



**Benefit Cost Analysis
Proposed Highway 103 -
St. Margaret's Bay
Connector Road Options**

**Part A
Benefit / Cost Analysis**

Presented To:

Nova Scotia Department of Transportation
and Infrastructure Renewal

April 2011

Project No. D10637

Table of Contents

Chapter	Contents	Page
1.0	Introduction and Project Scope.	1
2.0	The MicroBencost Model.. . . .	3
2.1	General Discussion.	3
2.2	Data Requirements.. . . .	3
3.0	Analysis Input Data.	7
4.0	MicroBencost Output.. . . .	10
4.1	Summary of Results.. . . .	10
4.2	Sensitivity Analysis.. . . .	12
4.3	Greenhouse Gas Reduction.	15
5.0	Conclusions.	17
	Appendix A - Input Data for Economic Evaluation	
	Appendix B - Output Results from Economic Evaluation	
	Appendix C - Output Results from Economic Evaluation Sensitivity Analysis	

Prepared by:
Greg O'Brien, PEng
David Blades, PEng

GENIVAR Inc.
1 Spectacle Lake Drive
DARTMOUTH NS B3B 1X7

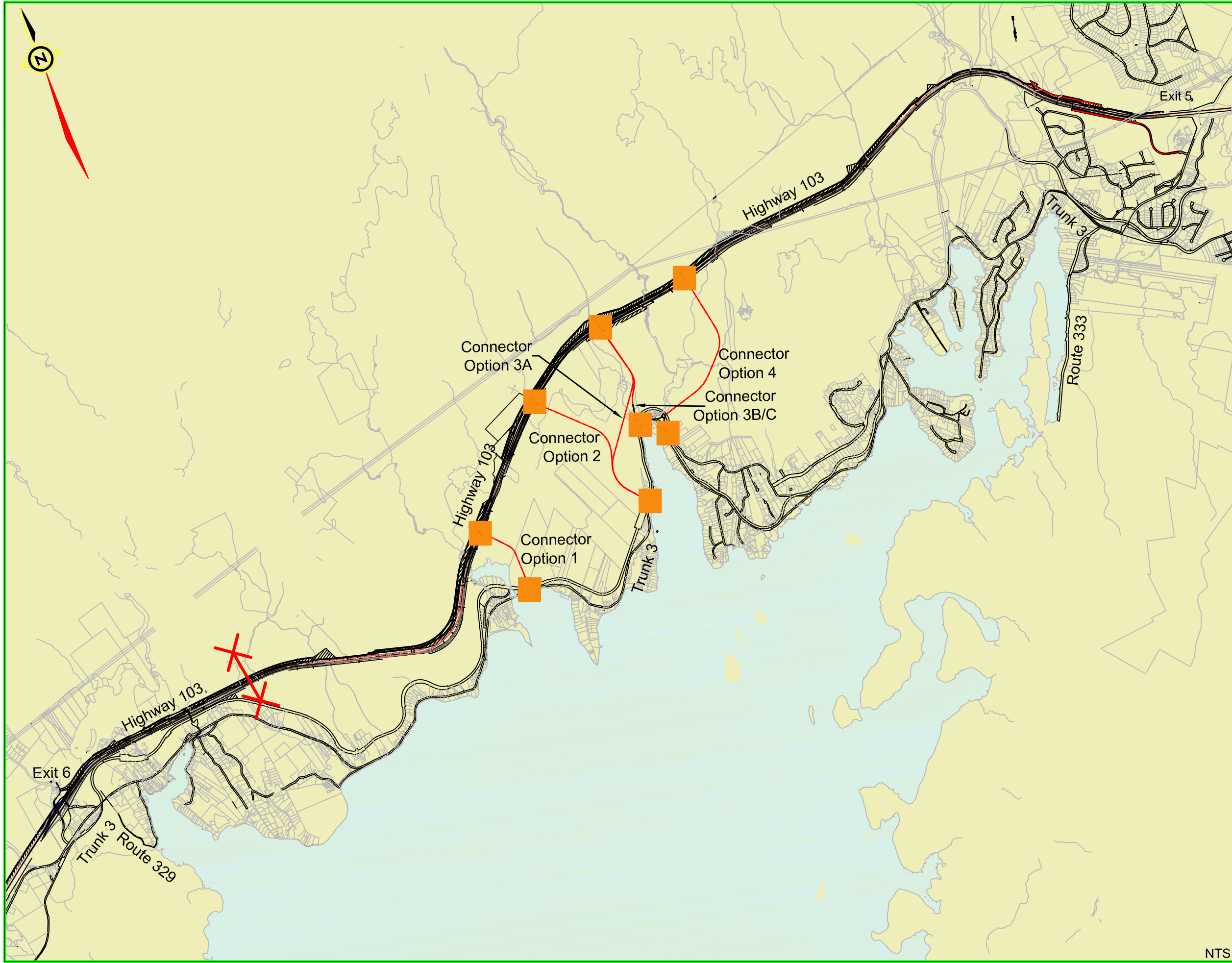
Phone (902) 835-9955
Fax (902) 835-1645
Email greg.obrien@genivar.com

1.0 Introduction and Project Scope

The Department of Transportation and Infrastructure Renewal (NSTIR) is preparing plans to extend twinning of Highway 103 from the existing extent of twinning west of the Route 213 (EXIT 5) interchange at Upper Tantallon to the EXIT 6 interchange at Hubbards. Since the existing 21 kilometer interchange spacing is much greater than normal for controlled access highways in Nova Scotia, and since continued access must be provided to lands north of Highway 103, NSTIR is examining several locations to provide an additional interchange. In addition to an interchange, a connector road between the new interchange on Highway 103 and Trunk 3 is possible.

There are six alignments for the connector road as shown in Figure 1. A connector road would provide improved access to Highway 103 for communities along Trunk 3. Also, since the section of Trunk 3 between Routes 333 and 213 in Upper Tantallon is heavily travelled during peak hours, an added benefit of a proposed connector would be the removal of some traffic from these roads which could delay or possibly eliminate the need for costly intersection upgrades.

The Department of Transportation and Infrastructure Renewal (NSTIR) commissioned the *Benefit Cost Analysis - Proposed Highway 103 St. Margaret's Bay Connector Road Options Study* to provide an economic evaluation of construction of a connector as well as provide an economic comparison between the six options being considered.



- Studied Connector Intersections
- Highway 103 Permanent Counter

GENIVAR
 1 SPECTACLE LAKE DRIVE
 DARTMOUTH, NOVA SCOTIA
 CANADA, B3B 1X7
 PHONE: 902 835-9955 ~ FAX: 902 835-1645
 WWW.GENIVAR.COM

CLIENT

NOVA SCOTIA
 Transportation and Infrastructure
 Renewal

PROJECT

Benefit Cost Analysis St. Margaret's Bay Connector Road Options

SHEET DESCRIPTION

FIGURE 1-1
STUDY AREA

March 2011

2.0 The MicroBENCOST Model

2.1 General Discussion

MicroBENCOST analyzes benefits and costs of a wide range of highway improvements. The program compares road user costs in the existing situation, the 'without improvement' alternative, to user costs if the improvement is completed, the 'with improvement' alternative.

There are seven general categories of projects that the program is capable of analyzing:

1. Added capacity (with or without alternate route);
2. Bypass;
3. Intersection / interchange;
4. Pavement rehabilitation;
5. Bridge;
6. Safety; and
7. Highway - railroad grade crossing.

MicroBENCOST evaluates highway improvement projects in terms of

- highway capital costs;
- highway maintenance costs; and
- user benefits.

Benefits that are expected from a new connector project will usually include safety benefits from relocating traffic from secondary roads to a 'safer' road class, and time and distance savings resulting from a more direct access to the higher road class.

2.2 Data Requirements

The *MicroBENCOST* model requires data for a large number of variables including traffic volume characteristics, travel speed, accident rates, and highway and vehicle costs.

Highway cost variables are used to calculate the present worth of capital and maintenance costs over the 25 year evaluation period. Volume, speed, accident and vehicle operating cost data are used to calculate user benefits of travel time savings, improved safety, and greater driver comfort.

MicroBENCOST includes default values for most variables required to complete evaluations, however, they are based on 1995 costs and conditions from the United States. Where possible, site specific or Nova Scotia values have been used. *MicroBENCOST* values were adapted when variable values were not readily available in Nova Scotia.

Speed - Volume / Capacity Characteristics Existing Two Lane Highway - The relationship between speed, volume and capacity can be expressed as a curve. Where the volume of traffic approaches the capacity for a section of road, the average travel speed on the road is reduced in a non-linear manner. This study looked at the speed/volume relationships for three classes of roadway; the connector, Existing Highway 103, and future 4-lane divided Highway 103. The posted speed limits for these three roadways were assumed to be 70 km/h, 100 km/h, and 110 km/h respectively. It has also been assumed that the roadways will operate with a free-flow speed approximately 5 km/h above the posted speed limit; 75 km/h, 105 km/h, and 115 km/h.

The speed/volume relationships used for this study were based on the Akcelic Speed-Flow Function. The Akcelic Speed-Flow Function provides an average speed based on volume, capacity of the road, free flow speed and facility type. The 115 km/h speed – flow relationship is shown in Table 1.

Table 1 - Speed - Volume / Capacity Relationship

V/C Range	Average Speed km/h		
	Highway 103 (existing)	Highway 103 (4-Lane)	Proposed Connector
0.10	105.0	115.0	80.8
0.20	104.9	114.9	79.1
0.30	104.9	114.8	78.5
0.40	104.7	114.7	77.7
0.50	104.6	114.6	76.6
0.60	104.5	114.6	75.1
1.00	90.3	97.6	52.5
1.50	20.6	20.1	18.9

Source: The Akcelik Speed Flow Function

Collision Costs - As indicated above, improved highway safety is an important benefit that accrues to society from a new connector with access to a higher class of roadway. In order to quantify these benefits for an economic analysis, it is necessary to establish a dollar value for accidents of various severities. 2004 accident costs provided by Nova Scotia Department of Transportation and Infrastructure Renewal were adjusted using Consumer Price Index information to provide estimates of accident costs in 2011\$. Both 2004\$ and 2011\$ accident costs are recorded in Table 2.

Table 2- Accident Costs for Economic Analyses

Accident Severity	Estimated Accident Cost	
	2004\$	2011\$
Fatal	2,000,000	2,770,000
Injury	50,000	57,000
Property Damage Only	8,000	9,000

Vehicle Cost Data - Vehicle capital, operating and maintenance costs, and time values for vehicle operation, are used by *MicroBENCOST* in calculation of time saving and fuel reduction benefits of a proposed highway improvement. *MicroBENCOST* (Metric Version 2.0, June 1998), contains default passenger vehicle and truck parameters and operating costs.

Vehicle cost data are recorded in Table A-3, Appendix A, of this Report. Local values for fuel, motor oil, tires and value of time are included. The *MicroBENCOST* maintenance & repair costs per 1000 kilometers' for different vehicle classes were used.

Value of time was determined to be 50% of the average hourly wage of a Nova Scotian for passenger vehicles and 100% for the truck fleet. Average hourly wage for a Nova Scotian is based on Statistics Canada, "*Average Hourly Wage of Employees by Selected Characteristics + Professional, Unadjusted Data, by Province*", January 2010 to January 2011 (February 2011).

Consumer Price Index values for 2002 to 2010 were obtained from the Statistics Canada internet site. The CPI values and the corresponding 2011\$ adjustment factors used in this Report are recorded in Table A-4, Appendix A.

Ambient Air Temperature data are used by *MicroBENCOST* when calculating exhaust emissions. The model accepts temperature data for three time periods of the year. The percentage of annual vehicle miles traveled is also required for each time period. Monthly ambient air temperatures were obtained from the Environment Canada Internet Site. The monthly values, combined to provide 'seasonal' temperature estimates for 'winter', 'spring / fall' and 'summer' months, are recorded in Table A-5, Appendix A. The percentages of annual vehicle miles of travel for each season, calculated using NSTIR permanent counter data, are also recorded in Table A-5.

The *Discount Rate*, the value of money, is integral to an economic analysis, since it makes it possible to determine the present worth of both benefits and costs that will occur in future years. The Province of Nova Scotia indicated that a discount rate of 4.9% should be used for this Study. To test the sensitivity of analysis results to changes in the discount rate, analyses were also completed for a discount rate of 7%.

3.0 Analysis Input Data

Traffic Volume Characteristics - The Department of Transportation & Infrastructure Renewal commissioned a study to be completed to project traffic volumes that would use a connector road between Highway 103 and Trunk 3 (St. Margaret's Bay Road). The *Highway 103 Proposed Boutilier's Point Interchanges Traffic Study* completed by GENIVAR Inc. in September 2010 projected peak hour volumes that would use each of the connector options presented. Volumes presented in that study were used to project user benefits of using each of the connector options for this study.

Data from the permanent counter located on Highway 103 (see Figure 1) was used to assist with converting peak hour volumes presented in the *Highway 103 Proposed Boutilier's Point Interchanges Traffic Study* into average daily traffic volumes for use in this study.

Roadway Costs - Roadway costs include the capital cost of constructing the highway, the annual operating costs and costs for periodic rehabilitation, such as repaving. Costs for each connector option are summarized in the following Table 3

Table 3 - Roadway Costs

Item	Description	Costs					
		Option 1	Option 2	Option 3A	Option 3B	Option 3C	Option 4
Capital Cost (Million \$)	Major Structures	550,000	350,000	250,000	250,000	150,000	1,100,000
	Grading and Drainage	292,690	476,203	580,964	494,991	511,189	656,176
	Sub-base / Base	730,116	1,187,891	1,449,219	1,234,757	1,275,163	1,636,833
	Surface	585,380	952,406	1,161,929	989,982	1,022,378	1,312,351
	Other ¹	1,279,739	721,338	702,767	760,243	485,233	788,040
	TOTAL CAPITAL COST	3,437,925	3,687,838	4,144,879	3,729,973	3,443,963	5,493,400
Maintenance	Annual operating cost; \$ per km	4,737					
Repaving	Repaving after 15 years, \$ per two lane km	209,337					

1 - Other includes Land Acquisition, Engineering and Design

Bypass Methodology - The 'bypass' category of MicroBENCOST analysis considers the benefits from diverting traffic from an existing route to an alternate. For this Study, the benefits of the proposed connector options have been analyzed as a 'bypass' for the west portion of the study area, and a 'bypass' for the east portion of the study area.

Route travel distances and speeds - During analysis of the western portion of the study area, the sections of Trunk 3 (St. Margaret's Bay Road) and Mill Lake Road to Highway 103, Exit 6 are considered to be the 'existing route' and the new connector and Highway 103 between the connector and Exit 6 are considered to be the 'bypass' or new route that diverted traffic will use. Analysis of the eastern portion of the study area includes Trunk 3 and Route 213 (Hammonds Plains Road) between the new connector intersection and Exit 5 as the 'existing route' and the new connector and Highway 103 between the connector and Exit 6 are considered to be the 'bypass' or new route that diverted traffic will use.

The MicroBENCOST 'added capacity with alternate route' analysis procedure requires input data for the traffic volume that will transfer from the existing route to the alternate route, as well as length and travel speeds for each route.

It is estimated that between 1835 and 2430 vehicles per day (vpd) will transfer from the alternate route. Travel distance savings varied depending on the length of the proposed connector options. However, each connector option resulted in a reduction in travel distance when compared to the existing route. Reduction in travel time was a significant proportion of the calculated benefits to the project.

Collision Rates - Although primary benefits from the construction of a connector will be time savings due to higher travel speeds on the upgraded route, additional savings in safety benefits are possible as vehicles transfer to higher class and safer highway sections. Collision rates for the travel routes are summarized in Table 4. Rates for the 'improved' route were adopted from the Provincial average accident rates.

Table 4 - Accident Rates for MicroBENCOST Analysis

Road Class	Accident Rates by Severity		
	Fatal	Injury	PDO
Highway 103 - Existing 2 Lane Highway	0.9	11.2	21.5
Highway 103 - Upgraded 4-Lane Highway	0.3	9.3	18.1
Existing Route - Trunk 3 / Hammonds Plains Road	0.7	26.8	44.1
Connector Road	0.9	11.2	21.5
NOTE: Accident rates are expressed as 'accidents per hundred million vehicle-kilometres'			

4.0 MicroBENCOST Output

4.1 Summary of Results

The *MicroBENCOST* analysis using input, or accepted default parameter and variable values, is considered the **Baseline Analysis** for each of the connector options studied.

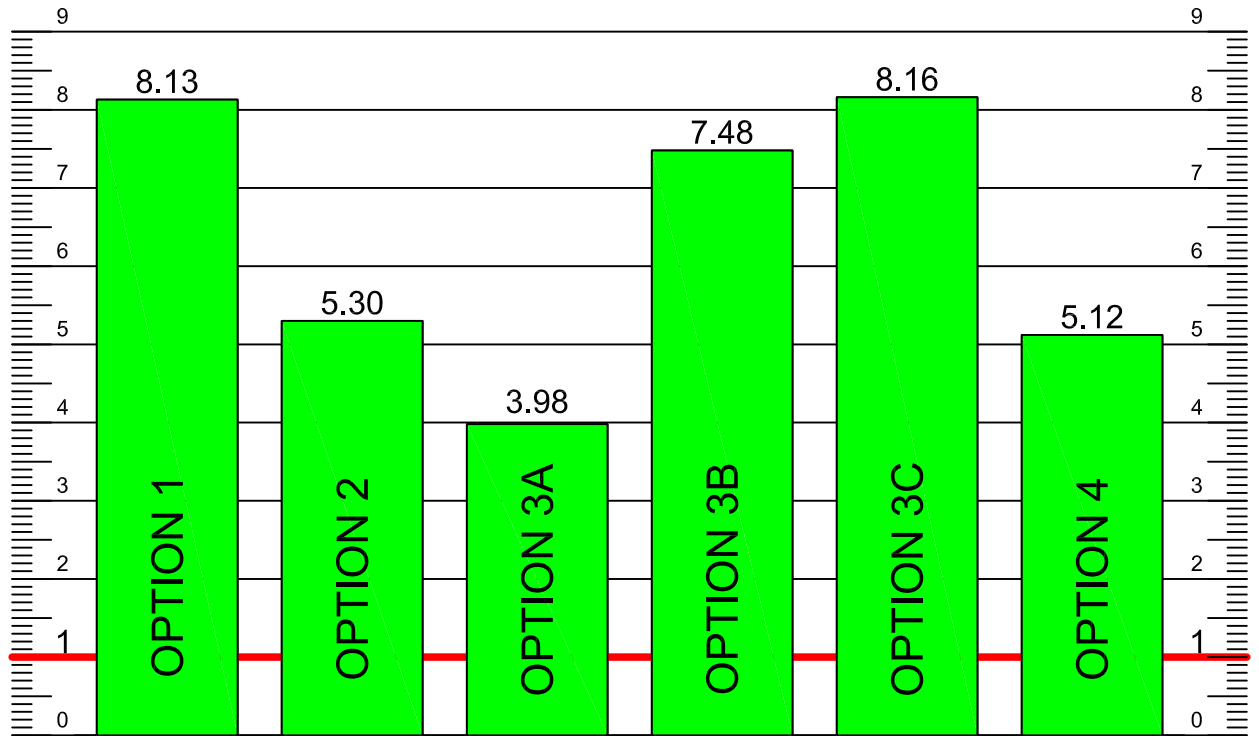
The *MicroBENCOST* outputs of Benefits, Costs and Economic Measures for the Baseline Analysis of the St. Margaret's Bay Connector Options to Highway 103 are included in Appendix B with results are shown in Table 5 and summarized in Figure 2.

Table 5 - Summary of Benefit Cost Analysis

Connector Option	Benefits (\$ Million)					Cost (\$ Million)				Benefit Cost Ratio
	traffic to or from	Delay Savings	Reduced Vehicle Operating Costs	Reduced Accident Costs	Total	Construction Costs	Maintenance and Rehabilitation	Salvage Value	Total	
Option 1	the west	1.964	0.068	0.248	2.280	3.277	0.178	-0.590	2.865	8.13
	the east	15.697	1.967	3.349	21.013					
	Total	17.661	2.035	3.597	23.293					
Option 2	the west	1.802	0.015	0.240	2.057	3.516	0.372	-0.668	3.220	5.30
	the east	11.872	0.645	2.500	15.017					
	Total	13.674	0.660	2.740	17.074					
Option 3A	the west	0.985	-0.057	0.126	1.054	3.951	0.453	-0.767	3.637	3.98
	the east	10.671	0.534	2.204	13.409					
	Total	11.656	0.477	2.330	14.463					
Option 3B	the west	2.240	0.265	0.341	2.846	3.556	0.259	-0.654	3.161	7.47
	the east	15.897	1.642	3.238	20.777					
	Total	18.137	1.907	3.579	23.623					
Option 3C	the west	2.240	0.265	0.341	2.846	3.283	0.259	-0.646	2.896	8.16
	the east	15.897	1.642	3.238	20.777					
	Total	18.137	1.907	3.579	23.623					
Option 4	the west	1.514	-0.152	0.187	1.549	5.237	0.404	-1.080	4.561	5.12
	the east	16.212	2.315	3.254	21.781					
	Total	17.726	2.163	3.441	23.330					

Significant user benefits from reduced travel time and collision costs provide a favorable Benefit / Cost Ratio for each option studied ranging from 3.98 to 8.16. The favorable B/C Ratios indicate that a connector between Trunk 3, St. Margaret's Bay Road to a new interchange on Highway 103 will produce good value on investment of public funds.

BENEFIT / COST SUMMARY



	OPTION 1	OPTION 2	OPTION 3A	OPTION 3B	OPTION 3C	OPTION 4
ADJUSTED BENEFIT (OVER 25 YRS.)	\$23,290,000	\$17,074,000	\$14,462,000	\$23,624,000	\$23,624,000	\$23,332,000
ADJUSTED COST (OVER 25 YRS.)	\$2,865,000	\$3,220,000	\$3,637,000	\$3,160,000	\$2,896,000	\$4,561,000
NET PRESENT VALUE	\$20,429,000	\$13,854,000	\$10,825,000	\$20,464,000	\$20,728,000	\$18,771,000
ESTIMATED 2013 AVERAGE ANNUAL DAILY TRAFFIC (AADT)	1,905	1,950	1,835	2,430	2,430	2,430

4.2 *Sensitivity Analyses*

A sensitivity analysis was conducted to determine how the study results would be affected by changes in key parameters. The value of each parameter to be tested was adjusted and then the *MicroBENCOST* model was rerun. The MicroBENCOST output results for the sensitivity analysis is included in Appendix C. A summary of run results are recorded in Table 6 and a graphical display of the results is shown in Figure 3.

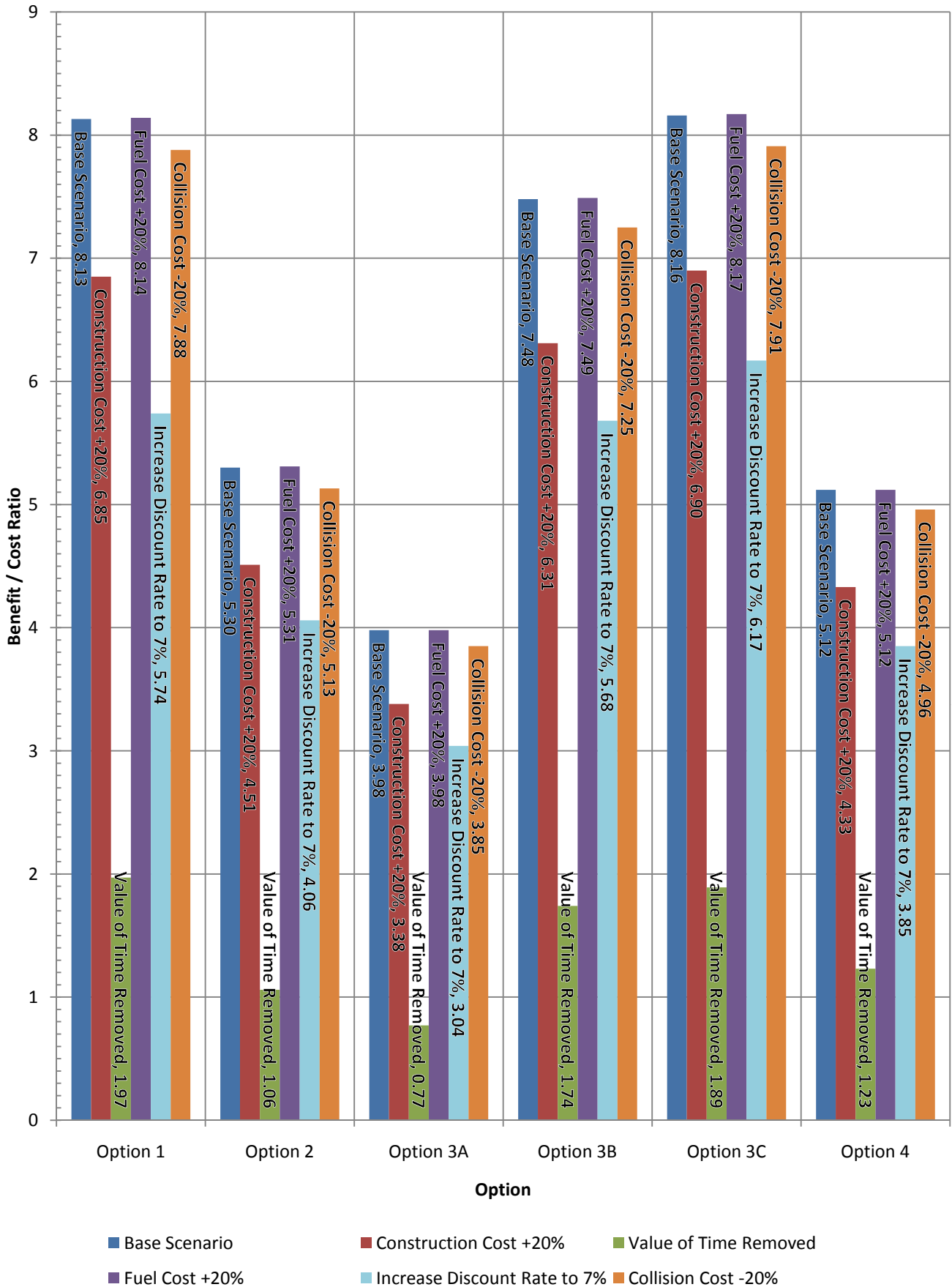
While variations in the cost of fuel had little effect on Study results, removal of the value of time savings had the expected results of causing a large reduction in benefits.

An increase in the discount rate from the study value of 4.9% to 7% would only reduce the B/C ratio to a favorable 3.04 to 6.17 depending on the connector option studied. Changes in construction costs or values for accident costs will not have any significant affect on the B/C ratio.

The sensitivity analysis indicated that construction of a connector road between Highway 103 and Trunk 3 in the study area would still be a beneficial project, even with unfavorable variations in some of the principal parameters.

Table 6 - Summary of Sensitivity Analysis

Connector Option	Sensitivity Analysis Scenario	Benefits (\$ Million)			Cost (\$ Million)	Benefit / Cost Ratio
		West Traffic	East Traffic	Total		
Option 1	Baseline	2.280	21.014	23.294	2.865	8.13
	Construction Cost +20%	2.280	21.014	23.294	3.403	6.85
	Value of Time Removed	0.316	5.317	5.633	2.865	1.97
	Fuel Cost +20%	2.279	21.036	23.315	2.865	8.14
	Increase Discount Rate to 7%	1.804	16.623	18.427	3.213	5.74
	Collision Cost -20%	2.230	20.344	22.574	2.865	7.88
Option 2	Baseline	2.057	15.017	17.074	3.220	5.30
	Construction Cost +20%	2.057	15.017	17.074	3.789	4.51
	Value of Time Removed	0.255	3.145	3.4	3.220	1.06
	Fuel Cost +20%	2.057	15.032	17.089	3.220	5.31
	Increase Discount Rate to 7%	1.628	11.879	13.507	3.330	4.06
	Collision Cost -20%	2.009	14.517	16.526	3.220	5.13
Option 3A	Baseline	1.053	13.409	14.462	3.637	3.98
	Construction Cost +20%	1.053	13.409	14.462	4.274	3.38
	Value of Time Removed	0.069	2.738	2.807	3.637	0.77
	Fuel Cost +20%	1.053	13.422	14.475	3.637	3.98
	Increase Discount Rate to 7%	0.834	10.607	11.441	3.759	3.04
	Collision Cost -20%	1.028	12.968	13.996	3.637	3.85
Option 3B	Baseline	2.846	20.778	23.624	3.160	7.48
	Construction Cost +20%	2.846	20.778	23.624	3.741	6.31
	Value of Time Removed	0.606	4.881	5.487	3.160	1.74
	Fuel Cost +20%	2.846	20.807	23.653	3.160	7.49
	Increase Discount Rate to 7%	2.252	16.435	18.687	3.291	5.68
	Collision Cost -20%	2.778	20.130	22.908	3.160	7.25
Option 3C	Baseline	2.846	20.778	23.624	2.896	8.16
	Construction Cost +20%	2.846	20.778	23.624	3.424	6.90
	Value of Time Removed	0.606	4.881	5.487	2.896	1.89
	Fuel Cost +20%	2.846	20.807	23.653	2.896	8.17
	Increase Discount Rate to 7%	2.252	16.435	18.687	3.029	6.17
	Collision Cost -20%	2.778	20.130	22.908	2.896	7.91
Option 4	Baseline	1.550	21.782	23.332	4.561	5.12
	Construction Cost +20%	1.550	21.782	23.332	5.392	4.33
	Value of Time Removed	0.036	5.569	5.605	4.561	1.23
	Fuel Cost +20%	1.548	21.815	23.363	4.561	5.12
	Increase Discount Rate to 7%	1.226	17.230	18.456	4.795	3.85
	Collision Cost -20%	1.512	21.131	22.643	4.561	4.96



4.2 *Greenhouse Gas Reduction*

The operation of passenger and commercial vehicles produces greenhouse gasses resulting from the combustion of fossil fuels. Vehicles using Highway 103 and the proposed connector / interchange will consume a different volume of fuel when compared to vehicles traveling to the same destination using Trunk 3. Factors which influence the consumption of fuel will include the difference in length of trip and the average speed traveled. MicroBENCOST calculates a Fuel Savings for each of the options over a 25 year period based on the total number of vehicles using each of the connector / interchange options, the average fuel economy of the fleet and the average speed of the vehicles. The results are presented in Table 7.

The reduction of Greenhouse Gas resulting from the operation of the connector / interchange and diversion of traffic to Highway 103 is directly proportional to the reduction in fuel consumption. To calculate the reduction in greenhouse gasses based on the reduction in fuel consumption, we have followed the methodology outlines by the United States Environmental Protection Agency (USEPA) Greenhouse Gas Emissions from a Typical Passenger Vehicle, February 2005 (EPA420-F-05-004).

Other greenhouse gasses that are emitted by vehicles burning fossil fuels include CH₄, N₂O, and HFCs. On average it has been estimated that CO₂ emissions account for approximately 95 percent of greenhouse gas emissions and the remaining gasses account for approximately 5 percent. To simplify the estimate of total greenhouse gas emissions reductions, we have multiplied the CO₂ emission by 100/95. The approximate reduction in other (CH₄, N₂O, HCFs) greenhouse gas emissions and total greenhouse gas emissions for each of the options are presented in Table 7.

Table 7- Reduction on Green House Gas Emissions over 25 Years

Connector Option	Fuel Saved (1000 liters)	Reduction in Greenhouse Gases (GHG), Million kg		
		CO ₂ ¹	Other GHGs (CH ₄ , N ₂ O, HFCs)	Total GHG Reduction
1	184	0.42	0.02	0.44
2	126	0.29	0.02	0.31
3A	111	0.26	0.01	0.27
3B	250	0.59	0.03	0.62
3C	258	0.59	0.03	0.62
4	277	0.64	0.03	0.67

1 - One liter of gasoline contains 639.6 grams (g) of carbon (C) which produces 2,345 g of CO₂ (The carbon content is multiplied by the ratio of the molecular weight of CO₂ to the molecular weight of carbon: 44/12). The number is then multiplied by an oxidation factor of 0.99, which assumes that 1 percent of the carbon remains un-oxidized. This results in a value of approximately 2.3 kg per liter of fuel.

Options 3B, 3C, and 4 have the greatest fuel savings and reduction in GHGs over the 25 year analysis period.

5.0 Conclusions

The significant user benefits from reduced travel time and collision costs provide favorable Benefit / Cost (B/C) Ratios ranging from 3.98 to 8.16. The favorable B/C Ratios indicate that a connector between Trunk 3, St. Margaret's Bay Road and Highway 103 in conjunction with the proposed twinning and interchange project, will produce excellent value on investment of public funds.

The sensitivity analysis indicates that the benefits of this project would outweigh the costs, even with unfavorable variations in some of the principal parameters.

Connector Options 3B, 3C, and 4 are expected to provide the largest reduction in Green House Gasses.

Connector Options 1 and 3C produce the highest and similar overall economic return for road users. Option 1 provides benefit to fewer users than Option 3C, however each of the users of Option 1 would realize a greater benefit as they travel a longer portion of their trip on the higher class Highway 103. Option 3C provides benefits to more users than Option 1, however each user receives a lower individual benefit as they travel a lesser portion of their trip on the higher class Highway 103.

While there are many factors to consider in selection of an appropriate road alignment, from an economic Benefit - Cost perspective, Options 1 and 3C provide the highest overall benefits to society. However, construction of Option 3C provides benefits to more users from Exit 5 than Option 1 therefore the benefits of road construction are shared amongst more individuals. Also, since Option 3C attracts more users than Option 1, there are greater reductions in peak hour traffic on heavily traveled sections of Route 213 (Hammonds Plains Road) and Trunk 3 (St. Margaret's Bay Road) in Upper Tantallon. Option 3C would have greater benefits to individuals still using these sections of existing road after construction of a connector.

Appendices

Contents

Appendix A	- Input Data for Economic Evaluation
Appendix B	- Output Results from Economic Evaluation
Appendix C	- Output Results from Economic Evaluation Sensitivity Analysis

Appendix A

Input Data for

Economic Evaluation

Table A-1 – Distribution of Hourly Volumes

Hour	Percent (Hourly Volume / AADT)	Directional Split	
		Southbound (Outbound)	Northbound (Inbound)
0:00 – 1:00	0.3%	64.5%	35.5%
1:00 – 2:00	0.2%	60.9%	39.1%
2:00 – 3:00	0.3%	40.0%	60.0%
3:00 – 4:00	0.6%	28.3%	71.7%
4:00 – 5:00	1.9%	20.3%	79.7%
5:00 – 6:00	4.2%	23.5%	76.5%
6:00 – 7:00	5.0%	38.5%	61.5%
7:00 – 8:00	5.2%	42.1%	57.9%
8:00 – 9:00	5.9%	43.2%	56.8%
9:00 – 10:00	6.3%	45.7%	54.3%
10:00 – 11:00	6.6%	48.0%	52.0%
11:00 – 12:00	6.6%	50.5%	49.5%
12:00 – 13:00	6.8%	51.8%	48.2%
13:00 – 14:00	7.1%	52.4%	47.6%
14:00 – 15:00	8.0%	54.1%	45.9%
15:00 – 16:00	9.0%	57.7%	42.3%
16:00 – 17:00	8.0%	59.2%	40.8%
17:00 – 18:00	5.6%	58.8%	41.2%
18:00 – 19:00	4.0%	56.2%	43.8%
19:00 – 20:00	3.1%	56.9%	43.1%
20:00 – 21:00	2.4%	60.5%	39.5%
21:00 – 22:00	1.5%	63.1%	36.9%
22:00 – 23:00	0.8%	67.9%	32.1%
23:00 – 24:00	0.5%	67.3%	32.7%
Total	100%	50.2%	49.8%

Note: These values are taken from a permanent counter on Highway 103, near Hubbards within the study area. The values are an average for all 365 days in 2009.

Table A-2 – Route Segment Data
Existing Trunk 3

Segment	Description	Kilometres		Segment Length	Speed Limit Km/hr	% No Passing	AADT
		Start	End				
1	Route 213 from HWY 103 SB ramps to beginning of 60 zone	0.0	1.0	1.0	70	100%	15,450
2	To intersection w Trunk 3	1.0	2.2	1.2	60	100%	12,595
3	To intersection with Rte 333	2.2	2.5	0.3	60	100%	12,050
4	To beginning of 70 zone	2.5	3.2	0.7	60	57%	7,025
5	To Plate Match 1 location	3.2	9.2	6.0	70	90%	4,525
6	To Option 4 intersection	9.2	13.0	3.8	70	87%	3,500
7	To Option 3B/C intersection	13.0	13.3	0.3	70	100%	3,500
8	To Option 2/3A intersection	13.3	14.4	1.1	70	46%	3,500
9	To Option 1 intersection	14.4	17.2	2.8	70	100%	3,000
10	To Plate Match 3 location	17.2	19.9	2.7	70	89%	2,975
11	To beginning 50 zone	19.9	22.8	2.9	70	100%	3,120
12	To intersection with Fox Point Rd	22.8	24.8	2.0	50	100%	3,620
13	To intersection with Rte 329	24.8	25.3	0.5	50	100%	2,570
14	To beginning 70 zone	25.3	25.6	0.3	50	100%	3,665
15	To intersection with Mill Lake Rd	25.6	26.2	0.6	70	100%	3,740
16	To Exit 6 Ramps	26.2	26.7	0.5	60	100%	2,310
Total Length of Analysis				26.7 km			

Existing Highway 103

Description	Kilometres		Segment Length	Speed Limit Km/hr	% No Passing	AADT (2009)
	Start	End				
Existing Highway 103 – Northbound Exit 6 Ramps to Existing Twinning	0.0	19.4	19.4	100	66%	4,772
Existing Highway 103 – Southbound Existing Twinning to Exit 6 Ramps	0.0	19.4	19.4	100	80%	4,806
Total Length of Analysis				19.4 km		

Table A-3 – Vehicle Operating Costs

Vehicle Class	% of Fleet	Unit Operating Costs					
		Fuel (\$/L)	Oil (\$/L)	Tires (\$/veh)	Depreciation Cost (\$/veh)	Maintenance & Repairs (\$/1,000km)	Time Cost (\$/hr)
Passenger Fleet	100%						
Small Passenger	17.4%	1.15	5.00	340	34.01	8,710	10.14
Medium/Large Passenger	50.8%	1.15	5.00	600	44.45	11,980	10.14
Pickup/Van	31.8%	1.15	5.00	800	52.37	9,080	10.14
Truck Fleet	100%						
2-Axle Single Unit	12.0%	1.21	5.00	1,190	98.18	13,530	24.35
3-Axle Single Unit	4.3%	1.21	5.00	4,730	138.84	70,750	24.35
2-S2 Semi's	8.6%	1.21	5.00	6,630	143.80	75,950	24.35
3-S2 Semi's	75.1%	1.21	5.00	8,520	143.80	80,540	24.35

Notes: 1. Local Value for fuel, motor oil, and tires have been used

Table A-4 – Consumer Price Index

Year	CPI	2011 Dollars
1995	87.6	1.355
1996	88.9	1.335
1997	90.4	1.313
1998	91.3	1.300
1999	92.9	1.278
2000	95.4	1.244
2001	97.8	1.214
2002	100.0	1.187
2003	102.8	1.155
2004	104.7	1.134
2005	107.0	1.109
2006	109.1	1.088
2007	111.5	1.065
2008	114.1	1.040
2009	114.4	1.038
2010	116.4	1.020
2011	118.7	1.000

Source for Table A-5 – Statistics Canada Internet Site:
["http://www.statcan.gc.ca/pub/62-001-x/2010011/t040-eng.htm"](http://www.statcan.gc.ca/pub/62-001-x/2010011/t040-eng.htm),
 December 21, 2010

Notes: 2010 CPI based on average of monthly CPI from
 January to November 2010

2011 CPI estimated based on average 2% inflation rate

Table A-5 – Ambient Air Temperatures

Month	Temperatures (°C)		% Vehicle Miles Traveled
	Daily Mean	Average	
December	-2.3	-3.6	26.2
January	-5.7		
February	-5.4		
March	-1.0		
April	4.2	6.3	32.6
May	9.3		
October	8.1		
November	3.6		
June	14.1	15.7	41.3
July	17.5		
August	17.6		
September	13.6		

Source for Table A-6 – Adapted from Environment Canada
 Internet Site:
["http://climate.weatheroffice.gc.ca/climate_normals/indin_e.html"](http://climate.weatheroffice.gc.ca/climate_normals/indin_e.html)
 April 2011 for St. Margaret's Bay, Nova Scotia (1971-2000)
 (% Vehicles Kilometres traveled calculated from NSTIR data)

Appendix B

*Output Results from
Economic Evaluation*

**Table B-1 – Summary of Benefits, Costs and Economic Measures for Option 1
Traffic to or from the West**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	113.29	3.87	14.30	131.46
2014	109.51	3.72	13.82	127.04
2015	106.47	3.78	13.46	123.72
2016	102.88	3.63	13.00	119.51
2017	99.07	3.28	12.49	114.84
2018	96.24	3.34	12.15	111.74
2019	92.94	3.20	11.73	107.87
2020	89.96	3.07	11.35	104.39
2021	87.32	3.11	11.04	101.47
2022	84.49	2.98	10.67	98.14
2023	81.72	2.86	10.32	94.91
2024	79.03	2.75	9.98	91.76
2025	76.41	2.64	9.64	88.69
2026	73.87	2.53	9.32	85.72
2027	71.39	2.43	9.00	82.83
2028	68.99	2.33	8.70	80.02
2029	66.98	2.35	8.46	77.78
2030	65.01	2.36	8.22	75.59
2031	62.62	2.16	7.90	72.68
2032	60.59	2.07	7.64	70.31
2033	58.76	2.08	7.42	68.27
2034	56.83	2.00	7.17	66.01
2035	54.96	1.92	6.93	63.81
2036	53.13	1.84	6.70	61.67
2037	51.36	1.77	6.48	59.60
Total	1963.84	68.06	247.91	2279.80

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	2.280
Discounted Construction Cost (Mill. \$) :	3.277
Discounted Salvage Value (Mill. \$) :	0.590
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.178
Discounted Total Agency Costs (Mill. \$) :	2.865
Fuel Consumption Savings (Mill. l.) :	-0.006
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.005
Net Present Value (Mill. \$) :	-0.585
Gross Benefit-Cost Ratio :	0.796
Netted Benefit-Cost Ratio :	0.821
Internal Rate of Return (Percent) :	3.503

**Table B-2 – Summary of Benefits, Costs and Economic Measures for Option 1
Traffic to or from the East**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	905.39	111.88	193.35	1210.62
2014	876.66	108.54	187.19	1172.40
2015	848.15	105.21	181.09	1134.45
2016	820.35	101.69	175.15	1097.19
2017	794.72	98.95	169.65	1063.32
2018	768.34	95.60	164.01	1027.95
2019	743.96	92.73	158.79	995.48
2020	719.78	89.88	153.62	963.28
2021	696.22	86.87	148.59	931.68
2022	673.67	84.21	143.76	901.64
2023	652.05	81.65	139.13	872.83
2024	630.97	79.14	134.62	844.74
2025	610.76	76.74	130.30	817.79
2026	591.06	74.38	126.08	791.52
2027	571.56	71.89	121.92	765.38
2028	553.15	69.69	117.98	740.83
2029	535.75	67.75	114.25	717.76
2030	518.00	65.48	110.46	693.94
2031	501.45	63.49	106.92	671.86
2032	485.10	61.51	103.43	650.05
2033	469.17	59.47	100.03	628.67
2034	454.30	57.79	96.84	608.93
2035	439.59	56.01	93.70	589.30
2036	425.45	54.29	90.67	570.41
2037	411.67	52.61	87.73	552.01
Total	15697.29	1967.45	3349.29	21014.02

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	21.014
Discounted Construction Cost (Mill. \$) :	3.277
Discounted Salvage Value (Mill. \$) :	0.590
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.178
Discounted Total Agency Costs (Mill. \$) :	2.865
Fuel Consumption Savings (Mill. l.) :	0.190
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.029
Net Present Value (Mill. \$) :	18.149
Gross Benefit-Cost Ratio :	7.334
Netted Benefit-Cost Ratio :	6.538
Internal Rate of Return (Percent) :	40.114

**Table B-3 – Summary of Benefits, Costs and Economic Measures for Option 2
Traffic to or from the West**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	104.39	0.96	13.90	119.25
2014	100.80	0.89	13.42	115.11
2015	96.84	0.54	12.85	110.23
2016	94.25	0.76	12.54	107.55
2017	91.69	0.96	12.23	104.88
2018	88.06	0.65	11.71	100.41
2019	85.22	0.60	11.32	97.14
2020	82.83	0.78	11.03	94.64
2021	80.12	0.72	10.67	91.51
2022	77.48	0.67	10.31	88.46
2023	74.91	0.62	9.96	85.50
2024	72.42	0.57	9.63	82.62
2025	69.99	0.53	9.30	79.82
2026	67.63	0.49	8.99	77.11
2027	65.79	0.61	8.76	75.16
2028	63.54	0.57	8.46	72.57
2029	61.52	0.53	8.18	70.23
2030	59.40	0.49	7.90	67.79
2031	57.49	0.45	7.64	65.58
2032	55.84	0.55	7.44	63.82
2033	53.68	0.39	7.13	61.19
2034	51.92	0.36	6.89	59.17
2035	50.39	0.44	6.70	57.53
2036	49.00	0.51	6.53	56.04
2037	47.36	0.48	6.31	54.15
Total	1802.53	15.12	239.80	2057.46

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	2.057
Discounted Construction Cost (Mill. \$) :	3.516
Discounted Salvage Value (Mill. \$) :	0.668
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.372
Discounted Total Agency Costs (Mill. \$) :	3.220
Fuel Consumption Savings (Mill. l.) :	-0.007
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.005
Net Present Value (Mill. \$) :	-1.162
Gross Benefit-Cost Ratio :	0.639
Netted Benefit-Cost Ratio :	0.669
Internal Rate of Return (Percent) :	2.282

**Table B-4 – Summary of Benefits, Costs and Economic Measures for Option 2
Traffic to or from the East**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	684.62	35.79	144.31	864.72
2014	662.73	34.83	139.68	837.24
2015	641.39	33.89	135.17	810.45
2016	620.93	32.98	130.84	784.75
2017	600.98	32.08	126.62	759.69
2018	581.09	30.91	122.43	734.44
2019	562.47	30.07	118.50	711.04
2020	544.33	29.24	114.66	688.23
2021	526.25	28.18	110.85	665.29
2022	509.31	27.40	107.27	643.99
2023	493.41	26.87	103.90	624.18
2024	477.53	26.12	100.55	604.20
2025	461.74	25.18	97.22	584.14
2026	446.90	24.48	94.08	565.46
2027	432.44	23.79	91.03	547.26
2028	418.54	23.12	88.10	529.76
2029	405.00	22.47	85.24	512.71
2030	391.56	21.67	82.41	495.63
2031	379.31	21.21	79.81	480.33
2032	366.96	20.60	77.20	464.76
2033	354.86	19.88	74.66	449.39
2034	343.66	19.44	72.28	435.38
2035	332.53	18.89	69.94	421.35
2036	321.82	18.35	67.67	407.84
2037	311.38	17.82	65.47	394.67
Total	11871.72	645.24	2499.90	15016.86

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	15.017
Discounted Construction Cost (Mill. \$) :	3.516
Discounted Salvage Value (Mill. \$) :	0.668
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.372
Discounted Total Agency Costs (Mill. \$) :	3.220
Fuel Consumption Savings (Mill. l.) :	0.133
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.025
Net Present Value (Mill. \$) :	11.797
Gross Benefit-Cost Ratio :	4.664
Netted Benefit-Cost Ratio :	4.356
Internal Rate of Return (Percent) :	26.912

**Table B-5 – Summary of Benefits, Costs and Economic Measures for Option 3A
Traffic to or from the West**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	56.87	-3.32	7.29	60.84
2014	55.71	-2.90	7.18	60.00
2015	53.12	-3.15	6.80	56.77
2016	51.46	-3.08	6.58	54.96
2017	49.58	-2.99	6.34	52.93
2018	48.01	-2.92	6.13	51.23
2019	46.95	-2.58	6.04	50.41
2020	45.44	-2.52	5.84	48.75
2021	43.32	-2.69	5.53	46.16
2022	41.92	-2.63	5.34	44.64
2023	40.93	-2.33	5.25	43.85
2024	39.58	-2.28	5.07	42.38
2025	38.27	-2.22	4.90	40.95
2026	36.99	-2.16	4.74	39.56
2027	35.75	-2.11	4.57	38.22
2028	35.00	-1.89	4.50	37.61
2029	33.81	-1.84	4.35	36.31
2030	32.37	-1.96	4.14	34.55
2031	31.26	-1.90	3.99	33.35
2032	30.56	-1.72	3.92	32.77
2033	29.50	-1.67	3.78	31.61
2034	28.24	-1.76	3.60	30.09
2035	27.58	-1.59	3.53	29.53
2036	26.61	-1.55	3.41	28.47
2037	25.77	-1.51	3.30	27.56
Total	984.63	-57.26	126.13	1053.49

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	1.053
Discounted Construction Cost (Mill. \$) :	3.951
Discounted Salvage Value (Mill. \$) :	0.767
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.453
Discounted Total Agency Costs (Mill. \$) :	3.637
Fuel Consumption Savings (Mill. l.) :	-0.008
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.003
Net Present Value (Mill. \$) :	-2.583
Gross Benefit-Cost Ratio :	0.290
Netted Benefit-Cost Ratio :	0.346
Internal Rate of Return (Percent) :	-0.453

**Table B-6 – Summary of Benefits, Costs and Economic Measures for Option 3A
Traffic to or from the East**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	615.37	29.49	127.22	772.08
2014	595.70	28.72	123.14	747.56
2015	576.52	27.96	119.16	723.64
2016	558.14	27.22	115.35	700.71
2017	540.22	26.49	111.63	678.34
2018	522.31	25.51	107.93	655.76
2019	505.58	24.83	104.47	634.88
2020	489.28	24.16	101.08	614.52
2021	473.02	23.27	97.72	594.01
2022	457.79	22.64	94.57	575.00
2023	443.52	22.24	91.60	557.35
2024	429.25	21.62	88.64	539.51
2025	415.03	20.84	85.71	521.58
2026	401.70	20.26	82.94	504.90
2027	388.70	19.70	80.25	488.65
2028	376.21	19.15	77.66	473.03
2029	364.05	18.62	75.14	457.81
2030	351.95	17.95	72.64	442.54
2031	340.95	17.59	70.36	428.90
2032	329.85	17.09	68.06	415.00
2033	318.96	16.48	65.81	401.26
2034	308.90	16.14	63.73	388.77
2035	298.90	15.68	61.65	376.24
2036	289.27	15.24	59.66	364.17
2037	279.89	14.81	57.72	352.42
Total	10671.04	533.72	2203.88	13408.64

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	13.409
Discounted Construction Cost (Mill. \$) :	3.951
Discounted Salvage Value (Mill. \$) :	0.767
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.453
Discounted Total Agency Costs (Mill. \$) :	3.637
Fuel Consumption Savings (Mill. l.) :	0.119
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.023
Net Present Value (Mill. \$) :	9.772
Gross Benefit-Cost Ratio :	3.687
Netted Benefit-Cost Ratio :	3.473
Internal Rate of Return (Percent) :	21.452

**Table B-7 – Summary of Benefits, Costs and Economic Measures for Option 3B
Traffic to or from the West**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	129.45	15.34	19.72	164.51
2014	125.19	14.81	19.07	159.07
2015	121.05	14.29	18.44	153.78
2016	117.02	13.80	17.82	148.63
2017	113.10	13.31	17.22	143.63
2018	110.05	13.12	16.78	139.94
2019	106.32	12.65	16.20	135.17
2020	102.34	11.99	15.57	129.90
2021	99.49	11.80	15.16	126.45
2022	96.07	11.38	14.63	122.08
2023	93.03	11.00	14.17	118.20
2024	90.36	10.80	13.78	114.94
2025	86.92	10.24	13.23	110.40
2026	84.12	9.90	12.80	106.82
2027	81.64	9.71	12.44	103.80
2028	78.97	9.38	12.03	100.38
2029	76.38	9.06	11.63	97.06
2030	73.85	8.74	11.24	93.84
2031	71.39	8.44	10.87	90.70
2032	69.00	8.14	10.50	87.65
2033	67.05	7.99	10.21	85.25
2034	64.77	7.71	9.87	82.35
2035	62.73	7.45	9.55	79.74
2036	60.58	7.19	9.22	76.99
2037	58.65	6.95	8.93	74.52
Total	2239.52	265.20	341.09	2845.80

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	2.846
Discounted Construction Cost (Mill. \$) :	3.556
Discounted Salvage Value (Mill. \$) :	0.654
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.259
Discounted Total Agency Costs (Mill. \$) :	3.160
Fuel Consumption Savings (Mill. l.) :	0.000
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.005
Net Present Value (Mill. \$) :	-0.314
Gross Benefit-Cost Ratio :	0.900
Netted Benefit-Cost Ratio :	0.912
Internal Rate of Return (Percent) :	4.216

**Table B-8 – Summary of Benefits, Costs and Economic Measures for Option 3B
Traffic to or from the East**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	916.66	92.59	186.96	1196.21
2014	887.72	90.08	181.03	1158.83
2015	859.05	87.33	175.16	1121.54
2016	830.70	84.39	169.37	1084.47
2017	803.86	81.82	163.88	1049.57
2018	778.41	79.58	158.67	1016.66
2019	753.23	77.14	153.52	983.90
2020	728.36	74.55	148.44	951.36
2021	705.37	72.51	143.73	921.61
2022	682.37	70.27	139.03	891.68
2023	660.48	68.14	134.56	863.18
2024	638.91	66.03	130.15	835.09
2025	618.37	64.03	125.95	808.35
2026	598.61	62.23	121.91	782.75
2027	578.86	60.15	117.88	756.89
2028	560.51	58.47	114.12	733.11
2029	542.21	56.67	110.38	709.26
2030	524.75	54.94	106.82	686.50
2031	507.94	53.38	103.38	664.70
2032	491.53	51.75	100.02	643.30
2033	475.54	50.15	96.76	622.46
2034	460.13	48.62	93.61	602.36
2035	445.43	47.23	90.61	583.27
2036	430.93	45.78	87.65	564.36
2037	416.95	44.37	84.79	546.12
Total	15896.91	1642.20	3238.39	20777.50

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	20.778
Discounted Construction Cost (Mill. \$) :	3.556
Discounted Salvage Value (Mill. \$) :	0.654
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.259
Discounted Total Agency Costs (Mill. \$) :	3.160
Fuel Consumption Savings (Mill. l.) :	0.258
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.031
Net Present Value (Mill. \$) :	17.617
Gross Benefit-Cost Ratio :	6.575
Netted Benefit-Cost Ratio :	5.955
Internal Rate of Return (Percent) :	36.595

**Table B-9 – Summary of Benefits, Costs and Economic Measures for Option 3C
Traffic to or from the West**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	129.45	15.34	19.72	164.51
2014	125.19	14.81	19.07	159.07
2015	121.05	14.29	18.44	153.78
2016	117.02	13.80	17.82	148.63
2017	113.10	13.31	17.22	143.63
2018	110.05	13.12	16.78	139.94
2019	106.32	12.65	16.20	135.17
2020	102.34	11.99	15.57	129.90
2021	99.49	11.80	15.16	126.45
2022	96.07	11.38	14.63	122.08
2023	93.03	11.00	14.17	118.20
2024	90.36	10.80	13.78	114.94
2025	86.92	10.24	13.23	110.40
2026	84.12	9.90	12.80	106.82
2027	81.64	9.71	12.44	103.80
2028	78.97	9.38	12.03	100.38
2029	76.38	9.06	11.63	97.06
2030	73.85	8.74	11.24	93.84
2031	71.39	8.44	10.87	90.70
2032	69.00	8.14	10.50	87.65
2033	67.05	7.99	10.21	85.25
2034	64.77	7.71	9.87	82.35
2035	62.73	7.45	9.55	79.74
2036	60.58	7.19	9.22	76.99
2037	58.65	6.95	8.93	74.52
Total	2239.52	265.20	341.09	2845.80

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	2.846
Discounted Construction Cost (Mill. \$) :	3.283
Discounted Salvage Value (Mill. \$) :	0.646
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.259
Discounted Total Agency Costs (Mill. \$) :	2.896
Fuel Consumption Savings (Mill. l.) :	0.000
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.005
Net Present Value (Mill. \$) :	-0.050
Gross Benefit-Cost Ratio :	0.983
Netted Benefit-Cost Ratio :	0.985
Internal Rate of Return (Percent) :	4.784

**Table B-10 – Summary of Benefits, Costs and Economic Measures for Option 3C
Traffic to or from the East**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	916.66	92.59	186.96	1196.21
2014	887.72	90.08	181.03	1158.83
2015	859.05	87.33	175.16	1121.54
2016	830.70	84.39	169.37	1084.47
2017	803.86	81.82	163.88	1049.57
2018	778.41	79.58	158.67	1016.66
2019	753.23	77.14	153.52	983.90
2020	728.36	74.55	148.44	951.36
2021	705.37	72.51	143.73	921.61
2022	682.37	70.27	139.03	891.68
2023	660.48	68.14	134.56	863.18
2024	638.91	66.03	130.15	835.09
2025	618.37	64.03	125.95	808.35
2026	598.61	62.23	121.91	782.75
2027	578.86	60.15	117.88	756.89
2028	560.51	58.47	114.12	733.11
2029	542.21	56.67	110.38	709.26
2030	524.75	54.94	106.82	686.50
2031	507.94	53.38	103.38	664.70
2032	491.53	51.75	100.02	643.30
2033	475.54	50.15	96.76	622.46
2034	460.13	48.62	93.61	602.36
2035	445.43	47.23	90.61	583.27
2036	430.93	45.78	87.65	564.36
2037	416.95	44.37	84.79	546.12
Total	15896.91	1642.20	3238.39	20777.50

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	20.778
Discounted Construction Cost (Mill. \$) :	3.283
Discounted Salvage Value (Mill. \$) :	0.646
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.259
Discounted Total Agency Costs (Mill. \$) :	2.896
Fuel Consumption Savings (Mill. l.) :	0.258
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.031
Net Present Value (Mill. \$) :	17.881
Gross Benefit-Cost Ratio :	7.174
Netted Benefit-Cost Ratio :	6.447
Internal Rate of Return (Percent) :	39.519

**Table B-11 – Summary of Benefits, Costs and Economic Measures for Option 4
Traffic to or from the West**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	87.55	-8.73	10.85	89.67
2014	84.64	-8.49	10.48	86.63
2015	81.80	-8.25	10.12	83.68
2016	79.05	-8.01	9.77	80.81
2017	76.37	-7.78	9.44	78.03
2018	74.53	-7.28	9.25	76.49
2019	71.97	-7.08	8.93	73.82
2020	69.02	-7.15	8.51	70.39
2021	67.29	-6.70	8.33	68.93
2022	64.95	-6.50	8.04	66.49
2023	62.87	-6.33	7.78	64.32
2024	61.23	-5.93	7.60	62.90
2025	58.70	-5.97	7.25	59.98
2026	56.78	-5.81	7.01	57.98
2027	55.25	-5.45	6.85	56.65
2028	53.42	-5.30	6.62	54.74
2029	51.64	-5.15	6.39	52.88
2030	49.91	-5.01	6.17	51.08
2031	48.23	-4.87	5.96	49.33
2032	46.60	-4.73	5.76	47.63
2033	45.38	-4.46	5.62	46.55
2034	43.83	-4.33	5.43	44.93
2035	42.42	-4.22	5.25	43.46
2036	40.96	-4.09	5.07	41.93
2037	39.63	-3.98	4.90	40.55
Total	1514.03	-151.57	187.38	1549.84

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	1.550
Discounted Construction Cost (Mill. \$) :	5.237
Discounted Salvage Value (Mill. \$) :	1.080
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.404
Discounted Total Agency Costs (Mill. \$) :	4.561
Fuel Consumption Savings (Mill. l.) :	-0.013
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.004
Net Present Value (Mill. \$) :	-3.011
Gross Benefit-Cost Ratio :	0.340
Netted Benefit-Cost Ratio :	0.425
Internal Rate of Return (Percent) :	0.336

**Table B-12 – Summary of Benefits, Costs and Economic Measures for Option 4
Traffic to or from the East**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	934.93	131.41	187.89	1254.23
2014	905.39	127.64	181.92	1214.95
2015	876.14	123.68	176.03	1175.85
2016	847.24	119.57	170.22	1137.03
2017	819.86	115.86	164.70	1100.42
2018	793.89	112.51	159.46	1065.85
2019	768.20	109.01	154.28	1031.49
2020	742.84	105.39	149.18	997.42
2021	719.38	102.35	144.45	966.18
2022	695.92	99.14	139.72	934.78
2023	673.59	96.08	135.23	904.90
2024	651.59	93.07	130.80	875.45
2025	630.64	90.19	126.58	847.41
2026	610.48	87.54	122.51	820.53
2027	590.34	84.65	118.46	793.46
2028	571.62	82.18	114.69	768.49
2029	552.95	79.60	110.93	743.48
2030	535.14	77.14	107.35	719.62
2031	517.99	74.86	103.89	696.73
2032	501.25	72.53	100.52	674.30
2033	484.95	70.26	97.24	652.45
2034	469.23	68.08	94.08	631.38
2035	454.22	66.06	91.06	611.34
2036	439.44	64.00	88.08	591.53
2037	425.19	62.01	85.21	572.41
Total	16212.40	2314.81	3254.47	21781.68

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	21.782
Discounted Construction Cost (Mill. \$) :	5.237
Discounted Salvage Value (Mill. \$) :	1.080
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.404
Discounted Total Agency Costs (Mill. \$) :	4.561
Fuel Consumption Savings (Mill. l.) :	0.290
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.031
Net Present Value (Mill. \$) :	17.221
Gross Benefit-Cost Ratio :	4.776
Netted Benefit-Cost Ratio :	4.288
Internal Rate of Return (Percent) :	26.328

Appendix C

Output Results from Economic Evaluation Sensitivity Analysis

**Table C-1 – Summary of Benefits, Costs and Economic Measures for Option 1
Traffic to or from the West – Increase Construction Cost +20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	113.29	3.87	14.30	131.46
2014	109.51	3.72	13.82	127.04
2015	106.47	3.78	13.46	123.72
2016	102.88	3.63	13.00	119.51
2017	99.07	3.28	12.49	114.84
2018	96.24	3.34	12.15	111.74
2019	92.94	3.20	11.73	107.87
2020	89.96	3.07	11.35	104.39
2021	87.32	3.11	11.04	101.47
2022	84.49	2.98	10.67	98.14
2023	81.72	2.86	10.32	94.91
2024	79.03	2.75	9.98	91.76
2025	76.41	2.64	9.64	88.69
2026	73.87	2.53	9.32	85.72
2027	71.39	2.43	9.00	82.83
2028	68.99	2.33	8.70	80.02
2029	66.98	2.35	8.46	77.78
2030	65.01	2.36	8.22	75.59
2031	62.62	2.16	7.90	72.68
2032	60.59	2.07	7.64	70.31
2033	58.76	2.08	7.42	68.27
2034	56.83	2.00	7.17	66.01
2035	54.96	1.92	6.93	63.81
2036	53.13	1.84	6.70	61.67
2037	51.36	1.77	6.48	59.60
Total	1963.84	68.06	247.91	2279.80

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	2.280
Discounted Construction Cost (Mill. \$) :	3.933
Discounted Salvage Value (Mill. \$) :	0.708
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.178
Discounted Total Agency Costs (Mill. \$) :	3.403
Fuel Consumption Savings (Mill. l.) :	-0.006
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.005
Net Present Value (Mill. \$) :	-1.123
Gross Benefit-Cost Ratio :	0.670
Netted Benefit-Cost Ratio :	0.714
Internal Rate of Return (Percent) :	2.641

**Table C-2 – Summary of Benefits, Costs and Economic Measures for Option 1
Traffic to or from the East– Increase Construction Cost +20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	905.39	111.88	193.35	1210.62
2014	876.66	108.54	187.19	1172.40
2015	848.15	105.21	181.09	1134.45
2016	820.35	101.69	175.15	1097.19
2017	794.72	98.95	169.65	1063.32
2018	768.34	95.60	164.01	1027.95
2019	743.96	92.73	158.79	995.48
2020	719.78	89.88	153.62	963.28
2021	696.22	86.87	148.59	931.68
2022	673.67	84.21	143.76	901.64
2023	652.05	81.65	139.13	872.83
2024	630.97	79.14	134.62	844.74
2025	610.76	76.74	130.30	817.79
2026	591.06	74.38	126.08	791.52
2027	571.56	71.89	121.92	765.38
2028	553.15	69.69	117.98	740.83
2029	535.75	67.75	114.25	717.76
2030	518.00	65.48	110.46	693.94
2031	501.45	63.49	106.92	671.86
2032	485.10	61.51	103.43	650.05
2033	469.17	59.47	100.03	628.67
2034	454.30	57.79	96.84	608.93
2035	439.59	56.01	93.70	589.30
2036	425.45	54.29	90.67	570.41
2037	411.67	52.61	87.73	552.01
Total	15697.29	1967.45	3349.29	21014.02

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	21.014
Discounted Construction Cost (Mill. \$) :	3.933
Discounted Salvage Value (Mill. \$) :	0.708
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.178
Discounted Total Agency Costs (Mill. \$) :	3.403
Fuel Consumption Savings (Mill. l.) :	0.190
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.029
Net Present Value (Mill. \$) :	17.611
Gross Benefit-Cost Ratio :	6.176
Netted Benefit-Cost Ratio :	5.478
Internal Rate of Return (Percent) :	33.660

**Table C-3 – Summary of Benefits, Costs and Economic Measures for Option 1
Traffic to or from the West – Value of Time Removed**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	0.00	3.87	14.30	18.17
2014	0.00	3.72	13.82	17.53
2015	0.00	3.78	13.46	17.24
2016	0.00	3.63	13.00	16.63
2017	0.00	3.28	12.49	15.77
2018	0.00	3.34	12.15	15.49
2019	0.00	3.20	11.73	14.93
2020	0.00	3.07	11.35	14.43
2021	0.00	3.11	11.04	14.15
2022	0.00	2.98	10.67	13.66
2023	0.00	2.86	10.32	13.18
2024	0.00	2.75	9.98	12.73
2025	0.00	2.64	9.64	12.28
2026	0.00	2.53	9.32	11.85
2027	0.00	2.43	9.00	11.43
2028	0.00	2.33	8.70	11.03
2029	0.00	2.35	8.46	10.80
2030	0.00	2.36	8.22	10.58
2031	0.00	2.16	7.90	10.06
2032	0.00	2.07	7.64	9.72
2033	0.00	2.08	7.42	9.50
2034	0.00	2.00	7.17	9.17
2035	0.00	1.92	6.93	8.85
2036	0.00	1.84	6.70	8.54
2037	0.00	1.77	6.48	8.24
Total	0.00	68.06	247.91	315.97

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	0.316
Discounted Construction Cost (Mill. \$) :	3.277
Discounted Salvage Value (Mill. \$) :	0.590
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.178
Discounted Total Agency Costs (Mill. \$) :	2.865
Fuel Consumption Savings (Mill. l.) :	-0.006
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.005
Net Present Value (Mill. \$) :	-2.549
Gross Benefit-Cost Ratio :	0.110
Netted Benefit-Cost Ratio :	0.222
Internal Rate of Return (Percent) :	-1.685

**Table C-4 – Summary of Benefits, Costs and Economic Measures for Option 1
Traffic to or from the East – Value of Time Removed**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	0.00	111.88	193.35	305.23
2014	0.00	108.54	187.19	295.74
2015	0.00	105.21	181.09	286.30
2016	0.00	101.69	175.15	276.84
2017	0.00	98.95	169.65	268.59
2018	0.00	95.60	164.01	259.61
2019	0.00	92.73	158.79	251.52
2020	0.00	89.88	153.62	243.49
2021	0.00	86.87	148.59	235.46
2022	0.00	84.21	143.76	227.97
2023	0.00	81.65	139.13	220.78
2024	0.00	79.14	134.62	213.77
2025	0.00	76.74	130.30	207.03
2026	0.00	74.38	126.08	200.47
2027	0.00	71.89	121.92	193.81
2028	0.00	69.69	117.98	187.68
2029	0.00	67.75	114.25	182.00
2030	0.00	65.48	110.46	175.94
2031	0.00	63.49	106.92	170.41
2032	0.00	61.51	103.43	164.94
2033	0.00	59.47	100.03	159.50
2034	0.00	57.79	96.84	154.63
2035	0.00	56.01	93.70	149.70
2036	0.00	54.29	90.67	144.96
2037	0.00	52.61	87.73	140.34
Total	0.00	1967.45	3349.29	5316.74

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	5.317
Discounted Construction Cost (Mill. \$) :	3.277
Discounted Salvage Value (Mill. \$) :	0.590
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.178
Discounted Total Agency Costs (Mill. \$) :	2.865
Fuel Consumption Savings (Mill. l.) :	0.190
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.029
Net Present Value (Mill. \$) :	2.452
Gross Benefit-Cost Ratio :	1.856
Netted Benefit-Cost Ratio :	1.748
Internal Rate of Return (Percent) :	10.282

**Table C-5 – Summary of Benefits, Costs and Economic Measures for Option 1
Traffic to or from the West – Fuel Cost +20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	113.29	3.83	14.30	131.41
2014	109.51	3.67	13.82	127.00
2015	106.47	3.74	13.46	123.68
2016	102.88	3.59	13.00	119.47
2017	99.07	3.24	12.49	114.80
2018	96.24	3.30	12.15	111.70
2019	92.94	3.17	11.73	107.84
2020	89.96	3.04	11.35	104.35
2021	87.32	3.08	11.04	101.44
2022	84.49	2.95	10.67	98.11
2023	81.72	2.83	10.32	94.88
2024	79.03	2.72	9.98	91.73
2025	76.41	2.61	9.64	88.67
2026	73.87	2.50	9.32	85.69
2027	71.39	2.40	9.00	82.80
2028	68.99	2.30	8.70	79.99
2029	66.98	2.32	8.46	77.76
2030	65.01	2.33	8.22	75.56
2031	62.62	2.14	7.90	72.66
2032	60.59	2.05	7.64	70.29
2033	58.76	2.06	7.42	68.25
2034	56.83	1.98	7.17	65.99
2035	54.96	1.90	6.93	63.79
2036	53.13	1.82	6.70	61.66
2037	51.36	1.75	6.48	59.58
Total	1963.84	67.34	247.91	2279.08

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	2.279
Discounted Construction Cost (Mill. \$) :	3.277
Discounted Salvage Value (Mill. \$) :	0.590
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.178
Discounted Total Agency Costs (Mill. \$) :	2.865
Fuel Consumption Savings (Mill. l.) :	-0.006
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.005
Net Present Value (Mill. \$) :	-0.586
Gross Benefit-Cost Ratio :	0.795
Netted Benefit-Cost Ratio :	0.821
Internal Rate of Return (Percent) :	3.501

**Table C-6 – Summary of Benefits, Costs and Economic Measures for Option 1
Traffic to or from the East – Fuel Cost +20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	905.39	112.92	193.35	1211.66
2014	876.66	109.56	187.19	1173.42
2015	848.15	106.22	181.09	1135.46
2016	820.35	102.68	175.15	1098.18
2017	794.72	99.93	169.65	1064.30
2018	768.34	96.56	164.01	1028.92
2019	743.96	93.68	158.79	996.43
2020	719.78	90.82	153.62	964.22
2021	696.22	87.80	148.59	932.61
2022	673.67	85.13	143.76	902.55
2023	652.05	82.55	139.13	873.73
2024	630.97	80.04	134.62	845.63
2025	610.76	77.62	130.30	818.67
2026	591.06	75.25	126.08	792.39
2027	571.56	72.75	121.92	766.23
2028	553.15	70.53	117.98	741.67
2029	535.75	68.58	114.25	718.59
2030	518.00	66.29	110.46	694.76
2031	501.45	64.29	106.92	672.67
2032	485.10	62.31	103.43	650.84
2033	469.17	60.25	100.03	629.45
2034	454.30	58.56	96.84	609.70
2035	439.59	56.77	93.70	590.06
2036	425.45	55.04	90.67	571.16
2037	411.67	53.35	87.73	552.75
Total	15697.29	1989.49	3349.29	21036.07

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	21.036
Discounted Construction Cost (Mill. \$) :	3.277
Discounted Salvage Value (Mill. \$) :	0.590
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.178
Discounted Total Agency Costs (Mill. \$) :	2.865
Fuel Consumption Savings (Mill. l.) :	0.190
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.029
Net Present Value (Mill. \$) :	18.171
Gross Benefit-Cost Ratio :	7.342
Netted Benefit-Cost Ratio :	6.544
Internal Rate of Return (Percent) :	40.149

**Table C-7 – Summary of Benefits, Costs and Economic Measures for Option 1
Traffic to or from the West – Increase Discount Rate to 7%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	108.88	3.72	13.74	126.35
2014	103.19	3.50	13.02	119.71
2015	98.36	3.49	12.44	114.29
2016	93.17	3.28	11.78	108.23
2017	87.96	2.92	11.09	101.96
2018	83.78	2.91	10.58	97.26
2019	79.31	2.73	10.01	92.06
2020	75.27	2.57	9.50	87.33
2021	71.62	2.55	9.05	83.23
2022	67.93	2.40	8.58	78.92
2023	64.42	2.26	8.14	74.82
2024	61.08	2.12	7.71	70.91
2025	57.90	2.00	7.31	67.20
2026	54.87	1.88	6.92	63.67
2027	51.99	1.77	6.56	60.32
2028	49.26	1.66	6.21	57.13
2029	46.88	1.64	5.92	54.44
2030	44.61	1.62	5.64	51.87
2031	42.12	1.45	5.31	48.89
2032	39.96	1.37	5.04	46.37
2033	37.99	1.35	4.80	44.14
2034	36.03	1.27	4.55	41.84
2035	34.15	1.19	4.31	39.65
2036	32.37	1.12	4.08	37.57
2037	30.67	1.05	3.87	35.60
Total	1553.78	53.82	196.15	1803.75

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	1.804
Discounted Construction Cost (Mill. \$) :	3.213
Discounted Salvage Value (Mill. \$) :	0.352
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.135
Discounted Total Agency Costs (Mill. \$) :	2.995
Fuel Consumption Savings (Mill. l.) :	-0.006
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.005
Net Present Value (Mill. \$) :	-1.192
Gross Benefit-Cost Ratio :	0.602
Netted Benefit-Cost Ratio :	0.629
Internal Rate of Return (Percent) :	3.503

**Table C-8 – Summary of Benefits, Costs and Economic Measures for Option 1
Traffic to or from the East – Increase Discount Rate to 7%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	870.20	107.54	185.83	1163.57
2014	826.05	102.28	176.39	1104.72
2015	783.50	97.19	167.28	1047.98
2016	742.94	92.09	158.63	993.66
2017	705.61	87.85	150.62	944.09
2018	668.80	83.21	142.77	894.78
2019	634.86	79.13	135.51	849.50
2020	602.18	75.19	128.52	805.89
2021	571.03	71.25	121.87	764.16
2022	541.69	67.71	115.60	725.00
2023	514.02	64.36	109.68	688.06
2024	487.65	61.17	104.04	652.86
2025	462.76	58.14	98.72	619.62
2026	439.04	55.25	93.65	587.95
2027	416.23	52.35	88.79	557.37
2028	394.92	49.76	84.23	528.91
2029	374.99	47.42	79.97	502.37
2030	355.45	44.93	75.80	476.17
2031	337.34	42.71	71.93	451.98
2032	319.93	40.57	68.21	428.72
2033	303.35	38.45	64.68	406.48
2034	287.97	36.63	61.39	385.99
2035	273.18	34.80	58.23	366.21
2036	259.21	33.07	55.24	347.52
2037	245.89	31.42	52.40	329.71
Total	12418.79	1554.50	2649.98	16623.28

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	16.623
Discounted Construction Cost (Mill. \$) :	3.213
Discounted Salvage Value (Mill. \$) :	0.352
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.135
Discounted Total Agency Costs (Mill. \$) :	2.995
Fuel Consumption Savings (Mill. l.) :	0.190
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.029
Net Present Value (Mill. \$) :	13.628
Gross Benefit-Cost Ratio :	5.550
Netted Benefit-Cost Ratio :	5.241
Internal Rate of Return (Percent) :	40.114

**Table C-9 – Summary of Benefits, Costs and Economic Measures for Option 1
Traffic to or from the West – Collision Cost Reduced by 20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	113.29	3.87	11.44	128.60
2014	109.51	3.72	11.06	124.28
2015	106.47	3.78	10.77	121.03
2016	102.88	3.63	10.40	116.91
2017	99.07	3.28	9.99	112.34
2018	96.24	3.34	9.72	109.31
2019	92.94	3.20	9.39	105.53
2020	89.96	3.07	9.08	102.12
2021	87.32	3.11	8.83	99.26
2022	84.49	2.98	8.54	96.01
2023	81.72	2.86	8.26	92.84
2024	79.03	2.75	7.98	89.76
2025	76.41	2.64	7.71	86.77
2026	73.87	2.53	7.46	83.85
2027	71.39	2.43	7.20	81.03
2028	68.99	2.33	6.96	78.28
2029	66.98	2.35	6.77	76.09
2030	65.01	2.36	6.58	73.94
2031	62.62	2.16	6.32	71.10
2032	60.59	2.07	6.11	68.78
2033	58.76	2.08	5.94	66.78
2034	56.83	2.00	5.74	64.57
2035	54.96	1.92	5.55	62.42
2036	53.13	1.84	5.36	60.33
2037	51.36	1.77	5.18	58.30
Total	1963.84	68.06	198.33	2230.22

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	2.230
Discounted Construction Cost (Mill. \$) :	3.277
Discounted Salvage Value (Mill. \$) :	0.590
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.178
Discounted Total Agency Costs (Mill. \$) :	2.865
Fuel Consumption Savings (Mill. l.) :	-0.006
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.005
Net Present Value (Mill. \$) :	-0.635
Gross Benefit-Cost Ratio :	0.778
Netted Benefit-Cost Ratio :	0.806
Internal Rate of Return (Percent) :	3.382

**Table C-10 – Summary of Benefits, Costs and Economic Measures for Option 1
Traffic to or from the East – Collision Cost Reduced by 20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	905.39	111.88	154.68	1171.95
2014	876.66	108.54	149.76	1134.96
2015	848.15	105.21	144.87	1098.23
2016	820.35	101.69	140.12	1062.16
2017	794.72	98.95	135.72	1029.39
2018	768.34	95.60	131.21	995.15
2019	743.96	92.73	127.03	963.72
2020	719.78	89.88	122.89	932.55
2021	696.22	86.87	118.87	901.96
2022	673.67	84.21	115.01	872.89
2023	652.05	81.65	111.31	845.00
2024	630.97	79.14	107.70	817.82
2025	610.76	76.74	104.24	791.73
2026	591.06	74.38	100.87	766.31
2027	571.56	71.89	97.54	740.99
2028	553.15	69.69	94.39	717.23
2029	535.75	67.75	91.40	694.91
2030	518.00	65.48	88.37	671.85
2031	501.45	63.49	85.54	650.48
2032	485.10	61.51	82.74	629.36
2033	469.17	59.47	80.02	608.66
2034	454.30	57.79	77.47	589.56
2035	439.59	56.01	74.96	570.56
2036	425.45	54.29	72.54	552.28
2037	411.67	52.61	70.18	534.47
Total	15697.29	1967.45	2679.43	20344.17

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	20.344
Discounted Construction Cost (Mill. \$) :	3.277
Discounted Salvage Value (Mill. \$) :	0.590
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.178
Discounted Total Agency Costs (Mill. \$) :	2.865
Fuel Consumption Savings (Mill. l.) :	0.190
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.029
Net Present Value (Mill. \$) :	17.479
Gross Benefit-Cost Ratio :	7.101
Netted Benefit-Cost Ratio :	6.333
Internal Rate of Return (Percent) :	38.874

**Table C-11 – Summary of Benefits, Costs and Economic Measures for Option 2
Traffic to or from the West – Increase Construction Cost +20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	104.39	0.96	13.90	119.25
2014	100.80	0.89	13.42	115.11
2015	96.84	0.54	12.85	110.23
2016	94.25	0.76	12.54	107.55
2017	91.69	0.96	12.23	104.88
2018	88.06	0.65	11.71	100.41
2019	85.22	0.60	11.32	97.14
2020	82.83	0.78	11.03	94.64
2021	80.12	0.72	10.67	91.51
2022	77.48	0.67	10.31	88.46
2023	74.91	0.62	9.96	85.50
2024	72.42	0.57	9.63	82.62
2025	69.99	0.53	9.30	79.82
2026	67.63	0.49	8.99	77.11
2027	65.79	0.61	8.76	75.16
2028	63.54	0.57	8.46	72.57
2029	61.52	0.53	8.18	70.23
2030	59.40	0.49	7.90	67.79
2031	57.49	0.45	7.64	65.58
2032	55.84	0.55	7.44	63.82
2033	53.68	0.39	7.13	61.19
2034	51.92	0.36	6.89	59.17
2035	50.39	0.44	6.70	57.53
2036	49.00	0.51	6.53	56.04
2037	47.36	0.48	6.31	54.15
Total	1802.53	15.12	239.80	2057.46

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	2.057
Discounted Construction Cost (Mill. \$) :	4.219
Discounted Salvage Value (Mill. \$) :	0.801
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.372
Discounted Total Agency Costs (Mill. \$) :	3.789
Fuel Consumption Savings (Mill. l.) :	-0.007
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.005
Net Present Value (Mill. \$) :	-1.732
Gross Benefit-Cost Ratio :	0.543
Netted Benefit-Cost Ratio :	0.589
Internal Rate of Return (Percent) :	1.627

**Table C-12 – Summary of Benefits, Costs and Economic Measures for Option 2
Traffic to or from the East – Increase Construction Cost +20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	684.62	35.79	144.31	864.72
2014	662.73	34.83	139.68	837.24
2015	641.39	33.89	135.17	810.45
2016	620.93	32.98	130.84	784.75
2017	600.98	32.08	126.62	759.69
2018	581.09	30.91	122.43	734.44
2019	562.47	30.07	118.50	711.04
2020	544.33	29.24	114.66	688.23
2021	526.25	28.18	110.85	665.29
2022	509.31	27.40	107.27	643.99
2023	493.41	26.87	103.90	624.18
2024	477.53	26.12	100.55	604.20
2025	461.74	25.18	97.22	584.14
2026	446.90	24.48	94.08	565.46
2027	432.44	23.79	91.03	547.26
2028	418.54	23.12	88.10	529.76
2029	405.00	22.47	85.24	512.71
2030	391.56	21.67	82.41	495.63
2031	379.31	21.21	79.81	480.33
2032	366.96	20.60	77.20	464.76
2033	354.86	19.88	74.66	449.39
2034	343.66	19.44	72.28	435.38
2035	332.53	18.89	69.94	421.35
2036	321.82	18.35	67.67	407.84
2037	311.38	17.82	65.47	394.67
Total	11871.72	645.24	2499.90	15016.86

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	15.017
Discounted Construction Cost (Mill. \$) :	4.219
Discounted Salvage Value (Mill. \$) :	0.801
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.372
Discounted Total Agency Costs (Mill. \$) :	3.789
Fuel Consumption Savings (Mill. l.) :	0.133
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.025
Net Present Value (Mill. \$) :	11.227
Gross Benefit-Cost Ratio :	3.963
Netted Benefit-Cost Ratio :	3.661
Internal Rate of Return (Percent) :	22.589

**Table C-13 – Summary of Benefits, Costs and Economic Measures for Option 2
Traffic to or from the West – Value of Time Removed**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	0.00	0.96	13.90	14.86
2014	0.00	0.89	13.42	14.31
2015	0.00	0.54	12.85	13.39
2016	0.00	0.76	12.54	13.30
2017	0.00	0.96	12.23	13.19
2018	0.00	0.65	11.71	12.36
2019	0.00	0.60	11.32	11.92
2020	0.00	0.78	11.03	11.81
2021	0.00	0.72	10.67	11.39
2022	0.00	0.67	10.31	10.98
2023	0.00	0.62	9.96	10.58
2024	0.00	0.57	9.63	10.20
2025	0.00	0.53	9.30	9.83
2026	0.00	0.49	8.99	9.48
2027	0.00	0.61	8.76	9.37
2028	0.00	0.57	8.46	9.03
2029	0.00	0.53	8.18	8.71
2030	0.00	0.49	7.90	8.39
2031	0.00	0.45	7.64	8.09
2032	0.00	0.55	7.44	7.98
2033	0.00	0.39	7.13	7.52
2034	0.00	0.36	6.89	7.25
2035	0.00	0.44	6.70	7.14
2036	0.00	0.51	6.53	7.04
2037	0.00	0.48	6.31	6.79
Total	0.00	15.12	239.80	254.92

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	0.255
Discounted Construction Cost (Mill. \$) :	3.516
Discounted Salvage Value (Mill. \$) :	0.668
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.372
Discounted Total Agency Costs (Mill. \$) :	3.220
Fuel Consumption Savings (Mill. l.) :	-0.007
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.005
Net Present Value (Mill. \$) :	-2.965
Gross Benefit-Cost Ratio :	0.079
Netted Benefit-Cost Ratio :	0.157
Internal Rate of Return (Percent) :	-2.220

**Table C-14 – Summary of Benefits, Costs and Economic Measures for Option 2
Traffic to or from the East – Value of Time Removed**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	0.00	35.79	144.31	180.10
2014	0.00	34.83	139.68	174.51
2015	0.00	33.89	135.17	169.06
2016	0.00	32.98	130.84	163.82
2017	0.00	32.08	126.62	158.70
2018	0.00	30.91	122.43	153.34
2019	0.00	30.07	118.50	148.56
2020	0.00	29.24	114.66	143.90
2021	0.00	28.18	110.85	139.03
2022	0.00	27.40	107.27	134.68
2023	0.00	26.87	103.90	130.77
2024	0.00	26.12	100.55	126.67
2025	0.00	25.18	97.22	122.40
2026	0.00	24.48	94.08	118.56
2027	0.00	23.79	91.03	114.82
2028	0.00	23.12	88.10	111.22
2029	0.00	22.47	85.24	107.70
2030	0.00	21.67	82.41	104.07
2031	0.00	21.21	79.81	101.02
2032	0.00	20.60	77.20	97.80
2033	0.00	19.88	74.66	94.53
2034	0.00	19.44	72.28	91.73
2035	0.00	18.89	69.94	88.82
2036	0.00	18.35	67.67	86.02
2037	0.00	17.82	65.47	83.29
Total	0.00	645.24	2499.90	3145.14

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	3.145
Discounted Construction Cost (Mill. \$) :	3.516
Discounted Salvage Value (Mill. \$) :	0.668
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.372
Discounted Total Agency Costs (Mill. \$) :	3.220
Fuel Consumption Savings (Mill. l.) :	0.133
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.025
Net Present Value (Mill. \$) :	-0.075
Gross Benefit-Cost Ratio :	0.977
Netted Benefit-Cost Ratio :	0.979
Internal Rate of Return (Percent) :	4.738

**Table C-15 – Summary of Benefits, Costs and Economic Measures for Option 2
Traffic to or from the West – Fuel Cost +20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	104.39	0.90	13.90	119.19
2014	100.80	0.83	13.42	115.06
2015	96.84	0.49	12.85	110.18
2016	94.25	0.71	12.54	107.50
2017	91.69	0.91	12.23	104.83
2018	88.06	0.60	11.71	100.37
2019	85.22	0.55	11.32	97.09
2020	82.83	0.73	11.03	94.60
2021	80.12	0.68	10.67	91.46
2022	77.48	0.63	10.31	88.42
2023	74.91	0.58	9.96	85.46
2024	72.42	0.54	9.63	82.58
2025	69.99	0.50	9.30	79.79
2026	67.63	0.46	8.99	77.07
2027	65.79	0.58	8.76	75.13
2028	63.54	0.54	8.46	72.54
2029	61.52	0.50	8.18	70.20
2030	59.40	0.46	7.90	67.76
2031	57.49	0.43	7.64	65.55
2032	55.84	0.52	7.44	63.79
2033	53.68	0.36	7.13	61.17
2034	51.92	0.33	6.89	59.14
2035	50.39	0.42	6.70	57.51
2036	49.00	0.49	6.53	56.02
2037	47.36	0.46	6.31	54.12
Total	1802.53	14.21	239.80	2056.54

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	2.057
Discounted Construction Cost (Mill. \$) :	3.516
Discounted Salvage Value (Mill. \$) :	0.668
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.372
Discounted Total Agency Costs (Mill. \$) :	3.220
Fuel Consumption Savings (Mill. l.) :	-0.007
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.005
Net Present Value (Mill. \$) :	-1.163
Gross Benefit-Cost Ratio :	0.639
Netted Benefit-Cost Ratio :	0.669
Internal Rate of Return (Percent) :	2.280

**Table C-16 – Summary of Benefits, Costs and Economic Measures for Option 2
Traffic to or from the East – Fuel Cost +20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	684.62	36.47	144.31	865.40
2014	662.73	35.51	139.68	837.91
2015	641.39	34.56	135.17	811.11
2016	620.93	33.64	130.84	785.41
2017	600.98	32.74	126.62	760.35
2018	581.09	31.56	122.43	735.09
2019	562.47	30.71	118.50	711.69
2020	544.33	29.88	114.66	688.87
2021	526.25	28.81	110.85	665.92
2022	509.31	28.03	107.27	644.62
2023	493.41	27.50	103.90	624.80
2024	477.53	26.74	100.55	604.82
2025	461.74	25.79	97.22	584.75
2026	446.90	25.09	94.08	566.07
2027	432.44	24.39	91.03	547.86
2028	418.54	23.72	88.10	530.35
2029	405.00	23.05	85.24	513.29
2030	391.56	22.25	82.41	496.21
2031	379.31	21.79	79.81	480.90
2032	366.96	21.17	77.20	465.33
2033	354.86	20.44	74.66	449.95
2034	343.66	20.00	72.28	435.94
2035	332.53	19.44	69.94	421.90
2036	321.82	18.89	67.67	408.38
2037	311.38	18.35	65.47	395.21
Total	11871.72	660.50	2499.90	15032.12

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	15.032
Discounted Construction Cost (Mill. \$) :	3.516
Discounted Salvage Value (Mill. \$) :	0.668
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.372
Discounted Total Agency Costs (Mill. \$) :	3.220
Fuel Consumption Savings (Mill. l.) :	0.133
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.025
Net Present Value (Mill. \$) :	11.812
Gross Benefit-Cost Ratio :	4.669
Netted Benefit-Cost Ratio :	4.360
Internal Rate of Return (Percent) :	26.935

**Table C-17 – Summary of Benefits, Costs and Economic Measures for Option 2
Traffic to or from the West – Increase Discount Rate to 7%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	100.33	0.92	13.36	114.61
2014	94.98	0.84	12.65	108.47
2015	89.46	0.50	11.87	101.83
2016	85.36	0.69	11.36	97.40
2017	81.41	0.85	10.86	93.12
2018	76.65	0.57	10.19	87.40
2019	72.72	0.51	9.66	82.89
2020	69.30	0.65	9.23	79.18
2021	65.71	0.59	8.75	75.05
2022	62.30	0.54	8.29	71.13
2023	59.05	0.49	7.86	67.40
2024	55.97	0.44	7.44	63.85
2025	53.03	0.40	7.05	60.48
2026	50.24	0.36	6.67	57.28
2027	47.91	0.45	6.38	54.73
2028	45.36	0.41	6.04	51.81
2029	43.06	0.37	5.73	49.16
2030	40.76	0.34	5.42	46.52
2031	38.67	0.31	5.14	44.12
2032	36.83	0.36	4.90	42.09
2033	34.71	0.25	4.61	39.57
2034	32.91	0.23	4.37	37.50
2035	31.31	0.27	4.16	35.75
2036	29.85	0.31	3.98	34.14
2037	28.29	0.29	3.77	32.34
Total	1426.16	11.93	189.73	1627.83

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	1.628
Discounted Construction Cost (Mill. \$) :	3.447
Discounted Salvage Value (Mill. \$) :	0.399
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.282
Discounted Total Agency Costs (Mill. \$) :	3.330
Fuel Consumption Savings (Mill. l.) :	-0.007
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.005
Net Present Value (Mill. \$) :	-1.702
Gross Benefit-Cost Ratio :	0.489
Netted Benefit-Cost Ratio :	0.506
Internal Rate of Return (Percent) :	2.282

**Table C-18 – Summary of Benefits, Costs and Economic Measures for Option 2
Traffic to or from the East – Increase Discount Rate to 7%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	658.01	34.40	138.70	831.11
2014	624.47	32.82	131.62	788.91
2015	592.50	31.31	124.86	748.67
2016	562.34	29.87	118.50	710.70
2017	533.60	28.48	112.43	674.50
2018	505.81	26.91	106.57	639.29
2019	479.99	25.66	101.12	606.77
2020	455.39	24.46	95.93	575.78
2021	431.63	23.11	90.92	545.67
2022	409.54	22.03	86.26	517.83
2023	388.96	21.18	81.91	492.05
2024	369.06	20.19	77.71	466.95
2025	349.85	19.08	73.66	442.59
2026	331.96	18.18	69.89	420.03
2027	314.91	17.32	66.29	398.53
2028	298.81	16.51	62.89	378.21
2029	283.47	15.72	59.66	358.85
2030	268.68	14.87	56.55	340.09
2031	255.17	14.27	53.69	323.13
2032	242.01	13.59	50.92	306.52
2033	229.44	12.85	48.27	290.56
2034	217.84	12.32	45.82	275.98
2035	206.65	11.74	43.46	261.84
2036	196.06	11.18	41.23	248.47
2037	185.98	10.64	39.11	235.73
Total	9392.14	508.69	1977.95	11878.78

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	11.879
Discounted Construction Cost (Mill. \$) :	3.447
Discounted Salvage Value (Mill. \$) :	0.399
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.282
Discounted Total Agency Costs (Mill. \$) :	3.330
Fuel Consumption Savings (Mill. l.) :	0.133
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.025
Net Present Value (Mill. \$) :	8.549
Gross Benefit-Cost Ratio :	3.568
Netted Benefit-Cost Ratio :	3.480
Internal Rate of Return (Percent) :	26.912

**Table C-19 – Summary of Benefits, Costs and Economic Measures for Option 2
Traffic to or from the West – Collision Cost Reduced by 20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	104.39	0.96	11.12	116.46
2014	100.80	0.89	10.74	112.43
2015	96.84	0.54	10.28	107.66
2016	94.25	0.76	10.03	105.04
2017	91.69	0.96	9.78	102.44
2018	88.06	0.65	9.36	98.07
2019	85.22	0.60	9.06	94.87
2020	82.83	0.78	8.83	92.43
2021	80.12	0.72	8.53	89.37
2022	77.48	0.67	8.25	86.40
2023	74.91	0.62	7.97	83.50
2024	72.42	0.57	7.70	80.69
2025	69.99	0.53	7.44	77.96
2026	67.63	0.49	7.19	75.31
2027	65.79	0.61	7.01	73.41
2028	63.54	0.57	6.77	70.88
2029	61.52	0.53	6.55	68.60
2030	59.40	0.49	6.32	66.21
2031	57.49	0.45	6.11	64.05
2032	55.84	0.55	5.95	62.33
2033	53.68	0.39	5.70	59.77
2034	51.92	0.36	5.51	57.79
2035	50.39	0.44	5.36	56.19
2036	49.00	0.51	5.22	54.74
2037	47.36	0.48	5.05	52.88
Total	1802.53	15.12	191.84	2009.50

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	2.009
Discounted Construction Cost (Mill. \$) :	3.516
Discounted Salvage Value (Mill. \$) :	0.668
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.372
Discounted Total Agency Costs (Mill. \$) :	3.220
Fuel Consumption Savings (Mill. l.) :	-0.007
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.005
Net Present Value (Mill. \$) :	-1.210
Gross Benefit-Cost Ratio :	0.624
Netted Benefit-Cost Ratio :	0.656
Internal Rate of Return (Percent) :	2.170

**Table C-20 – Summary of Benefits, Costs and Economic Measures for Option 2
Traffic to or from the East – Collision Cost Reduced by 20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	684.62	35.79	115.45	835.86
2014	662.73	34.83	111.75	809.31
2015	641.39	33.89	108.13	783.41
2016	620.93	32.98	104.67	758.58
2017	600.98	32.08	101.30	734.36
2018	581.09	30.91	97.95	709.95
2019	562.47	30.07	94.80	687.34
2020	544.33	29.24	91.73	665.30
2021	526.25	28.18	88.68	643.12
2022	509.31	27.40	85.82	622.53
2023	493.41	26.87	83.12	603.40
2024	477.53	26.12	80.44	584.09
2025	461.74	25.18	77.78	564.69
2026	446.90	24.48	75.27	546.64
2027	432.44	23.79	72.82	529.05
2028	418.54	23.12	70.48	512.14
2029	405.00	22.47	68.19	495.66
2030	391.56	21.67	65.92	479.15
2031	379.31	21.21	63.85	464.37
2032	366.96	20.60	61.76	449.32
2033	354.86	19.88	59.72	434.46
2034	343.66	19.44	57.83	420.93
2035	332.53	18.89	55.95	407.36
2036	321.82	18.35	54.14	394.30
2037	311.38	17.82	52.38	381.58
Total	11871.72	645.24	1999.92	14516.88

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	14.517
Discounted Construction Cost (Mill. \$) :	3.516
Discounted Salvage Value (Mill. \$) :	0.668
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.372
Discounted Total Agency Costs (Mill. \$) :	3.220
Fuel Consumption Savings (Mill. l.) :	0.133
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.025
Net Present Value (Mill. \$) :	11.297
Gross Benefit-Cost Ratio :	4.509
Netted Benefit-Cost Ratio :	4.213
Internal Rate of Return (Percent) :	26.037

**Table C-21 – Summary of Benefits, Costs and Economic Measures for Option 3A
Traffic to or from the West – Increase Construction Cost +20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	56.87	-3.32	7.29	60.84
2014	55.71	-2.90	7.18	60.00
2015	53.12	-3.15	6.80	56.77
2016	51.46	-3.08	6.58	54.96
2017	49.58	-2.99	6.34	52.93
2018	48.01	-2.92	6.13	51.23
2019	46.95	-2.58	6.04	50.41
2020	45.44	-2.52	5.84	48.75
2021	43.32	-2.69	5.53	46.16
2022	41.92	-2.63	5.34	44.64
2023	40.93	-2.33	5.25	43.85
2024	39.58	-2.28	5.07	42.38
2025	38.27	-2.22	4.90	40.95
2026	36.99	-2.16	4.74	39.56
2027	35.75	-2.11	4.57	38.22
2028	35.00	-1.89	4.50	37.61
2029	33.81	-1.84	4.35	36.31
2030	32.37	-1.96	4.14	34.55
2031	31.26	-1.90	3.99	33.35
2032	30.56	-1.72	3.92	32.77
2033	29.50	-1.67	3.78	31.61
2034	28.24	-1.76	3.60	30.09
2035	27.58	-1.59	3.53	29.53
2036	26.61	-1.55	3.41	28.47
2037	25.77	-1.51	3.30	27.56
Total	984.63	-57.26	126.13	1053.49

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	1.053
Discounted Construction Cost (Mill. \$) :	4.742
Discounted Salvage Value (Mill. \$) :	0.921
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.453
Discounted Total Agency Costs (Mill. \$) :	4.274
Fuel Consumption Savings (Mill. l.) :	-0.008
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.003
Net Present Value (Mill. \$) :	-3.220
Gross Benefit-Cost Ratio :	0.247
Netted Benefit-Cost Ratio :	0.321
Internal Rate of Return (Percent) :	-0.667

**Table C-22 – Summary of Benefits, Costs and Economic Measures for Option 3A
Traffic to or from the East – Increase Construction Cost +20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	615.37	29.49	127.22	772.08
2014	595.70	28.72	123.14	747.56
2015	576.52	27.96	119.16	723.64
2016	558.14	27.22	115.35	700.71
2017	540.22	26.49	111.63	678.34
2018	522.31	25.51	107.93	655.76
2019	505.58	24.83	104.47	634.88
2020	489.28	24.16	101.08	614.52
2021	473.02	23.27	97.72	594.01
2022	457.79	22.64	94.57	575.00
2023	443.52	22.24	91.60	557.35
2024	429.25	21.62	88.64	539.51
2025	415.03	20.84	85.71	521.58
2026	401.70	20.26	82.94	504.90
2027	388.70	19.70	80.25	488.65
2028	376.21	19.15	77.66	473.03
2029	364.05	18.62	75.14	457.81
2030	351.95	17.95	72.64	442.54
2031	340.95	17.59	70.36	428.90
2032	329.85	17.09	68.06	415.00
2033	318.96	16.48	65.81	401.26
2034	308.90	16.14	63.73	388.77
2035	298.90	15.68	61.65	376.24
2036	289.27	15.24	59.66	364.17
2037	279.89	14.81	57.72	352.42
Total	10671.04	533.72	2203.88	13408.64

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	13.409
Discounted Construction Cost (Mill. \$) :	4.742
Discounted Salvage Value (Mill. \$) :	0.921
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.453
Discounted Total Agency Costs (Mill. \$) :	4.274
Fuel Consumption Savings (Mill. l.) :	0.119
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.023
Net Present Value (Mill. \$) :	9.135
Gross Benefit-Cost Ratio :	3.138
Netted Benefit-Cost Ratio :	2.927
Internal Rate of Return (Percent) :	17.982

**Table C-23 – Summary of Benefits, Costs and Economic Measures for Option 3A
Traffic to or from the West – Value of Time Removed**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	0.00	-3.32	7.29	3.97
2014	0.00	-2.90	7.18	4.28
2015	0.00	-3.15	6.80	3.65
2016	0.00	-3.08	6.58	3.50
2017	0.00	-2.99	6.34	3.35
2018	0.00	-2.92	6.13	3.21
2019	0.00	-2.58	6.04	3.46
2020	0.00	-2.52	5.84	3.32
2021	0.00	-2.69	5.53	2.83
2022	0.00	-2.63	5.34	2.72
2023	0.00	-2.33	5.25	2.92
2024	0.00	-2.28	5.07	2.80
2025	0.00	-2.22	4.90	2.68
2026	0.00	-2.16	4.74	2.57
2027	0.00	-2.11	4.57	2.47
2028	0.00	-1.89	4.50	2.61
2029	0.00	-1.84	4.35	2.50
2030	0.00	-1.96	4.14	2.18
2031	0.00	-1.90	3.99	2.09
2032	0.00	-1.72	3.92	2.21
2033	0.00	-1.67	3.78	2.11
2034	0.00	-1.76	3.60	1.84
2035	0.00	-1.59	3.53	1.94
2036	0.00	-1.55	3.41	1.86
2037	0.00	-1.51	3.30	1.79
Total	0.00	-57.26	126.13	68.86

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	0.069
Discounted Construction Cost (Mill. \$) :	3.951
Discounted Salvage Value (Mill. \$) :	0.767
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.453
Discounted Total Agency Costs (Mill. \$) :	3.637
Fuel Consumption Savings (Mill. l.) :	-0.008
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.003
Net Present Value (Mill. \$) :	-3.568
Gross Benefit-Cost Ratio :	0.019
Netted Benefit-Cost Ratio :	0.097
Internal Rate of Return (Percent) :	-2.735

**Table C-24 – Summary of Benefits, Costs and Economic Measures for Option 3A
Traffic to or from the East – Value of Time Removed**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	0.00	29.49	127.22	156.71
2014	0.00	28.72	123.14	151.86
2015	0.00	27.96	119.16	147.12
2016	0.00	27.22	115.35	142.57
2017	0.00	26.49	111.63	138.13
2018	0.00	25.51	107.93	133.45
2019	0.00	24.83	104.47	129.30
2020	0.00	24.16	101.08	125.24
2021	0.00	23.27	97.72	121.00
2022	0.00	22.64	94.57	117.21
2023	0.00	22.24	91.60	113.83
2024	0.00	21.62	88.64	110.27
2025	0.00	20.84	85.71	106.54
2026	0.00	20.26	82.94	103.21
2027	0.00	19.70	80.25	99.95
2028	0.00	19.15	77.66	96.82
2029	0.00	18.62	75.14	93.76
2030	0.00	17.95	72.64	90.59
2031	0.00	17.59	70.36	87.95
2032	0.00	17.09	68.06	85.15
2033	0.00	16.48	65.81	82.30
2034	0.00	16.14	63.73	79.87
2035	0.00	15.68	61.65	77.34
2036	0.00	15.24	59.66	74.90
2037	0.00	14.81	57.72	72.53
Total	0.00	533.72	2203.88	2737.60

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	2.738
Discounted Construction Cost (Mill. \$) :	3.951
Discounted Salvage Value (Mill. \$) :	0.767
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.453
Discounted Total Agency Costs (Mill. \$) :	3.637
Fuel Consumption Savings (Mill. l.) :	0.119
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.023
Net Present Value (Mill. \$) :	-0.899
Gross Benefit-Cost Ratio :	0.753
Netted Benefit-Cost Ratio :	0.772
Internal Rate of Return (Percent) :	3.128

**Table C-25 – Summary of Benefits, Costs and Economic Measures for Option 3A
Traffic to or from the West – Fuel Cost +20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	56.87	-3.38	7.29	60.78
2014	55.71	-2.95	7.18	59.94
2015	53.12	-3.20	6.80	56.71
2016	51.46	-3.13	6.58	54.91
2017	49.58	-3.04	6.34	52.88
2018	48.01	-2.97	6.13	51.18
2019	46.95	-2.62	6.04	50.37
2020	45.44	-2.56	5.84	48.71
2021	43.32	-2.73	5.53	46.11
2022	41.92	-2.67	5.34	44.59
2023	40.93	-2.37	5.25	43.81
2024	39.58	-2.31	5.07	42.34
2025	38.27	-2.26	4.90	40.92
2026	36.99	-2.20	4.74	39.53
2027	35.75	-2.14	4.57	38.18
2028	35.00	-1.92	4.50	37.58
2029	33.81	-1.87	4.35	36.28
2030	32.37	-1.99	4.14	34.52
2031	31.26	-1.93	3.99	33.32
2032	30.56	-1.74	3.92	32.74
2033	29.50	-1.70	3.78	31.59
2034	28.24	-1.79	3.60	30.06
2035	27.58	-1.62	3.53	29.50
2036	26.61	-1.57	3.41	28.45
2037	25.77	-1.53	3.30	27.53
Total	984.63	-58.20	126.13	1052.56

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	1.053
Discounted Construction Cost (Mill. \$) :	3.951
Discounted Salvage Value (Mill. \$) :	0.767
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.453
Discounted Total Agency Costs (Mill. \$) :	3.637
Fuel Consumption Savings (Mill. l.) :	-0.008
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.003
Net Present Value (Mill. \$) :	-2.584
Gross Benefit-Cost Ratio :	0.289
Netted Benefit-Cost Ratio :	0.346
Internal Rate of Return (Percent) :	-0.455

**Table C-26 – Summary of Benefits, Costs and Economic Measures for Option 3A
Traffic to or from the East – Fuel Cost +20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	615.37	30.10	127.22	772.68
2014	595.70	29.32	123.14	748.16
2015	576.52	28.56	119.16	724.24
2016	558.14	27.82	115.35	701.30
2017	540.22	27.08	111.63	678.93
2018	522.31	26.10	107.93	656.35
2019	505.58	25.41	104.47	635.46
2020	489.28	24.73	101.08	615.10
2021	473.02	23.84	97.72	594.58
2022	457.79	23.20	94.57	575.56
2023	443.52	22.79	91.60	557.91
2024	429.25	22.18	88.64	540.07
2025	415.03	21.38	85.71	522.13
2026	401.70	20.81	82.94	505.45
2027	388.70	20.24	80.25	489.19
2028	376.21	19.69	77.66	473.56
2029	364.05	19.15	75.14	458.33
2030	351.95	18.47	72.64	443.06
2031	340.95	18.11	70.36	429.42
2032	329.85	17.60	68.06	415.51
2033	318.96	16.99	65.81	401.76
2034	308.90	16.64	63.73	389.27
2035	298.90	16.18	61.65	376.73
2036	289.27	15.73	59.66	364.66
2037	279.89	15.29	57.72	352.90
Total	10671.04	547.39	2203.88	13422.32

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	13.422
Discounted Construction Cost (Mill. \$) :	3.951
Discounted Salvage Value (Mill. \$) :	0.767
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.453
Discounted Total Agency Costs (Mill. \$) :	3.637
Fuel Consumption Savings (Mill. l.) :	0.119
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.023
Net Present Value (Mill. \$) :	9.786
Gross Benefit-Cost Ratio :	3.691
Netted Benefit-Cost Ratio :	3.477
Internal Rate of Return (Percent) :	21.471

**Table C-27 – Summary of Benefits, Costs and Economic Measures for Option 3A
Traffic to or from the West – Increase Discount Rate to 7%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	54.66	-3.19	7.00	58.47
2014	52.50	-2.73	6.77	56.53
2015	49.07	-2.91	6.28	52.44
2016	46.61	-2.79	5.96	49.78
2017	44.02	-2.65	5.63	47.00
2018	41.79	-2.54	5.34	44.59
2019	40.07	-2.20	5.15	43.02
2020	38.01	-2.11	4.88	40.79
2021	35.53	-2.21	4.53	37.86
2022	33.70	-2.11	4.30	35.89
2023	32.27	-1.84	4.14	34.57
2024	30.59	-1.76	3.92	32.75
2025	28.99	-1.68	3.71	31.03
2026	27.48	-1.61	3.52	29.39
2027	26.03	-1.54	3.33	27.83
2028	24.99	-1.35	3.21	26.85
2029	23.66	-1.29	3.04	25.42
2030	22.21	-1.34	2.84	23.71
2031	21.03	-1.28	2.69	22.44
2032	20.16	-1.13	2.59	21.61
2033	19.07	-1.08	2.45	20.44
2034	17.90	-1.11	2.28	19.07
2035	17.14	-0.99	2.20	18.35
2036	16.21	-0.94	2.08	17.35
2037	15.39	-0.90	1.97	16.46
Total	779.11	-45.29	99.81	833.62

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	0.834
Discounted Construction Cost (Mill. \$) :	3.874
Discounted Salvage Value (Mill. \$) :	0.458
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.343
Discounted Total Agency Costs (Mill. \$) :	3.759
Fuel Consumption Savings (Mill. l.) :	-0.008
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.003
Net Present Value (Mill. \$) :	-2.925
Gross Benefit-Cost Ratio :	0.222
Netted Benefit-Cost Ratio :	0.245
Internal Rate of Return (Percent) :	-0.453

**Table C-28 – Summary of Benefits, Costs and Economic Measures for Option 3A
Traffic to or from the East – Increase Discount Rate to 7%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	591.45	28.34	122.28	742.07
2014	561.31	27.06	116.03	704.40
2015	532.58	25.83	110.08	668.49
2016	505.48	24.65	104.47	634.59
2017	479.64	23.52	99.12	602.28
2018	454.65	22.21	93.95	570.81
2019	431.45	21.19	89.15	541.78
2020	409.34	20.21	84.57	514.12
2021	387.96	19.09	80.15	487.20
2022	368.11	18.21	76.04	462.36
2023	349.63	17.53	72.21	439.37
2024	331.74	16.71	68.51	416.96
2025	314.46	15.79	64.94	395.19
2026	298.38	15.05	61.61	375.05
2027	283.06	14.35	58.44	355.85
2028	268.59	13.67	55.45	337.71
2029	254.80	13.03	52.59	320.43
2030	241.50	12.31	49.85	303.66
2031	229.36	11.83	47.33	288.53
2032	217.54	11.27	44.89	273.70
2033	206.23	10.66	42.55	259.44
2034	195.81	10.23	40.39	246.44
2035	185.75	9.75	38.31	233.81
2036	176.24	9.29	36.35	221.87
2037	167.18	8.84	34.48	210.50
Total	8442.24	420.63	1743.74	10606.61

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	10.607
Discounted Construction Cost (Mill. \$) :	3.874
Discounted Salvage Value (Mill. \$) :	0.458
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.343
Discounted Total Agency Costs (Mill. \$) :	3.759
Fuel Consumption Savings (Mill. l.) :	0.119
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.023
Net Present Value (Mill. \$) :	6.848
Gross Benefit-Cost Ratio :	2.822
Netted Benefit-Cost Ratio :	2.768
Internal Rate of Return (Percent) :	21.452

**Table C-29 – Summary of Benefits, Costs and Economic Measures for Option 3A
Traffic to or from the West – Collision Cost Reduced by 20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	56.87	-3.32	5.83	59.38
2014	55.71	-2.90	5.75	58.56
2015	53.12	-3.15	5.44	55.41
2016	51.46	-3.08	5.27	53.64
2017	49.58	-2.99	5.07	51.66
2018	48.01	-2.92	4.91	50.00
2019	46.95	-2.58	4.83	49.20
2020	45.44	-2.52	4.67	47.59
2021	43.32	-2.69	4.42	45.05
2022	41.92	-2.63	4.28	43.57
2023	40.93	-2.33	4.20	42.80
2024	39.58	-2.28	4.06	41.37
2025	38.27	-2.22	3.92	39.97
2026	36.99	-2.16	3.79	38.62
2027	35.75	-2.11	3.66	37.30
2028	35.00	-1.89	3.60	36.71
2029	33.81	-1.84	3.48	35.44
2030	32.37	-1.96	3.31	33.72
2031	31.26	-1.90	3.19	32.55
2032	30.56	-1.72	3.14	31.99
2033	29.50	-1.67	3.03	30.86
2034	28.24	-1.76	2.88	29.37
2035	27.58	-1.59	2.83	28.82
2036	26.61	-1.55	2.73	27.79
2037	25.77	-1.51	2.64	26.90
Total	984.63	-57.26	100.90	1028.27

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	1.028
Discounted Construction Cost (Mill. \$) :	3.951
Discounted Salvage Value (Mill. \$) :	0.767
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.453
Discounted Total Agency Costs (Mill. \$) :	3.637
Fuel Consumption Savings (Mill. l.) :	-0.008
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.003
Net Present Value (Mill. \$) :	-2.609
Gross Benefit-Cost Ratio :	0.283
Netted Benefit-Cost Ratio :	0.340
Internal Rate of Return (Percent) :	-0.510

**Table C-30 – Summary of Benefits, Costs and Economic Measures for Option 3A
Traffic to or from the East – Collision Cost Reduced by 20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	615.37	29.49	101.78	746.64
2014	595.70	28.72	98.51	722.93
2015	576.52	27.96	95.33	699.81
2016	558.14	27.22	92.28	677.64
2017	540.22	26.49	89.31	656.02
2018	522.31	25.51	86.35	634.18
2019	505.58	24.83	83.57	613.99
2020	489.28	24.16	80.87	594.31
2021	473.02	23.27	78.18	574.47
2022	457.79	22.64	75.65	556.09
2023	443.52	22.24	73.28	539.03
2024	429.25	21.62	70.91	521.79
2025	415.03	20.84	68.57	504.44
2026	401.70	20.26	66.35	488.31
2027	388.70	19.70	64.20	472.60
2028	376.21	19.15	62.13	457.50
2029	364.05	18.62	60.11	442.78
2030	351.95	17.95	58.12	428.01
2031	340.95	17.59	56.29	414.83
2032	329.85	17.09	54.45	401.39
2033	318.96	16.48	52.65	388.09
2034	308.90	16.14	50.98	376.03
2035	298.90	15.68	49.32	363.91
2036	289.27	15.24	47.73	352.24
2037	279.89	14.81	46.18	340.87
Total	10671.04	533.72	1763.10	12967.87

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	12.968
Discounted Construction Cost (Mill. \$) :	3.951
Discounted Salvage Value (Mill. \$) :	0.767
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.453
Discounted Total Agency Costs (Mill. \$) :	3.637
Fuel Consumption Savings (Mill. l.) :	0.119
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.023
Net Present Value (Mill. \$) :	9.331
Gross Benefit-Cost Ratio :	3.566
Netted Benefit-Cost Ratio :	3.362
Internal Rate of Return (Percent) :	20.754

**Table C-31 – Summary of Benefits, Costs and Economic Measures for Option 3B
Traffic to or from the West – Increase Construction Cost +20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	129.45	15.34	19.72	164.51
2014	125.19	14.81	19.07	159.07
2015	121.05	14.29	18.44	153.78
2016	117.02	13.80	17.82	148.63
2017	113.10	13.31	17.22	143.63
2018	110.05	13.12	16.78	139.94
2019	106.32	12.65	16.20	135.17
2020	102.34	11.99	15.57	129.90
2021	99.49	11.80	15.16	126.45
2022	96.07	11.38	14.63	122.08
2023	93.03	11.00	14.17	118.20
2024	90.36	10.80	13.78	114.94
2025	86.92	10.24	13.23	110.40
2026	84.12	9.90	12.80	106.82
2027	81.64	9.71	12.44	103.80
2028	78.97	9.38	12.03	100.38
2029	76.38	9.06	11.63	97.06
2030	73.85	8.74	11.24	93.84
2031	71.39	8.44	10.87	90.70
2032	69.00	8.14	10.50	87.65
2033	67.05	7.99	10.21	85.25
2034	64.77	7.71	9.87	82.35
2035	62.73	7.45	9.55	79.74
2036	60.58	7.19	9.22	76.99
2037	58.65	6.95	8.93	74.52
Total	2239.52	265.20	341.09	2845.80

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	2.846
Discounted Construction Cost (Mill. \$) :	4.267
Discounted Salvage Value (Mill. \$) :	0.785
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.259
Discounted Total Agency Costs (Mill. \$) :	3.741
Fuel Consumption Savings (Mill. l.) :	0.000
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.005
Net Present Value (Mill. \$) :	-0.895
Gross Benefit-Cost Ratio :	0.761
Netted Benefit-Cost Ratio :	0.790
Internal Rate of Return (Percent) :	3.260

**Table C-32 – Summary of Benefits, Costs and Economic Measures for Option 3B
Traffic to or from the East – Increase Construction Cost +20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	916.66	92.59	186.96	1196.21
2014	887.72	90.08	181.03	1158.83
2015	859.05	87.33	175.16	1121.54
2016	830.70	84.39	169.37	1084.47
2017	803.86	81.82	163.88	1049.57
2018	778.41	79.58	158.67	1016.66
2019	753.23	77.14	153.52	983.90
2020	728.36	74.55	148.44	951.36
2021	705.37	72.51	143.73	921.61
2022	682.37	70.27	139.03	891.68
2023	660.48	68.14	134.56	863.18
2024	638.91	66.03	130.15	835.09
2025	618.37	64.03	125.95	808.35
2026	598.61	62.23	121.91	782.75
2027	578.86	60.15	117.88	756.89
2028	560.51	58.47	114.12	733.11
2029	542.21	56.67	110.38	709.26
2030	524.75	54.94	106.82	686.50
2031	507.94	53.38	103.38	664.70
2032	491.53	51.75	100.02	643.30
2033	475.54	50.15	96.76	622.46
2034	460.13	48.62	93.61	602.36
2035	445.43	47.23	90.61	583.27
2036	430.93	45.78	87.65	564.36
2037	416.95	44.37	84.79	546.12
Total	15896.91	1642.20	3238.39	20777.50

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	20.778
Discounted Construction Cost (Mill. \$) :	4.267
Discounted Salvage Value (Mill. \$) :	0.785
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.259
Discounted Total Agency Costs (Mill. \$) :	3.741
Fuel Consumption Savings (Mill. l.) :	0.258
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.031
Net Present Value (Mill. \$) :	17.037
Gross Benefit-Cost Ratio :	5.555
Netted Benefit-Cost Ratio :	4.993
Internal Rate of Return (Percent) :	30.716

**Table C-33 – Summary of Benefits, Costs and Economic Measures for Option 3B
Traffic to or from the West – Value of Time Removed**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	0.00	15.34	19.72	35.06
2014	0.00	14.81	19.07	33.88
2015	0.00	14.29	18.44	32.73
2016	0.00	13.80	17.82	31.61
2017	0.00	13.31	17.22	30.53
2018	0.00	13.12	16.78	29.89
2019	0.00	12.65	16.20	28.86
2020	0.00	11.99	15.57	27.56
2021	0.00	11.80	15.16	26.96
2022	0.00	11.38	14.63	26.01
2023	0.00	11.00	14.17	25.17
2024	0.00	10.80	13.78	24.58
2025	0.00	10.24	13.23	23.48
2026	0.00	9.90	12.80	22.70
2027	0.00	9.71	12.44	22.15
2028	0.00	9.38	12.03	21.41
2029	0.00	9.06	11.63	20.69
2030	0.00	8.74	11.24	19.99
2031	0.00	8.44	10.87	19.31
2032	0.00	8.14	10.50	18.65
2033	0.00	7.99	10.21	18.21
2034	0.00	7.71	9.87	17.58
2035	0.00	7.45	9.55	17.01
2036	0.00	7.19	9.22	16.41
2037	0.00	6.95	8.93	15.87
Total	0.00	265.20	341.09	606.28

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	0.606
Discounted Construction Cost (Mill. \$) :	3.556
Discounted Salvage Value (Mill. \$) :	0.654
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.259
Discounted Total Agency Costs (Mill. \$) :	3.160
Fuel Consumption Savings (Mill. l.) :	0.000
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.005
Net Present Value (Mill. \$) :	-2.554
Gross Benefit-Cost Ratio :	0.192
Netted Benefit-Cost Ratio :	0.282
Internal Rate of Return (Percent) :	-1.100

**Table C-34 – Summary of Benefits, Costs and Economic Measures for Option 3B
Traffic to or from the East – Value of Time Removed**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	0.00	92.59	186.96	279.55
2014	0.00	90.08	181.03	271.10
2015	0.00	87.33	175.16	262.49
2016	0.00	84.39	169.37	253.77
2017	0.00	81.82	163.88	245.70
2018	0.00	79.58	158.67	238.25
2019	0.00	77.14	153.52	230.66
2020	0.00	74.55	148.44	223.00
2021	0.00	72.51	143.73	216.24
2022	0.00	70.27	139.03	209.30
2023	0.00	68.14	134.56	202.70
2024	0.00	66.03	130.15	196.18
2025	0.00	64.03	125.95	189.98
2026	0.00	62.23	121.91	184.13
2027	0.00	60.15	117.88	178.03
2028	0.00	58.47	114.12	172.60
2029	0.00	56.67	110.38	167.05
2030	0.00	54.94	106.82	161.75
2031	0.00	53.38	103.38	156.76
2032	0.00	51.75	100.02	151.77
2033	0.00	50.15	96.76	146.91
2034	0.00	48.62	93.61	142.23
2035	0.00	47.23	90.61	137.84
2036	0.00	45.78	87.65	133.43
2037	0.00	44.37	84.79	129.17
Total	0.00	1642.20	3238.39	4880.59

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	4.881
Discounted Construction Cost (Mill. \$) :	3.556
Discounted Salvage Value (Mill. \$) :	0.654
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.259
Discounted Total Agency Costs (Mill. \$) :	3.160
Fuel Consumption Savings (Mill. l.) :	0.258
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.031
Net Present Value (Mill. \$) :	1.720
Gross Benefit-Cost Ratio :	1.544
Netted Benefit-Cost Ratio :	1.484
Internal Rate of Return (Percent) :	8.444

**Table C-35 – Summary of Benefits, Costs and Economic Measures for Option 3B
Traffic to or from the West – Fuel Cost +20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	129.45	15.33	19.72	164.50
2014	125.19	14.80	19.07	159.06
2015	121.05	14.29	18.44	153.77
2016	117.02	13.79	17.82	148.63
2017	113.10	13.31	17.22	143.63
2018	110.05	13.11	16.78	139.94
2019	106.32	12.65	16.20	135.17
2020	102.34	11.99	15.57	129.90
2021	99.49	11.80	15.16	126.45
2022	96.07	11.37	14.63	122.07
2023	93.03	11.00	14.17	118.20
2024	90.36	10.80	13.78	114.94
2025	86.92	10.24	13.23	110.40
2026	84.12	9.90	12.80	106.82
2027	81.64	9.71	12.44	103.80
2028	78.97	9.38	12.03	100.38
2029	76.38	9.06	11.63	97.06
2030	73.85	8.74	11.24	93.84
2031	71.39	8.44	10.87	90.70
2032	69.00	8.15	10.50	87.65
2033	67.05	7.99	10.21	85.26
2034	64.77	7.71	9.87	82.35
2035	62.73	7.45	9.55	79.74
2036	60.58	7.19	9.22	77.00
2037	58.65	6.95	8.93	74.52
Total	2239.52	265.16	341.09	2845.76

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	2.846
Discounted Construction Cost (Mill. \$) :	3.556
Discounted Salvage Value (Mill. \$) :	0.654
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.259
Discounted Total Agency Costs (Mill. \$) :	3.160
Fuel Consumption Savings (Mill. l.) :	0.000
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.005
Net Present Value (Mill. \$) :	-0.315
Gross Benefit-Cost Ratio :	0.900
Netted Benefit-Cost Ratio :	0.912
Internal Rate of Return (Percent) :	4.216

Table C-36 – Summary of Benefits, Costs and Economic Measures for Option 3B
Traffic to or from the East – Fuel Cost +20%
 Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	916.66	93.99	186.96	1197.61
2014	887.72	91.47	181.03	1160.21
2015	859.05	88.70	175.16	1122.91
2016	830.70	85.74	169.37	1085.82
2017	803.86	83.15	163.88	1050.90
2018	778.41	80.89	158.67	1017.98
2019	753.23	78.44	153.52	985.19
2020	728.36	75.83	148.44	952.63
2021	705.37	73.77	143.73	922.87
2022	682.37	71.51	139.03	892.92
2023	660.48	69.36	134.56	864.40
2024	638.91	67.24	130.15	836.30
2025	618.37	65.22	125.95	809.54
2026	598.61	63.40	121.91	783.92
2027	578.86	61.31	117.88	758.05
2028	560.51	59.61	114.12	734.25
2029	542.21	57.79	110.38	710.38
2030	524.75	56.04	106.82	687.61
2031	507.94	54.47	103.38	665.79
2032	491.53	52.82	100.02	644.38
2033	475.54	51.21	96.76	623.52
2034	460.13	49.66	93.61	603.40
2035	445.43	48.26	90.61	584.29
2036	430.93	46.79	87.65	565.37
2037	416.95	45.37	84.79	547.12
Total	15896.91	1672.07	3238.39	20807.37

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	20.807
Discounted Construction Cost (Mill. \$) :	3.556
Discounted Salvage Value (Mill. \$) :	0.654
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.259
Discounted Total Agency Costs (Mill. \$) :	3.160
Fuel Consumption Savings (Mill. l.) :	0.258
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.031
Net Present Value (Mill. \$) :	17.647
Gross Benefit-Cost Ratio :	6.584
Netted Benefit-Cost Ratio :	5.963
Internal Rate of Return (Percent) :	36.639

**Table C-37 – Summary of Benefits, Costs and Economic Measures for Option 3B
Traffic to or from the West – Increase Discount Rate to 7%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	124.42	14.74	18.96	158.11
2014	117.96	13.95	17.97	149.88
2015	111.82	13.20	17.03	142.05
2016	105.98	12.49	16.14	134.61
2017	100.42	11.82	15.29	127.53
2018	95.79	11.42	14.60	121.81
2019	90.73	10.80	13.83	115.35
2020	85.62	10.03	13.03	108.68
2021	81.60	9.68	12.43	103.71
2022	77.25	9.15	11.77	98.16
2023	73.34	8.67	11.17	93.18
2024	69.84	8.35	10.65	88.83
2025	65.86	7.76	10.03	83.65
2026	62.49	7.35	9.51	79.35
2027	59.45	7.07	9.06	75.59
2028	56.38	6.70	8.59	71.67
2029	53.46	6.34	8.14	67.94
2030	50.67	6.00	7.72	64.39
2031	48.03	5.68	7.31	61.01
2032	45.51	5.37	6.93	57.81
2033	43.35	5.17	6.60	55.12
2034	41.06	4.89	6.25	52.20
2035	38.98	4.63	5.94	49.55
2036	36.91	4.38	5.62	46.91
2037	35.03	4.15	5.33	44.51
Total	1771.93	209.79	269.88	2251.60

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	2.252
Discounted Construction Cost (Mill. \$) :	3.486
Discounted Salvage Value (Mill. \$) :	0.391
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.196
Discounted Total Agency Costs (Mill. \$) :	3.291
Fuel Consumption Savings (Mill. l.) :	0.000
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.005
Net Present Value (Mill. \$) :	-1.040
Gross Benefit-Cost Ratio :	0.684
Netted Benefit-Cost Ratio :	0.702
Internal Rate of Return (Percent) :	4.216

**Table C-38 – Summary of Benefits, Costs and Economic Measures for Option 3B
Traffic to or from the East – Increase Discount Rate to 7%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	881.03	88.99	179.69	1149.71
2014	836.47	84.88	170.57	1091.93
2015	793.57	80.68	161.81	1036.06
2016	752.32	76.43	153.39	982.15
2017	713.73	72.65	145.51	931.88
2018	677.57	69.27	138.11	884.95
2019	642.78	65.83	131.01	839.62
2020	609.36	62.37	124.19	795.92
2021	578.54	59.47	117.89	755.90
2022	548.69	56.50	111.80	716.99
2023	520.67	53.71	106.07	680.46
2024	493.78	51.03	100.59	645.40
2025	468.52	48.51	95.43	612.46
2026	444.65	46.22	90.55	581.43
2027	421.54	43.80	85.84	551.19
2028	400.17	41.75	81.48	523.39
2029	379.50	39.66	77.26	496.43
2030	360.08	37.70	73.30	471.07
2031	341.70	35.91	69.54	447.16
2032	324.17	34.13	65.97	424.27
2033	307.47	32.43	62.56	402.46
2034	291.67	30.82	59.34	381.82
2035	276.81	29.35	56.31	362.47
2036	262.54	27.89	53.40	343.83
2037	249.04	26.50	50.65	326.19
Total	12576.39	1296.49	2562.26	16435.14

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	16.435
Discounted Construction Cost (Mill. \$) :	3.486
Discounted Salvage Value (Mill. \$) :	0.391
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.196
Discounted Total Agency Costs (Mill. \$) :	3.291
Fuel Consumption Savings (Mill. l.) :	0.258
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.031
Net Present Value (Mill. \$) :	13.144
Gross Benefit-Cost Ratio :	4.994
Netted Benefit-Cost Ratio :	4.771
Internal Rate of Return (Percent) :	36.595

**Table C-39 – Summary of Benefits, Costs and Economic Measures for Option 3B
Traffic to or from the West – Collision Cost Reduced by 20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	129.45	15.34	15.78	160.56
2014	125.19	14.81	15.26	155.25
2015	121.05	14.29	14.75	150.09
2016	117.02	13.80	14.26	145.07
2017	113.10	13.31	13.78	140.19
2018	110.05	13.12	13.42	136.59
2019	106.32	12.65	12.96	131.93
2020	102.34	11.99	12.46	126.79
2021	99.49	11.80	12.13	123.42
2022	96.07	11.38	11.71	119.15
2023	93.03	11.00	11.33	115.36
2024	90.36	10.80	11.02	112.19
2025	86.92	10.24	10.59	107.75
2026	84.12	9.90	10.24	104.26
2027	81.64	9.71	9.95	101.31
2028	78.97	9.38	9.62	97.98
2029	76.38	9.06	9.31	94.74
2030	73.85	8.74	9.00	91.59
2031	71.39	8.44	8.69	88.52
2032	69.00	8.14	8.40	85.55
2033	67.05	7.99	8.17	83.21
2034	64.77	7.71	7.89	80.38
2035	62.73	7.45	7.64	77.83
2036	60.58	7.19	7.38	75.15
2037	58.65	6.95	7.14	72.73
Total	2239.52	265.20	272.87	2777.58

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	2.778
Discounted Construction Cost (Mill. \$) :	3.556
Discounted Salvage Value (Mill. \$) :	0.654
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.259
Discounted Total Agency Costs (Mill. \$) :	3.160
Fuel Consumption Savings (Mill. l.) :	0.000
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.005
Net Present Value (Mill. \$) :	-0.383
Gross Benefit-Cost Ratio :	0.879
Netted Benefit-Cost Ratio :	0.892
Internal Rate of Return (Percent) :	4.066

**Table C-40 – Summary of Benefits, Costs and Economic Measures for Option 3B
Traffic to or from the East – Collision Cost Reduced by 20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	916.66	92.59	149.57	1158.82
2014	887.72	90.08	144.82	1122.62
2015	859.05	87.33	140.13	1086.51
2016	830.70	84.39	135.50	1050.60
2017	803.86	81.82	131.11	1016.79
2018	778.41	79.58	126.94	984.93
2019	753.23	77.14	122.82	953.19
2020	728.36	74.55	118.76	921.67
2021	705.37	72.51	114.99	892.87
2022	682.37	70.27	111.23	863.87
2023	660.48	68.14	107.65	836.27
2024	638.91	66.03	104.12	809.06
2025	618.37	64.03	100.76	783.16
2026	598.61	62.23	97.53	758.37
2027	578.86	60.15	94.30	733.32
2028	560.51	58.47	91.30	710.29
2029	542.21	56.67	88.31	687.18
2030	524.75	54.94	85.45	665.14
2031	507.94	53.38	82.70	644.02
2032	491.53	51.75	80.02	623.30
2033	475.54	50.15	77.41	603.11
2034	460.13	48.62	74.89	583.63
2035	445.43	47.23	72.48	565.14
2036	430.93	45.78	70.12	546.83
2037	416.95	44.37	67.83	529.16
Total	15896.91	1642.20	2590.71	20129.83

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	20.130
Discounted Construction Cost (Mill. \$) :	3.556
Discounted Salvage Value (Mill. \$) :	0.654
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.259
Discounted Total Agency Costs (Mill. \$) :	3.160
Fuel Consumption Savings (Mill. l.) :	0.258
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.031
Net Present Value (Mill. \$) :	16.970
Gross Benefit-Cost Ratio :	6.370
Netted Benefit-Cost Ratio :	5.772
Internal Rate of Return (Percent) :	35.488

**Table C-41 – Summary of Benefits, Costs and Economic Measures for Option 3C
Traffic to or from the West – Increase Construction Cost +20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	129.45	15.34	19.72	164.51
2014	125.19	14.81	19.07	159.07
2015	121.05	14.29	18.44	153.78
2016	117.02	13.80	17.82	148.63
2017	113.10	13.31	17.22	143.63
2018	110.05	13.12	16.78	139.94
2019	106.32	12.65	16.20	135.17
2020	102.34	11.99	15.57	129.90
2021	99.49	11.80	15.16	126.45
2022	96.07	11.38	14.63	122.08
2023	93.03	11.00	14.17	118.20
2024	90.36	10.80	13.78	114.94
2025	86.92	10.24	13.23	110.40
2026	84.12	9.90	12.80	106.82
2027	81.64	9.71	12.44	103.80
2028	78.97	9.38	12.03	100.38
2029	76.38	9.06	11.63	97.06
2030	73.85	8.74	11.24	93.84
2031	71.39	8.44	10.87	90.70
2032	69.00	8.14	10.50	87.65
2033	67.05	7.99	10.21	85.25
2034	64.77	7.71	9.87	82.35
2035	62.73	7.45	9.55	79.74
2036	60.58	7.19	9.22	76.99
2037	58.65	6.95	8.93	74.52
Total	2239.52	265.20	341.09	2845.80

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	2.846
Discounted Construction Cost (Mill. \$) :	3.940
Discounted Salvage Value (Mill. \$) :	0.775
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.259
Discounted Total Agency Costs (Mill. \$) :	3.424
Fuel Consumption Savings (Mill. l.) :	0.000
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.005
Net Present Value (Mill. \$) :	-0.578
Gross Benefit-Cost Ratio :	0.831
Netted Benefit-Cost Ratio :	0.853
Internal Rate of Return (Percent) :	3.775

**Table C-42 – Summary of Benefits, Costs and Economic Measures for Option 3C
Traffic to or from the East – Increase Construction Cost +20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	916.66	92.59	186.96	1196.21
2014	887.72	90.08	181.03	1158.83
2015	859.05	87.33	175.16	1121.54
2016	830.70	84.39	169.37	1084.47
2017	803.86	81.82	163.88	1049.57
2018	778.41	79.58	158.67	1016.66
2019	753.23	77.14	153.52	983.90
2020	728.36	74.55	148.44	951.36
2021	705.37	72.51	143.73	921.61
2022	682.37	70.27	139.03	891.68
2023	660.48	68.14	134.56	863.18
2024	638.91	66.03	130.15	835.09
2025	618.37	64.03	125.95	808.35
2026	598.61	62.23	121.91	782.75
2027	578.86	60.15	117.88	756.89
2028	560.51	58.47	114.12	733.11
2029	542.21	56.67	110.38	709.26
2030	524.75	54.94	106.82	686.50
2031	507.94	53.38	103.38	664.70
2032	491.53	51.75	100.02	643.30
2033	475.54	50.15	96.76	622.46
2034	460.13	48.62	93.61	602.36
2035	445.43	47.23	90.61	583.27
2036	430.93	45.78	87.65	564.36
2037	416.95	44.37	84.79	546.12
Total	15896.91	1642.20	3238.39	20777.50

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	20.778
Discounted Construction Cost (Mill. \$) :	3.940
Discounted Salvage Value (Mill. \$) :	0.775
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.259
Discounted Total Agency Costs (Mill. \$) :	3.424
Fuel Consumption Savings (Mill. l.) :	0.258
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.031
Net Present Value (Mill. \$) :	17.354
Gross Benefit-Cost Ratio :	6.069
Netted Benefit-Cost Ratio :	5.405
Internal Rate of Return (Percent) :	33.161

**Table C-43 – Summary of Benefits, Costs and Economic Measures for Option 3C
Traffic to or from the West – Value of Time Removed**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	0.00	15.34	19.72	35.06
2014	0.00	14.81	19.07	33.88
2015	0.00	14.29	18.44	32.73
2016	0.00	13.80	17.82	31.61
2017	0.00	13.31	17.22	30.53
2018	0.00	13.12	16.78	29.89
2019	0.00	12.65	16.20	28.86
2020	0.00	11.99	15.57	27.56
2021	0.00	11.80	15.16	26.96
2022	0.00	11.38	14.63	26.01
2023	0.00	11.00	14.17	25.17
2024	0.00	10.80	13.78	24.58
2025	0.00	10.24	13.23	23.48
2026	0.00	9.90	12.80	22.70
2027	0.00	9.71	12.44	22.15
2028	0.00	9.38	12.03	21.41
2029	0.00	9.06	11.63	20.69
2030	0.00	8.74	11.24	19.99
2031	0.00	8.44	10.87	19.31
2032	0.00	8.14	10.50	18.65
2033	0.00	7.99	10.21	18.21
2034	0.00	7.71	9.87	17.58
2035	0.00	7.45	9.55	17.01
2036	0.00	7.19	9.22	16.41
2037	0.00	6.95	8.93	15.87
Total	0.00	265.20	341.09	606.28

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	0.606
Discounted Construction Cost (Mill. \$) :	3.283
Discounted Salvage Value (Mill. \$) :	0.646
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.259
Discounted Total Agency Costs (Mill. \$) :	2.896
Fuel Consumption Savings (Mill. l.) :	0.000
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.005
Net Present Value (Mill. \$) :	-2.290
Gross Benefit-Cost Ratio :	0.209
Netted Benefit-Cost Ratio :	0.303
Internal Rate of Return (Percent) :	-0.798

**Table C-44 – Summary of Benefits, Costs and Economic Measures for Option 3C
Traffic to or from the East – Value of Time Removed**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	0.00	92.59	186.96	279.55
2014	0.00	90.08	181.03	271.10
2015	0.00	87.33	175.16	262.49
2016	0.00	84.39	169.37	253.77
2017	0.00	81.82	163.88	245.70
2018	0.00	79.58	158.67	238.25
2019	0.00	77.14	153.52	230.66
2020	0.00	74.55	148.44	223.00
2021	0.00	72.51	143.73	216.24
2022	0.00	70.27	139.03	209.30
2023	0.00	68.14	134.56	202.70
2024	0.00	66.03	130.15	196.18
2025	0.00	64.03	125.95	189.98
2026	0.00	62.23	121.91	184.13
2027	0.00	60.15	117.88	178.03
2028	0.00	58.47	114.12	172.60
2029	0.00	56.67	110.38	167.05
2030	0.00	54.94	106.82	161.75
2031	0.00	53.38	103.38	156.76
2032	0.00	51.75	100.02	151.77
2033	0.00	50.15	96.76	146.91
2034	0.00	48.62	93.61	142.23
2035	0.00	47.23	90.61	137.84
2036	0.00	45.78	87.65	133.43
2037	0.00	44.37	84.79	129.17
Total	0.00	1642.20	3238.39	4880.59

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	4.881
Discounted Construction Cost (Mill. \$) :	3.283
Discounted Salvage Value (Mill. \$) :	0.646
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.259
Discounted Total Agency Costs (Mill. \$) :	2.896
Fuel Consumption Savings (Mill. l.) :	0.258
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.031
Net Present Value (Mill. \$) :	1.984
Gross Benefit-Cost Ratio :	1.685
Netted Benefit-Cost Ratio :	1.604
Internal Rate of Return (Percent) :	9.253

**Table C-45 – Summary of Benefits, Costs and Economic Measures for Option 3C
Traffic to or from the West – Fuel Cost +20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	129.45	15.33	19.72	164.50
2014	125.19	14.80	19.07	159.06
2015	121.05	14.29	18.44	153.77
2016	117.02	13.79	17.82	148.63
2017	113.10	13.31	17.22	143.63
2018	110.05	13.11	16.78	139.94
2019	106.32	12.65	16.20	135.17
2020	102.34	11.99	15.57	129.90
2021	99.49	11.80	15.16	126.45
2022	96.07	11.37	14.63	122.07
2023	93.03	11.00	14.17	118.20
2024	90.36	10.80	13.78	114.94
2025	86.92	10.24	13.23	110.40
2026	84.12	9.90	12.80	106.82
2027	81.64	9.71	12.44	103.80
2028	78.97	9.38	12.03	100.38
2029	76.38	9.06	11.63	97.06
2030	73.85	8.74	11.24	93.84
2031	71.39	8.44	10.87	90.70
2032	69.00	8.15	10.50	87.65
2033	67.05	7.99	10.21	85.26
2034	64.77	7.71	9.87	82.35
2035	62.73	7.45	9.55	79.74
2036	60.58	7.19	9.22	77.00
2037	58.65	6.95	8.93	74.52
Total	2239.52	265.16	341.09	2845.76

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	2.846
Discounted Construction Cost (Mill. \$) :	3.283
Discounted Salvage Value (Mill. \$) :	0.646
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.259
Discounted Total Agency Costs (Mill. \$) :	2.896
Fuel Consumption Savings (Mill. l.) :	0.000
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.005
Net Present Value (Mill. \$) :	-0.050
Gross Benefit-Cost Ratio :	0.983
Netted Benefit-Cost Ratio :	0.985
Internal Rate of Return (Percent) :	4.784

**Table C-46 – Summary of Benefits, Costs and Economic Measures for Option 3C
Traffic to or from the East – Fuel Cost +20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	916.66	93.99	186.96	1197.61
2014	887.72	91.47	181.03	1160.21
2015	859.05	88.70	175.16	1122.91
2016	830.70	85.74	169.37	1085.82
2017	803.86	83.15	163.88	1050.90
2018	778.41	80.89	158.67	1017.98
2019	753.23	78.44	153.52	985.19
2020	728.36	75.83	148.44	952.63
2021	705.37	73.77	143.73	922.87
2022	682.37	71.51	139.03	892.92
2023	660.48	69.36	134.56	864.40
2024	638.91	67.24	130.15	836.30
2025	618.37	65.22	125.95	809.54
2026	598.61	63.40	121.91	783.92
2027	578.86	61.31	117.88	758.05
2028	560.51	59.61	114.12	734.25
2029	542.21	57.79	110.38	710.38
2030	524.75	56.04	106.82	687.61
2031	507.94	54.47	103.38	665.79
2032	491.53	52.82	100.02	644.38
2033	475.54	51.21	96.76	623.52
2034	460.13	49.66	93.61	603.40
2035	445.43	48.26	90.61	584.29
2036	430.93	46.79	87.65	565.37
2037	416.95	45.37	84.79	547.12
Total	15896.91	1672.07	3238.39	20807.37

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	20.807
Discounted Construction Cost (Mill. \$) :	3.283
Discounted Salvage Value (Mill. \$) :	0.646
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.259
Discounted Total Agency Costs (Mill. \$) :	2.896
Fuel Consumption Savings (Mill. l.) :	0.258
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.031
Net Present Value (Mill. \$) :	17.911
Gross Benefit-Cost Ratio :	7.185
Netted Benefit-Cost Ratio :	6.456
Internal Rate of Return (Percent) :	39.567

**Table C-47 – Summary of Benefits, Costs and Economic Measures for Option 3C
Traffic to or from the West – Increase Discount Rate to 7%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	124.42	14.74	18.96	158.11
2014	117.96	13.95	17.97	149.88
2015	111.82	13.20	17.03	142.05
2016	105.98	12.49	16.14	134.61
2017	100.42	11.82	15.29	127.53
2018	95.79	11.42	14.60	121.81
2019	90.73	10.80	13.83	115.35
2020	85.62	10.03	13.03	108.68
2021	81.60	9.68	12.43	103.71
2022	77.25	9.15	11.77	98.16
2023	73.34	8.67	11.17	93.18
2024	69.84	8.35	10.65	88.83
2025	65.86	7.76	10.03	83.65
2026	62.49	7.35	9.51	79.35
2027	59.45	7.07	9.06	75.59
2028	56.38	6.70	8.59	71.67
2029	53.46	6.34	8.14	67.94
2030	50.67	6.00	7.72	64.39
2031	48.03	5.68	7.31	61.01
2032	45.51	5.37	6.93	57.81
2033	43.35	5.17	6.60	55.12
2034	41.06	4.89	6.25	52.20
2035	38.98	4.63	5.94	49.55
2036	36.91	4.38	5.62	46.91
2037	35.03	4.15	5.33	44.51
Total	1771.93	209.79	269.88	2251.60

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	2.252
Discounted Construction Cost (Mill. \$) :	3.219
Discounted Salvage Value (Mill. \$) :	0.386
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.196
Discounted Total Agency Costs (Mill. \$) :	3.029
Fuel Consumption Savings (Mill. l.) :	0.000
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.005
Net Present Value (Mill. \$) :	-0.777
Gross Benefit-Cost Ratio :	0.743
Netted Benefit-Cost Ratio :	0.758
Internal Rate of Return (Percent) :	4.784

**Table C-48 – Summary of Benefits, Costs and Economic Measures for Option 3C
Traffic to or from the East – Increase Discount Rate to 7%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	881.03	88.99	179.69	1149.71
2014	836.47	84.88	170.57	1091.93
2015	793.57	80.68	161.81	1036.06
2016	752.32	76.43	153.39	982.15
2017	713.73	72.65	145.51	931.88
2018	677.57	69.27	138.11	884.95
2019	642.78	65.83	131.01	839.62
2020	609.36	62.37	124.19	795.92
2021	578.54	59.47	117.89	755.90
2022	548.69	56.50	111.80	716.99
2023	520.67	53.71	106.07	680.46
2024	493.78	51.03	100.59	645.40
2025	468.52	48.51	95.43	612.46
2026	444.65	46.22	90.55	581.43
2027	421.54	43.80	85.84	551.19
2028	400.17	41.75	81.48	523.39
2029	379.50	39.66	77.26	496.43
2030	360.08	37.70	73.30	471.07
2031	341.70	35.91	69.54	447.16
2032	324.17	34.13	65.97	424.27
2033	307.47	32.43	62.56	402.46
2034	291.67	30.82	59.34	381.82
2035	276.81	29.35	56.31	362.47
2036	262.54	27.89	53.40	343.83
2037	249.04	26.50	50.65	326.19
Total	12576.39	1296.49	2562.26	16435.14

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	16.435
Discounted Construction Cost (Mill. \$) :	3.219
Discounted Salvage Value (Mill. \$) :	0.386
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.196
Discounted Total Agency Costs (Mill. \$) :	3.029
Fuel Consumption Savings (Mill. l.) :	0.258
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.031
Net Present Value (Mill. \$) :	13.406
Gross Benefit-Cost Ratio :	5.426
Netted Benefit-Cost Ratio :	5.165
Internal Rate of Return (Percent) :	39.519

**Table C-49 – Summary of Benefits, Costs and Economic Measures for Option 3C
Traffic to or from the West – Collision Cost Reduced by 20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	129.45	15.34	15.78	160.56
2014	125.19	14.81	15.26	155.25
2015	121.05	14.29	14.75	150.09
2016	117.02	13.80	14.26	145.07
2017	113.10	13.31	13.78	140.19
2018	110.05	13.12	13.42	136.59
2019	106.32	12.65	12.96	131.93
2020	102.34	11.99	12.46	126.79
2021	99.49	11.80	12.13	123.42
2022	96.07	11.38	11.71	119.15
2023	93.03	11.00	11.33	115.36
2024	90.36	10.80	11.02	112.19
2025	86.92	10.24	10.59	107.75
2026	84.12	9.90	10.24	104.26
2027	81.64	9.71	9.95	101.31
2028	78.97	9.38	9.62	97.98
2029	76.38	9.06	9.31	94.74
2030	73.85	8.74	9.00	91.59
2031	71.39	8.44	8.69	88.52
2032	69.00	8.14	8.40	85.55
2033	67.05	7.99	8.17	83.21
2034	64.77	7.71	7.89	80.38
2035	62.73	7.45	7.64	77.83
2036	60.58	7.19	7.38	75.15
2037	58.65	6.95	7.14	72.73
Total	2239.52	265.20	272.87	2777.58

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	2.778
Discounted Construction Cost (Mill. \$) :	3.283
Discounted Salvage Value (Mill. \$) :	0.646
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.259
Discounted Total Agency Costs (Mill. \$) :	2.896
Fuel Consumption Savings (Mill. l.) :	0.000
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.005
Net Present Value (Mill. \$) :	-0.119
Gross Benefit-Cost Ratio :	0.959
Netted Benefit-Cost Ratio :	0.964
Internal Rate of Return (Percent) :	4.626

**Table C-50 – Summary of Benefits, Costs and Economic Measures for Option 3C
Traffic to or from the East – Collision Cost Reduced by 20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	916.66	92.59	149.57	1158.82
2014	887.72	90.08	144.82	1122.62
2015	859.05	87.33	140.13	1086.51
2016	830.70	84.39	135.50	1050.60
2017	803.86	81.82	131.11	1016.79
2018	778.41	79.58	126.94	984.93
2019	753.23	77.14	122.82	953.19
2020	728.36	74.55	118.76	921.67
2021	705.37	72.51	114.99	892.87
2022	682.37	70.27	111.23	863.87
2023	660.48	68.14	107.65	836.27
2024	638.91	66.03	104.12	809.06
2025	618.37	64.03	100.76	783.16
2026	598.61	62.23	97.53	758.37
2027	578.86	60.15	94.30	733.32
2028	560.51	58.47	91.30	710.29
2029	542.21	56.67	88.31	687.18
2030	524.75	54.94	85.45	665.14
2031	507.94	53.38	82.70	644.02
2032	491.53	51.75	80.02	623.30
2033	475.54	50.15	77.41	603.11
2034	460.13	48.62	74.89	583.63
2035	445.43	47.23	72.48	565.14
2036	430.93	45.78	70.12	546.83
2037	416.95	44.37	67.83	529.16
Total	15896.91	1642.20	2590.71	20129.83

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	20.130
Discounted Construction Cost (Mill. \$) :	3.283
Discounted Salvage Value (Mill. \$) :	0.646
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.259
Discounted Total Agency Costs (Mill. \$) :	2.896
Fuel Consumption Savings (Mill. l.) :	0.258
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.031
Net Present Value (Mill. \$) :	17.234
Gross Benefit-Cost Ratio :	6.951
Netted Benefit-Cost Ratio :	6.249
Internal Rate of Return (Percent) :	38.321

**Table C-51 – Summary of Benefits, Costs and Economic Measures for Option 4
Traffic to or from the West – Increase Construction Cost +20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	87.55	-8.73	10.85	89.67
2014	84.64	-8.49	10.48	86.63
2015	81.80	-8.25	10.12	83.68
2016	79.05	-8.01	9.77	80.81
2017	76.37	-7.78	9.44	78.03
2018	74.53	-7.28	9.25	76.49
2019	71.97	-7.08	8.93	73.82
2020	69.02	-7.15	8.51	70.39
2021	67.29	-6.70	8.33	68.93
2022	64.95	-6.50	8.04	66.49
2023	62.87	-6.33	7.78	64.32
2024	61.23	-5.93	7.60	62.90
2025	58.70	-5.97	7.25	59.98
2026	56.78	-5.81	7.01	57.98
2027	55.25	-5.45	6.85	56.65
2028	53.42	-5.30	6.62	54.74
2029	51.64	-5.15	6.39	52.88
2030	49.91	-5.01	6.17	51.08
2031	48.23	-4.87	5.96	49.33
2032	46.60	-4.73	5.76	47.63
2033	45.38	-4.46	5.62	46.55
2034	43.83	-4.33	5.43	44.93
2035	42.42	-4.22	5.25	43.46
2036	40.96	-4.09	5.07	41.93
2037	39.63	-3.98	4.90	40.55
Total	1514.03	-151.57	187.38	1549.84

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	1.550
Discounted Construction Cost (Mill. \$) :	6.284
Discounted Salvage Value (Mill. \$) :	1.296
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.404
Discounted Total Agency Costs (Mill. \$) :	5.392
Fuel Consumption Savings (Mill. l.) :	-0.013
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.004
Net Present Value (Mill. \$) :	-3.842
Gross Benefit-Cost Ratio :	0.287
Netted Benefit-Cost Ratio :	0.389
Internal Rate of Return (Percent) :	0.033

**Table C-52 – Summary of Benefits, Costs and Economic Measures for Option 4
Traffic to or from the East – Increase Construction Cost +20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	934.93	131.41	187.89	1254.23
2014	905.39	127.64	181.92	1214.95
2015	876.14	123.68	176.03	1175.85
2016	847.24	119.57	170.22	1137.03
2017	819.86	115.86	164.70	1100.42
2018	793.89	112.51	159.46	1065.85
2019	768.20	109.01	154.28	1031.49
2020	742.84	105.39	149.18	997.42
2021	719.38	102.35	144.45	966.18
2022	695.92	99.14	139.72	934.78
2023	673.59	96.08	135.23	904.90
2024	651.59	93.07	130.80	875.45
2025	630.64	90.19	126.58	847.41
2026	610.48	87.54	122.51	820.53
2027	590.34	84.65	118.46	793.46
2028	571.62	82.18	114.69	768.49
2029	552.95	79.60	110.93	743.48
2030	535.14	77.14	107.35	719.62
2031	517.99	74.86	103.89	696.73
2032	501.25	72.53	100.52	674.30
2033	484.95	70.26	97.24	652.45
2034	469.23	68.08	94.08	631.38
2035	454.22	66.06	91.06	611.34
2036	439.44	64.00	88.08	591.53
2037	425.19	62.01	85.21	572.41
Total	16212.40	2314.81	3254.47	21781.68

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	21.782
Discounted Construction Cost (Mill. \$) :	6.284
Discounted Salvage Value (Mill. \$) :	1.296
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.404
Discounted Total Agency Costs (Mill. \$) :	5.392
Fuel Consumption Savings (Mill. l.) :	0.290
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.031
Net Present Value (Mill. \$) :	16.390
Gross Benefit-Cost Ratio :	4.040
Netted Benefit-Cost Ratio :	3.608
Internal Rate of Return (Percent) :	22.110

**Table C-53 – Summary of Benefits, Costs and Economic Measures for Option 4
Traffic to or from the West – Value of Time Removed**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	0.00	-8.73	10.85	2.12
2014	0.00	-8.49	10.48	1.99
2015	0.00	-8.25	10.12	1.87
2016	0.00	-8.01	9.77	1.76
2017	0.00	-7.78	9.44	1.65
2018	0.00	-7.28	9.25	1.96
2019	0.00	-7.08	8.93	1.85
2020	0.00	-7.15	8.51	1.37
2021	0.00	-6.70	8.33	1.64
2022	0.00	-6.50	8.04	1.54
2023	0.00	-6.33	7.78	1.45
2024	0.00	-5.93	7.60	1.67
2025	0.00	-5.97	7.25	1.28
2026	0.00	-5.81	7.01	1.20
2027	0.00	-5.45	6.85	1.40
2028	0.00	-5.30	6.62	1.32
2029	0.00	-5.15	6.39	1.24
2030	0.00	-5.01	6.17	1.16
2031	0.00	-4.87	5.96	1.10
2032	0.00	-4.73	5.76	1.03
2033	0.00	-4.46	5.62	1.17
2034	0.00	-4.33	5.43	1.10
2035	0.00	-4.22	5.25	1.04
2036	0.00	-4.09	5.07	0.98
2037	0.00	-3.98	4.90	0.92
Total	0.00	-151.57	187.38	35.81

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	0.036
Discounted Construction Cost (Mill. \$) :	5.237
Discounted Salvage Value (Mill. \$) :	1.080
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.404
Discounted Total Agency Costs (Mill. \$) :	4.561
Fuel Consumption Savings (Mill. l.) :	-0.013
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.004
Net Present Value (Mill. \$) :	-4.525
Gross Benefit-Cost Ratio :	0.008
Netted Benefit-Cost Ratio :	0.136
Internal Rate of Return (Percent) :	-2.197

**Table C-54 – Summary of Benefits, Costs and Economic Measures for Option 4
Traffic to or from the East – Value of Time Removed**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	0.00	131.41	187.89	319.30
2014	0.00	127.64	181.92	309.56
2015	0.00	123.68	176.03	299.71
2016	0.00	119.57	170.22	289.78
2017	0.00	115.86	164.70	280.56
2018	0.00	112.51	159.46	271.97
2019	0.00	109.01	154.28	263.29
2020	0.00	105.39	149.18	254.58
2021	0.00	102.35	144.45	246.80
2022	0.00	99.14	139.72	238.86
2023	0.00	96.08	135.23	231.31
2024	0.00	93.07	130.80	223.86
2025	0.00	90.19	126.58	216.77
2026	0.00	87.54	122.51	210.05
2027	0.00	84.65	118.46	203.11
2028	0.00	82.18	114.69	196.87
2029	0.00	79.60	110.93	190.53
2030	0.00	77.14	107.35	184.48
2031	0.00	74.86	103.89	178.75
2032	0.00	72.53	100.52	173.05
2033	0.00	70.26	97.24	167.51
2034	0.00	68.08	94.08	162.15
2035	0.00	66.06	91.06	157.12
2036	0.00	64.00	88.08	152.08
2037	0.00	62.01	85.21	147.22
Total	0.00	2314.81	3254.47	5569.28

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	5.569
Discounted Construction Cost (Mill. \$) :	5.237
Discounted Salvage Value (Mill. \$) :	1.080
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.404
Discounted Total Agency Costs (Mill. \$) :	4.561
Fuel Consumption Savings (Mill. l.) :	0.290
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.031
Net Present Value (Mill. \$) :	1.009
Gross Benefit-Cost Ratio :	1.221
Netted Benefit-Cost Ratio :	1.193
Internal Rate of Return (Percent) :	6.319

**Table C-55 – Summary of Benefits, Costs and Economic Measures for Option 4
Traffic to or from the West – Fuel Cost +20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	87.55	-8.82	10.85	89.58
2014	84.64	-8.58	10.48	86.54
2015	81.80	-8.34	10.12	83.59
2016	79.05	-8.10	9.77	80.72
2017	76.37	-7.87	9.44	77.94
2018	74.53	-7.36	9.25	76.41
2019	71.97	-7.15	8.93	73.75
2020	69.02	-7.22	8.51	70.32
2021	67.29	-6.77	8.33	68.86
2022	64.95	-6.57	8.04	66.43
2023	62.87	-6.39	7.78	64.25
2024	61.23	-5.99	7.60	62.84
2025	58.70	-6.03	7.25	59.91
2026	56.78	-5.87	7.01	57.92
2027	55.25	-5.51	6.85	56.59
2028	53.42	-5.36	6.62	54.68
2029	51.64	-5.21	6.39	52.83
2030	49.91	-5.06	6.17	51.02
2031	48.23	-4.92	5.96	49.28
2032	46.60	-4.77	5.76	47.58
2033	45.38	-4.50	5.62	46.51
2034	43.83	-4.37	5.43	44.88
2035	42.42	-4.26	5.25	43.42
2036	40.96	-4.13	5.07	41.89
2037	39.63	-4.02	4.90	40.51
Total	1514.03	-153.17	187.38	1548.24

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	1.548
Discounted Construction Cost (Mill. \$) :	5.237
Discounted Salvage Value (Mill. \$) :	1.080
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.404
Discounted Total Agency Costs (Mill. \$) :	4.561
Fuel Consumption Savings (Mill. l.) :	-0.013
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.004
Net Present Value (Mill. \$) :	-3.012
Gross Benefit-Cost Ratio :	0.339
Netted Benefit-Cost Ratio :	0.425
Internal Rate of Return (Percent) :	0.333

**Table C-56 – Summary of Benefits, Costs and Economic Measures for Option 4
Traffic to or from the East – Fuel Cost +20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	934.93	133.04	187.89	1255.85
2014	905.39	129.24	181.92	1216.55
2015	876.14	125.26	176.03	1177.43
2016	847.24	121.12	170.22	1138.58
2017	819.86	117.38	164.70	1101.95
2018	793.89	114.01	159.46	1067.36
2019	768.20	110.49	154.28	1032.97
2020	742.84	106.85	149.18	998.87
2021	719.38	103.78	144.45	967.61
2022	695.92	100.55	139.72	936.19
2023	673.59	97.47	135.23	906.29
2024	651.59	94.43	130.80	876.82
2025	630.64	91.53	126.58	848.75
2026	610.48	88.86	122.51	821.85
2027	590.34	85.95	118.46	794.75
2028	571.62	83.46	114.69	769.77
2029	552.95	80.86	110.93	744.73
2030	535.14	78.37	107.35	720.86
2031	517.99	76.07	103.89	697.95
2032	501.25	73.73	100.52	675.50
2033	484.95	71.44	97.24	653.63
2034	469.23	69.23	94.08	632.54
2035	454.22	67.20	91.06	612.48
2036	439.44	65.12	88.08	592.65
2037	425.19	63.11	85.21	573.51
Total	16212.40	2348.56	3254.47	21815.42

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	21.815
Discounted Construction Cost (Mill. \$) :	5.237
Discounted Salvage Value (Mill. \$) :	1.080
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.404
Discounted Total Agency Costs (Mill. \$) :	4.561
Fuel Consumption Savings (Mill. l.) :	0.290
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.031
Net Present Value (Mill. \$) :	17.255
Gross Benefit-Cost Ratio :	4.783
Netted Benefit-Cost Ratio :	4.295
Internal Rate of Return (Percent) :	26.364

**Table C-57 – Summary of Benefits, Costs and Economic Measures for Option 4
Traffic to or from the West – Increase Discount Rate to 7%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	84.15	-8.39	10.43	86.19
2014	79.75	-8.00	9.87	81.63
2015	75.57	-7.62	9.35	77.30
2016	71.59	-7.26	8.85	73.18
2017	67.81	-6.91	8.38	69.28
2018	64.87	-6.34	8.05	66.58
2019	61.42	-6.04	7.62	63.00
2020	57.75	-5.98	7.12	58.89
2021	55.19	-5.49	6.84	56.54
2022	52.23	-5.22	6.46	53.47
2023	49.56	-4.99	6.13	50.70
2024	47.32	-4.58	5.88	48.61
2025	44.47	-4.52	5.49	45.44
2026	42.18	-4.31	5.21	43.07
2027	40.23	-3.97	4.99	41.25
2028	38.14	-3.78	4.72	39.08
2029	36.14	-3.61	4.47	37.01
2030	34.25	-3.44	4.24	35.05
2031	32.45	-3.27	4.01	33.18
2032	30.73	-3.12	3.80	31.41
2033	29.34	-2.88	3.64	30.10
2034	27.78	-2.74	3.44	28.48
2035	26.36	-2.62	3.26	27.01
2036	24.95	-2.49	3.09	25.55
2037	23.67	-2.38	2.93	24.22
Total	1197.91	-119.96	148.26	1226.22

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	1.226
Discounted Construction Cost (Mill. \$) :	5.134
Discounted Salvage Value (Mill. \$) :	0.645
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.306
Discounted Total Agency Costs (Mill. \$) :	4.795
Fuel Consumption Savings (Mill. l.) :	-0.013
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.004
Net Present Value (Mill. \$) :	-3.569
Gross Benefit-Cost Ratio :	0.256
Netted Benefit-Cost Ratio :	0.305
Internal Rate of Return (Percent) :	0.336

**Table C-58 – Summary of Benefits, Costs and Economic Measures for Option 4
Traffic to or from the East – Increase Discount Rate to 7%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	898.59	126.30	180.58	1205.48
2014	853.12	120.27	171.42	1144.81
2015	809.36	114.25	162.61	1086.22
2016	767.30	108.29	154.16	1029.74
2017	727.93	102.87	146.23	977.03
2018	691.04	97.93	138.80	927.77
2019	655.55	93.03	131.66	880.24
2020	621.47	88.17	124.81	834.45
2021	590.03	83.95	118.48	792.45
2022	559.59	79.72	112.35	751.66
2023	531.00	75.74	106.60	713.35
2024	503.58	71.93	101.08	676.59
2025	477.82	68.34	95.90	642.06
2026	453.47	65.03	91.00	609.49
2027	429.90	61.65	86.27	577.82
2028	408.10	58.67	81.88	548.65
2029	387.02	55.71	77.64	520.38
2030	367.21	52.93	73.66	493.80
2031	348.46	50.36	69.89	468.71
2032	330.58	47.84	66.30	444.71
2033	313.55	45.43	62.87	421.86
2034	297.43	43.15	59.63	400.22
2035	282.27	41.06	56.59	379.92
2036	267.73	38.99	53.66	360.39
2037	253.96	37.04	50.90	341.89
Total	12826.07	1828.63	2574.98	17229.68

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	17.230
Discounted Construction Cost (Mill. \$) :	5.134
Discounted Salvage Value (Mill. \$) :	0.645
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.306
Discounted Total Agency Costs (Mill. \$) :	4.795
Fuel Consumption Savings (Mill. l.) :	0.290
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.031
Net Present Value (Mill. \$) :	12.435
Gross Benefit-Cost Ratio :	3.593
Netted Benefit-Cost Ratio :	3.422
Internal Rate of Return (Percent) :	26.328

**Table C-59 – Summary of Benefits, Costs and Economic Measures for Option 4
Traffic to or from the West – Collision Cost Reduced by 20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	87.55	-8.73	8.68	87.50
2014	84.64	-8.49	8.38	84.53
2015	81.80	-8.25	8.10	81.65
2016	79.05	-8.01	7.82	78.85
2017	76.37	-7.78	7.55	76.14
2018	74.53	-7.28	7.40	74.64
2019	71.97	-7.08	7.14	72.04
2020	69.02	-7.15	6.81	68.69
2021	67.29	-6.70	6.67	67.27
2022	64.95	-6.50	6.43	64.89
2023	62.87	-6.33	6.22	62.76
2024	61.23	-5.93	6.08	61.38
2025	58.70	-5.97	5.80	58.53
2026	56.78	-5.81	5.61	56.58
2027	55.25	-5.45	5.48	55.28
2028	53.42	-5.30	5.29	53.41
2029	51.64	-5.15	5.11	51.60
2030	49.91	-5.01	4.94	49.84
2031	48.23	-4.87	4.77	48.13
2032	46.60	-4.73	4.61	46.48
2033	45.38	-4.46	4.50	45.43
2034	43.83	-4.33	4.34	43.84
2035	42.42	-4.22	4.20	42.41
2036	40.96	-4.09	4.05	40.92
2037	39.63	-3.98	3.92	39.57
Total	1514.03	-151.57	149.90	1512.36

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	1.512
Discounted Construction Cost (Mill. \$) :	5.237
Discounted Salvage Value (Mill. \$) :	1.080
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.404
Discounted Total Agency Costs (Mill. \$) :	4.561
Fuel Consumption Savings (Mill. l.) :	-0.013
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.004
Net Present Value (Mill. \$) :	-3.048
Gross Benefit-Cost Ratio :	0.332
Netted Benefit-Cost Ratio :	0.418
Internal Rate of Return (Percent) :	0.275

**Table C-60 – Summary of Benefits, Costs and Economic Measures for Option 4
Traffic to or from the East – Collision Cost Reduced by 20%**

Summary of Discounted Benefits (Thous. \$)

Year	Delay Savings	Red Veh Op Cost	Red Acc Cost	Total Benefits
2011	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00
2013	934.93	131.41	150.31	1216.65
2014	905.39	127.64	145.54	1178.57
2015	876.14	123.68	140.82	1140.64
2016	847.24	119.57	136.17	1102.98
2017	819.86	115.86	131.76	1067.48
2018	793.89	112.51	127.57	1033.96
2019	768.20	109.01	123.43	1000.63
2020	742.84	105.39	119.35	967.58
2021	719.38	102.35	115.56	937.29
2022	695.92	99.14	111.78	906.84
2023	673.59	96.08	108.18	877.86
2024	651.59	93.07	104.64	849.29
2025	630.64	90.19	101.26	822.09
2026	610.48	87.54	98.01	796.03
2027	590.34	84.65	94.77	769.76
2028	571.62	82.18	91.75	745.55
2029	552.95	79.60	88.74	721.29
2030	535.14	77.14	85.88	698.15
2031	517.99	74.86	83.11	675.96
2032	501.25	72.53	80.42	654.20
2033	484.95	70.26	77.79	633.00
2034	469.23	68.08	75.26	612.56
2035	454.22	66.06	72.84	593.13
2036	439.44	64.00	70.47	573.91
2037	425.19	62.01	68.17	555.36
Total	16212.40	2314.81	2603.57	21130.79

Summary Problem Benefits, Costs, and Economic Measures

Total Discounted User Benefits (Mill. \$) :	21.131
Discounted Construction Cost (Mill. \$) :	5.237
Discounted Salvage Value (Mill. \$) :	1.080
Discounted Increase in Maint. and Rehab. (Mill. \$) :	0.404
Discounted Total Agency Costs (Mill. \$) :	4.561
Fuel Consumption Savings (Mill. l.) :	0.290
Carbon Monoxide Emission Reduction (Mill. Kg.) :	0.031
Net Present Value (Mill. \$) :	16.570
Gross Benefit-Cost Ratio :	4.633
Netted Benefit-Cost Ratio :	4.164
Internal Rate of Return (Percent) :	25.565