$ 73,424	$ 23,000	$ 1,380	$ -	$ 1,380	LOT 11 GREENLAWN S/D PB10 P46 PLAT IN DB2060 P764 *SEE NOTEM ANNEX
1602 PALMETTO ST			0	0	0	$ 69,300	$ -	$ 69,300	$ 24,150	$ 1,450	$ -	$ 1,450	LOT 36 BFT EST COR OCONNELL & PALMETTO
			0	0	0	$ 69,300	$ -	$ 69,300	$ 24,150	$ 1,450	$ -	$ 1,450	LOT 35 BFT EST 9-7-77 DB02531199
1805 OCONNELL ST			0	0	0	$ 63,000	$ -	$ 63,000	$ 18,975	$ 1,140	$ -	$ 1,140	W 1/2 OF LOT 6 E 1/2 OF LOT 8
			0	0	0	$ 500	$ -	$ 500	$ 500	$ 30	$ 30	$ -	LIFT STATION @ CAROLINA COVE
			0	0	0	$ 76,357	$ -	$ 76,357	$ 23,000	$ 1,380	$ -	$ 1,380	LOT 18 GREENLAWN S/D PB10 P46 PLAT IN DB2060 P764 *SEE NOTEM ANNEX
1908 OCONNELL ST			0	0	0	$ 63,000	$ -	$ 63,000	$ 18,975	$ 1,140	$ -	$ 1,140	LOT 41 BEAUFORT ESTS 9-7-77 DB02531203
2212 NATIONAL ST			0	0	0	$ 63,000	$ -	$ 63,000	$ 18,975	$ 1,140	$ -	$ 1,140	LOT 29 VILLAGE OF HIGGINSONVILLE
			0	0	0	$ 431,250	$ 165,730	$ 596,980	$ 455,897	$ 27,350	$ -	$ 27,350	POR LOT 58 SEC 31 1N1W ENMARK PB43 P200 *0.02 AC TO US 21 R/W JR#746
1402 PALMETTO ST			0	0	0	$ 75,600	$ -	$ 75,600	$ 21,977	$ 1,320	$ -	$ 1,320	S 1/2 19 21 23 N 1/2 22 *********SEE NOTEM**********
			0	0	0	$ 79,283	$ -	$ 79,283	$ 23,000	$ 1,380	$ -	$ 1,380	LOT 24 GREENLAWN PB98 P57 *SEE NOTEM ANNEX BY ORDINANCE O-05-05
1408 PALMETTO ST			0	0	0	$ 63,000	$ -	$ 63,000	$ 18,975	$ 1,140	$ -	$ 1,140	LOT 20 HIGGINSVILLE 6-8-46 DB00660535
			0	0	0	$ 76,400	$ -	$ 76,400	$ 34,500	$ 2,070	$ -	$ 2,070	POR LOT 5A POLK VILLAGE
			0	0	0	$ 299,856	$ -	$ 299,856	$ 204,700	$ 12,280	$ 12,280	$ -	CONDEMNATION #119369 *DEMO PERMIT ISSUED 6/25/02
			0	0	0	$ 302,113	$ -	$ 302,113	$ 302,113	$ 18,130	$ -	$ 18,130	LOT 7 PORT ROYAL ISLAND AMOCO STATION
1909 LOVEJOY ST			0	0	0	$ 146,960	$ -	$ 146,960	$ 24,150	$ 1,450	$ 1,450	$ -	LOT 28 HIGGINSONVILLE S/D PB12 P1 PB95 P95
1913 LOVEJOY ST			0	0	0	$ 147,022	$ -	$ 147,022	$ 24,150	$ 1,450	$ 1,450	$ -	2303 LOVEJOY ST LT 32 HIGGINSONVILLE
1915 LOVEJOY ST			0	0	0	$ 145,808	$ -	$ 145,808	$ 24,150	$ 1,450	$ 1,450	$ -	LOT 34 HIGGINSONVILLE
106 RIBAUT RD			0	0	0	$ 3,309,688	$ -	$ 3,309,688	$ 2,559	$ 150	$ 150	$ -	QC DEED 04170361 SCE&G 0.15 AC R/W DB2834 P2380 (65266)
1814 BOUNDARY ST			0	0	0	$ 403,793	$ -	$ 403,793	$ 172,500	$ 10,350	$ -	$ 10,350	*DEMO PMT #3875 #BKM1242 ADDRESS CHG PER REQUEST OF ANDREW P TR
			0	0	0	$ 500	$ -	$ 500	$ 500	$ 30	$ 30	$ -	CITY OF BEAUFORT SEWER LIFT STA PB42 P89
			0	0	0	$ 500	$ -	$ 500	$ 500	$ 30	$ -	$ 30	TOTAL ACREAGE INCLUDES 0.02 AC MARSH PB114 P57
			0	0	0	$ 485,450	$ -	$ 485,450	$ 37,720	$ 2,260	$ -	$ 2,260	OUT PARCEL LIVE OAK AT BATTERY CREEK S/D PB110 P138-141 PB113 P29-32
			0	0	0	$ 160,606	$ -	$ 160,606	$ 84,870	$ 5,090	$ -	$ 5,090	PARCEL F FKA PARCEL G PB72 P191 PB74 P196
			0	0	0	$ 160,606	$ -	$ 160,606	$ 84,870	$ 5,090	$ -	$ 5,090	PARCEL G FKA PARCEL H PB72 P192 PB74 P196
1911 MORRIS ST			0	0	0	$ 126,000	$ -	$ 126,000	$ 37,949	$ 2,280	$ -	$ 2,280	LOTS 26 28 HIGGINSVILLE S/D SPLIT 4/98 1 LOT 1/281
			0	0	0	$ 295,413	$ 23,630	$ 319,043	$ 319,043	$ 19,140	$ -	$ 19,140	POR LOTS 1 2 3 N M POLK S/D
			0	0	0	$ 1,509,590	$ -	$ 1,509,590	$ 807,185	$ 48,430	$ -	$ 48,430	PARCEL C BEAUFORT TOWN CENTER FKA 500 FT N OF SYCAMORE ST ON HWY
							Total	#########			$ 513,280	$ 5,118,340	

***Compact Development creates a one-time property value increase of 7%. This value is estimated on the appraised value of the commercial and residential properties and is a conservative estimate based on local development							Total + .07	#########					
							Difference	#########					
							Year Increase Spread over four years	$ 3,229,996					

	1 - Boundary Street at SC 170 - Eastbound				1 -Boundary Street at SC 170 - Westbound				1 - Boundary Street at SC 170 - Westbound Left (onto 170)				Boundary Street at SC 170 - Northbound Righ		
	AM Peak (Cars)	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak
2008	1,147.00	32.10	1,058.00	62.90	847.00	4.30	1,069.00	10.10	292.00	32.00	604.00	40.70	536.00	22.10	693.00
2009	1,163.45	37.37	1,073.18	73.94	859.18	4.50	1,084.36	10.40	295.95	32.25	612.91	41.31	542.68	22.22	703.64
2010	1,179.91	42.64	1,088.36	84.98	871.36	4.69	1,099.73	10.71	299.91	32.51	621.82	41.92	549.36	22.34	714.27
2011	1,196.36	47.90	1,103.55	96.02	883.55	4.89	1,115.09	11.01	303.86	32.76	630.73	42.53	556.05	22.45	724.91
2012	1,212.82	53.17	1,118.73	107.06	895.73	5.08	1,130.45	11.32	307.82	33.02	639.64	43.14	562.73	22.57	735.55
2013	1,226.59	52.69	1,130.86	105.80	904.41	5.63	1,146.14	11.50	311.32	32.80	651.05	43.87	567.14	22.85	744.95
2014	1,240.36	52.21	1,143.00	104.54	913.09	6.18	1,161.82	11.67	314.82	32.57	662.45	44.60	571.55	23.12	754.36
2015	1,254.14	51.73	1,155.14	103.27	921.77	6.73	1,177.50	11.85	318.32	32.35	673.86	45.33	575.95	23.39	763.77
2016	1,267.91	51.25	1,167.27	102.01	930.45	7.28	1,193.18	12.03	321.82	32.13	685.27	46.06	580.36	23.66	773.18
2017	1,281.68	50.76	1,179.41	100.75	939.14	7.83	1,208.86	12.20	325.32	31.90	696.68	46.80	584.77	23.94	782.59
2018	1,295.45	50.28	1,191.55	99.48	947.82	8.38	1,224.55	12.38	328.82	31.68	708.09	47.53	589.18	24.21	792.00
2019	1,309.23	49.80	1,203.68	98.22	956.50	8.93	1,240.23	12.56	332.32	31.46	719.50	48.26	593.59	24.48	801.41
2020	1,323.00	49.32	1,215.82	96.95	965.18	9.48	1,255.91	12.74	335.82	31.24	730.91	48.99	598.00	24.75	810.82
2021	1,336.77	48.84	1,227.95	95.69	973.86	10.03	1,271.59	12.91	339.32	31.01	742.32	49.72	602.41	25.03	820.23
2022	1,350.55	48.35	1,240.09	94.43	982.55	10.58	1,287.27	13.09	342.82	30.79	753.73	50.45	606.82	25.30	829.64
2023	1,364.32	47.87	1,252.23	93.16	991.23	11.13	1,302.95	13.27	346.32	30.57	765.14	51.19	611.23	25.57	839.05
2024	1,378.09	47.39	1,264.36	91.90	999.91	11.68	1,318.64	13.45	349.82	30.35	776.55	51.92	615.64	25.85	848.45
2025	1,391.86	46.91	1,276.50	90.64	1,008.59	12.23	1,334.32	13.62	353.32	30.12	787.95	52.65	620.05	26.12	857.86
2026	1,405.64	46.43	1,288.64	89.37	1,017.27	12.78	1,350.00	13.80	356.82	29.90	799.36	53.38	624.45	26.39	867.27
2027	1,419.41	45.95	1,300.77	88.11	1,025.95	13.33	1,365.68	13.98	360.32	29.68	810.77	54.11	628.86	26.66	876.68
2028	1,433.18	45.46	1,312.91	86.85	1,034.64	13.88	1,381.36	14.15	363.82	29.45	822.18	54.85	633.27	26.94	886.09
2029	1,446.95	44.98	1,325.05	85.58	1,043.32	14.43	1,397.05	14.33	367.32	29.23	833.59	55.58	637.68	27.21	895.50
2030	1,450.00	21.50	1,325.00	35.10	1,038.00	16.40	1,414.00	14.00	369.00	27.10	855.00	56.80	633.00	28.10	900.00
2031	1,463.77	21.02	1,349.32	83.05	1,060.68	15.53	1,428.41	14.69	374.32	28.79	856.41	57.04	646.50	27.75	914.32
	303	-10.6	267	-27.8	191	12.1	345	3.9	77	-4.9	251	16.1	97	6	207
	13.77272727	-0.481818182	12.1363636	-1.2636364	8.6818182	0.55	15.68181818	0.177272727	3.5	-0.2227273	11.40909091	0.731818182	4.4090909	0.2727273	9.409090909
	***The 2010 Census was used for Median Income of Beaufort County and employee median income estimates.														
	***All Traffic Estimates are based on through traffic during Peak Hours, both eastbound and westbound. This Synchro Model was run in 2008 by Kimley-Horn & Associates and was projected to 2030.														

nt (onto Boundary	2 - Boundary Street at Polk Street/Beaufort Plaza - Eastbound				2 - Boundary Street at Polk Street/Beaufort Plaza - Westbound				3 - Boundary Street at Hogarth Street - Eastbound				3 - Boundar	
Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)
23.80	1,521.00	-	1,479.00	-	1,154.00	-	1,742.00	-	1,457.00	6.40	1,665.00	8.30	1,101.00	3.80
23.75	1,542.86	-	1,500.23	7.37	1,170.59	-	1,767.00	1.21	1,477.91	6.66	1,688.91	8.68	1,116.82	3.80
23.70	1,564.73	-	1,521.45	14.75	1,187.18	-	1,792.00	2.43	1,498.82	6.93	1,712.82	9.06	1,132.64	3.80
23.65	1,586.59	-	1,542.68	22.12	1,203.77	-	1,817.00	3.64	1,519.73	7.19	1,736.73	9.45	1,148.45	3.80
23.60	1,608.45	-	1,563.91	29.49	1,220.36	-	1,842.00	4.85	1,540.64	7.45	1,760.64	9.83	1,164.27	3.80
24.67	1,625.73	0.64	1,589.95	36.86	1,227.45	0.02	1,852.59	6.07	1,553.82	7.43	1,784.36	9.76	1,176.64	4.12
25.74	1,643.00	1.28	1,616.00	44.24	1,234.55	0.04	1,863.18	7.28	1,567.00	7.41	1,808.09	9.70	1,189.00	4.44
26.80	1,660.27	1.92	1,642.05	51.61	1,241.64	0.05	1,873.77	8.50	1,580.18	7.39	1,831.82	9.64	1,201.36	4.75
27.87	1,677.55	2.56	1,668.09	58.98	1,248.73	0.07	1,884.36	9.71	1,593.36	7.36	1,855.55	9.57	1,213.73	5.07
28.94	1,694.82	3.20	1,694.14	66.35	1,255.82	0.09	1,894.95	10.92	1,606.55	7.34	1,879.27	9.51	1,226.09	5.39
30.01	1,712.09	3.85	1,720.18	73.73	1,262.91	0.11	1,905.55	12.14	1,619.73	7.32	1,903.00	9.45	1,238.45	5.71
31.08	1,729.36	4.49	1,746.23	81.10	1,270.00	0.13	1,916.14	13.35	1,632.91	7.30	1,926.73	9.38	1,250.82	6.03
32.15	1,746.64	5.13	1,772.27	88.47	1,277.09	0.15	1,926.73	14.56	1,646.09	7.27	1,950.45	9.32	1,263.18	6.35
33.21	1,763.91	5.77	1,798.32	95.85	1,284.18	0.16	1,937.32	15.78	1,659.27	7.25	1,974.18	9.25	1,275.55	6.66
34.28	1,781.18	6.41	1,824.36	103.22	1,291.27	0.18	1,947.91	16.99	1,672.45	7.23	1,997.91	9.19	1,287.91	6.98
35.35	1,798.45	7.05	1,850.41	110.59	1,298.36	0.20	1,958.50	18.20	1,685.64	7.20	2,021.64	9.13	1,300.27	7.30
36.42	1,815.73	7.69	1,876.45	117.96	1,305.45	0.22	1,969.09	19.42	1,698.82	7.18	2,045.36	9.06	1,312.64	7.62
37.49	1,833.00	8.33	1,902.50	125.34	1,312.55	0.24	1,979.68	20.63	1,712.00	7.16	2,069.09	9.00	1,325.00	7.94
38.55	1,850.27	8.97	1,928.55	132.71	1,319.64	0.25	1,990.27	21.85	1,725.18	7.14	2,092.82	8.94	1,337.36	8.25
39.62	1,867.55	9.61	1,954.59	140.08	1,326.73	0.27	2,000.86	23.06	1,738.36	7.11	2,116.55	8.87	1,349.73	8.57
40.69	1,884.82	10.25	1,980.64	147.45	1,333.82	0.29	2,011.45	24.27	1,751.55	7.09	2,140.27	8.81	1,362.09	8.89
41.76	1,902.09	10.90	2,006.68	154.83	1,340.91	0.31	2,022.05	25.49	1,764.73	7.07	2,164.00	8.75	1,374.45	9.21
47.30	1,901.00	14.10	2,052.00	162.20	1,310.00	0.40	1,975.00	26.70	1,747.00	5.90	2,187.00	6.90	1,373.00	10.80
43.90	1,936.64	12.18	2,058.77	169.57	1,355.09	0.35	2,043.23	27.91	1,791.09	7.02	2,211.45	8.62	1,399.18	9.85
23.5	380	14.1	573	162.2	156	0.4	233	26.7	290	-0.5	522	-1.4	272	7
1.068181818	17.272727	0.640909091	26.04545455	7.372727273	7.0909091	0.018181818	10.59090909	1.213636364	13.181818	-0.022727273	23.72727273	-0.063636364	12.363636	0.318181818

y Street at Hogarth Street - Westbound		4 - Boundary Street at Beaufort Town Center - Eastbound				4 - Boundary Street at Beaufort Town Center - Westbound				5 - Boundary Street at Marsh Road - Eastbound				Boundary
PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak
1,701.00	3.30	1,398.00	1.40	1,417.00	4.20	1,084.00	3.40	1,475.00	11.20	1,324.00	3.00	1,566.00	4.40	1,086.00
1,725.45	3.57	1,418.09	1.45	1,437.36	4.40	1,099.59	3.38	1,496.18	11.49	1,343.00	3.21	1,588.50	5.15	1,101.59
1,749.91	3.84	1,438.18	1.51	1,457.73	4.60	1,115.18	3.36	1,517.36	11.77	1,362.00	3.42	1,611.00	5.91	1,117.18
1,774.36	4.10	1,458.27	1.56	1,478.09	4.80	1,130.77	3.35	1,538.55	12.06	1,381.00	3.63	1,633.50	6.66	1,132.77
1,798.82	4.37	1,478.36	1.62	1,498.45	5.00	1,146.36	3.33	1,559.73	12.35	1,400.00	3.84	1,656.00	7.42	1,148.36
1,815.86	5.78	1,495.64	1.67	1,518.00	4.98	1,158.77	3.31	1,577.05	11.98	1,415.68	3.90	1,676.14	7.65	1,160.73
1,832.91	7.18	1,512.91	1.72	1,537.55	4.95	1,171.18	3.30	1,594.36	11.62	1,431.36	3.97	1,696.27	7.87	1,173.09
1,849.95	8.59	1,530.18	1.77	1,557.09	4.93	1,183.59	3.29	1,611.68	11.25	1,447.05	4.04	1,716.41	8.10	1,185.45
1,867.00	9.99	1,547.45	1.82	1,576.64	4.91	1,196.00	3.27	1,629.00	10.89	1,462.73	4.11	1,736.55	8.33	1,197.82
1,884.05	11.40	1,564.73	1.87	1,596.18	4.89	1,208.41	3.26	1,646.32	10.53	1,478.41	4.18	1,756.68	8.55	1,210.18
1,901.09	12.80	1,582.00	1.92	1,615.73	4.86	1,220.82	3.25	1,663.64	10.16	1,494.09	4.25	1,776.82	8.78	1,222.55
1,918.14	14.20	1,599.27	1.97	1,635.27	4.84	1,233.23	3.23	1,680.95	9.80	1,509.77	4.31	1,796.95	9.01	1,234.91
1,935.18	15.61	1,616.55	2.02	1,654.82	4.82	1,245.64	3.22	1,698.27	9.44	1,525.45	4.38	1,817.09	9.24	1,247.27
1,952.23	17.01	1,633.82	2.07	1,674.36	4.80	1,258.05	3.20	1,715.59	9.07	1,541.14	4.45	1,837.23	9.46	1,259.64
1,969.27	18.42	1,651.09	2.12	1,693.91	4.77	1,270.45	3.19	1,732.91	8.71	1,556.82	4.52	1,857.36	9.69	1,272.00
1,986.32	19.82	1,668.36	2.17	1,713.45	4.75	1,282.86	3.18	1,750.23	8.35	1,572.50	4.59	1,877.50	9.92	1,284.36
2,003.36	21.23	1,685.64	2.22	1,733.00	4.73	1,295.27	3.16	1,767.55	7.98	1,588.18	4.65	1,897.64	10.15	1,296.73
2,020.41	22.63	1,702.91	2.27	1,752.55	4.70	1,307.68	3.15	1,784.86	7.62	1,603.86	4.72	1,917.77	10.37	1,309.09
2,037.45	24.04	1,720.18	2.32	1,772.09	4.68	1,320.09	3.14	1,802.18	7.25	1,619.55	4.79	1,937.91	10.60	1,321.45
2,054.50	25.44	1,737.45	2.37	1,791.64	4.66	1,332.50	3.12	1,819.50	6.89	1,635.23	4.86	1,958.05	10.83	1,333.82
2,071.55	26.85	1,754.73	2.42	1,811.18	4.64	1,344.91	3.11	1,836.82	6.53	1,650.91	4.93	1,978.18	11.05	1,346.18
2,088.59	28.25	1,772.00	2.47	1,830.73	4.61	1,357.32	3.10	1,854.14	6.16	1,666.59	5.00	1,998.32	11.28	1,358.55
2,076.00	34.20	1,778.00	2.50	1,847.00	3.70	1,357.00	3.10	1,856.00	3.20	1,669.00	4.50	2,009.00	9.40	1,358.00
2,122.68	31.06	1,806.55	2.57	1,869.82	4.57	1,382.14	3.07	1,888.77	5.44	1,697.95	5.13	2,038.59	11.74	1,383.27
375	30.9	380	1.1	430	-0.5	273	-0.3	381	-8	345	1.5	443	5	272
17.04545455	1.404545455	17.272727	0.05	19.54545455	-0.022727273	12.40909091	-0.013636364	17.31818182	-0.363636364	15.68182	0.06818	20.13636364	0.227272727	12.36364

Street at Marsh Road - Westbour			6 - Boundary Street at Ribaut Road - Eastbound				6 - Boundary Street at Ribaut Road - Eastbound-Right to Ribaut				6 - Boundary Street at Ribaut Road -Westbound				6 - Boundary Street at Ribaut Road - North Bound Left onto Boundary			
Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)
4.30	1,544.00	11.90	712.00	21.30	894.00	30.00	695.00	62.80	746.00	87.50	604.00	13.30	894.00	30.00	473.00	58.50	750.00	43.50
4.42	1,566.18	12.11	722.23	21.91	906.86	31.23	705.00	62.77	757.00	88.33	612.68	13.66	907.00	29.99	479.77	58.25	761.50	46.65
4.55	1,588.36	12.33	732.45	22.53	919.73	32.46	715.00	62.74	768.00	89.16	621.36	14.03	920.00	29.97	486.55	57.99	773.00	49.81
4.67	1,610.55	12.54	742.68	23.14	932.59	33.70	725.00	62.70	779.00	90.00	630.05	14.39	933.00	29.96	493.32	57.74	784.50	52.96
4.79	1,632.73	12.75	752.91	23.75	945.45	34.93	735.00	62.67	790.00	90.83	638.73	14.75	946.00	29.95	500.09	57.48	796.00	56.12
4.80	1,651.36	12.88	758.18	25.20	952.73	34.55	749.55	60.18	805.55	88.16	647.55	15.92	954.00	29.15	506.86	55.67	807.82	55.82
4.82	1,670.00	13.00	763.45	26.65	960.00	34.17	764.09	57.69	821.09	85.50	656.36	17.08	962.00	28.35	513.64	53.86	819.64	55.52
4.83	1,688.64	13.12	768.73	28.09	967.27	33.80	778.64	55.20	836.64	82.84	665.18	18.25	970.00	27.55	520.41	52.05	831.45	55.22
4.85	1,707.27	13.25	774.00	29.54	974.55	33.42	793.18	52.71	852.18	80.17	674.00	19.41	978.00	26.75	527.18	50.25	843.27	54.92
4.86	1,725.91	13.37	779.27	30.98	981.82	33.04	807.73	50.22	867.73	77.51	682.82	20.57	986.00	25.95	533.95	48.44	855.09	54.62
4.87	1,744.55	13.49	784.55	32.43	989.09	32.66	822.27	47.73	883.27	74.85	691.64	21.74	994.00	25.15	540.73	46.63	866.91	54.32
4.89	1,763.18	13.61	789.82	33.87	996.36	32.29	836.82	45.24	898.82	72.18	700.45	22.90	1,002.00	24.35	547.50	44.82	878.73	54.02
4.90	1,781.82	13.74	795.09	35.32	1,003.64	31.91	851.36	42.75	914.36	69.52	709.27	24.06	1,010.00	23.55	554.27	43.01	890.55	53.72
4.91	1,800.45	13.86	800.36	36.76	1,010.91	31.53	865.91	40.25	929.91	66.85	718.09	25.23	1,018.00	22.75	561.05	41.20	902.36	53.42
4.93	1,819.09	13.98	805.64	38.21	1,018.18	31.15	880.45	37.76	945.45	64.19	726.91	26.39	1,026.00	21.95	567.82	39.39	914.18	53.12
4.94	1,837.73	14.10	810.91	39.65	1,025.45	30.78	895.00	35.27	961.00	61.53	735.73	27.55	1,034.00	21.15	574.59	37.58	926.00	52.82
4.95	1,856.36	14.23	816.18	41.10	1,032.73	30.40	909.55	32.78	976.55	58.86	744.55	28.72	1,042.00	20.35	581.36	35.77	937.82	52.52
4.97	1,875.00	14.35	821.45	42.55	1,040.00	30.02	924.09	30.29	992.09	56.20	753.36	29.88	1,050.00	19.55	588.14	33.96	949.64	52.22
4.98	1,893.64	14.47	826.73	43.99	1,047.27	29.65	938.64	27.80	1,007.64	53.54	762.18	31.05	1,058.00	18.75	594.91	32.15	961.45	51.92
5.00	1,912.27	14.60	832.00	45.44	1,054.55	29.27	953.18	25.31	1,023.18	50.87	771.00	32.21	1,066.00	17.95	601.68	30.35	973.27	51.62
5.01	1,930.91	14.72	837.27	46.88	1,061.82	28.89	967.73	22.82	1,038.73	48.21	779.82	33.37	1,074.00	17.15	608.45	28.54	985.09	51.32
5.02	1,949.55	14.84	842.55	48.33	1,069.09	28.51	982.27	20.33	1,054.27	45.55	788.64	34.54	1,082.00	16.35	615.23	26.73	996.91	51.02
4.60	1,954.00	14.60	828.00	53.10	1,054.00	21.70	1,015.00	8.00	1,088.00	28.90	798.00	38.90	1,070.00	12.40	622.00	18.70	1,010.00	36.90
5.05	1,986.82	15.09	853.09	51.22	1,083.64	27.76	1,011.36	15.35	1,085.36	40.22	806.27	36.86	1,098.00	14.75	628.77	23.11	1,020.55	50.42
0.3	410	2.7	116	31.8	160	-8.3	320	-54.8	342	-58.6	194	25.6	176	-17.6	149	-39.8	260	-6.6
0.013636	18.63636	0.122727	5.272727	1.445455	7.272727	-0.377272727	14.54545	-2.49091	15.54545455	-2.663636364	8.818182	1.163636	8	-0.8	6.772727273	-1.809090909	11.81818182	-0.3

Total Eastbound Delay (AM)	Total Westbound Delay (AM)	Total Eastbound Del	Total Westbound De	Total Through Vehicles (Eastbound - AM)	Total Vehicles (Westbound - AM)	Total Through Vehicles (Eastbound - PM)	Total Vehicles (Westbound - PM)	Eastbound - AM -Average Through Cars (Based on 6 Intersections)	Westbound - AM -Average Through Cars (Based on 6 Intersections)	Eastbound - PM - Avg. Through Cars	Westboun d PM - Avg. Through Cars	Avg. Eastbound Delay Total (AM)	Avg. Westbound Delay Total (AM)	Avg. Eastbound Delay Total (PM)
Delay (s)	Delay (s)	Delay (s)	Delay (s)					# of Cars	# of Cars	# of Cars	# of Cars	Seconds	Seconds	Seconds
149.10	134.10	221.10	150.70	8,790.00	6,168.00	9,518.00	9,779.00	1,465.00	1,028.00	1,586.33	1,629.83	218,431.50	137,854.80	350,738.30
155.60	135.23	235.49	156.74	8,915.23	6,256.41	9,655.68	9,920.59	1,485.87	1,042.73	1,609.28	1,653.43	231,194.81	141,006.19	378,970.88
162.09	136.35	249.88	162.77	9,040.45	6,344.82	9,793.36	10,062.18	1,506.74	1,057.47	1,632.23	1,677.03	244,229.25	144,190.80	407,863.92
168.59	137.48	264.27	168.81	9,165.68	6,433.23	9,931.05	10,203.77	1,527.61	1,072.20	1,655.17	1,700.63	257,534.83	147,408.63	437,417.41
175.08	138.61	278.66	174.85	9,290.91	6,521.64	10,068.73	10,345.36	1,548.48	1,086.94	1,678.12	1,724.23	271,111.54	150,659.68	467,631.36
174.56	139.21	275.57	177.03	9,392.32	6,586.86	10,202.55	10,455.86	1,565.39	1,097.81	1,700.42	1,742.64	273,259.54	152,825.22	468,582.82
174.05	139.81	272.47	179.22	9,493.73	6,652.09	10,336.36	10,566.36	1,582.29	1,108.68	1,722.73	1,761.06	275,390.01	155,003.80	469,396.20
173.53	140.41	269.38	181.40	9,595.14	6,717.32	10,470.18	10,676.86	1,599.19	1,119.55	1,745.03	1,779.48	277,502.97	157,195.42	470,071.50
173.01	141.01	266.28	183.59	9,696.55	6,782.55	10,604.00	10,787.36	1,616.09	1,130.42	1,767.33	1,797.89	279,598.42	159,400.09	470,608.73
172.49	141.61	263.19	185.78	9,797.95	6,847.77	10,737.82	10,897.86	1,632.99	1,141.30	1,789.64	1,816.31	281,676.35	161,617.81	471,007.89
171.97	142.21	260.09	187.96	9,899.36	6,913.00	10,871.64	11,008.36	1,649.89	1,152.17	1,811.94	1,834.73	283,736.76	163,848.57	471,268.96
171.45	142.81	257.00	190.15	10,000.77	6,978.23	11,005.45	11,118.86	1,666.80	1,163.04	1,834.24	1,853.14	285,779.66	166,092.38	471,391.97
170.94	143.41	253.90	192.34	10,102.18	7,043.45	11,139.27	11,229.36	1,683.70	1,173.91	1,856.55	1,871.56	287,805.04	168,349.24	471,376.89
170.42	144.01	250.80	194.52	10,203.59	7,108.68	11,273.09	11,339.86	1,700.60	1,184.78	1,878.85	1,889.98	289,812.90	170,619.13	471,223.74
169.90	144.61	247.71	196.71	10,305.00	7,173.91	11,406.91	11,450.36	1,717.50	1,195.65	1,901.15	1,908.39	291,803.25	172,902.08	470,932.51
169.38	145.21	244.61	198.90	10,406.41	7,239.14	11,540.73	11,560.86	1,734.40	1,206.52	1,923.45	1,926.81	293,776.08	175,198.07	470,503.21
168.86	145.81	241.52	201.08	10,507.82	7,304.36	11,674.55	11,671.36	1,751.30	1,217.39	1,945.76	1,945.23	295,731.40	177,507.10	469,935.83
168.35	146.41	238.42	203.27	10,609.23	7,369.59	11,808.36	11,781.86	1,768.20	1,228.27	1,968.06	1,963.64	297,669.20	179,829.18	469,230.38
167.83	147.01	235.33	205.45	10,710.64	7,434.82	11,942.18	11,892.36	1,785.11	1,239.14	1,990.36	1,982.06	299,589.48	182,164.31	468,386.85
167.31	147.61	232.23	207.64	10,812.05	7,500.05	12,076.00	12,002.86	1,802.01	1,250.01	2,012.67	2,000.48	301,492.25	184,512.48	467,405.24
166.79	148.21	229.14	209.83	10,913.45	7,565.27	12,209.82	12,113.36	1,818.91	1,260.88	2,034.97	2,018.89	303,377.50	186,873.70	466,285.56
166.27	148.81	226.04	212.01	11,014.86	7,630.50	12,343.64	12,223.86	1,835.81	1,271.75	2,057.27	2,037.31	305,245.24	189,247.96	465,027.80
137.70	147.30	153.00	198.80	11,021.00	7,603.00	12,462.00	12,210.00	1,836.83	1,267.17	2,077.00	2,035.00	252,931.95	186,653.65	317,781.00
142.24	150.01	219.85	216.39	11,206.95	7,760.95	12,611.27	12,444.86	1,867.83	1,293.49	2,101.88	2,074.14	265,672.74	194,035.62	462,098.05

Avg. Westbound Delay Total (PM)	Total Delay (during AM/PM Peak)	Total Hours Delay (per day)	Total Hours Delayed (per Year based on 260 working days a year)	Business Hours (4.6 %)	Car Hours	Business Rate Value ($27.4/hour)	Car Rate Value ($13.70/hour based on Median Income-2010)	Total Time Valued for Delay (With Improvements)	Total Time Valued for Delay (Without TIGER Improvements)	Total Time Saved (in Dollars)	Construction Delay (added time .35 of construction time 18 month, one lane) - Cars Delayed in Year	Approximate Delay of 30s	Hours Delayed in Year	Cars Delayed (95.6)	Business Delayed (4.6%)	Cars Total	Business Total
Seconds	Seconds	Hours															
245,615.88	952,640.48	264.62	$ 68,802	$ 3,165	$ 65,637	$ 86,718	$ 899,226	$ 985,944									
259,152.89	1,010,324.77	280.65	$ 72,968	$ 3,357	$ 69,611	$ 91,969	$ 953,676	$ 1,045,645									
272,974.80	1,069,258.76	297.02	$ 77,224	$ 3,552	$ 73,672	$ 97,333	$ 1,009,305	$ 1,106,639									
287,081.60	1,129,442.47	313.73	$ 81,571	$ 3,752	$ 77,819	$ 102,812	$ 1,066,115	$ 1,168,927									
301,473.30	1,190,875.88	330.80	$ 86,008	$ 3,956	$ 82,051	$ 108,404	$ 1,124,103	$ 1,232,508			441,728.48	0.01	3,681.07	3,519.10	147.24	$ 48,211.72	$ 4,034.45
308,503.43	1,203,170.99	334.21	$ 86,896	$ 3,997	$ 82,898	$ 109,523	$ 1,135,709	$ 1,245,233	$ 1,150,575	$ (94,658)							
315,614.08	1,215,404.09	337.61	$ 87,779	$ 4,038	$ 83,741	$ 110,637	$ 1,147,256	$ 1,257,893	$ 1,184,981	$ (72,912)							
322,805.27	1,227,575.17	340.99	$ 88,658	$ 4,078	$ 84,580	$ 111,745	$ 1,158,745	$ 1,270,490	$ 1,219,881	$ (50,609)							
330,076.98	1,239,684.23	344.36	$ 89,533	$ 4,119	$ 85,414	$ 112,847	$ 1,170,175	$ 1,283,022	$ 1,255,274	$ (27,749)							
337,429.23	1,251,731.28	347.70	$ 90,403	$ 4,159	$ 86,244	$ 113,944	$ 1,181,547	$ 1,295,490	$ 1,291,160	$ (4,330)							
344,862.01	1,263,716.31	351.03	$ 91,268	$ 4,198	$ 87,070	$ 115,035	$ 1,192,860	$ 1,307,894	$ 1,327,540	$ 19,645							
352,375.32	1,275,639.32	354.34	$ 92,130	$ 4,238	$ 87,892	$ 116,120	$ 1,204,114	$ 1,320,234	$ 1,364,413	$ 44,179							
359,969.16	1,287,500.33	357.64	$ 92,986	$ 4,277	$ 88,709	$ 117,200	$ 1,215,310	$ 1,332,510	$ 1,401,780	$ 69,270							
367,643.53	1,299,299.31	360.92	$ 93,838	$ 4,317	$ 89,522	$ 118,274	$ 1,226,448	$ 1,344,721	$ 1,439,640	$ 94,918							
375,398.44	1,311,036.28	364.18	$ 94,686	$ 4,356	$ 90,330	$ 119,342	$ 1,237,526	$ 1,356,869	$ 1,477,993	$ 121,124							
383,233.87	1,322,711.23	367.42	$ 95,529	$ 4,394	$ 91,135	$ 120,405	$ 1,248,547	$ 1,368,952	$ 1,516,840	$ 147,888							
391,149.84	1,334,324.17	370.65	$ 96,368	$ 4,433	$ 91,935	$ 121,462	$ 1,259,509	$ 1,380,971	$ 1,556,180	$ 175,209							
399,146.33	1,345,875.09	373.85	$ 97,202	$ 4,471	$ 92,731	$ 122,514	$ 1,270,412	$ 1,392,925	$ 1,596,014	$ 203,088							
407,223.36	1,357,364.00	377.05	$ 98,032	$ 4,509	$ 93,522	$ 123,559	$ 1,281,257	$ 1,404,816	$ 1,636,341	$ 231,525							
415,380.92	1,368,790.89	380.22	$ 98,857	$ 4,547	$ 94,310	$ 124,600	$ 1,292,043	$ 1,416,642	$ 1,677,161	$ 260,519							
423,619.01	1,380,155.77	383.38	$ 99,678	$ 4,585	$ 95,093	$ 125,634	$ 1,302,770	$ 1,428,404	$ 1,718,475	$ 290,070							
431,937.63	1,391,458.63	386.52	$ 100,494	$ 4,623	$ 95,871	$ 126,663	$ 1,313,440	$ 1,440,102	$ 1,760,282	$ 320,179							
404,558.00	1,161,924.60	322.76	$ 83,917	$ 3,860	$ 80,057	$ 105,769	$ 1,096,775	$ 1,202,544	$ 1,802,582	$ 600,038							
448,816.46	1,370,622.88	380.73	$ 98,989	$ 4,554	$ 94,436	$ 124,766	$ 1,293,772	$ 1,418,538	$ 1,845,376	$ 426,838							
								$ 31,007,914	$ 28,222,484	$ 2,754,232							

Construction Delay	Difference

	1 - Boundary Street at SC 170 - Eastbound				1 -Boundary Street at SC 170 - Westbound			1 - Boundary Street at SC 170 - Westbound Left (onto 170)				- Boundary Street at SC 170 - Northbound Right (onto Boundary S			
	AM Peak (Cars)	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)
2008	1,147.00	32.10	1,058.00	62.90	847.00	4.30	10.10	292.00	32.00	604.00	40.70	536.00	22.10	693.00	23.80
2009	1,160.77	31.62	1,070.14	61.64	855.68	4.85	10.28	295.50	31.78	615.41	41.43	540.41	22.37	702.41	24.87
2010	1,174.55	31.14	1,082.27	60.37	864.36	5.40	10.45	299.00	31.55	626.82	42.16	544.82	22.65	711.82	25.94
2011	1,188.32	30.65	1,094.41	59.11	873.05	5.95	10.63	302.50	31.33	638.23	42.90	549.23	22.92	721.23	27.00
2012	1,202.09	30.17	1,106.55	57.85	881.73	6.50	10.81	306.00	31.11	649.64	43.63	553.64	23.19	730.64	28.07
2013	1,215.86	29.69	1,118.68	56.58	890.41	7.05	10.99	309.50	30.89	661.05	44.36	558.05	23.46	740.05	29.14
2014	1,229.64	29.21	1,130.82	55.32	899.09	7.60	11.16	313.00	30.66	672.45	45.09	562.45	23.74	749.45	30.21
2015	1,243.41	28.73	1,142.95	54.05	907.77	8.15	11.34	316.50	30.44	683.86	45.82	566.86	24.01	758.86	31.28
2016	1,257.18	28.25	1,155.09	52.79	916.45	8.70	11.52	320.00	30.22	695.27	46.55	571.27	24.28	768.27	32.35
2017	1,270.95	27.76	1,167.23	51.53	925.14	9.25	11.70	323.50	30.00	706.68	47.29	575.68	24.55	777.68	33.41
2018	1,284.73	27.28	1,179.36	50.26	933.82	9.80	11.87	327.00	29.77	718.09	48.02	580.09	24.83	787.09	34.48
2019	1,298.50	26.80	1,191.50	49.00	942.50	10.35	12.05	330.50	29.55	729.50	48.75	584.50	25.10	796.50	35.55
2020	1,312.27	26.32	1,203.64	47.74	951.18	10.90	12.23	334.00	29.33	740.91	49.48	588.91	25.37	805.91	36.62
2021	1,326.05	25.84	1,215.77	46.47	959.86	11.45	12.40	337.50	29.10	752.32	50.21	593.32	25.65	815.32	37.69
2022	1,339.82	25.35	1,227.91	45.21	968.55	12.00	12.58	341.00	28.88	763.73	50.95	597.73	25.92	824.73	38.75
2023	1,353.59	24.87	1,240.05	43.95	977.23	12.55	12.76	344.50	28.66	775.14	51.68	602.14	26.19	834.14	39.82
2024	1,367.36	24.39	1,252.18	42.68	985.91	13.10	12.94	348.00	28.44	786.55	52.41	606.55	26.46	843.55	40.89
2025	1,381.14	23.91	1,264.32	41.42	994.59	13.65	13.11	351.50	28.21	797.95	53.14	610.95	26.74	852.95	41.96
2026	1,394.91	23.43	1,276.45	40.15	1,003.27	14.20	13.29	355.00	27.99	809.36	53.87	615.36	27.01	862.36	43.03
2027	1,408.68	22.95	1,288.59	38.89	1,011.95	14.75	13.47	358.50	27.77	820.77	54.60	619.77	27.28	871.77	44.10
2028	1,422.45	22.46	1,300.73	37.63	1,020.64	15.30	13.65	362.00	27.55	832.18	55.34	624.18	27.55	881.18	45.16
2029	1,436.23	21.98	1,312.86	36.36	1,029.32	15.85	13.82	365.50	27.32	843.59	56.07	628.59	27.83	890.59	46.23
2030	1,450.00	21.50	1,325.00	35.10	1,038.00	16.40	14.00	369.00	27.10	855.00	56.80	633.00	28.10	900.00	47.30
2031	1,463.77	21.02	1,337.14	33.84	1,046.68	16.95	14.18	372.50	26.88	866.41	57.53	637.41	28.37	909.41	48.37
	303	-10.6	267	-27.8	191	12.1	3.9	77	-4.9	251	16.1	97	6	207	23.5
	13.77272727	-0.481818182	12.1363636	-1.2636364	8.6818182	0.55	0.177272727	3.5	-0.2227273	11.40909091	0.731818182	4.4090909	0.2727273	9.409090909	1.068181818

***Phase 1 Improvement are the baseline for differential times. This is the

***All Traffic Estimates are based on through traffic during Peak Hours, both eastbound and westbound. This Synchro Model was run in 2008 by Kimley-Horn & Associates and was projected to 2030.

2 - Boundary Street at Polk Street/Beaufort Plaza - Eastbound				2 - Boundary Street at Polk Street/Beaufort Plaza - Westbound				3 - Boundary Street at Hogarth Street - Eastbound				3 - Boundary Street at Hogarth Street - W		
AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak
1,521.00	-	1,479.00	-	1,154.00	-	1,742.00	-	1,457.00	6.40	1,665.00	8.30	1,101.00	3.80	1,701.00
1,542.86	-	1,505.05	7.37	1,170.59	-	1,752.59	1.21	1,477.91	6.66	1,688.91	8.68	1,116.82	3.80	1,725.45
1,564.73	-	1,531.09	14.75	1,187.18	-	1,763.18	2.43	1,498.82	6.93	1,712.82	9.06	1,132.64	3.80	1,749.91
1,586.59	-	1,557.14	22.12	1,203.77	-	1,773.77	3.64	1,519.73	7.19	1,736.73	9.45	1,148.45	3.80	1,774.36
1,608.45	-	1,583.18	29.49	1,220.36	-	1,784.36	4.85	1,540.64	7.45	1,760.64	9.83	1,164.27	3.80	1,798.82
1,630.32	-	1,609.23	36.86	1,236.95	-	1,794.95	6.07	1,561.55	7.72	1,784.55	10.21	1,180.09	3.80	1,823.27
1,652.18	-	1,635.27	44.24	1,253.55	-	1,805.55	7.28	1,582.45	7.98	1,808.45	10.59	1,195.91	3.80	1,847.73
1,674.05	-	1,661.32	51.61	1,270.14	-	1,816.14	8.50	1,603.36	8.25	1,832.36	10.97	1,211.73	3.80	1,872.18
1,695.91	-	1,687.36	58.98	1,286.73	-	1,826.73	9.71	1,624.27	8.51	1,856.27	11.35	1,227.55	3.80	1,896.64
1,717.77	-	1,713.41	66.35	1,303.32	-	1,837.32	10.92	1,645.18	8.77	1,880.18	11.74	1,243.36	3.80	1,921.09
1,739.64	-	1,739.45	73.73	1,319.91	-	1,847.91	12.14	1,666.09	9.04	1,904.09	12.12	1,259.18	3.80	1,945.55
1,761.50	-	1,765.50	81.10	1,336.50	-	1,858.50	13.35	1,687.00	9.30	1,928.00	12.50	1,275.00	3.80	1,970.00
1,783.36	-	1,791.55	88.47	1,353.09	-	1,869.09	14.56	1,707.91	9.56	1,951.91	12.88	1,290.82	3.80	1,994.45
1,805.23	-	1,817.59	95.85	1,369.68	-	1,879.68	15.78	1,728.82	9.83	1,975.82	13.26	1,306.64	3.80	2,018.91
1,827.09	-	1,843.64	103.22	1,386.27	-	1,890.27	16.99	1,749.73	10.09	1,999.73	13.65	1,322.45	3.80	2,043.36
1,848.95	-	1,869.68	110.59	1,402.86	-	1,900.86	18.20	1,770.64	10.35	2,023.64	14.03	1,338.27	3.80	2,067.82
1,870.82	-	1,895.73	117.96	1,419.45	-	1,911.45	19.42	1,791.55	10.62	2,047.55	14.41	1,354.09	3.80	2,092.27
1,892.68	-	1,921.77	125.34	1,436.05	-	1,922.05	20.63	1,812.45	10.88	2,071.45	14.79	1,369.91	3.80	2,116.73
1,914.55	-	1,947.82	132.71	1,452.64	-	1,932.64	21.85	1,833.36	11.15	2,095.36	15.17	1,385.73	3.80	2,141.18
1,936.41	-	1,973.86	140.08	1,469.23	-	1,943.23	23.06	1,854.27	11.41	2,119.27	15.55	1,401.55	3.80	2,165.64
1,958.27	-	1,999.91	147.45	1,485.82	-	1,953.82	24.27	1,875.18	11.67	2,143.18	15.94	1,417.36	3.80	2,190.09
1,980.14	-	2,025.95	154.83	1,502.41	-	1,964.41	25.49	1,896.09	11.94	2,167.09	16.32	1,433.18	3.80	2,214.55
2,002.00	-	2,052.00	162.20	1,519.00	-	1,975.00	26.70	1,917.00	12.20	2,191.00	16.70	1,449.00	3.80	2,239.00
2,023.86	-	2,078.05	169.57	1,535.59	-	1,985.59	27.91	1,937.91	12.46	2,214.91	17.08	1,464.82	3.80	2,263.45
481	0	573	162.2	365	0	233	26.7	460	5.8	526	8.4	348	0	538
21.863636	0	26.04545455	7.372727273	16.590909	0	10.59090909	1.213636364	20.909091	0.263636364	23.90909091	0.381818182	15.818182	0	24.45454545

Westbound	4 - Boundary Street at Beaufort Town Center - Eastbound				4 - Boundary Street at Beaufort Town Center - Westbound				5 - Boundary Street at Marsh Road - Eastbound				- Boundary Street at Marsh Road -		
Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak
3.30	1,398.00	1.40	1,417.00	4.20	1,084.00	3.40	1,475.00	11.20	1,324.00	3.00	1,566.00	4.40	1,086.00	4.30	1,544.00
3.57	1,418.09	1.45	1,437.36	4.40	1,099.59	3.38	1,496.18	11.49	1,343.00	3.21	1,588.50	5.15	1,101.59	4.42	1,566.18
3.84	1,438.18	1.51	1,457.73	4.60	1,115.18	3.36	1,517.36	11.77	1,362.00	3.42	1,611.00	5.91	1,117.18	4.55	1,588.36
4.10	1,458.27	1.56	1,478.09	4.80	1,130.77	3.35	1,538.55	12.06	1,381.00	3.63	1,633.50	6.66	1,132.77	4.67	1,610.55
4.37	1,478.36	1.62	1,498.45	5.00	1,146.36	3.33	1,559.73	12.35	1,400.00	3.84	1,656.00	7.42	1,148.36	4.79	1,632.73
4.64	1,498.45	1.67	1,518.82	5.20	1,161.95	3.31	1,580.91	12.63	1,419.00	4.05	1,678.50	8.17	1,163.95	4.91	1,654.91
4.91	1,518.55	1.73	1,539.18	5.40	1,177.55	3.29	1,602.09	12.92	1,438.00	4.25	1,701.00	8.93	1,179.55	5.04	1,677.09
5.18	1,538.64	1.78	1,559.55	5.60	1,193.14	3.27	1,623.27	13.20	1,457.00	4.46	1,723.50	9.68	1,195.14	5.16	1,699.27
5.45	1,558.73	1.84	1,579.91	5.80	1,208.73	3.25	1,644.45	13.49	1,476.00	4.67	1,746.00	10.44	1,210.73	5.28	1,721.45
5.71	1,578.82	1.89	1,600.27	6.00	1,224.32	3.24	1,665.64	13.78	1,495.00	4.88	1,768.50	11.19	1,226.32	5.40	1,743.64
5.98	1,598.91	1.95	1,620.64	6.20	1,239.91	3.22	1,686.82	14.06	1,514.00	5.09	1,791.00	11.95	1,241.91	5.53	1,765.82
6.25	1,619.00	2.00	1,641.00	6.40	1,255.50	3.20	1,708.00	14.35	1,533.00	5.30	1,813.50	12.70	1,257.50	5.65	1,788.00
6.52	1,639.09	2.05	1,661.36	6.60	1,271.09	3.18	1,729.18	14.64	1,552.00	5.51	1,836.00	13.45	1,273.09	5.77	1,810.18
6.79	1,659.18	2.11	1,681.73	6.80	1,286.68	3.16	1,750.36	14.92	1,571.00	5.72	1,858.50	14.21	1,288.68	5.90	1,832.36
7.05	1,679.27	2.16	1,702.09	7.00	1,302.27	3.15	1,771.55	15.21	1,590.00	5.93	1,881.00	14.96	1,304.27	6.02	1,854.55
7.32	1,699.36	2.22	1,722.45	7.20	1,317.86	3.13	1,792.73	15.50	1,609.00	6.14	1,903.50	15.72	1,319.86	6.14	1,876.73
7.59	1,719.45	2.27	1,742.82	7.40	1,333.45	3.11	1,813.91	15.78	1,628.00	6.35	1,926.00	16.47	1,335.45	6.26	1,898.91
7.86	1,739.55	2.33	1,763.18	7.60	1,349.05	3.09	1,835.09	16.07	1,647.00	6.55	1,948.50	17.23	1,351.05	6.39	1,921.09
8.13	1,759.64	2.38	1,783.55	7.80	1,364.64	3.07	1,856.27	16.35	1,666.00	6.76	1,971.00	17.98	1,366.64	6.51	1,943.27
8.40	1,779.73	2.44	1,803.91	8.00	1,380.23	3.05	1,877.45	16.64	1,685.00	6.97	1,993.50	18.74	1,382.23	6.63	1,965.45
8.66	1,799.82	2.49	1,824.27	8.20	1,395.82	3.04	1,898.64	16.93	1,704.00	7.18	2,016.00	19.49	1,397.82	6.75	1,987.64
8.93	1,819.91	2.55	1,844.64	8.40	1,411.41	3.02	1,919.82	17.21	1,723.00	7.39	2,038.50	20.25	1,413.41	6.88	2,009.82
9.20	1,840.00	2.60	1,865.00	8.60	1,427.00	3.00	1,941.00	17.50	1,742.00	7.60	2,061.00	21.00	1,429.00	7.00	2,032.00
9.47	1,860.09	2.65	1,885.36	8.80	1,442.59	2.98	1,962.18	17.79	1,761.00	7.81	2,083.50	21.75	1,444.59	7.12	2,054.18
5.9	442	1.2	448	4.4	343	-0.4	466	6.3	418	4.6	495	16.6	343	2.7	488
0.268181818	20.090909	0.054545455	20.36363636	0.2	15.59090909	-0.018181818	21.18181818	0.286363636	19	0.20909	22.5	0.754545455	15.59091	0.122727	22.18182

- Westboun	- Boundary Street at Ribaut Road - Eastboun				- Boundary Street at Ribaut Road - Eastbound-Right to Ribau				6 - Boundary Street at Ribaut Road -Westbound				6 - Boundary Street at Ribaut Road - North Bound Left onto Boundary				Total Eastbound Delay (AM)
Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	Delay (s)
11.90	712.00	21.30	894.00	30.00	695.00	62.80	746.00	87.50	604.00	13.30	894.00	30.00	473.00	58.50	750.00	43.50	149.10
12.11	722.23	21.91	906.86	31.23	705.00	62.77	757.00	88.33	612.68	13.66	907.00	29.99	479.77	58.25	761.50	46.65	150.00
12.33	732.45	22.53	919.73	32.46	715.00	62.74	768.00	89.16	621.36	14.03	920.00	29.97	486.55	57.99	773.00	49.81	150.90
12.54	742.68	23.14	932.59	33.70	725.00	62.70	779.00	90.00	630.05	14.39	933.00	29.96	493.32	57.74	784.50	52.96	151.80
12.75	752.91	23.75	945.45	34.93	735.00	62.67	790.00	90.83	638.73	14.75	946.00	29.95	500.09	57.48	796.00	56.12	152.70
12.97	763.14	24.37	958.32	36.16	745.00	62.64	801.00	91.66	647.41	15.12	959.00	29.93	506.86	57.23	807.50	59.27	153.60
13.18	773.36	24.98	971.18	37.39	755.00	62.61	812.00	92.49	656.09	15.48	972.00	29.92	513.64	56.97	819.00	62.43	154.50
13.40	783.59	25.60	984.05	38.62	765.00	62.58	823.00	93.32	664.77	15.85	985.00	29.90	520.41	56.72	830.50	65.58	155.40
13.61	793.82	26.21	996.91	39.85	775.00	62.55	834.00	94.15	673.45	16.21	998.00	29.89	527.18	56.46	842.00	68.74	156.30
13.82	804.05	26.82	1,009.77	41.09	785.00	62.51	845.00	94.99	682.14	16.57	1,011.00	29.88	533.95	56.21	853.50	71.89	157.20
14.04	814.27	27.44	1,022.64	42.32	795.00	62.48	856.00	95.82	690.82	16.94	1,024.00	29.86	540.73	55.95	865.00	75.05	158.10
14.25	824.50	28.05	1,035.50	43.55	805.00	62.45	867.00	96.65	699.50	17.30	1,037.00	29.85	547.50	55.70	876.50	78.20	159.00
14.46	834.73	28.66	1,048.36	44.78	815.00	62.42	878.00	97.48	708.18	17.66	1,050.00	29.84	554.27	55.45	888.00	81.35	159.90
14.68	844.95	29.28	1,061.23	46.01	825.00	62.39	889.00	98.31	716.86	18.03	1,063.00	29.82	561.05	55.19	899.50	84.51	160.80
14.89	855.18	29.89	1,074.09	47.25	835.00	62.35	900.00	99.15	725.55	18.39	1,076.00	29.81	567.82	54.94	911.00	87.66	161.70
15.10	865.41	30.50	1,086.95	48.48	845.00	62.32	911.00	99.98	734.23	18.75	1,089.00	29.80	574.59	54.68	922.50	90.82	162.60
15.32	875.64	31.12	1,099.82	49.71	855.00	62.29	922.00	100.81	742.91	19.12	1,102.00	29.78	581.36	54.43	934.00	93.97	163.50
15.53	885.86	31.73	1,112.68	50.94	865.00	62.26	933.00	101.64	751.59	19.48	1,115.00	29.77	588.14	54.17	945.50	97.13	164.40
15.75	896.09	32.35	1,125.55	52.17	875.00	62.23	944.00	102.47	760.27	19.85	1,128.00	29.75	594.91	53.92	957.00	100.28	165.30
15.96	906.32	32.96	1,138.41	53.40	885.00	62.20	955.00	103.30	768.95	20.21	1,141.00	29.74	601.68	53.66	968.50	103.44	166.20
16.17	916.55	33.57	1,151.27	54.64	895.00	62.16	966.00	104.14	777.64	20.57	1,154.00	29.73	608.45	53.41	980.00	106.59	167.10
16.39	926.77	34.19	1,164.14	55.87	905.00	62.13	977.00	104.97	786.32	20.94	1,167.00	29.71	615.23	53.15	991.50	109.75	168.00
16.60	937.00	34.80	1,177.00	57.10	915.00	62.10	988.00	105.80	795.00	21.30	1,180.00	29.70	622.00	52.90	1,003.00	112.90	168.90
16.81	947.23	35.41	1,189.86	58.33	925.00	62.07	999.00	106.63	803.68	21.66	1,193.00	29.69	628.77	52.65	1,014.50	116.05	169.80
4.7	225	13.5	283	27.1	220	-0.7	242	18.3	191	8	286	-0.3	149	-5.6	253	69.4	
0.213636	10.22727	0.613636	12.86364	1.231818	10	-0.03182	11	0.831818182	8.681818	0.363636	13	-0.013636364	6.772727273	-0.254545455	11.5	3.154545455	

Total Westbound Delay (AM)	Total Eastbound Delay (PM)	Total Westbound Delay (PM)	Total Through Vehicles (Eastbound - AM)	Total Vehicles (Westbound - AM)	Total Through Vehicles (Eastbound - PM)	Total Vehicles (Westbound - PM)	Eastbound - AM - Average Through Cars (Based on 6 Intersections)	Westbound - AM -Average Through Cars (Based on 6 Intersections)	Eastbound - PM - Avg. Through Cars	Westbound PM - Avg. Through Cars	Avg. Eastbound Delay Total (AM)	Avg. Westbound Delay Total (AM)	Avg. Eastbound Delay Total (PM)	Avg. Westbound Delay Total (PM)
Delay (s)	Delay (s)	Delay (s)										Seconds	Seconds	Seconds
134.10	221.10	150.70	8,790.00	6,168.00	9,518.00	9,779.00	1,465.00	1,028.00	1,586.33	1,629.83	218,431.50	137,854.80	350,738.30	245,615.88
135.22	224.30	156.73	8,910.27	6,252.45	9,656.23	9,909.00	1,485.05	1,042.08	1,609.37	1,651.50	222,756.82	140,912.33	360,989.28	258,842.60
136.35	227.51	162.76	9,030.55	6,336.91	9,794.45	10,039.00	1,505.09	1,056.15	1,632.41	1,673.17	227,118.22	144,001.46	371,387.91	272,330.69
137.47	230.71	168.80	9,150.82	6,421.36	9,932.68	10,169.00	1,525.14	1,070.23	1,655.45	1,694.83	231,515.70	147,122.20	381,934.19	286,080.16
138.59	233.92	174.83	9,271.09	6,505.82	10,070.91	10,299.00	1,545.18	1,084.30	1,678.48	1,716.50	235,949.26	150,274.54	392,628.12	300,091.01
139.71	237.12	180.86	9,391.36	6,590.27	10,209.14	10,429.00	1,565.23	1,098.38	1,701.52	1,738.17	240,418.91	153,458.49	403,469.71	314,363.24
140.84	240.33	186.89	9,511.64	6,674.73	10,347.36	10,559.00	1,585.27	1,112.45	1,724.56	1,759.83	244,924.64	156,674.05	414,458.95	328,896.85
141.96	243.53	192.92	9,631.91	6,759.18	10,485.59	10,689.00	1,605.32	1,126.53	1,747.60	1,781.50	249,466.45	159,921.22	425,595.84	343,691.84
143.08	246.74	198.95	9,752.18	6,843.64	10,623.82	10,819.00	1,625.36	1,140.61	1,770.64	1,803.17	254,044.34	163,199.99	436,880.38	358,748.20
144.20	249.94	204.99	9,872.45	6,928.09	10,762.05	10,949.00	1,645.41	1,154.68	1,793.67	1,824.83	258,658.31	166,510.37	448,312.57	374,065.95
145.33	253.15	211.02	9,992.73	7,012.55	10,900.27	11,079.00	1,665.45	1,168.76	1,816.71	1,846.50	263,308.36	169,852.35	459,892.42	389,645.07
146.45	256.35	217.05	10,113.00	7,097.00	11,038.50	11,209.00	1,685.50	1,182.83	1,839.75	1,868.17	267,994.50	173,225.94	471,619.91	405,485.58
147.57	259.55	223.08	10,233.27	7,181.45	11,176.73	11,339.00	1,705.55	1,196.91	1,862.79	1,889.83	272,716.72	176,631.14	483,495.06	421,587.46
148.70	262.76	229.11	10,353.55	7,265.91	11,314.95	11,469.00	1,725.59	1,210.98	1,885.83	1,911.50	277,475.02	180,067.94	495,517.86	437,950.72
149.82	265.96	235.15	10,473.82	7,350.36	11,453.18	11,599.00	1,745.64	1,225.06	1,908.86	1,933.17	282,269.40	183,536.35	507,688.31	454,575.35
150.94	269.17	241.18	10,594.09	7,434.82	11,591.41	11,729.00	1,765.68	1,239.14	1,931.90	1,954.83	287,099.86	187,036.37	520,006.42	471,461.37
152.06	272.37	247.21	10,714.36	7,519.27	11,729.64	11,859.00	1,785.73	1,253.21	1,954.94	1,976.50	291,966.41	190,567.99	532,472.17	488,608.77
153.19	275.58	253.24	10,834.64	7,603.73	11,867.86	11,989.00	1,805.77	1,267.29	1,977.98	1,998.17	296,869.04	194,131.22	545,085.58	506,017.54
154.31	278.78	259.27	10,954.91	7,688.18	12,006.09	12,119.00	1,825.82	1,281.36	2,001.02	2,019.83	301,807.75	197,726.06	557,846.64	523,687.70
155.43	281.99	265.30	11,075.18	7,772.64	12,144.32	12,249.00	1,845.86	1,295.44	2,024.05	2,041.50	306,782.54	201,352.50	570,755.35	541,619.23
156.55	285.19	271.34	11,195.45	7,857.09	12,282.55	12,379.00	1,865.91	1,309.52	2,047.09	2,063.17	311,793.41	205,010.55	583,811.72	559,812.14
157.68	288.40	277.37	11,315.73	7,941.55	12,420.77	12,509.00	1,885.95	1,323.59	2,070.13	2,084.83	316,840.36	208,700.20	597,015.73	578,266.43
158.80	291.60	283.40	11,436.00	8,026.00	12,559.00	12,639.00	1,906.00	1,337.67	2,093.17	2,106.50	321,923.40	212,421.47	610,367.40	596,982.10
159.92	294.80	289.43	11,556.27	8,110.45	12,697.23	12,769.00	1,926.05	1,351.74	2,116.20	2,128.17	327,042.52	216,174.34	623,866.72	615,959.15

Total Delay (during AM/PM Peak)	Total Hours Delay (per day)	Total Hours Delayed (per Year based on 260 working days a year)	Business Percentage of Hours	Car Percentage of Hours	Business Rate Value ($27.40/hour)	Car Rate Value ($13.70/hour based on Median Income- 2010)	Total Time Valued for Delay
Seconds	Hours						
952,640.48	264.62	$68,802	$3,165	$65,637	$86,718	$899,226	$985,944
983,501.02	273.19	$71,031	$3,267	$67,763	$89,527	$928,356	$1,017,883
1,014,838.28	281.90	$73,294	$3,372	$69,922	$92,380	$957,936	$1,050,316
1,046,652.25	290.74	$75,592	$3,477	$72,114	$95,276	$987,966	$1,083,242
1,078,942.94	299.71	$77,924	$3,584	$74,339	$98,215	$1,018,447	$1,116,662
1,111,710.36	308.81	$80,290	$3,693	$76,597	$101,198	$1,049,377	$1,150,575
1,144,954.49	318.04	$82,691	$3,804	$78,887	$104,224	$1,080,757	$1,184,981
1,178,675.34	327.41	$85,127	$3,916	$81,211	$107,294	$1,112,587	$1,219,881
1,212,872.91	336.91	$87,596	$4,029	$83,567	$110,406	$1,144,867	$1,255,274
1,247,547.20	346.54	$90,101	$4,145	$85,956	$113,563	$1,177,597	$1,291,160
1,282,698.20	356.31	$92,639	$4,261	$88,378	$116,763	$1,210,777	$1,327,540
1,318,325.93	366.20	$95,212	$4,380	$90,833	$120,006	$1,244,407	$1,364,413
1,354,430.37	376.23	$97,820	$4,500	$93,320	$123,292	$1,278,487	$1,401,780
1,391,011.54	386.39	$100,462	$4,621	$95,841	$126,622	$1,313,018	$1,439,640
1,428,069.42	396.69	$103,138	$4,744	$98,394	$129,996	$1,347,998	$1,477,993
1,465,604.02	407.11	$105,849	$4,869	$100,980	$133,412	$1,383,428	$1,516,840
1,503,615.34	417.67	$108,594	$4,995	$103,599	$136,872	$1,419,308	$1,556,180
1,542,103.38	428.36	$111,374	$5,123	$106,251	$140,376	$1,455,638	$1,596,014
1,581,068.14	439.19	$114,188	$5,253	$108,936	$143,923	$1,492,418	$1,636,341
1,620,509.62	450.14	$117,037	$5,384	$111,653	$147,513	$1,529,648	$1,677,161
1,660,427.82	461.23	$119,920	$5,516	$114,403	$151,147	$1,567,328	$1,718,475
1,700,822.73	472.45	$122,837	$5,651	$117,187	$154,824	$1,605,458	$1,760,282
1,741,694.37	483.80	$125,789	$5,786	$120,003	$158,545	$1,644,038	$1,802,582
1,783,042.72	495.29	$128,775	$5,924	$122,852	$162,308	$1,683,068	$1,845,376
							$33,476,531

	1 - Boundary Street at SC 170 - Eastbound				1 -Boundary Street at SC 170 - Westbound				1 - Boundary Street at SC 170 - Westbound Left (onto 170)				- Boundary Street at SC 170 - Northbound Righ		
	AM Peak (Cars)	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak
2008	1,147.00	32.10	1,058.00	62.90	847.00	4.30	1,069.00	10.10	292.00	32.00	604.00	40.70	536.00	22.10	693.00
2009	1,163.45	37.37	1,073.18	73.94	859.18	4.50	1,084.36	10.40	295.95	32.25	612.91	41.31	542.68	22.22	703.64
2010	1,179.91	42.64	1,088.36	84.98	871.36	4.69	1,099.73	10.71	299.91	32.51	621.82	41.92	549.36	22.34	714.27
2011	1,196.36	47.90	1,103.55	96.02	883.55	4.89	1,115.09	11.01	303.86	32.76	630.73	42.53	556.05	22.45	724.91
2012	1,212.82	53.17	1,118.73	107.06	895.73	5.08	1,130.45	11.32	307.82	33.02	639.64	43.14	562.73	22.57	735.55
2013	1,229.27	58.44	1,133.91	118.10	907.91	5.28	1,145.82	11.62	311.77	33.27	648.55	43.75	569.41	22.69	746.18
2014	1,245.73	63.71	1,149.09	129.15	920.09	5.47	1,161.18	11.93	315.73	33.53	657.45	44.35	576.09	22.81	756.82
2015	1,262.18	68.98	1,164.27	140.19	932.27	5.67	1,176.55	12.23	319.68	33.78	666.36	44.96	582.77	22.93	767.45
2016	1,278.64	74.25	1,179.45	151.23	944.45	5.86	1,191.91	12.54	323.64	34.04	675.27	45.57	589.45	23.05	778.09
2017	1,295.09	79.51	1,194.64	162.27	956.64	6.06	1,207.27	12.84	327.59	34.29	684.18	46.18	596.14	23.16	788.73
2018	1,311.55	84.78	1,209.82	173.31	968.82	6.25	1,222.64	13.15	331.55	34.55	693.09	46.79	602.82	23.28	799.36
2019	1,328.00	90.05	1,225.00	184.35	981.00	6.45	1,238.00	13.45	335.50	34.80	702.00	47.40	609.50	23.40	810.00
2020	1,344.45	95.32	1,240.18	195.39	993.18	6.65	1,253.36	13.75	339.45	35.05	710.91	48.01	616.18	23.52	820.64
2021	1,360.91	100.59	1,255.36	206.43	1,005.36	6.84	1,268.73	14.06	343.41	35.31	719.82	48.62	622.86	23.64	831.27
2022	1,377.36	105.85	1,270.55	217.47	1,017.55	7.04	1,284.09	14.36	347.36	35.56	728.73	49.23	629.55	23.75	841.91
2023	1,393.82	111.12	1,285.73	228.51	1,029.73	7.23	1,299.45	14.67	351.32	35.82	737.64	49.84	636.23	23.87	852.55
2024	1,410.27	116.39	1,300.91	239.55	1,041.91	7.43	1,314.82	14.97	355.27	36.07	746.55	50.45	642.91	23.99	863.18
2025	1,426.73	121.66	1,316.09	250.60	1,054.09	7.62	1,330.18	15.28	359.23	36.33	755.45	51.05	649.59	24.11	873.82
2026	1,443.18	126.93	1,331.27	261.64	1,066.27	7.82	1,345.55	15.58	363.18	36.58	764.36	51.66	656.27	24.23	884.45
2027	1,459.64	132.20	1,346.45	272.68	1,078.45	8.01	1,360.91	15.89	367.14	36.84	773.27	52.27	662.95	24.35	895.09
2028	1,476.09	137.46	1,361.64	283.72	1,090.64	8.21	1,376.27	16.19	371.09	37.09	782.18	52.88	669.64	24.46	905.73
2029	1,492.55	142.73	1,376.82	294.76	1,102.82	8.40	1,391.64	16.50	375.05	37.35	791.09	53.49	676.32	24.58	916.36
2030	1,509.00	148.00	1,392.00	305.80	1,115.00	8.60	1,407.00	16.80	379.00	37.60	800.00	54.10	683.00	24.70	927.00
2031	1,525.45	153.27	1,407.18	316.84	1,127.18	8.80	1,422.36	17.10	382.95	37.85	808.91	54.71	689.68	24.82	937.64
	362	115.9	334	242.9	268	4.3	338	6.7	87	5.6	196	13.4	147	2.6	234
	16.45	5.27	15.18	11.04	12.18	0.20	15.36	0.30	3.95	0.25	8.91	0.61	6.68	0.12	10.64
	***No Improvement is based on the No-Build Scenario														
	***All Traffic Estimates are based on through traffic during Peak Hours, both eastbound and westbound. This Synchro Model was run in 2008 by Kimley-Horn & Associates and was projected to 2030.														

nt (onto Boundary S	2 - Boundary Street at Polk Street/Beaufort Plaza - Eastbound				2 - Boundary Street at Polk Street/Beaufort Plaza - Westbound				3 - Boundary Street at Hogarth Street - Eastbound				3 - Bounda	
Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)
23.80	1,521.00	-	1,479.00	-	1,154.00	-	1,742.00	-	1,457.00	6.40	1,665.00	8.30	1,101.00	3.80
23.75	1,542.86	-	1,500.23	7.37	1,170.59	-	1,767.00	1.21	1,477.91	6.66	1,688.91	8.68	1,116.82	3.80
23.70	1,564.73	-	1,521.45	14.75	1,187.18	-	1,792.00	2.43	1,498.82	6.93	1,712.82	9.06	1,132.64	3.80
23.65	1,586.59	-	1,542.68	22.12	1,203.77	-	1,817.00	3.64	1,519.73	7.19	1,736.73	9.45	1,148.45	3.80
23.60	1,608.45	-	1,563.91	29.49	1,220.36	-	1,842.00	4.85	1,540.64	7.45	1,760.64	9.83	1,164.27	3.80
23.55	1,630.32	-	1,585.14	36.86	1,236.95	-	1,867.00	6.07	1,561.55	7.72	1,784.55	10.21	1,180.09	3.80
23.50	1,652.18	-	1,606.36	44.24	1,253.55	-	1,892.00	7.28	1,582.45	7.98	1,808.45	10.59	1,195.91	3.80
23.45	1,674.05	-	1,627.59	51.61	1,270.14	-	1,917.00	8.50	1,603.36	8.25	1,832.36	10.97	1,211.73	3.80
23.40	1,695.91	-	1,648.82	58.98	1,286.73	-	1,942.00	9.71	1,624.27	8.51	1,856.27	11.35	1,227.55	3.80
23.35	1,717.77	-	1,670.05	66.35	1,303.32	-	1,967.00	10.92	1,645.18	8.77	1,880.18	11.74	1,243.36	3.80
23.30	1,739.64	-	1,691.27	73.73	1,319.91	-	1,992.00	12.14	1,666.09	9.04	1,904.09	12.12	1,259.18	3.80
23.25	1,761.50	-	1,712.50	81.10	1,336.50	-	2,017.00	13.35	1,687.00	9.30	1,928.00	12.50	1,275.00	3.80
23.20	1,783.36	-	1,733.73	88.47	1,353.09	-	2,042.00	14.56	1,707.91	9.56	1,951.91	12.88	1,290.82	3.80
23.15	1,805.23	-	1,754.95	95.85	1,369.68	-	2,067.00	15.78	1,728.82	9.83	1,975.82	13.26	1,306.64	3.80
23.10	1,827.09	-	1,776.18	103.22	1,386.27	-	2,092.00	16.99	1,749.73	10.09	1,999.73	13.65	1,322.45	3.80
23.05	1,848.95	-	1,797.41	110.59	1,402.86	-	2,117.00	18.20	1,770.64	10.35	2,023.64	14.03	1,338.27	3.80
23.00	1,870.82	-	1,818.64	117.96	1,419.45	-	2,142.00	19.42	1,791.55	10.62	2,047.55	14.41	1,354.09	3.80
22.95	1,892.68	-	1,839.86	125.34	1,436.05	-	2,167.00	20.63	1,812.45	10.88	2,071.45	14.79	1,369.91	3.80
22.90	1,914.55	-	1,861.09	132.71	1,452.64	-	2,192.00	21.85	1,833.36	11.15	2,095.36	15.17	1,385.73	3.80
22.85	1,936.41	-	1,882.32	140.08	1,469.23	-	2,217.00	23.06	1,854.27	11.41	2,119.27	15.55	1,401.55	3.80
22.80	1,958.27	-	1,903.55	147.45	1,485.82	-	2,242.00	24.27	1,875.18	11.67	2,143.18	15.94	1,417.36	3.80
22.75	1,980.14	-	1,924.77	154.83	1,502.41	-	2,267.00	25.49	1,896.09	11.94	2,167.09	16.32	1,433.18	3.80
22.70	2,002.00	-	1,946.00	162.20	1,519.00	-	2,292.00	26.70	1,917.00	12.20	2,191.00	16.70	1,449.00	3.80
22.65	2,023.86	-	1,967.23	169.57	1,535.59	-	2,317.00	27.91	1,937.91	12.46	2,214.91	17.08	1,464.82	3.80
-1.1	481	0	467	162.2	365	0	550	26.7	460	5.8	526	8.4	348	0
(0.05)	21.86	-	21.23	7.37	16.59	-	25.00	1.21	20.91	0.26	23.91	0.38	15.82	-

ry Street at Hogarth Street - Westbound		4 - Boundary Street at Beaufort Town Center - Eastbound				4 - Boundary Street at Beaufort Town Center - Westbound				5 - Boundary Street at Marsh Road - Eastbound				- Boundary
PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak
1,701.00	3.30	1,398.00	1.40	1,417.00	4.20	1,084.00	3.40	1,475.00	11.20	1,324.00	3.00	1,566.00	4.40	1,086.00
1,725.45	3.57	1,418.09	1.45	1,437.36	4.40	1,099.59	3.38	1,496.18	11.49	1,343.00	3.21	1,588.50	5.15	1,101.59
1,749.91	3.84	1,438.18	1.51	1,457.73	4.60	1,115.18	3.36	1,517.36	11.77	1,362.00	3.42	1,611.00	5.91	1,117.18
1,774.36	4.10	1,458.27	1.56	1,478.09	4.80	1,130.77	3.35	1,538.55	12.06	1,381.00	3.63	1,633.50	6.66	1,132.77
1,798.82	4.37	1,478.36	1.62	1,498.45	5.00	1,146.36	3.33	1,559.73	12.35	1,400.00	3.84	1,656.00	7.42	1,148.36
1,823.27	4.64	1,498.45	1.67	1,518.82	5.20	1,161.95	3.31	1,580.91	12.63	1,419.00	4.05	1,678.50	8.17	1,163.95
1,847.73	4.91	1,518.55	1.73	1,539.18	5.40	1,177.55	3.29	1,602.09	12.92	1,438.00	4.25	1,701.00	8.93	1,179.55
1,872.18	5.18	1,538.64	1.78	1,559.55	5.60	1,193.14	3.27	1,623.27	13.20	1,457.00	4.46	1,723.50	9.68	1,195.14
1,896.64	5.45	1,558.73	1.84	1,579.91	5.80	1,208.73	3.25	1,644.45	13.49	1,476.00	4.67	1,746.00	10.44	1,210.73
1,921.09	5.71	1,578.82	1.89	1,600.27	6.00	1,224.32	3.24	1,665.64	13.78	1,495.00	4.88	1,768.50	11.19	1,226.32
1,945.55	5.98	1,598.91	1.95	1,620.64	6.20	1,239.91	3.22	1,686.82	14.06	1,514.00	5.09	1,791.00	11.95	1,241.91
1,970.00	6.25	1,619.00	2.00	1,641.00	6.40	1,255.50	3.20	1,708.00	14.35	1,533.00	5.30	1,813.50	12.70	1,257.50
1,994.45	6.52	1,639.09	2.05	1,661.36	6.60	1,271.09	3.18	1,729.18	14.64	1,552.00	5.51	1,836.00	13.45	1,273.09
2,018.91	6.79	1,659.18	2.11	1,681.73	6.80	1,286.68	3.16	1,750.36	14.92	1,571.00	5.72	1,858.50	14.21	1,288.68
2,043.36	7.05	1,679.27	2.16	1,702.09	7.00	1,302.27	3.15	1,771.55	15.21	1,590.00	5.93	1,881.00	14.96	1,304.27
2,067.82	7.32	1,699.36	2.22	1,722.45	7.20	1,317.86	3.13	1,792.73	15.50	1,609.00	6.14	1,903.50	15.72	1,319.86
2,092.27	7.59	1,719.45	2.27	1,742.82	7.40	1,333.45	3.11	1,813.91	15.78	1,628.00	6.35	1,926.00	16.47	1,335.45
2,116.73	7.86	1,739.55	2.33	1,763.18	7.60	1,349.05	3.09	1,835.09	16.07	1,647.00	6.55	1,948.50	17.23	1,351.05
2,141.18	8.13	1,759.64	2.38	1,783.55	7.80	1,364.64	3.07	1,856.27	16.35	1,666.00	6.76	1,971.00	17.98	1,366.64
2,165.64	8.40	1,779.73	2.44	1,803.91	8.00	1,380.23	3.05	1,877.45	16.64	1,685.00	6.97	1,993.50	18.74	1,382.23
2,190.09	8.66	1,799.82	2.49	1,824.27	8.20	1,395.82	3.04	1,898.64	16.93	1,704.00	7.18	2,016.00	19.49	1,397.82
2,214.55	8.93	1,819.91	2.55	1,844.64	8.40	1,411.41	3.02	1,919.82	17.21	1,723.00	7.39	2,038.50	20.25	1,413.41
2,239.00	9.20	1,840.00	2.60	1,865.00	8.60	1,427.00	3.00	1,941.00	17.50	1,742.00	7.60	2,061.00	21.00	1,429.00
2,263.45	9.47	1,860.09	2.65	1,885.36	8.80	1,442.59	2.98	1,962.18	17.79	1,761.00	7.81	2,083.50	21.75	1,444.59
538	5.9	442	1.2	448	4.4	343	-0.4	466	6.3	418	4.6	495	16.6	343
24.45	0.27	20.09	0.05	20.36	0.20	15.59	(0.02)	21.18	0.29	19.00	0.21	22.50	0.75	15.59

Street at Marsh Road - Westboun			- Boundary Street at Ribaut Road - Eastboun				- Boundary Street at Ribaut Road - Eastbound-Right to Ribau				6 - Boundary Street at Ribaut Road -Westbound				6 - Boundary Street at Ribaut Road - North Bound Left onto Boundary			
Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)
4.30	1,544.00	11.90	712.00	21.30	894.00	30.00	695.00	62.80	746.00	87.50	604.00	13.30	894.00	30.00	473.00	58.50	750.00	43.50
4.42	1,566.18	12.11	722.23	21.91	906.86	31.23	705.00	62.77	757.00	88.33	612.68	13.66	907.00	29.99	479.77	58.25	761.50	46.65
4.55	1,588.36	12.33	732.45	22.53	919.73	32.46	715.00	62.74	768.00	89.16	621.36	14.03	920.00	29.97	486.55	57.99	773.00	49.81
4.67	1,610.55	12.54	742.68	23.14	932.59	33.70	725.00	62.70	779.00	90.00	630.05	14.39	933.00	29.96	493.32	57.74	784.50	52.96
4.79	1,632.73	12.75	752.91	23.75	945.45	34.93	735.00	62.67	790.00	90.83	638.73	14.75	946.00	29.95	500.09	57.48	796.00	56.12
4.91	1,654.91	12.97	763.14	24.37	958.32	36.16	745.00	62.64	801.00	91.66	647.41	15.12	959.00	29.93	506.86	57.23	807.50	59.27
5.04	1,677.09	13.18	773.36	24.98	971.18	37.39	755.00	62.61	812.00	92.49	656.09	15.48	972.00	29.92	513.64	56.97	819.00	62.43
5.16	1,699.27	13.40	783.59	25.60	984.05	38.62	765.00	62.58	823.00	93.32	664.77	15.85	985.00	29.90	520.41	56.72	830.50	65.58
5.28	1,721.45	13.61	793.82	26.21	996.91	39.85	775.00	62.55	834.00	94.15	673.45	16.21	998.00	29.89	527.18	56.46	842.00	68.74
5.40	1,743.64	13.82	804.05	26.82	1,009.77	41.09	785.00	62.51	845.00	94.99	682.14	16.57	1,011.00	29.88	533.95	56.21	853.50	71.89
5.53	1,765.82	14.04	814.27	27.44	1,022.64	42.32	795.00	62.48	856.00	95.82	690.82	16.94	1,024.00	29.86	540.73	55.95	865.00	75.05
5.65	1,788.00	14.25	824.50	28.05	1,035.50	43.55	805.00	62.45	867.00	96.65	699.50	17.30	1,037.00	29.85	547.50	55.70	876.50	78.20
5.77	1,810.18	14.46	834.73	28.66	1,048.36	44.78	815.00	62.42	878.00	97.48	708.18	17.66	1,050.00	29.84	554.27	55.45	888.00	81.35
5.90	1,832.36	14.68	844.95	29.28	1,061.23	46.01	825.00	62.39	889.00	98.31	716.86	18.03	1,063.00	29.82	561.05	55.19	899.50	84.51
6.02	1,854.55	14.89	855.18	29.89	1,074.09	47.25	835.00	62.35	900.00	99.15	725.55	18.39	1,076.00	29.81	567.82	54.94	911.00	87.66
6.14	1,876.73	15.10	865.41	30.50	1,086.95	48.48	845.00	62.32	911.00	99.98	734.23	18.75	1,089.00	29.80	574.59	54.68	922.50	90.82
6.26	1,898.91	15.32	875.64	31.12	1,099.82	49.71	855.00	62.29	922.00	100.81	742.91	19.12	1,102.00	29.78	581.36	54.43	934.00	93.97
6.39	1,921.09	15.53	885.86	31.73	1,112.68	50.94	865.00	62.26	933.00	101.64	751.59	19.48	1,115.00	29.77	588.14	54.17	945.50	97.13
6.51	1,943.27	15.75	896.09	32.35	1,125.55	52.17	875.00	62.23	944.00	102.47	760.27	19.85	1,128.00	29.75	594.91	53.92	957.00	100.28
6.63	1,965.45	15.96	906.32	32.96	1,138.41	53.40	885.00	62.20	955.00	103.30	768.95	20.21	1,141.00	29.74	601.68	53.66	968.50	103.44
6.75	1,987.64	16.17	916.55	33.57	1,151.27	54.64	895.00	62.16	966.00	104.14	777.64	20.57	1,154.00	29.73	608.45	53.41	980.00	106.59
6.88	2,009.82	16.39	926.77	34.19	1,164.14	55.87	905.00	62.13	977.00	104.97	786.32	20.94	1,167.00	29.71	615.23	53.15	991.50	109.75
7.00	2,032.00	16.60	937.00	34.80	1,177.00	57.10	915.00	62.10	988.00	105.80	795.00	21.30	1,180.00	29.70	622.00	52.90	1,003.00	112.90
7.12	2,054.18	16.81	947.23	35.41	1,189.86	58.33	925.00	62.07	999.00	106.63	803.68	21.66	1,193.00	29.69	628.77	52.65	1,014.50	116.05
2.7	488	4.7	225	13.5	283	27.1	220	-0.7	242	18.3	191	8	286	-0.3	149	-5.6	253	69.4
0.12	22.18	0.21	10.23	0.61	12.86	1.23	10.00	(0.03)	11.00	0.83	8.68	0.36	13.00	(0.01)	6.77	(0.25)	11.50	3.15

Total Eastbound Delay (AM)	Total Westbound Delay (AM)	Total Eastbound Delay (PM)	Total Westbound Delay (PM)	Total Through Vehicles (Eastbound - AM)	Total Vehicles (Westbound - AM)	Total Through Vehicles (Eastbound - PM)	Total Vehicles (Westbound - PM)	Eastbound - AM - Average Through Cars (Based on 6 Intersections)	Westbound - AM -Average Through Cars (Based on 6 Intersections)	Eastbound - PM - Avg. Through Cars	Westbound PM - Avg. Through Cars	Avg. Eastbound Delay Total (AM)	Avg. Westbound Delay Total (AM)
Delay (s)	Delay (s)	Delay (s)	Delay (s)										Seconds
149.10	134.10	221.10	150.70	8,790.00	6,168.00	9,518.00	9,779.00	1,465.00	1,028.00	1,586.33	1,629.83	218,431.50	137,854.80
155.60	135.23	235.49	156.74	8,915.23	6,256.41	9,655.68	9,920.59	1,485.87	1,042.73	1,609.28	1,653.43	231,194.81	141,006.19
162.09	136.35	249.88	162.77	9,040.45	6,344.82	9,793.36	10,062.18	1,506.74	1,057.47	1,632.23	1,677.03	244,229.25	144,190.80
168.59	137.48	264.27	168.81	9,165.68	6,433.23	9,931.05	10,203.77	1,527.61	1,072.20	1,655.17	1,700.63	257,534.83	147,408.63
175.08	138.61	278.66	174.85	9,290.91	6,521.64	10,068.73	10,345.36	1,548.48	1,086.94	1,678.12	1,724.23	271,111.54	150,659.68
181.58	139.74	293.05	180.88	9,416.14	6,610.05	10,206.41	10,486.95	1,569.36	1,101.67	1,701.07	1,747.83	284,959.39	153,943.95
188.07	140.86	307.45	186.92	9,541.36	6,698.45	10,344.09	10,628.55	1,590.23	1,116.41	1,724.02	1,771.42	299,078.38	157,261.44
194.57	141.99	321.84	192.95	9,666.59	6,786.86	10,481.77	10,770.14	1,611.10	1,131.14	1,746.96	1,795.02	313,468.50	160,612.16
201.06	143.12	336.23	198.99	9,791.82	6,875.27	10,619.45	10,911.73	1,631.97	1,145.88	1,769.91	1,818.62	328,129.76	163,996.09
207.56	144.25	350.62	205.03	9,917.05	6,963.68	10,757.14	11,053.32	1,652.84	1,160.61	1,792.86	1,842.22	343,062.16	167,413.24
214.05	145.37	365.01	211.06	10,042.27	7,052.09	10,894.82	11,194.91	1,673.71	1,175.35	1,815.80	1,865.82	358,265.69	170,863.61
220.55	146.50	379.40	217.10	10,167.50	7,140.50	11,032.50	11,336.50	1,694.58	1,190.08	1,838.75	1,889.42	373,740.35	174,347.21
227.05	147.63	393.79	223.14	10,292.73	7,228.91	11,170.18	11,478.09	1,715.45	1,204.82	1,861.70	1,913.02	389,486.16	177,864.02
233.54	148.75	408.18	229.17	10,417.95	7,317.32	11,307.86	11,619.68	1,736.33	1,219.55	1,884.64	1,936.61	405,503.10	181,414.06
240.04	149.88	422.57	235.21	10,543.18	7,405.73	11,445.55	11,761.27	1,757.20	1,234.29	1,907.59	1,960.21	421,791.17	184,997.31
246.53	151.01	436.96	241.25	10,668.41	7,494.14	11,583.23	11,902.86	1,778.07	1,249.02	1,930.54	1,983.81	438,350.38	188,613.79
253.03	152.14	451.35	247.28	10,793.64	7,582.55	11,720.91	12,044.45	1,798.94	1,263.76	1,953.48	2,007.41	455,180.73	192,263.48
259.52	153.26	465.75	253.32	10,918.86	7,670.95	11,858.59	12,186.05	1,819.81	1,278.49	1,976.43	2,031.01	472,282.21	195,946.40
266.02	154.39	480.14	259.35	11,044.09	7,759.36	11,996.27	12,327.64	1,840.68	1,293.23	1,999.38	2,054.61	489,654.83	199,662.53
272.51	155.52	494.53	265.39	11,169.32	7,847.77	12,133.95	12,469.23	1,861.55	1,307.96	2,022.33	2,078.20	507,298.59	203,411.89
279.01	156.65	508.92	271.43	11,294.55	7,936.18	12,271.64	12,610.82	1,882.42	1,322.70	2,045.27	2,101.80	525,213.48	207,194.47
285.50	157.77	523.31	277.46	11,419.77	8,024.59	12,409.32	12,752.41	1,903.30	1,337.43	2,068.22	2,125.40	543,399.50	211,010.27
292.00	158.90	537.70	283.50	11,545.00	8,113.00	12,547.00	12,894.00	1,924.17	1,352.17	2,091.17	2,149.00	561,856.67	214,859.28
298.50	160.03	552.09	289.54	11,670.23	8,201.41	12,684.68	13,035.59	1,945.04	1,366.90	2,114.11	2,172.60	580,584.97	218,741.52

Avg. Eastbound Delay Total (PM)	Avg. Westbound Delay Total (PM)	Total Delay (during AM/PM Peak)	Total Hours Delay (per day)	Total Hours Delayed (per Year based on 260 working days a year)	Business Percentage of Hours	Car Percentage of Hours	Business Rate Value ($27.40/hour)	Car Rate Value ($13.70/hour based on Median Income- 2010)	Total Time Valued for Delay
Seconds	Seconds	Seconds	Hours						
350,738.30	245,615.88	952,640.48	264.62	$68,802	$3,165	$65,637	$86,718	$899,226	$985,944
378,970.88	259,152.89	1,010,324.77	280.65	$72,968	$3,357	$69,611	$91,969	$953,676	$1,045,645
407,863.92	272,974.80	1,069,258.76	297.02	$77,224	$3,552	$73,672	$97,333	$1,009,305	$1,106,639
437,417.41	287,081.60	1,129,442.47	313.73	$81,571	$3,752	$77,819	$102,812	$1,066,115	$1,168,927
467,631.36	301,473.30	1,190,875.88	330.80	$86,008	$3,956	$82,051	$108,404	$1,124,103	$1,232,508
498,505.76	316,149.90	1,253,559.01	348.21	$90,535	$4,165	$86,370	$114,110	$1,183,272	$1,297,382
530,040.62	331,111.40	1,317,491.84	365.97	$95,152	$4,377	$90,775	$119,930	$1,243,620	$1,363,550
562,235.94	346,357.79	1,382,674.39	384.08	$99,860	$4,594	$95,266	$125,863	$1,305,148	$1,431,011
595,091.71	361,889.09	1,449,106.65	402.53	$104,658	$4,814	$99,843	$131,911	$1,367,855	$1,499,766
628,607.93	377,705.28	1,516,788.61	421.33	$109,546	$5,039	$104,507	$138,072	$1,431,742	$1,569,814
662,784.61	393,806.37	1,585,720.29	440.48	$114,524	$5,268	$109,256	$144,346	$1,496,809	$1,641,155
697,621.75	410,192.36	1,655,901.67	459.97	$119,593	$5,501	$114,092	$150,735	$1,563,055	$1,713,790
733,119.34	426,863.24	1,727,332.77	479.81	$124,752	$5,739	$119,013	$157,237	$1,630,481	$1,787,718
769,277.39	443,819.03	1,800,013.57	500.00	$130,001	$5,980	$124,021	$163,853	$1,699,087	$1,862,940
806,095.89	461,059.71	1,873,944.09	520.54	$135,340	$6,226	$129,115	$170,583	$1,768,872	$1,939,455
843,574.85	478,585.29	1,949,124.31	541.42	$140,770	$6,475	$134,295	$177,427	$1,839,837	$2,017,264
881,714.27	496,395.77	2,025,554.25	562.65	$146,290	$6,729	$139,561	$184,384	$1,911,981	$2,096,365
920,514.14	514,491.15	2,103,233.89	584.23	$151,900	$6,987	$144,913	$191,455	$1,985,306	$2,176,761
959,974.46	532,871.42	2,182,163.25	606.16	$157,601	$7,250	$150,351	$198,640	$2,059,809	$2,258,449
1,000,095.24	551,536.59	2,262,342.31	628.43	$163,391	$7,516	$155,875	$205,939	$2,135,493	$2,341,431
1,040,876.48	570,486.66	2,343,771.09	651.05	$169,272	$7,787	$161,486	$213,351	$2,212,356	$2,425,707
1,082,318.17	589,721.63	2,426,449.57	674.01	$175,244	$8,061	$167,182	$220,877	$2,290,399	$2,511,276
1,124,420.32	609,241.50	2,510,377.77	697.33	$181,305	$8,340	$172,965	$228,517	$2,369,621	$2,598,138
1,167,182.92	629,046.26	2,595,555.67	720.99	$187,457	$8,623	$178,834	$236,271	$2,450,023	$2,686,293
									$42,757,927

5-Buried Power Lines

Project Years	Buried Power Lines (capital costs included in estimation)	O+M (Overhead)	O+M (Buried)	Difference	Tree Trimming Cost (approximate savings 10,000 per mile based on conservative average of NC Study)	Total Savings
2012		$ 1,376	$ 1,380	$ (4.50)	$ 15,000	$ -
2013		$ 1,376	$ 1,380	$ (4.50)	$ 15,000	$ 7,498
2014		$ 1,376	$ 1,380	$ (4.50)	$ 15,000	$ 14,996
2015		$ 1,376	$ 1,380	$ (4.50)	$ 15,000	$ 14,996
2016		$ 1,376	$ 1,380	$ (4.50)	$ 15,000	$ 14,996
2017		$ 1,376	$ 1,380	$ (4.50)	$ 15,000	$ 14,996
2018		$ 1,376	$ 1,380	$ (4.50)	$ 15,000	$ 14,996
2019		$ 1,376	$ 1,380	$ (4.50)	$ 15,000	$ 14,996
2020		$ 1,376	$ 1,380	$ (4.50)	$ 15,000	$ 14,996
2021		$ 1,376	$ 1,380	$ (4.50)	$ 15,000	$ 14,996
2022		$ 1,376	$ 1,380	$ (4.50)	$ 15,000	$ 14,996
2023		$ 1,376	$ 1,380	$ (4.50)	$ 15,000	$ 14,996
2024		$ 1,376	$ 1,380	$ (4.50)	$ 15,000	$ 14,996
2025		$ 1,376	$ 1,380	$ (4.50)	$ 15,000	$ 14,996
2026		$ 1,376	$ 1,380	$ (4.50)	$ 15,000	$ 14,996
2027		$ 1,376	$ 1,380	$ (4.50)	$ 15,000	$ 14,996
2028		$ 1,376	$ 1,380	$ (4.50)	$ 15,000	$ 14,996
2029		$ 1,376	$ 1,380	$ (4.50)	$ 15,000	$ 14,996
2030		$ 1,376	$ 1,380	$ (4.50)	$ 15,000	$ 14,996
2031		$ 1,376	$ 1,380	$ (4.50)	$ 15,000	$ 14,996
						$ 277,417

Total Miles of *** Value based on average of North Carolina Study, 2006 as cited in Virginia Commission Report

2010 Census Population - By Block

	Density		
423	1.226086957	Current Density	
8	2.802898551	Proposed Density	
59	**Cost of Development**		
9	1 unit per acre per household cost	$ 5,052.00	
47	2.67 units per acre per household cost	$ 3,669.00	
52	Difference in Cost = Servicing Savings Per Year Once Realized and Completed		$ 1,438,320.00
27			
25			
4			
3			
26			
54			
23			
31			
14			
158			
2			
195			
12			
11	Households		
Total Popu 1183	496.0167715		

Additional People - Household Size at 20-Year Buildout		2.385	
544		1297.44	
Combined Households (Buildout+Existing)		2031	2011
1040	Total Cost to Service (1 Unit/Acre)	$ 5,254,080.00	$ 2,136,996.00
	Total Cost to Service (2.67 Unit/Acre)	$ 3,815,760.00	
	Difference	$ 1,438,320.00	

***Calculations are based on Victoria Transport Policy Report, 2010 cost per acre per household of service.

	Low Density (1/acre)	High Density (2.67/acre)	Difference in Cost
2012	$2,505,877	$2,505,877	$0
2013	$2,650,519	$2,574,818	$75,701
2014	$2,795,161	$2,643,759	$151,402
2015	$2,939,804	$2,712,700	$227,103
2016	$3,084,446	$2,781,642	$302,804
2017	$3,229,088	$2,850,583	$378,505
2018	$3,373,730	$2,919,524	$454,206
2019	$3,518,373	$2,988,465	$529,907
2020	$3,663,015	$3,057,407	$605,608
2021	$3,807,657	$3,126,348	$681,309
2022	$3,952,300	$3,195,289	$757,011
2023	$4,096,942	$3,264,230	$832,712
2024	$4,241,584	$3,333,171	$908,413
2025	$4,386,226	$3,402,113	$984,114
2026	$4,530,869	$3,471,054	$1,059,815
2027	$4,675,511	$3,539,995	$1,135,516
2028	$4,820,153	$3,608,936	$1,211,217
2029	$4,964,795	$3,677,878	$1,286,918
2030	$5,109,438	$3,746,819	$1,362,619
2031	$5,254,080	$3,815,760	$1,438,320
			$14,383,200
	$144,642	$68,941	

		Percent of Arch. And Engineering	Percent of Construction Jobs	Jobs Created (Months - Construction)	Jobs Created (Engineering Jobs)	TIGER III - No Ped/Bike - Additional Jobs Created	Job Years Created Total without Bike/Pedestrian Features
Job Months (per billion)	8,781						
Job Months (per billion +16% for repair)	10,186						
Job Months (per million)	10						
Total Boundary Street	30,393,700	1,812,500	28,581,200			221	
Boundary Street cost minus ROW Acquisition	25,018,000	2,501,800	22,516,200	229.2	28.5	25	2.1
Phase 1	8,555,800	855,580	7,700,220	78.4	8.7	25	18.4
Median Income (American Community Survey - 2010 -	27,328.00						
Median Income (American Community Survey - 2010 -	100,085.00						

	Jobs Year	Jobs Year -Additional from Bike-Ped	Total Construction - TIGER III	Total Construction Phase 1	
TIGER III	19.1	2.4	$ 521,929	$ 237,874.4	
Phase 1	6.5	0.7	$ 178,616	$ 72,636.7	Economic Competitiveness cost
Construction without Bike/Ped Facilities	18.4	2.1	$ 700,544	$ 310,511.1	$ 390,033
More Jobs	0.7	0.3	**Difference**	$ 51,277.8	
				-	

***

Additional Jobs	317.3
Direct and Indirect withBike/Ped	
Road Only	159.8
Difference	157.5

***Based on estimate of jobs created per million dollars spent on infrastructure.

Intersections affected by TIGER III	Three Year Total Number of Crashes	PDO Crashes	Injury Crashes AIS 1	AIS 2	AIS 4	AIS 6
Intersection not signalized or Accessed by left turns after Implementation (Greenlawn)	88	59	18	7	3	1
Mid Block -Entire Corridor	415	302	68	33	11	1
Yearly Average - Entire Corridor	167.7	120.3	28.7	13.3	4.7	0.7
Number of Accidents in TIGER III Improvements - Existing - Mid Block - after Hogarth	84.3	60.3	14.3	6.3	3	0.7

2011	-
2012	$ 1,536,717
2013	$ 3,073,433
2014	$ 3,073,433
2015	$ 3,073,433
2016	$ 3,073,433
2017	$ 3,073,433
2019	$ 3,073,433
2020	$ 3,073,433
2021	$ 3,073,433
2022	$ 3,073,433
2023	$ 3,073,433
2024	$ 3,073,433
2025	$ 3,073,433
2026	$ 3,073,433
2027	$ 3,073,433
2028	$ 3,073,433
2029	$ 3,073,433
2030	$ 3,073,433
2031	$ 3,073,433
	$ 56,858,515

Property Value Only $3,285 Per Crash

**Adding the total crash number of three years and then dividing to get a yearly average. The value per year without the improvements and

** Crash reduction is a steady rate based

***The SCDOT ranks crashes from 1 - 4 this information has been translated into AIS per the NOFA.

	O	C	B	A	K
2005-2007 Average Yearly Accidents TIGER Section	60.33333333	14.33333333	6.33333333	3	0.66666667
2005-2007 Average Entire Corridor	120.3333333	28.66666667	13.3333333	4.66666667	0.66666667

	O	C	B	A	K		
	No Injury	**Poss Inf.**	**Non-Incapacitating**	**Incapacitating**	**Killed**	**Injured Severity Unknown**	**Unknown If Injured**
AIS 0	0.92534	0.23437	0.08347	0.03437	0	0.21538	0.43676
AIS 1	0.07257	0.68946	0.76843	0.55449	0	0.62728	0.41739
AIS 2	0.00198	0.06391	0.10898	0.20908	0	0.104	0.08872
AIS 3	0.00008	0.01071	0.03191	0.14437	0	0.03858	0.04817
AIS 4	0	0.00142	0.0062	0.03986	0	0.00442	0.00617
AIS 5	0.00003	0.00013	0.00101	0.01783	0	0.01034	0.00279
Fatality	0	0	0	0	1	0	0

TIGER Improvements Section	**O**	**C**	**B**	**A**	**K**	**Total in TIGER Improvement Area**	**Reduction Rate with Traffic Calming and Access Management**	**TIGER III Rate Reduced**	**TIGER III Implementation Rate**	**Costs Per NOFA**	**Cost of TIGER zone without improvements**	**Cost of TIGER with Improvements**	**Difference**
AIS 0	55.82884667	3.359303333	0.52864333	0.10311	0	59.8199033	0.37	22.13336423	37.6865391	$ 3,285.00	$ 196,508.38	$ 123,800.28	$ 72,708.10
AIS 1	4.37839	9.88226	4.86672333	1.66347	0	20.7908433	0.48	9.9796048	10.81123853	$ 18,600.00	$ 386,709.69	$ 201,089.04	$ 185,620.65
AIS 2	0.11946	0.916043333	0.69020667	0.62724	0	2.35295	0.48	1.129416	1.223534	$ 291,400.00	$ 685,649.63	$ 356,537.81	$ 329,111.82
AIS 3	0.004826667	0.15351	0.20209667	0.43311	0	0.79354333	0.48	0.3809008	0.412642533	$ 651,000.00	$ 516,596.71	$ 268,630.29	$ 247,966.42
AIS 4	0	0.020353333	0.03926667	0.11958	0	0.1792	0.48	0.086016	0.093184	$ 1,649,200.00	$ 295,536.64	$ 153,679.05	$ 141,857.59
AIS 5	0.00181	0.001863333	0.00639667	0.05349	0	0.06356	0.48	0.0305088	0.0330512	$ 3,676,600.00	$ 233,684.70	$ 121,516.04	$ 112,168.65
Fatality	0	0	0	0	0.66666667	0.66666667	0.48	0.32	0.346666667	$ 6,200,000.00	$ 4,133,333.33	$ 2,149,333.33	$ 1,984,000.00
												Total Per Year	$ 3,073,433.24

	Repaving - Two Cycles - Five Lane	General Maintenance Costs	Maintenance Costs (with Median)	Repaving - Four Lane	Total - No Change	Total - with Median	Difference
2012		$ 10,946	$ 6,567		$ 10,946	$ 6,567	$ -
2013		$ 10,946	$ 6,567		$ 10,946	$ 6,567	$ 2,189
2014		$ 10,946	$ 6,567		$ 10,946	$ 6,567	$ 4,378
2015	$ 526,680	$ 10,946	$ 6,567		$ 537,626	$ 6,567	$ 531,058
2016		$ 10,946	$ 6,567		$ 10,946	$ 6,567	$ 4,378
2017		$ 10,946	$ 6,567		$ 10,946	$ 6,567	$ 4,378
2018		$ 10,946	$ 6,567		$ 10,946	$ 6,567	$ 4,378
2019		$ 10,946	$ 6,567		$ 10,946	$ 6,567	$ 4,378
2020		$ 10,946	$ 6,567		$ 10,946	$ 6,567	$ 4,378
2021		$ 10,946	$ 6,567		$ 10,946	$ 6,567	$ 4,378
2022		$ 10,946	$ 6,567	$ 331,056	$ 10,946	$ 337,623	$ (326,678)
2023		$ 10,946	$ 6,567		$ 10,946	$ 6,567	$ 4,378
2024		$ 10,946	$ 6,567		$ 10,946	$ 6,567	$ 4,378
2025	$ 526,680	$ 10,946	$ 6,567		$ 537,626	$ 6,567	$ 531,058
2026		$ 10,946	$ 6,567		$ 10,946	$ 6,567	$ 4,378
2027		$ 10,946	$ 6,567		$ 10,946	$ 6,567	$ 4,378
2028		$ 10,946	$ 6,567		$ 10,946	$ 6,567	$ 4,378
2029		$ 10,946	$ 6,567		$ 10,946	$ 6,567	$ 4,378
2030		$ 10,946	$ 6,567		$ 10,946	$ 6,567	$ 4,378
2031		$ 10,946	$ 6,567		$ 10,946	$ 6,567	$ 4,378
Total					$ 1,272,270	$ 462,402	$ 809,868

http://www.fhwa.dot.gov/publications/research/safety/pedbike/05085/chapt12.cfm

While there is only a slight savings in cost to build a raised median versus a center left–turn lane, there is a substantial savings in maintenance. An FDOT study compared 6.4 km (4 mi) of median versus center left–turn lane maintenance costs and found that medians save an average of 40 percent on maintenance costs based on a 20–year roadway life. More frequent resurfacing, such as every 7 to 9 years, would show much greater savings. This, too, surprises many designers. During the full life of the roadway asphalt, a raised median saves costs associated with sweeping accumulated debris, repainting lines, replacing raised pavement markers, and resurfacing lanes.

Based on estimate f ***

1.5 Mile Cor 7920

Sq. ft. of Pav 554400

$ 526,680.00

.25 in additional miles to be repaved and new to system

	Trees Planted	Benefit	Cost	Difference
2012	298	$ 28,450	$ 6,118	$ -
2013	298	$ 28,450	$ 6,118	$ 11,166
2014	298	$ 28,450	$ 6,118	$ 22,332
2015	298	$ 28,450	$ 6,118	$ 22,332
2016	298	$ 28,450	$ 6,118	$ 22,332
2017	298	$ 28,450	$ 6,118	$ 22,332
2018	298	$ 28,450	$ 6,118	$ 22,332
2019	298	$ 28,450	$ 6,118	$ 22,332
2020	298	$ 28,450	$ 6,118	$ 22,332
2021	298	$ 28,450	$ 6,118	$ 22,332
2022	298	$ 28,450	$ 6,118	$ 22,332
2023	298	$ 28,450	$ 6,118	$ 22,332
2024	298	$ 28,450	$ 6,118	$ 22,332
2025	298	$ 28,450	$ 6,118	$ 22,332
2026	298	$ 28,450	$ 6,118	$ 22,332
2027	298	$ 28,450	$ 6,118	$ 22,332
2028	298	$ 28,450	$ 6,118	$ 22,332
2029	298	$ 28,450	$ 6,118	$ 22,332
2030	298	$ 28,450	$ 6,118	$ 22,332
2031	298	$ 28,450	$ 6,118	$ 22,332
				$ 413,144

	Benefit	Cost	Net Difference	
Gingko	98.18	13.28	84.9	
Pistache	92.76	27.78	64.98	
Average	95.47	20.53	74.94	Per Tree/Per Year

http://www.fs.fed.us/psw/programs/uesd/uep/products/cufr_162.pdf

average tree = 60 ft. spacing

Total spa 17886 **including Neil Road, Beaufort Plaza Drive

# of Tree 298.1 **Average spacing of street trees is a conservative estimate taking into account driveways and cross streets

Project Year	Carbon Storage Per Acre of Tree Storage	Carbon Storage Per Acre of Storage	Air Pollution Removal	Carbon Removal	Total	Maintenance	Added Value	Difference
2012	$800	$650	$300	$25	$1,775	-$26,000		$0
2013	$800	$650	$300	$25	$1,775	-$26,000	$545,840	$573,615
2014	$800	$650	$300	$25	$1,775	-$26,000		-$24,225
2015	$800	$650	$300	$25	$1,775	-$26,000		-$24,225
2016	$800	$650	$300	$25	$1,775	-$26,000		-$24,225
2017	$800	$650	$300	$25	$1,775	-$26,000		-$24,225
2018	$800	$650	$300	$25	$1,775	-$26,000		-$24,225
2019	$800	$650	$300	$25	$1,775	-$26,000		-$24,225
2020	$800	$650	$300	$25	$1,775	-$26,000		-$24,225
2021	$800	$650	$300	$25	$1,775	-$26,000		-$24,225
2022	$800	$650	$300	$25	$1,775	-$26,000		-$24,225
2023	$800	$650	$300	$25	$1,775	-$26,000		-$24,225
2024	$800	$650	$300	$25	$1,775	-$26,000		-$24,225
2025	$800	$650	$300	$25	$1,775	-$26,000		-$24,225
2026	$800	$650	$300	$25	$1,775	-$26,000		-$24,225
2027	$800	$650	$300	$25	$1,775	-$26,000		-$24,225
2028	$800	$650	$300	$25	$1,775	-$26,000		-$24,225
2029	$800	$650	$300	$25	$1,775	-$26,000		-$24,225
2030	$800	$650	$300	$25	$1,775	-$26,000		-$24,225
2031	$800	$650	$300	$25	$1,775	-$26,000		-$24,225
***Estimates based on a 1-acre park					$35,500	-$520,000		$137,565

Average from Study	Acres	
3411.5	160	$ 545,840

***Value is according to a study, "Measuring the Economic Impact and Value of Parks, Trails, and Open Space in Jefferson County, Accounting for Current and Future Scenarios." Average is of two urban parks values and is accrued for the acreage in study area as a one time benefit.

**Benefit Values are from the "Air Quality Effects of Urban Trees and Parks."

RIDERSHIP	Total	Cars (95.4%)	Trucks (4.6%)
2007	36,000	34,344	1,656
2008	36,517	34,838	1,680
2009	37,035	35,331	1,704
2010	37,552	35,825	1,727
2011	38,070	36,318	1,751
2012	38,587	36,812	1,775
2013	39,104	37,306	1,799
2014	39,622	37,799	1,823
2015	40,139	38,293	1,846
2016	40,657	38,786	1,870
2017	41,174	39,280	1,894
2018	41,691	39,773	1,918
2019	42,209	40,267	1,942
2020	42,726	40,761	1,965
2021	43,243	41,254	1,989
2022	43,761	41,748	2,013
2023	44,278	42,241	2,037
2024	44,796	42,735	2,061
2025	45,313	43,229	2,084
2026	45,830	43,722	2,108
2027	46,348	44,216	2,132
2028	46,865	44,709	2,156
2029	47,383	45,203	2,180
2030	47,900	45,697	2,203
2031	48,417	46,190	2,227

Column B	Ridership: 2007
Column C	Percentage of Ridership - Cars Only
Column D	Percentage of Ridership - Trucks Only

Population-Area

Population (connecting to Beaufort)	2010 Census
Block Group: 450130005004	692
Block Group: 450130006001	345
Block Group: 450130007001	407
Block Group: 450130007002	269
Block Group: 450130006002	595
Block Group: 450130007003	238
Block Group: 450130007004	817
Total	3,363
Immediate Access to Greenway	
Population Household Average - 2.385	8,021

Access to Greenway